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08 Screen Repair

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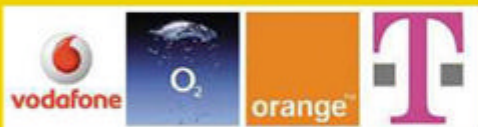
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Repairing Your Screen



A broken screen doesn't necessarily mean a broken device...

A broken screen is no laughing matter, especially if that screen is embedded into several hundred pounds worth of electronic hardware that might otherwise be in full working order. It's enough to break your heart at the best of times, but if you can't see what's going on in

your system then it can be hard to recover the contents stored therein, and that's potentially a more serious issue. If you think junking your iPad's bad, imagine that iPad containing an unfinished novel, a dissertation that's due imminently or a set of family photos that haven't been backed up yet.

Don't cut your losses and chuck that broken hardware in the bin just yet, though. A non-working screen doesn't have to mean the end of a system's lifespan. There are options available to you, and if you want to get a screen repaired or replaced – or indeed, do it yourself – then

the right expertise, tools or parts are easy to obtain if you know where to look.

In fact, the hardest part is choosing how to proceed, and that's why we've put together this guide to help you diagnose, replace and repair a faulty screen, no matter what the problem might be.

“ Don't cut your losses and chuck that broken hardware in the bin just yet ”

the glass edges or disturb any shards that might fall out, but if the device still switches on then you can at least retrieve and back up your files before sending it for repair.

If the screen has simply gone blank and won't respond, or is displaying other visual artifacts like lines or glitched areas then you may have a less obvious fault on your hands. The problem may even lie somewhere in the graphics chipset rather than the monitor. So, before you buy a replacement screen, you need to determine whether the fault is with the screen or some other component.

Software problems are the easiest to rule out, so it makes sense to start with those. If your screen goes blank or isn't responding, the most obvious step to take is to perform a hard reset of your system. Give it a few minutes to cool down and then reboot it. If the problem is due to a broken circuit or connection, it might be that giving it time to cool causes the connection to contract and re-establish its link. A software misconfiguration might correct itself as a result of the reboot. Either way, if the screen is working again, continue to use it and see if the problem recurs.

If the screen still doesn't work (or continues to fail intermittently) then the next thing to rule out is driver or configuration problems. You're unlikely to encounter these on tablets and phones, but it's not impossible, especially if you've tinkered with the device outside of normal usage (for example, by jailbreaking or rooting it).

To check configuration issues on a Windows PC, boot it into Safe Mode. This will revert

the graphics driver to a basic universal VGA driver, so your resolution and colour depth will be set at the extreme minimum, but if you get a picture then at least you can reinstall fresh graphics and/or monitor drivers to try and correct the issue outside of safe mode. On tablets and phones, a similar course of action would be to back up your data and then perform a factory reset on the device. If the screen problem is caused by software, a factory reset should correct it.

If the screen still has issues in safe mode or after a factory reset, you can assume a hardware problem. You now need to figure out whether the problem is with the screen or the graphics chipset. The best way to do this is to attach an external monitor. Again, it's easiest to do this with laptops, but some phones and tablets will allow you to do the same.

If an external monitor picks up a signal, then you know that the system itself is fine and the problem exists between the system and its existing screen. If the external monitor also remains blank, the problem could be any number of things, from a burnt-out GPU to a loose CPU. Whatever is causing it, it's pretty certain that the latter situation hints at a you having more serious problem on your hands – one that means a professional should probably be involved.

Once you've narrowed the problem down to a genuine fault with the screen, the next step is to repair and/or replace it. The procedure varies depending on the device you're using, but in all cases you can either try to do it yourself, or forgo the risk in favour of getting it professionally repaired.

Testing Your Screen

It may sound obvious, but before you replace a screen or take it for repair, you should probably determine whether or not it has actually broken. There are many ways a screen can break or fail, but sometimes what appears to be a broken screen might be something else.

The most obvious type of breakage is a physical shock which shatters the screen's glass. These are the simplest to diagnose and repair, and have a slight advantage in that you can often still use your system without too much danger. With touchscreens you have to be careful not to cut yourself on





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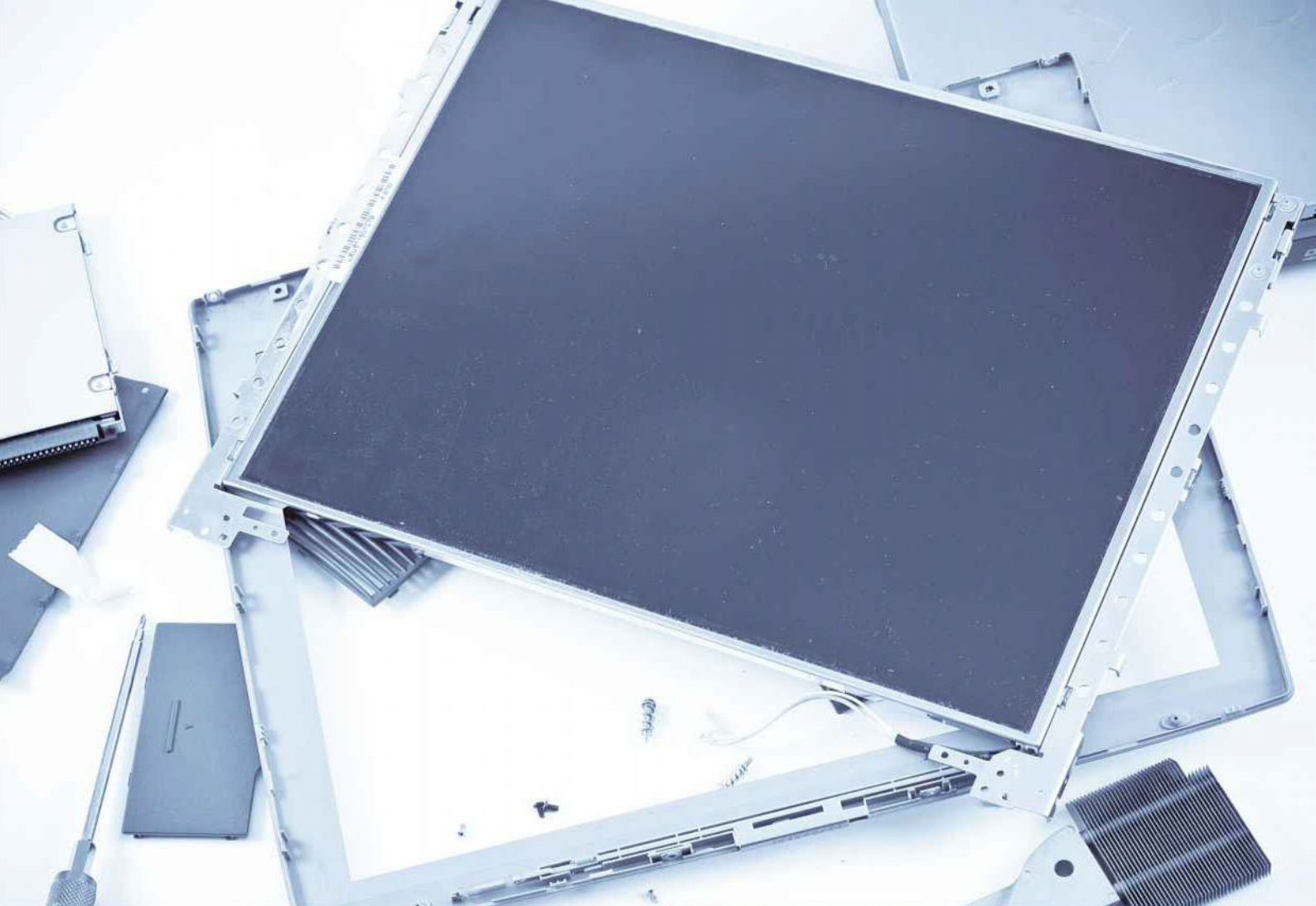
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Laptop Screens

Let's assume your laptop screen is definitely broken. You should be able to get it repaired professionally for around £100-£150, and the procedure can take a couple of hours if the shop has the parts, or a few days if they don't.

If your laptop is insured or still under warranty you may be able to arrange a site-to-site replacement, but that will mean an even longer wait in exchange for the possibility of receiving your laptop back in its factory condition. Unfortunately accidental breakages aren't likely to be covered by the warranty – and it's worth noting that opening the system up will likely void any remaining warranty period you may have. If you're accident-prone or have an extended warranty you want to keep intact, contact your supplier or point of sale to see if they'll do a repair for you.

If you want to keep the laptop where you can see it, don't mind potentially voiding a warranty and have a strong

stomach, you could replace the screen yourself. Replacement screens aren't universal, so you'll have to determine the exact make and model of your laptop so that you can buy a panel that fits it, but any website selling spare parts should be able to guide you to the appropriate purchase. The cheapest panels will cost about £40, whereas the most expensive – high definition touchscreens, and the like – can run to as much as £100.

If you prefer, you can buy the full assembly rather than individual parts. This is essentially the entire upper half of a laptop, which you simply attach and connect, rather than open your existing one up and replace the screen, but it'll cost significantly more to do this – anything between £100 to £650 wouldn't be abnormal.

Once you have the parts, you have to remove the screen. Doing this normally requires removing some or all of the laptop's case. Under ideal circumstances you'll only have to remove the screen's bezel,

External Monitor

If you're really sure your laptop screen is broken, it's worth noting that your only options aren't repair or retirement. While it isn't an ideal solution in all cases, you could simply connect an external monitor to your system as a permanent or semi-permanent replacement with no associated drop in performance or visual quality.

The disadvantage of this is that you lose the portability of the laptop (arguably its defining feature) but it does have its advantages too. For one, you don't have to surrender access to your laptop while it's repaired. Some people might be able to manage without access to their system for a day or two, but if you're doing a time-critical project or are on a deadline there might not be time – and in that case, trying to repair it yourself is an even worse idea!

If you have a spare monitor available, it's also a lot cheaper – and even if you don't, buying an external monitor might be cheaper than replacing the one in your laptop. An LCD monitor with resolution equivalent to most laptop screens – 1366 x 768 – costs just £60, which is £40 cheaper than the average price for a screen repair.

External monitors also have the advantage of re-usability, so if your hardware is nearing the end of its lifespan anyway, using a spare monitor instead of repairing it can tide you over just long enough to buy an upgrade when you're ready to, instead of throwing good money after hardware that's almost done with.

Attaching an external monitor to a broken laptop might not be the most convenient solution, but ultimately, it is an option worth considering in some circumstances. Just don't get too comfortable and forget about the problem – otherwise, the next time you want to take your laptop out with you things might get difficult!



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Screen-sharing

If your monitor or screen breaks and you haven't got an alternative to hand but need quick access to your system, you might find that you can use a screen-sharing program instead. If you install a VNC (virtual network computing) or Remote desktop server on your system, if/when the screen gets damaged you can simply switch the machine on and log into it using a VNC client on your laptop, tablet or phone, or in some cases any other system connected to the Internet.

Software packages to investigate include the likes of Windows Remote Desktop, TeamViewer and UltraVNC, but you can also use remote access web services, like LogMeIn and Join.Me. Some are only compatible with other Windows systems, but others are platform-independent. Notably, VNC servers and clients exist for almost every platform allowing you to access any system without a screen from any system with one.

Screen sharing of course has both advantages and disadvantages. It's not much good as a long-term solution (because input can be laggy and certain functions may be disabled) but it does allow an easy way to retrieve your files without dismantling your hardware and removing the storage. It's particularly bad for high-bandwidth visuals, so playing games and watching videos is unlikely to work. But it does allow you to control and administer your system even if the screen has broken, which is ideal if you can't shut your system down for any reason.

Perhaps the biggest disadvantage of remote access is that unless you're extremely good at visualising your screen output, you have to set the server up in advance of any breakage. It doesn't take much in the way of time, effort or system resources to establish a server – but most people don't even think about it until their screen has broken, so if you're reading this and thinking it sounds like a good idea, now's the time to do it!

but some designs will also require you to remove the hinge cover and keyboard to get at the power and data connectors. Keep in mind that the following section is only a general guide which will get you most of the way, but variations in individual systems mean you may have to deviate by differing amounts.

First, locate the grommets near the screen's face that cover up the screws keeping the bezel in place. You may have to prise them out with a flat-head screwdriver, and you'll usually find them in the corners and at the top. Expect to remove between four and eight in total, and be aware that some screws may be hidden beneath rubber bumpers or stickers. Once you've exposed all of the screws, remove them and put them to one side.

Now you have to be a bit delicate as you pop the bezel off the front of the system. It's clipped in at regular intervals all the way around, so start in the bottom left and prise it open until the clips pop out, then work your way around until the face is completely

free of the laptop lid. Again, you'll need to use a flathead screwdriver to get a good amount of force on the clips.

Once you've done that, you'll have access to the non-working or damaged screen panel. It'll be seated into a metal housing, which is then screwed onto the lid of the laptop. Remove the screws and place them to one side. At this point you'll probably be able to remove the laptop's lid entirely, so do that and put it somewhere out of the way.

With the lid casing gone, you should now have access to the rear of the panel. If you were previously unable to locate the panel's part number, you should be able to find it here. Take a moment to identify the data and power connectors to the screen and any other components housed inside the laptop lid, which might include webcams, speakers and wireless antennae (the latter will probably be found at the base, and may even be taped in).

Check that you know how these connections sit before you remove them. It's a good idea to take a photograph

so that you've got visual reference for what it looked like before you did anything. Once you've done that, remove the connections and any fixing tape so that the panel is fully disconnected. You can then remove the panel by unscrewing the mounts on the metal frame. At this point the panel should come loosely away. If it doesn't, you've either missed a screw or a connector (or some other kind of mounting) so locate and remove it before you continue.

The new panel can now be inserted. Screw it back into place and reinsert the power

and data connectors. Once it's been seated and connected properly, you might want to test it by turning on your laptop as normal. If everything's gone to plan, you should see the laptop boot as normal.

If your system seems to boot but no picture appears, there are three likely problems: either the power connector is loose or disconnected, the data connector is loose or disconnected, or the problem lies elsewhere in the system. The first two matters can be corrected by re-seating the plugs to ensure a firm connection. The latter might

require additional diagnosis – maybe the graphics chipset has broken, or the power or data cables are broken or worn. Either way, professional repair might now be necessary.

If the screen works, however, you've effectively finished. Replace the screen's outer case, screw the bezel back on to the front, replace the grommets, and you're done!

Tablet/Phone Screens

Replacing screens on a tablet or phone is similar to replacing the screen in a laptop, in that you simply have to take it apart, replace the damaged

component, then reassemble it – but it's worth pointing out that the procedure is often an order of magnitude more complex. Even getting into sealed units can be difficult – you'll often need more than a screwdriver!

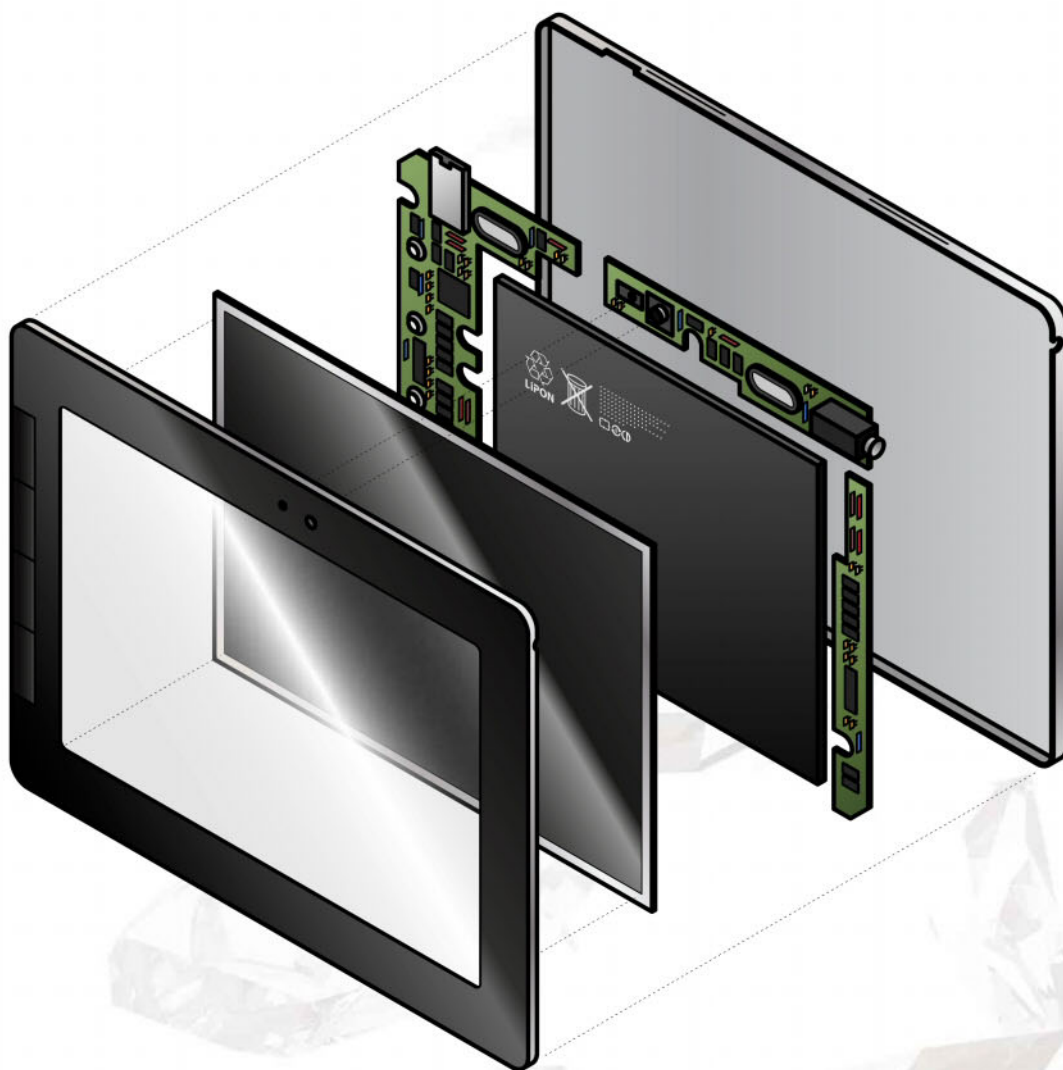
Before you proceed, be aware that replacing a tablet or phone screen will certainly invalidate the warranty, and has enormous potential to damage the hardware. It's best to keep a record of the disassembly at all points, because the internals are often very tightly packed so that the system can fit in as little space as possible. You may even want to watch a YouTube video of disassembly first – there are plenty around for most models of phone and tablet!

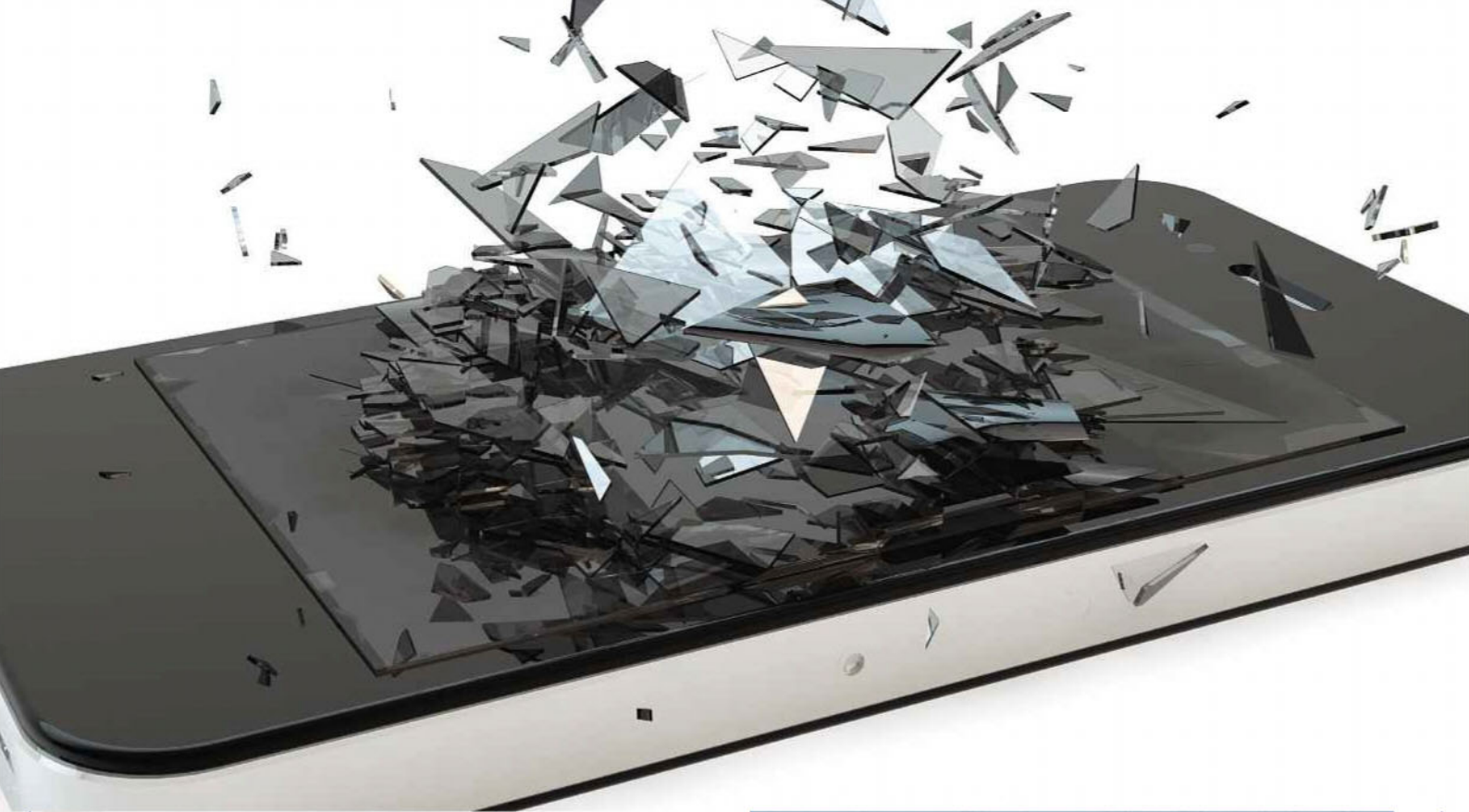
As with a laptop, the procedure starts with you acquiring a replacement screen for your device. In most cases, the panel itself will be fine – only the glass is likely to need replacing – which means it's normally less than £30 for the replacement parts. Make sure you buy good quality parts from a reputable seller, though – cheap screens may be damaged more easily, or offer poorer input accuracy than official or well-made replacements.

To replace a tablet or phone screen, you usually need screwdrivers, screen-adhering tape, a heat gun (to melt the screen adhesive), glass-proof gloves, compressed air, and plastic tools for prying apart the components – plastic razorblades work well. Before you attempt a repair, it's a good idea to back up the phone's contents and remove the SIM card for safe keeping.

First, you have to remove the device's rear cover. Sometimes you can simply prise this cover off with a fingernail or tool, but it may involve removing a small screw or two before you can remove it from the back off. It's rarely as straightforward as it looks, though – your best bet is to watch a video to determine the correct procedure for your device.

“ Replacing a tablet or phone screen will certainly invalidate the warranty, and has enormous potential to damage the hardware ”





“ Once you’ve mastered replacing the screen on a system, you might also want to think about an upgrade ”

Once the back is off, you’ll probably need to remove the battery first (since this is the most frequently-replaced component, it’s normally the first you can access and relatively easy to remove) and then unseat any cables from their mounts, brackets or fixtures. Take great care doing this, if any cables snap it will almost certainly render your device permanently unusable!

Once the cables are free, you can unscrew the device’s motherboard and remove it. You may need to disconnect it from a bracket too. This is the most complex part, so if you can successfully move get the mainboard detached from the screen, you’re halfway to success. Remember to put the electronics down on an anti-static surface so as not to risk damaging them!

Once the screen is free, you need to take the front assembly and use the heat gun to melt the adhesive at the

edges. This may cause the glass to shatter, so wear a hardy pair of gloves. If you’re worried about glass fragments, try running packing tape over the front of the screen before you try to remove it.

Take care not to touch the LCD face when you take the screen to bits – you don’t want to damage the panel and digitiser, otherwise you’ll have to replace them too. Take care not to leave the heat gun in the same place for long, as it may discolour the LCD screen. Keep it moving and constantly pull at the glass so that it pops out as soon as it can. Don’t use too much force – you don’t want to break the bezel!

At this point you can replace the broken screen with the new one. Put screen adhesive in the appropriate areas (i.e. anywhere that adhesive is now missing) but use the original adhesive as much as possible. Don’t put the adhesive anywhere that it’ll be visible,

Screen Upgrades

Once you’ve mastered replacing the screen on a system, you might also want to think about an upgrade. The procedure is the same – remove the old panel, insert a new, compatible one – but there’s no reason the new one can’t have higher specs than the old one.

Beware that doing so might result in diminished performance in some systems. The most common reason to upgrade a screen is to increase the resolution, and higher-resolution displays require more resources, from CPU to GPU to RAM. If your system is already at the limits of its capabilities, inserting a higher-resolution screen might cause it to balk. Just because you can fit a 4K screen in your laptop, it doesn’t mean your laptop will be happy running it.

Still, in most cases you can add an improved screen without any difficulty or significant impact on performance. As long as the hardware is compatible with the power and data connectors and fits the frame, it’s one of the few things on a laptop that can be upgraded at home.

either – use the original glue as a guide. Warm it up with the heat gun and then press it into place. Take care not to touch the inside of the glass – you can’t wipe a fingerprint off once it’s reassembled!

Give the digitiser and LCD a quick blast of compressed air to remove any dust, then replace them. You can now replace the mainboard on top of the LCD screen, re-thread and reconnect any cables you moved and replace any screws. Re-affix the back of the device and when you’re happy it’s ready, power it on. Test that the screen input and output are both working as they should be, and if they are,

give yourself a pat on the back. It’s done and you can breathe a hearty sigh of relief and vow to be more careful next time.

If that didn’t work, though, keep in mind that a professional can replace the screen for you, and they’re likely to have much more experience doing it. An official iPhone repair costs up to £106 from Apple, but third-party repair should be significantly cheaper than that. In most cases, if you can afford to risk losing your phone to a botched self-repair job, you can afford to get it repaired for you – but if you just want the challenge... well, good luck! **mm**

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HOME SCIENCE AND TECHNOLOGY GADGETS

Aaron takes a look at some of the best gadgets and devices that let you satisfy your science and technology urges

If you're a PC user, there's a good chance you're also the kind of person who's interested in science and technology and enjoy playing around with cool gadgets. Computers and these kinds of interest go hand in hand, so we're going to have a look at some home science and technology items you can find. We're not going to limit things to solely PC-based gear, although we will, of course, cover computing alongside other scientific home endeavours. This includes home microscopes, telescopes, as well as computing gadgets, 3D printers and hobbyist boards. Well, this is Micro Mart, after all.

We're not just going to take a look at these products, though; we're also going to give you some tips, with a bit of guidance on buying these items and what you should look for should you be thinking of getting started with a new hobby. So even if you've never used a microscope before or peered into the cosmos, you should have some essential tips to help you buy the right models for you.

DIY Computing

As computing is our speciality, we'll kick things off with some hobbyist and computer learning. And what better way to do this than with the

Raspberry Pi or, more specifically, its second incarnation.

The Raspberry Pi 2 Model B is a big leap forward in power from its initial launch version. The new board comes fitted with Broadcom 900MHz quad-core ARM Cortex A7 CPU, 1GB RAM and, as always, features plenty of connectivity to allow for cheap computing and, more interestingly, experimentation. There are four USB ports, HDMI, 3.5mm audio jack and composite video, camera and display interfaces, micro-SD slot, VideoCore IV 3D GPU and 40 GPIO pins. It's fully compatible with the previous generation of Raspberry Pi units too.

All of this cost a mere \$35 and fits onto a tiny motherboard that can even run Windows 10, thanks to a special version of the upcoming OS, developed by Microsoft for the system.

The strength of the Raspberry Pi is its educational and hobbyist capabilities. It's a system that was designed to get young children interested and familiar with computing, and that's something it's done very well thus far. This affordable and small system can be used in all sorts of projects and devices, and with the full support of Microsoft behind it, it's only going to be even more useful, especially for those who want to make a break



▲ The Raspberry Pi 2 Model B is the latest iteration of the hobby and educational mini-PC, and it's just as recommended

into the IT industry and to take their first steps into do-it-yourself computing. As it only costs \$35, don't expect a powerhouse. It's still a low-power system, and you get what you pay for, but power isn't the focus here, learning is.

Unlike other PCs, which can be far too expensive to experiment on, a \$35 system isn't a problem, and it's cheap enough to be the focus of any budding computer engineer's projects. It's also perfect for a school environment, due to

▼ The Elenco MX909 500 in 1 Electronics Learning Lab will teach you the basics of electronics



“ For the more advanced tinkerers, there’s no shortage of sellers online of hobbyist PCBs ”

the low cost and suitability to be used in lessons as an extension on the traditional curriculum.

This all goes towards creating one of the very best science and technology hobby purchases you can make and is a buy we can wholeheartedly recommend. Whether you want to build your own PC to run Linux or Windows, or you’re simply a tinkerer, this is a perfect option.

For the more advanced tinkerers, there’s no shortage of sellers online of hobbyist PCBs. These allow the creation of circuit boards from scratch, and there’s plenty of scope if you shop around, but you’ll need to learn more about circuits and electronics first. For this you may want to use a device like the Elenco MX909 500 in 1 Electronics Learning Lab. Priced at around £400, this is a powerful training tool for ages ten and up, which teaches you the basics of electronics and circuits and is a great way to teach yourself. There are cheaper options, but this is considered by many as one of the best.

3D Printers

Sticking with computers for a bit longer, a new entry into the home market is the 3D printer. Still a relatively new technology, you can actually buy one of these for use in the home, allowing access to 3D printing for a whole host of uses.

As 3D printing is so new, don’t expect to find cheap options here, it’s strictly a luxury at the moment. That said, it may not be quite as expensive as you may think, and you can find 3D printers for well under £1,000.

One such example is the XYZprinting Da Vinci 1.0. This is an award-winning 3D printer that houses a 475 cubic inch volume and can print using both ABS and PLA thermoplastics. It uses simple filament cartridges that are easy to

install, and the construction hides the high temperature areas and components and keeps them from the user, meaning this is a good option for children.

The unit costs around £500 and is one of the most popular options for those using 3D printing in the home. There are cheaper options around, however.

Possibly the cheapest you’ll find is a 3D printer ‘pen’. These devices effectively let you draw your 3D item using a special heat-based extrusion system. They’re easy to use and far more affordable than a standard 3D printer, although they do require some artistic ability and dexterity. You simply insert the filament into the pen and then you draw your item, building up the layers as you go.

Prices vary for these pens, but you should be able to find one for around £50-60, which is a good price for those who want to get started. Once you become more confident that 3D printing is for you and want to splash out on the next level, maybe a DIY printer kit would be the best route.

3D printer kits are usually a more affordable option for those looking to buy their own device, with the slight downside of having to build the printer yourself. This, however, isn’t the downside it appears to be.

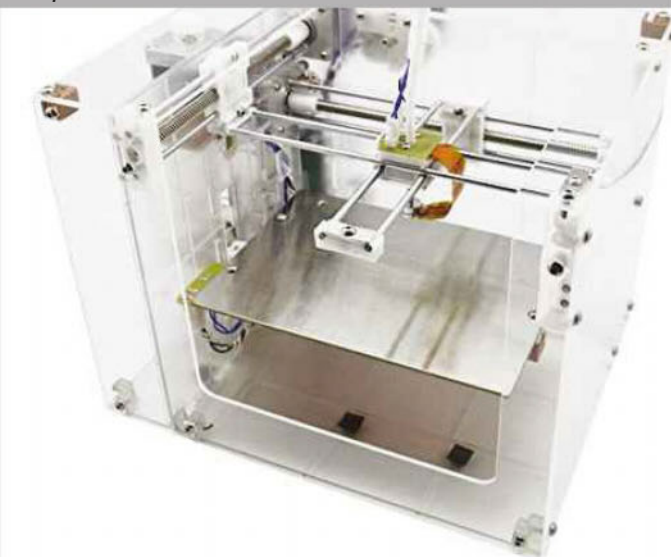
Buying a 3D printer kit is a great way to learn how the technology works, and after doing so, you’ll have more of an understanding of the process than most, and you’ll probably be able to troubleshoot and fix problems you may not have been able to by buying a ready-built model.

The Makibox 3D printer kit is a good example. For around £270-300, this kit comes with everything you need to build your own 3D printer, including the case panels, rails, runners, motor, printer head, filament and so on. The whole kit

3D printer pens can be a great, cost-effective way of getting into 3D printing



Self-assembly 3D printers like the Makibox seen here are cheaper and more educational



WANHAO WANHAO Duplicator 5S

The Wanhao D5S mini is a pricey but great home 3D printer



The Veho Discovery Deluxe 400X is a cheap but good quality entry-level digital microscope



Celestron LCD Digital Microscope II



The Celestron Pentaview LCD is a powerful digital microscope



“ If you have the cash and want a top-notch 3D printer, you can find plenty of expensive models ”

can be put together in around four hours according to the instructions, depending on technical proficiency. Once assembled, the printer is a fully functional model that may not look quite as swish as pre-built alternatives, but it does the job and teaches you or your older children about electronics and 3D printing as you assemble it.

Of course, if you have the cash and want a top-notch 3D printer, you can find plenty of expensive models. One of the best in our opinion is the Wanhao D5S mini. This is a superb 3D printer that is not only fast and easy to use but automates a lot of the process and is very reliable, nailing print jobs in fewer tries (some cheaper models can produce less than ideal reproductions).

It's expensive, of course, costing around £900, but if you're looking for a great quality home 3D printer, this is one of the very best.

Microscopes

Microscopes have always been a popular piece of hardware for all home science buffs, and there are plenty of models now made for younger children. Sadly, many of these models are all but worthless, with the cheaper, plastic units being little more than toys. Standard, more expensive microscopes, however, are rarely suited for younger children, due to fragile construction and difficulty in their use. Luckily, digital microscopes have managed to fill the gap and not only allow easier access for children but also present many benefits over the standard microscope.

Digital microscopes, as the name suggests, are digital devices that don't rely on the usual construction of a microscope or delicate glass slides and lenses. Instead, they're more durable and can connect to a computer in order to instantly snap still images or record video. What's

more, they can be found for a very reasonable price, although quality does vary.

A great option to begin with is the Veho VMS-004 Discovery Deluxe. Priced at only £40, this digital microscope has a 400x magnification level, a useful and flexible stand and a quick snapshot button for taking images. Its rubber housing makes it perfect for younger users too, making it a great entry-level microscope that gives decent performance for a good price. It's also surprisingly flexible in terms of use, and the magnification rating will suit most tasks.

Stepping up to the next level is the Celestron LCD Digital Microscope II. This is much more like a standard microscope, with the same physical appearance, except for an LCD display instead of eye pieces. It delivers up to 1600x magnification via the camera sensor, and there's a built-in 5MP camera, as well as the ability to capture 30fps SD video.

The Celestron LCD Digital Microscope II is built for biological use, so it will be great for those who need to get a closer look at nature. and the colour 3.5" TFT LCD screen means that anyone can use it, even younger children who may usually struggle to use normal, stereovision eye pieces.

The unit can be found for around £190, which is a decent price for such a powerful digital microscope.

Finally, is another Celestron model, this time the Celestron Pentaview LCD. Like the previous model, this is a more traditional-style unit, but it's also more powerful, with a maximum magnification of 2400x. It also has a 5MP camera, and the 4.3" LCD screen is touch sensitive, making it easier to use. Both top and bottom LED illumination is featured, there's a 4GB SD card and with the right cable, it has AV/TV connectivity.

This extra power comes at a cost, though, and it'll set you

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The Celestron Travel Scope 70 is cheap, but great for the learner



The Skywatcher Explorer 130M f / 900 is a decent, more advanced telescope



The level of automation in the Celestron SkyProdigy 6 SCT makes it useful for both new and experienced users



“ Simple telescopes also have the benefit of usually being more portable ”

back around £300. This is still a decent price, though, and if you're thinking of using this, you're not likely going to be a newcomer in search of entry level.

Telescopes

If you're a budding stargazer, you've probably already got yourself a telescope, but if you're planning on getting into the hobby, you may need a bit of guidance before you splash out.

Buying a telescope can be tricky, especially for newcomers, and there's a golden rule you should follow if it's your first time in the field: keep it simple. It may be tempting to shell out for that powerful telescope packed with features, knobs and extras, but for the layman, this kind of telescope is overkill. The confusion and daunting nature of getting the most out of a model like this can put many off, so to start with, you'll want to stick with a simple, straightforward model.

Simple telescopes also have the benefit of usually being more portable so are easier to take with you or break out quickly if you need to. This means they're also more flexible and good for more uses.

Another key thing to remember is that you're not going to see the kinds of things you see on the news or the Discovery Channel. Home telescopes are nowhere near as powerful as the ones used here, and results are less focused. This is normal, and you need to be aware of the limitations, as well as the impact your location has. Some locations simply won't be as suitable as others (such as brightly lit urban areas), so bear this in mind. Okay, let's take a look at some good options.

Although it costs only around £50, the Celestron Travel Scope 70 is one of the better budget offerings and one of the best options for newcomers. It's cheap, but the

telescope itself is actually very good for the price. And because it's a travel model, it's both portable and easy to use, two great and important features for learners.

We found a package containing azimuthal mount, tripod, 10mm, 20mm and 4mm eyepieces, 3x Barlow lens and an astronomy CD-ROM, all for under £45. A perfect package for a new stargazer.

Stepping things up a gear we move on to the Skywatcher Explorer 130M f / 900. This is a popular and very capable telescope that's more expensive than the Celestron travel model, at around £170, but it's far more powerful and more suited to those who know what they're doing.

It features magnification levels of 36x, 72x, 90x and 180x and boasts a better light-gathering performance than most 114mm alternatives. It comes with a range of ocular lenses, Barlow lenses, red dot finder and mount, as it's a very good option to go for if you're not totally new to the field.

Finally, what can you get for around the £1,000 range? Well, you could do far worse than the Celestron SkyProdigy 6 SCT. This is an advanced telescope and is designed for those that know their stuff, as well as those who have a lot to learn. It's very powerful and utilises electric motors and various fully automated functions, such as lens alignment.

Of particular interest is the database-driven automatic features that allow users to select from a collection of objects in the database, so even if you don't know where a constellation is, the telescope can find it for you. It manages this using a combination of digital camera and special 'StarSense' technology for automatic alignment. It's impressive stuff, accompanied by great performance of the core telescope. All of this should cost around £1,000. [mm](#)

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ARE YOUR GADGETS SECRETLY SPYING ON YOU?

Sarah Dobbs investigates the technology that's checking up on you...

Anthing you say in the safety of your own living room is private, right? Not so fast. Your sofa might not be as private as you thought; even once the kids are in bed, there could be someone listening in. Yup, your most prized possessions, your gadgets, might be spying on you.

Over the last week or so, you might have seen a worrying screencap retweeted into your Twitter timeline. Originally posted by Parker Higgins (@xor), the tweet juxtaposed part of Samsung's smart TV privacy policy with a passage from George Orwell's *Nineteen Eighty-Four*. In case

you missed it, here's what Samsung has to say about its tellies:

"...Samsung may collect and your device may capture voice commands and associated texts so that we can provide you with Voice Recognition features and evaluate and improve the features. Please be aware that if your spoken words include personal or other sensitive information, that information will be among the data captured and transmitted to a third party through your use of Voice Recognition."

(You can read the full privacy policy here, if you're

so inclined: www.samsung.com/uk/info/privacy-SmartTV.html).

The Orwell quote it was being compared to was about the 'telescreens' installed in every citizen's home, through which the Thought Police could listen in on people's conversations. Now, any time there's ever an internet privacy controversy, poor old Orwell tends to get dragged in, but here the comparison looks particularly apt. The idea that someone, somewhere – a mysterious 'third party' – can have access to all your personal conversations just because you chose to buy a Samsung TV is pretty terrifying.

It doesn't seem legal, but the privacy policy doesn't seem to leave much room for misinterpretation.

Lots of news organisations have picked up on the story since that tweet, and Samsung has been called on to explain what's going on. So what is going on, and how scared should you really be?

Taking Privacy Seriously

If we take a step back and think about this rationally for a moment, Samsung's policy more or less makes sense. Smart TVs use voice recognition technology so users can control their TVs by



“ They have cameras installed that can identify faces ”

So why would Samsung need to transmit any data to a third party? Well, because its smart TVs can do more than just respond to the most basic requests: as well as what it calls “imperative voice control”, which is just a series of pre-programmed commands, there’s a voice control mode called ‘interactive voice control’. That’s the mode that lets users be a bit more chatty with their TVs. According to the instruction manual, you can ask things like ‘Is there anything interesting on tonight?’ or get your smart TV to search Google for you. In order to process those kinds of questions, though, voice data is transmitted over the internet to a third-party server, where the words are recognised and analysed in order to give useful results to the user.

That all sounds much more reasonable than that privacy policy initially made out, doesn’t it? Samsung has been quick to answer media

enquiries about the whole debacle, telling the *Guardian* that “Samsung takes consumer privacy very seriously. In all of our smart TVs, any data gathering or their use is carried out with utmost transparency, and we provide meaningful options for consumers to

freely choose or opt out of a service. We employ industry-standard security safeguards and practices, including data encryption, to secure consumers’ personal information and prevent unauthorised collection or use.”

In other words: take a deep breath and calm down, guys. It’s not as scary as it sounds.

Is Your TV Watching You?

Don’t relax completely just yet, though. Because while

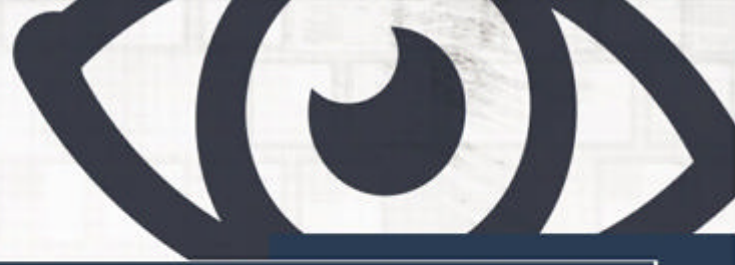
talking to them, but in order to recognise and act on voice commands, the television needs to be ‘listening’ to any conversations going on around it.

However, that doesn’t mean there’s someone on the other end listening to you moaning about your crappy day at work every night. Most of the time, it turns out, the TV is lying pretty much dormant. When it ‘hears’ a command, it’ll pop up a notification on screen to let its users know it’s listening for further commands. Usually, that’s when you’d use the command to change the channel or turn the volume up or whatever other basic change you might want to make to your TV.

Don’t Worry About Facebook

Got déjà vu with all this talk of gadgets listening to your conversations? That might be because last year there was a similar controversy over an update to the Facebook app. A new feature called ‘Identify TV and Music’ was rolled out. The idea was that Facebook could automatically add information to users’ status updates based on background noise. That was worrying for obvious reasons: in order to identify what music you were listening to or what TV show you had playing in the background, Facebook would need to use your phone’s microphone to eavesdrop on you. Yikes.

After some investigation, though, this feature turned out not to be so sinister after all. For one thing, it was an opt-in feature, so any freaked out by it didn’t have to switch it on. For another, the app would filter out any background conversations that it couldn’t identify as being part of a TV show or song and focus only on the copyrighted stuff. And for another, it wasn’t listening all the time: the app would only capture 15 seconds of audio when a user was actively writing a status update. So that’s probably okay, then.



your smart TV might not be recording your every conversation, it may still be tracking you in other ways. And we're not just talking about Samsung TVs here either. Most new televisions have a whole host of features that are either incredibly useful or slightly creepy, depending on your mindset, and depending on how the data they collect is used.

For example, a lot of smart TVs have facial recognition systems built in. That means they have cameras installed that can identify faces sitting on your sofa in front of them and identify who they belong to. It would be easy to dig out another quote from *Nineteen Eighty-Four* here and imagine some shadowy entity sitting in an office building somewhere checking who's watching what on their TVs. But actually, the facial recognition feature is pretty limited. It's used as an alternative login for smart TVs that have separate user accounts built in, so you can log in by looking at the camera instead of typing in your username and password. And all the data needed to make this feature work is stored locally, on your TV and not transmitted anywhere else.

So if your TV's not checking your face to see how much you're enjoying the *X Factor* finale, you can indulge in all sorts of crap TV without worrying about who's judging you for it, yeah? Maybe not. Because your smart TV is almost certainly tracking what you're watching, even if its camera is turned off. Data about what channels you've watched, what movies you've downloaded or streamed, and other apps you've used on your smart TV will all be collected and used to build a profile of your TV using habits. Feeling creeped out again yet? It's about to get worse...

How To Opt Out

The recent press about smart TVs spying on you at all times might have been slightly overstated. But there are still reasons to be genuinely concerned, so if you want to switch off as much of this monitoring as you can, here's how to opt out:

- **Opt out on your TV:**

The exact location of the option to turn off voice recognition varies from one brand to another, but your best bet is the privacy section of the settings menu. If you're feeling extra paranoid, you could turn off your TV's ability to connect to the internet by disabling its wi-fi connection, although that will mean you can't actually use it as a smart TV any more.

- **Opt out on your games console:**

To turn off collection of voice data on your Xbox, open the Family settings and go to Privacy. On a PlayStation 4, the option you're looking for is under the System menu in Settings.

- **Opt out on your mobile:**

This is the really tricky one, since you'll need to keep on top of every app you install, as well as your basic phone features, and you may not be able to revoke specific permissions for an app; it might just be a case of choosing whether or not to use something. So whenever you install something, check what it has access to. For Android phones, you can do that in the Apps section of the Settings menu. Google Now can be turned off in Google Settings, while Siri can be disabled by going to Settings > General > Siri and then tapping the switch to turn it off. Windows users can turn off Cortana by going to Settings > Applications > Cortana.

- **Opt out on your laptop:**

It feels paranoid to mention this, but it is possible for both hackers and security agencies to access your laptop's webcam without you knowing about it. The easiest way to fix that, if you're worried, is to put a sticker over the lens when you're not using it.

Most web browsers also offer a Do Not Track setting, which means your online activity won't be captured by websites for the purpose of serving you advertising. In Chrome, for example, you'll find that under Settings, Advanced Settings, Privacy. Other than that, you'll need to be careful about programs you install and websites you visit.



Because You Watched

In the same way that data on the websites you visit is stored in cookies and used to serve

you personalised adverts while you're browsing the web, data collected by your television may be used to serve you personalised content. That can

be useful, of course. If your television knows what you like to watch, it can offer you recommendations based on that.

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It can also serve you personalised advertising. Not during the breaks in *The X Factor*, of course; we're not quite there yet, but you might find that adverts appear on your smart TV's home screen, based on what you've watched recently. A massive investigation carried out by *Which* found that not every kind of smart TV served ads (Sony doesn't, for example), but most other brands did.

Most of us can shrug off personalised adverts by now; they've been around online for too long. But sometimes, some companies are going too far with what they track. In 2013, IT consultant Jason Huntley decided to dig into what his LG TV was tracking after he noticed he was being served targeted advertising. He discovered something alarming: not only was his TV transmitting all sorts of info on what he was watching, unencrypted, back to its own servers, but it was also harvesting information on the files he had accessed on a USB hard drive plugged into his TV. That meant information about his children had been sent off, without Huntley's knowledge or permission,

into a company's database, just because he'd watched a Christmas video on his TV from an external hard drive.

Even more disturbingly, although Huntley found the option to switch off his TV's 'collection of watching info' setting, it continued to transmit data on what he was watching. There was no way to opt out; his TV carried on tracking everything he watched regardless.

Huntley got in touch with the ICO (Information Commissioner's Office), who opened an investigation into whether LG had broken the Data Protection Act. He also complained to LG, who responded by issuing a software patch to its smart TVs that both turned off the tracking of external files and made sure that the opt-out button actually worked. Still, though the issue might now be resolved, it's a bit scary to think that your gadgets might still be tracking you even when you think you've opted out.

It's Not Just Your TV

Although recent coverage has focused on one particular brand of smart TVs, it's worth pointing out that a lot of our

gadgets have the capacity to record our speech. Voice control has become more popular than ever recently, and almost every piece of technology you come into contact with can use it. Whenever you're thinking about investing in something that can take voice commands, it's worth checking out the privacy policy to see whether you're happy with it.

In most cases, companies are far more reassuring than

Samsung was in its policy. Microsoft, for example, takes great pains to explain that if you use voice commands with your Xbox One and Kinect, it's unlikely anything personal will be captured. Although the system will transmit examples of speech, it focuses solely on voice commands, and samples of your voice will only be used by Microsoft to improve its speech recognition technology. (There's a way to opt out too, if you don't even want

An Orwellian Checklist

His name always gets brought up in debates about privacy, but how close are we really to living in the kind of awful dystopian future George Orwell envisioned for us? Here's a handy checklist to help you figure out when it's really time to panic. Cross off six or more of these and it might be time to leave the country...

- The clocks start striking 13.
- Pubs start serving beer in litres instead of pints.
- Chocolate is rationed by the government.
- The world gets divided into three superstates, instead of countries.
- All history books are destroyed.
- A Ministry of Truth is established.
- Microphones are installed in all public places to record citizens' conversations.
- A new, simplified language sees existing words twisted or mashed together.
- A newly elected leader has a moustache.
- $2+2=5$.



it listening to how you say 'Grand Theft Auto'.)

One gadget you might want to be particularly careful of is your mobile phone. Obviously, phones are tailor made to transmit voice data – that's what they're for – but now we're all carrying around mini-computers in the form of smartphones, there may be ways your data is being used that you're not entirely comfortable with.

Most smartphones come with some kind of virtual assistant now: if you have an Apple device, it's Siri, while for Android users it's Google Now, and for Microsoft Phone users, it's Cortana. These assistants can be useful in all kinds of ways, from remembering appointments to keeping track of your shopping list, but you need to hand over a significant amount of personal data to get the best out of them. And again, it's worth digging into the privacy policies and various permissions and settings associated with each of them to make sure you know what you're getting into before you do it.

Siri, for example, stores user data anonymously in Apple's servers and keeps it there for up to two years before its deleted. Cortana will pull in information from your emails and Facebook account to help you remember important things, but it can be set not to, if that freaks you out. And

if Google Now seems to know too much about you, you can turn off certain settings. For example, if you tell the app your main method of transportation is driving, it can generate maps of where you parked your car, but if that's too weird, you can switch it off, along with other location-specific features.

Security Concerns

Even if you're prepared to trust the various technology companies you've bought from to only use your data responsibly and for purposes you've agreed to let them, there might still be something left to worry about.

Over the last few years, we've seen several big companies get hacked, and personal data has been stolen from all sorts of sources you'd expect to be impenetrable. The recent Sony email hack is one such example, or think of the Heartbleed bug, which meant that even seemingly secure websites were left vulnerable. The completely benign intentions of your TV manufacturer might turn out to be irrelevant if all your data ended up getting hacked.

I can't imagine any hacker on earth having the time to listen to all the inane conversations I have in front of the telly in order to find something incriminating, but who knows? There are lots of

“ Over the last few years, we've seen several big companies get hacked ”

things we might talk about – names, addresses, dates of birth, passwords, maybe even credit card numbers – when we think we're not being listened to by strangers.

It's not just hackers we need to worry about either. In 2013, it emerged that the US National Security Agency had been accessing information from all sorts of sources, including various tech companies, to monitor its own citizens' communications. Without a warrant. Exactly what was and wasn't accessed is still unclear, but if emails, online searches and phone calls could be intercepted and searched, why would voice data collected by televisions or games consoles be any safer? Think about it too hard and you might find yourself yearning for a tin foil hat. Or maybe a tin foil roof.

Let's Get Paranoid

The reality of the modern world is that we're all being tracked, all the time, in all kinds of ways. There are security cameras all over the place (one per 11 people, on average, in the UK), and if you want to get the best

prices at your local supermarket, you probably let them track your buying habits via a loyalty card too. For the most part, we've learned to accept it and ignore it.

When tracking gets creepy is when we don't realise it's happening or when we don't know what's happening to the data. That's really why the Samsung privacy policy scared so many of us so much. We don't like to imagine someone listening in when we didn't give them permission to, especially when they're a 'third party' we can't even identify. What Samsung and every other company needs to learn from all this controversy is that they need to be more transparent about what's happening; ideally, if your TV is going to be recording your conversations, you need to know about it before you hand over your money. And there also needs to be a way for people to opt out. There might be a trade-off, in terms of which features you can use if you don't want your data collected, but we need to be allowed to make those choices for ourselves, rather than having them inflicted on us. [mm](#)



Component Watch

James Hunt looks at deals to turn your warbling into a digital masterpiece

One of the great things about a home PC is that it can be a virtual studio of tools, allowing you to record, edit and release material entirely off your own back. But before you can become a podcasting or bedroom-guitarist sensation, you need to get a decent microphone. How much can you expect to pay, and what sort of deals are out there? This week's Component Watch finds out.

Deal 1: Trust Starzz Microphone **RRP: £14.99 / Deal Price: £10.61**

This desk mic comes with an extra-long 250cm cable and a mini-tripod, and while its amplification isn't brilliant (it works best as a handheld rather than a desk mic), you can't argue with the price. A 3.5mm jack and an power switch makes it convenient and near-universally compatible, and that, combined with the price, makes it an ideal entry-level piece of hardware.

Where to get it: Amazon - amzn.to/1EPLu0w



Deal 2: Soundlab UD236 **RRP: £29.99 / Deal Price: £24.99**

Similar looking but better performing to the Trust Starzz, the Soundlab UD236 is a professionally balanced condenser mic with an internal filter that eliminates parasitic noise, built-in hardware on/off switch, a six-metre lead with a 6.35mm jack (so you'll need a 3.5mm converter!) and a robust carry case. Although designed for music recording, it would work just as well for voice input on a PC.

Where to get it: Maplin - bit.ly/1Esjoup



Deal 3: Snowball iCE HD Audio USB Microphone **RRP: £69.99 / Deal Price: £49.99**

This high-quality desk mic allows you to record audio on any USB-compatible system, whether for chat or more professional reasons. It's sensitive enough for even quiet voices but has a

large enough dynamic range to capture bands and instruments too. There are no drivers to install, and it comes with an adjustable desktop stand and the USB cables you need to get started. Worth the money, especially at a discount!

Where to get it: Maplin - bit.ly/1DTeiXi



Deal 4: Zoom iQ5 **RRP: £99.99 / Deal Price: £74.99**

If you prefer to do your recording on a smartphone, the Zoom iQ5 might be a better option for you than the device's internal mic. This high-quality stereo condenser mic is ideal for recording music but also small enough to fit into your pocket. Its orientation works both vertically and horizontally, and you can use the associated app to adjust the stereo performance in real time. A fantastic accessory for any compatible smartphone, especially at 25% off!

Where to get it: GAK - bit.ly/1FXgmzO



Deal 5: Editors Keys SL150 **RRP: £114.99 / Deal Price: £88.99**

If you want to record high-quality vocals, instruments and podcasts, you need a microphone like this: dual 34mm shock-mounted diaphragms eliminate all unwanted noise, a fully digital connection ensures no interference, and a five-year warranty means if anything goes wrong, you can always get a replacement. Driverless and compatible with all USB-enabled systems, it's an expensive microphone, but it's also the last you'll ever need.

Where to get it: Amazon - amzn.to/1Bs5SaU



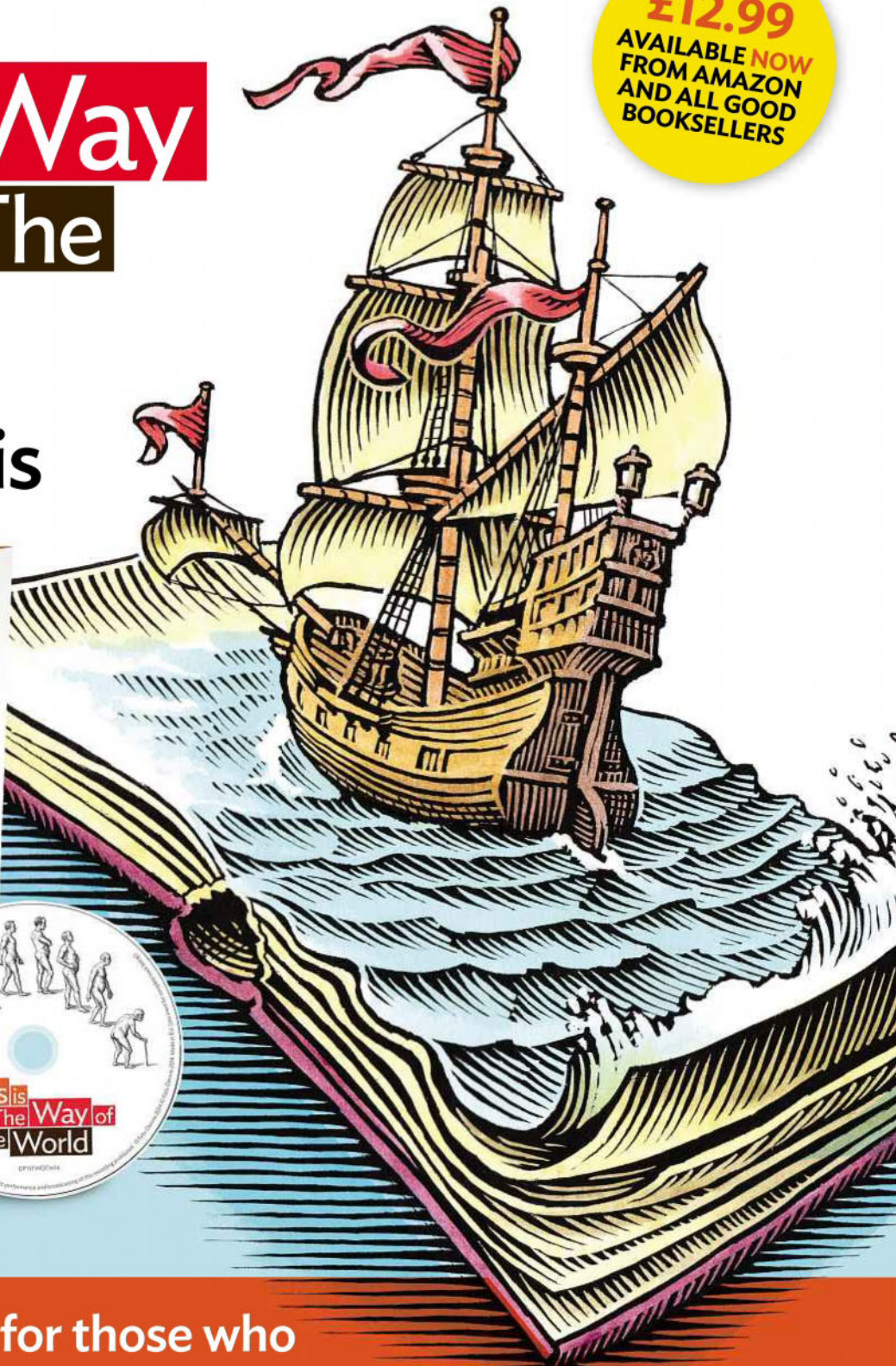
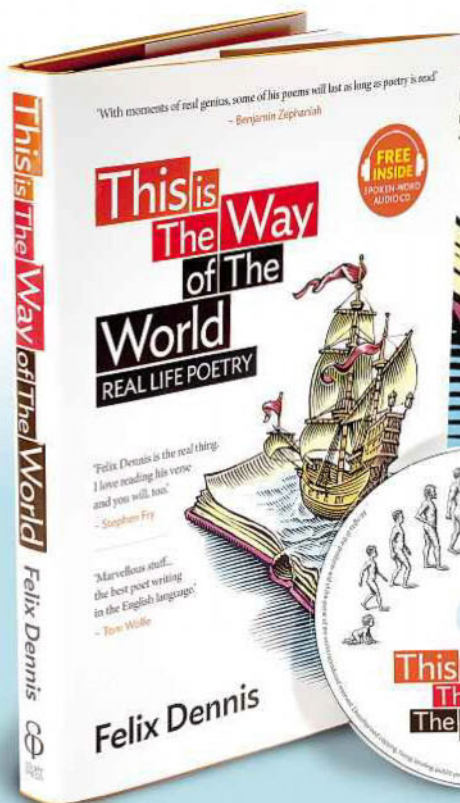
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– Benjamin Zephaniah

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Lenovo Silences Superfish

Adware controversy put to bed

YouTube Launches New App

Google goes child-safe

It's pretty much a given that the most pressing technology-centric concern as a parent is that kids are safe when they go online. Google has tapped into those concerns by launching a new app that's just for children in order to make their online experience so much safer.

YouTube Kids has parental controls, restricts who can upload content to the site, and runs entirely separately from the main YouTube service. It's available in the States only, at this moment in time, but the

idea is that it's going to come to the UK when it's been proven to work over there.

The NSPCC has welcomed the move, with a spokesperson quoted in the press as saying that the app "will be embraced by parents" and that it will bring an extra bit of reassurance that younger kids won't be exposed to the more racier content on the service. With the ability to limit web time for kids plus the chance to switch off the Search function entirely, it sounds like this deserves to be a success for Google.



Mario's Secret Revealed

Gravity is behind his mighty leaps

Mario is many things. He possesses a mighty fine moustache, he can run with the best of them and, perhaps most importantly, he is one heck of a jumper.

His ability to leap over many a mushroom in a single bound has been a question that's clearly bothered TV show *Space Time* that airs over in the States, to such a degree that the show has worked out that in *Super Mario World*, he must live in a world with eight times our own surface gravity.

By all accounts, the gravitational pull is so strong that Jupiter, our own solar system's largest planet, doesn't have as much. The programme also asserted that he must be incredibly fit, have an amazing heart

that can pump blood round his body like no other as the gravitational pull would have an affect on that. Essentially, it transpires that there is no planet in our solar system that's quite like *Super Mario World*. Shocker.

Some people have far too much time on their hands. Although, honestly, this is well worth tracking down on the web.



The top bods over at Lenovo would not have been happy to have the company's name as being associated with an adware scandal. Yet, it was – and all because of a piece of software called Superfish.

Superfish, for the uninitiated, is a bit of pre-installed adware found on Lenovo's laptop computers. One that huge numbers of disgruntled users discovered was not only 'hijacking' their web browsers, but also putting them at risk of malicious attacks due to its ability to read data sent over secure SSL

connections – an ability that rendered systems potentially vulnerable to hackers.

The company eventually reacted to these complaints by removing Superfish from any future laptops, releasing a tool to help its customers remove it themselves and launching an investigation into the decision to install it in the first place. However, it's the comments made by a company statement about Superfish that perhaps stand out most of all. On the release of the removal tool, many months after Superfish was first spotted, the statement from February 20th reads: "We

ordered Superfish preloads to stop and had server connections shut down in January based on user complaints about the experience. However, we did not know about this potential security vulnerability until yesterday."

For what has already been a PR disaster for Lenovo, that statement hardly helped matters much. Worse still, it faces a class action lawsuit filed against in the US from a blogger unhappy at Superfish for using up bandwidth and memory resources, as well as leaving her system vulnerable.

Yikes.



Mobile computing devices, whether they be laptops, phones or tablets, are great when they're in good condition, but the minute anything goes wrong with them, you're in trouble. Software problems can be fixed easily enough, but if a component gets damaged, then it often means replacing the whole device.

But that doesn't have to be the case, if you're willing to roll up your sleeves and don't mind risking what's left of the device in question.

Personally, I've had some success with replacing a broken charging port on a Nexus 7, replacing the battery in an old iPod, among other things, using parts ordered from eBay.

However, I also ordered a replacement LCD for an iPod Touch and broke the glass case of the iPod trying to fit it. I then ordered one of those and broke the new screen while trying to attach them both.

Do I regret trying? Not a bit. But be sure you're prepared for things to go wrong if you try to replace a screen.

See you next time...

Anthony

Editor

University Accepts Students By Mistake

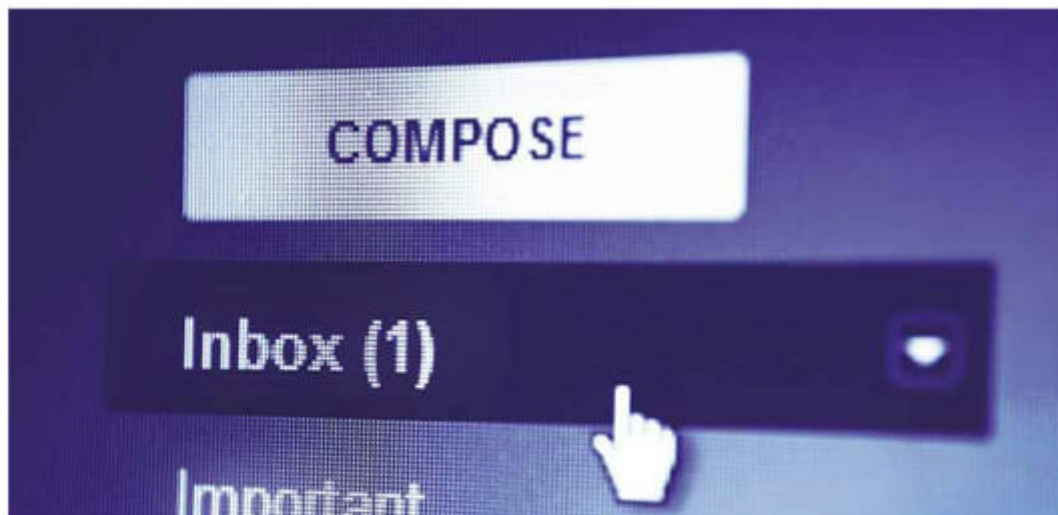
Hundreds were emailed in error, then had offers recinded

We feel a little sorry for the hundreds of students who were told that they had been accepted on a top-ranked graduate science programme, only to later be informed that actually they hadn't. At all.

America's Carnegie Mellon University is something of a big deal in computer engineering circles so receiving a letter stating that you are one of a lucky few to get in is a rare thing indeed. Only not so much in this case

as 800 letters were sent out in error because of a glitch. Hours later, further emails were sent letting recipients know of the error.

That must have been a horrible thing to go through, and we can only imagine the stress that it put upon those poor souls. While someone from the Pittsburgh university did state that they understood the disappointment the situation created, we doubt very much that they truly grasp what the unlucky applicants were subjected to in this case.



Meanwhile... On The Internet...

In the wake of several recent controversies, Twitter has once again promised to crack down on trolling and abuse across its platform. In an attempt to put some flesh on the bones of what it's been half-promising for a while, the firm's CEO, Dick Costolo, has sought to give some details on what that actually means for a firm that, by his own admission, 'sucks' at dealing with such things (tinyurl.com/Motl1352a).

Apparently, Twitter is looking to move the emphasis in all this away from the people who are on the receiving end of abuse and on to those accused of dishing it out. This "cost of dealing with harassment," as Costolo put it, "isn't being placed upon the right person," adding that "It shouldn't be the person who's being harassed who has to do a lot of work."

However, as has been true in the past, while these words are no doubt earnest (one of the big business issues facing Twitter going forward would appear to be the negative impact of such abuse), there is still little in the way of details regarding what these commitments mean in terms of Twitter's everyday operation.

If you operate a WordPress-powered site, and are using the WP-slimstat app, you probably want to be paying attention to the next few lines, as a flaw in the way the popular plug-in (apparently it has about 1.3m users) has been shown to leave sites vulnerable to attack by bods at data security firm Securi. In a blog post (tinyurl.com/Motl1352b), it described how a weak security key generation procedure could allow a hacker to exploit the software as a means to get into databases or even take over a site. Update now, basically.

Aaaaaaaand Finally...

Talking of hacks, in the wake of Superfish and furore that has recently surrounded Lenovo, it became the victim of a hack last week, potentially at the hands of the infamous Lizard Squad. For a while it was a total site takeover, soundtracked by a song from *High School Musical*. Cheeky (tinyurl.com/Motl1352c).

And then there was that thing with the llamas (tinyurl.com/Motl1352d), which seemed to send everyone insane for a while, and when everyone went even insane over what colour a dress was. Yes, really (tinyurl.com/Motl1352e), this is what the world has come to. We want to get off sometimes...

After a couple of years of too-ing and fro-ing, and a massive online outburst of feeling on the matter, the US Federal Communications Commission has finally put a stake in the ground as far as its position on the issue of net neutrality is concerned. And it's largely being seen as a victory for those who wanted to ensure that comms companies wouldn't be allowed to create faster and slower lanes depending on what services were willing to pay them (tinyurl.com/Motl1352f) to deliver their content.

Put in simple terms, it has decided to classify the provision of internet services as a Title II service – essentially the same way that voice services are currently classified – which gives them increased powers to dictate how firms operate, like setting rates and forcing them to open up markets to competition. As the commissioner himself, Tom Wheeler, put it, the FCC now believes that, "The internet is the most powerful and pervasive platform on the planet," and "simply too important to be left without rules and without a referee on the field."

The Title II decision comes after a series of legal rulings in the US that challenged the commission's right to enforce net neutrality and Barack Obama's intervention in the matter in late 2014 (tinyurl.com/Motl1352g). Of course, this being America, not everyone agrees with the right of the government to interfere in all of this – the commission's vote on the matter was only carried by three votes to two – and there are likely to be more days in court over this in the coming months. Indeed, one of the companies directly effected by the decision, Verizon, responded by calling the decision a "Throwback Thursday" move to impose "1930s rules on the internet", and to illustrate its point, it printed its response in morse code (tinyurl.com/Motl1352h). Which is about as catty a response as you could imagine.

You may wonder why we should care about all of this... But, as we've pointed out before, where America goes...



Sitting alongside similar Shankar projects involving *Venom*, *The Punisher* and *Judge Dredd*, *Power Rangers* is a distinctly NSFW piece of work that imagines a bleak future for the once-youthful warriors, featuring established acting talents like Katee Sackhoff and James Van Der Beek, and some blockbuster standard special effects. We would link you to it, but just as we were going to press, word came through that the film had been pulled from Vimeo and YouTube following a copyright claim (tinyurl.com/Motl1352ll), so we'll leave you to track it down yourselves. At the time of writing, Shankar's Facebook page was a good place to start.

.AVWhy?

The world of fan films is a murky area on the internet; the variety of different copyright regimes across the world and the generally US-centric idea of 'fair use' (tinyurl.com/Motl1352i) has generally only served to muddy the waters and make these heartfelt tributes a very grey legal area. This is especially true when the 'fan' film is produced by professional filmmakers and to the kind of standards to which Joseph Khan made *Power Rangers* – a glossy, explosive and bloody 15-minute re-imagining of the classic *Power Rangers* concept (tinyurl.com/Motl1352j), which forms part of producer Adi Shankar's ever-growing 'Bootleg Universe' of such projects (his swearsy reasoning for these films lies at tinyurl.com/Motl1352k).

Caption Competition



Two weeks ago, we left you to caption this empty-headed fellow. Here's a selection of the best:

- **doctoryorkie:** "Where information was stored before the internet."
- **D-Dan:** "Arghh, It's empty. He must be a politician."
- **phantom9:** "Lid lifted on 3D printing head."
- **BullStuff:** "Blue Man Group member blows his mind!"
- **idunno:** "Insert operating software here."
- **EdP:** "Its where Lenovo would like to store its junk!"
- **wyliecoyoteuk:** "New cloud-based brain storage announced – "We'll mind your Mind for you."
- **wyliecoyoteuk:** "Blue Sky thinking"
- **Hendrik Van Den Berg:** "Okay, I've replaced the CPU with my brain; now let's see if it passes the Turing test"
- **Thomas Turnbull:** "I've just discovered my brain is open source."
- **Thomas Turnbull:** "I meant to just take my hat off but I got carried away"
- **John Cawley:** "Diagram showing content of average Twitter users head."

Many thanks to everyone who entered this week, and congratulations to our winner, ricedg, who came up with "If Hannibal Lecter did pedal bins..."

To enter this week, head to the 'Other Stuff' section of our forum (forum.micromart.co.uk) and say something funny (but not too rude) about the picture below or email us via caption@micromart.co.uk.



Animation Studio For Filmmakers And Animators

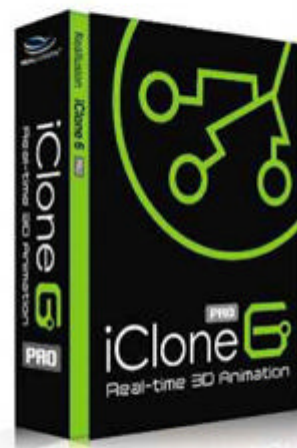
iClone 6 promises flexible UI, PhysX support and a bunch of other great features

Reallusion has launched iClone 6, an update of its animation studio that was apparently three years in the making. Coming with a new flexible UI, iClone 6 has settings providing instant layouts for animation or visual effects, or you can set up a custom workspace if you'd prefer. Among the raft of features included are new 3D technologies, Indigo RT Plug-in for ultra-realistic rendering, plus support for NVidia's PhysX technology.

With access to 300,000 content items via Reallusion's Marketplaces, this certainly promises to be an excellent step into the world of

animation software – especially at £80 for the Standard version of the software.

If it sounds like your cup of tea, you can always trial it over at www.reallusion.com.



E-sports Arena Agreed For UK

Gfinity to bring the fun here too

With the Call of Duty European Championships having recently taking place here in the UK, e-sports is a hot topic in the UK right now, so it's little surprise that a key figure in those Championships – Gfinity, the UK's leading e-sports company – has recently announced that the UK now has its very own dedicated e-sports arena.

Working In partnership with cinema chain Vue, part of the Fulham Broadway multiplex is being transformed into a dedicated 600-person capacity venue, to be named the Gfinity Arena, with player lounge for up to 50 gamers.

All this is due to open in March for the 2015 Gfinity Championships, and we hope it plays host to some success stories for e-sports in this country.

Snippets!

Tommy On A Stamp

You may have heard of Tommy Flowers. If you haven't, you should have, because he's the guy who designed the Colossus computer, which now takes pride of place at The National Museum of Computing. Well, soon even more people may know all about his great work as the Royal Mail has issued a stamp celebrating his achievement as part of a series recognising key inventions from the past century. Tommy's son said that his dad would be delighted with the recognition, which adds a lovely epilogue to what is just a nice story.

Apple Launches Pay Once And Play

The Apple App Store has introduced a new section titled Pay Once And Play. The section, as you'd expect, lists games that don't require in-app purchases to play, something that has been a bugbear for too for too long. Including new and major releases as well as App Store originals, it's likely to be viewed as a concession on Apple's part to attempt to address much of the ire thrown in its general direction when in-app spending is involved.

HTTP/2 Approved

In what will be the biggest update to the HTTP standard in 15 years, web protocol HTTP/2 has been approved by the Internet Engineering Steering Group. It's a decision that paves the way for quicker page loading and better encryption, though the new standard will now go through a period of editing before being applied in real terms. The idea behind the new standard is that it should make it quicker to browse, reduce bandwidth and make it easier to use secure connections. All good things.

Penclic Answers The Call

Righties and lefties both catered for

Many a journalist will be able to tell you tales a-plenty of aching limbs and the onset of RSI. Scandinavia's Penclic understands the importance of stemming the RSI tide, though, and it has recently unveiled its latest pen-alike mouse, the B3.

This Bluetooth-enabled B3 is great for both right- and left-handed users and its symmetrical design is actually pretty appealing. A scroll wheel is found in the middle of the pen shaft, and that also doubles as the middle click button on a standard mouse design.

This setup is designed for easier operation and its ergonomic design should, in theory, provide a relaxed working environment and more efficient surfing, allowing your forearm to rest on the work surface and aid in counteracting static tension in your arms and shoulders.

Read more on the £40 device over at www.penclic.se.



Internet of Things Kit Announced

Your Starter for, erm, \$50?

We've all heard plenty about the so-called Internet of Things, but now ARM and IBM have teamed up to bring a "starter kit" to market.

The 'mbed IoT Starter Kit', reported to be going to retail at anywhere between \$50

and \$200, includes a microcontroller development board made by Freescale featuring an ARM Cortex-M4 processor and built-in memory, plus a sensor expansion board to measure temperature and motion. The kit, which can be web- and computer-connected via

Ethernet and USB cables, promises to make it easier to test IoT prototypes, including smart home applications.

The board is backed with cloud support from IBM and you can read plenty more for yourself if you pay a visit to developer.mbed.org/platforms/IBMEthernetKit.

Chicago Police Pay Hacker

Bitcoin payment for Cryptoware 'help'

It seems that America's police departments are under attack from hackers, as a department in a Chicago suburb has been reported as paying out \$500 in bitcoins to a hacker for relieving them of nasty Cryptoware.

The *Chicago Tribune* broke the story that Midlothian police – not related to Scotland in the slightest, by the way – had been beset by Cryptoware at the start of the year as a malware-containing email was opened up by a staff member. With money demanded in exchange for a code to let the Cryptoware loose, the police department apparently did indeed pay up the required

bitcoins for the hacker to do his job, and they have assured onlookers that there was no access to any files at all.

All this smacks of a really worrying situation where the police give the bad guys what they want. There is previous evidence to this in the States too, with police departments in Detroit and Tennessee having been targeted by Cryptoware of late. The chaps in Detroit refused to pay up, though (quite right), while the sheriff's office in Tennessee did give over some money.

As for the hackers, no word on how the Police are going to collectively deal with them – but it doesn't look too good right now.



NVidia In Legal Row

Speed claims under fire in class action suit

Graphics card maker NVidia is staring down the wrong end of a class action lawsuit brought against it in the US. The lawsuit, which has emerged in California, relates to allegations that the company wrongly advertised

the hardware power behind the GTX 970 card that it brought to market last year.

The card was advertised as having 4GB high-speed GDDR5 RAM when it was unveiled, but after much analysis following customer complaints over performance

issues, it turned out that the card split the RAM into a couple of blocks, depending on the usage. The upshot of this being that 500MB of that RAM runs at a much lower speed than GDDR5.

This speed difference has led to plaintiffs in the lawsuit

going up against Nvidia, which is described as having "uniformly marketed, advertised, sold, and disseminated information that represents the GTX 970 to have specific capabilities when it does not".

'Ooh', and indeed, 'er, missus'.



Buffalo LinkStation 441

Michael goes buffalo hunting with a NAS box

DETAILS

- Price: £349.99
- Manufacturer: Buffalo
- Website: www.buffalo-technology.com
- Required spec: Windows, Mac, Android and iOS

Buffalo has released its LinkStation 441 NAS 4-bay desktop unit, which is compatible with Windows, Mac, Android and iOS platforms. Aimed at small business and home office users, this NAS box is available as a diskless product or with a storage capacity of up to 16TB depending on your needs.

I've been checking out this NAS box populated with four 1TB drives. Included in the package are leads for power (two and three-pin versions) and an Ethernet cable for integrating the NAS box into a network via a connection to a router. You also get a quick setup guide, software CD and a couple of keys for when you need to unlock a front panel to gain access to the drive bays.

With dimensions of 230 x 170 x 215mm and weighing 7.5kg fully loaded, this NAS box gives an immediate impression of being a solid device that will provide the required protection for the drives that hold your valuable data, which can be stored using 0/1/5/10 RAID modes. The front of the unit also features an LCD panel displaying feedback information, while LEDs show Info, Error and LAN status issues. Buttons for power and functions sit either side of the LCD panel. The function button allows you to switch between modes such as direct

copy, dismounting USB devices and rebuilding a RAID array.

Hidden out of sight at the rear of the box are various connection options. There are sockets for linking to a power source and router. Ports are available for connecting USB 2.0 and USB 3.0 devices, plus linking the NAS box to a UPS option. A second USB 3.0 port is concealed behind the drive access panel.

Setting up this NAS box is a fairly straightforward process, as various automatic housekeeping tasks are carried out prior to installing the NAS Navigator 2 software. One slightly disappointing aspect of this procedure was that the NAS box did not automatically appear as part of my network from the Windows desktop. However, this was easily remedied using a basic wizard. The NAS Navigator 2 software gives you access to

the available storage. A selection of utilities found on the CD includes TurboPC EX, offering faster data transfer speed and NovaBackup.

You can use the NAS box storage space as you would with any other drives. Sensitive data can be protected for your eyes only, while more general content can be placed in folders open to selected groups of users. Specific instructions are listed in the user manual for allowing content to be made available via the internet using mobile devices.

The NovaBackup software takes care of backup jobs with features such as opting for full or incremental backup, with a choice of targeted content at a destination chosen by the user on a scheduled basis. A NovaBackup of 4.36GB of documents took five minutes and 29 seconds. Using copy and paste, I then transferred 59.1GB

of video files, via the router link, in 27 minutes and 30 seconds. The same data was then used for transfer via a USB 2.0 link from an external hard drive, which took 41 minutes and 43 seconds, indicating that my home network was faster than USB 2.0 when transferring data.

mm Michael Fereday

A solid, easy-to-use NAS box for the small business environment



Corsair Carbide Series 100R Silent Edition Mid-Tower Case

Corsair demonstrates that not all great cases need to cost

DETAILS

- Price: £48 98 Inc. VAT
- Manufacturer: Corsair
- Website: www.corsair.com/en-gb
- Required spec: ATX, MicroATX or Mini-ITX system

Normally when I get a case to review, it's for someone else. By that I mean they're often for someone who likes lime-green neon, neo-classical architecture or the aesthetics of bulldozers.

Personally, I like simplicity and understated elegance, along with a good dose of practicality.

And shocking as it might seem, that makes the new Corsair Carbide 100R case almost perfect for me – and hopefully a number of people reading this magazine.

The case comes in two variants: a clear side-panel model with a dorsal vent and the 'Silent Edition' review model that has no window but does have sound absorbing on the sides and roof.

Unexpectedly the windowed version actually costs about £8 less, because soundproofing costs more than plastic, I guess.

As a mid-tower design, this case isn't built to take massive amounts of equipment, but conversely you could build a very powerful rig in it due to a number of interesting design choices.

The one that I immediately identified was that by offering only two 5.25" external drive bays and four 3.5"/2.5" combo hard drive mounts, Corsair managed to leave a decent path clear in the centre of the case.

At the front end of this channel, Corsair mounted a 120mm fan, directing air onto the motherboard where the x16 slots are most likely to be positioned. That gap also allows you to mount a very big video card (414mm) without fouling any of the internal structures.

Additional cooling comes from another pre-installed 120mm fan at the rear, and you can mount a second one ahead of the drive bays at the bottom, and both the front mounted fans can be upgraded to 140mm.

The only problem I can see

in this layout is that it isn't appropriate for using a closed water cooling solution, like the new Corsair H110i GT, though the windowed model's dorsal vents are.

The fans are connected to a simple three-speed controller that can be adjusted from the outside, but the placement of this on the rear of the case doesn't make it that accessible for those who place their case under a desk or out of sight.

The placement of the front USB 3.0 ports is good, as is the floor filter, which is exactly where the PSU will suck air in.

Overall, for the money, this is an excellent case that feels like it should cost at least another £25 more. The sound proof material not only reduces the resonant vibrations in the system but also makes the case feel more substantial.

This is so nice that I'm seriously considering switching it for my Lian Li PC-A05FNB, the adhesive feet of which fell off in a recent move.

If you want to build a powerful system and don't want planning permission or your own Blackpool illuminations, then this could well be the case for you.

mm Mark Pickavance

Great understated case for all but the very largest systems



Acer Liquid Jade 16GB

Acer occupies the middle ground in the smartphone wars

DETAILS

- Price: £199.99
- Manufacturer: Acer
- Website: www.acer.co.uk/acer/GB/content/series/liquidjade

Some in the smartphone business have worked out that not everyone is prepared to spend £500 or more on a phone or sign up for a £40-per-month contract. But equally most of these same people don't want a slow device with a rubbish camera.

As a result, we're seeing a new stratum of £125-£225 phones that have generally good specifications that won't blow tumbleweeds through your current account.

The Acer Jade Liquid fits this slot exactly, being a fully featured KitKat Android phone with a 5" 720p display, 13MP camera and a quad-core CPU.

I've reviewed a few phones like this that failed to live up to their specs, but the Liquid Jade is actually better than most of those and better than its price might suggest.

The centrepiece of this design is a remarkably thin and light chassis that when combined with the screen and internals only weighs an astonishing 110g.

After minimal weight, the next stand-out feature is the terrific IPS display. Protected by curved Gorilla Glass 3, it delivers punchy colours, excellent viewing angles and is wonderfully crisp. The display immediately makes web pages and maps very readable, and email

management easier for those with aged-impaired vision.

If the hardware has a weakness, it's probably the MediaTek MT6582 ARM Cortex-A7 processor and ARM Mali-400 GPU. While generally good, compared with the latest ARM designs, this one is a little behind the curve. In benchmarks, these parts perform much like the processor that Google put in its old Nexus 4.

That said, compared with many cheaper Android devices, the Liquid Jade has tons of power and can play even 3D titles with some aplomb. The



“ Has tons of power and can play even 3D titles with some aplomb ”

wi-fi also doesn't work in 802.11 ac mode and there's no LTE support, unlike the latest version of the Motorola Moto G. However, it does support USB OTG.

I'd like to think that some of these omissions are trade-offs against features that more people are likely to use, like

the impressive 13MP, F1.8 lens camera.

Another is the clever SIM tray that can take either a single nano SIM and a micro-SD card (32GB max) or two nano SIMs. Multi-SIM phones are huge in Asia but have been frowned on by contract sellers in Europe. If you have a



business and personal mobile, then this phone could allow you to merge them into a single device.

Acer also threw in Dolby DTS-HD audio, emitted through a special speaker output on the phone's rear.

So what's not to like? A few things, but thankfully none of them are deal breakers. My first complaint is the shiny plastic back that Acer applied to this design, which on the black model corners the market for visible fingerprints. I suspect the white model is superior in this respect, but a textured non-gloss surface would have looked much smarter.

The second is a common complaint with Android phones: phone makers'

insistence on putting their own twist on Google's Android OS. As per HTC and Samsung, Acer just couldn't resist messing with the interface in a rather slapdash way that will annoy Android purists intensely. While it isn't entirely awful, I just wish they'd accept that most people like Android the way Google made it.

Among these customisations are dumbed-down modes for children and old folks that are patronising in the extreme. I'd hoped these things had gone with feature phones, but they keep returning. If a person is too old or young to understand Android, then they don't need a smartphone.

And finally, I would have liked a removable and replaceable

battery, but the back doesn't come off. The battery life isn't amazing, though Acer did add a nice OS-level feature, where the phone will automatically power itself off at certain times of the day if you wish.

If you can ignore those aspects, this is an exceptionally impressive phone for an incredibly competitive price. Those wanting these things even cheaper might be able to find a 1GB RAM and 8GB storage model it released previously, which sells for about £25 less.

Personally, I'd plump for the 16GB model reviewed here, because you're less likely to need the micro-SD, opening up the possibility of using dual SIMs instead.

Even if Acer's interface vandals have been busy, they can't obscure that this is an excellent design with many features that I'd class as 'premium' even by modern standards. If Acer did a Nexus uncluttered edition, then I'd be tempted to get one myself.

If you want something physically bigger but lighter to carry than the great Moto G, then the Liquid Jade is an excellent choice and fantastic value for money.

mm Mark Pickavance

A KitKat phone that could easily be mistaken for a premium device

Specifications:

- **Android OS:** KitKat 4.4.2.
- **CPU:** Mediatek MT6572M quad-core 1.30 GHz ARM-V7.
- **Display:** IPS 12.7 cm (5") (1280 x 700).
- **Cameras:** 13 megapixel (rear camera), 2 megapixel (front camera).
- **Memory:** 2GB RAM.
- **Storage:** 16GB.
- **SIM:** Nano (dual).
- **Battery capacity:** 2100mAh.
- **wi-fi standards supported:** 802.11 b/ g/ n.
- **Connectivity:** GPS, Bluetooth, 3.5mm headphone jack, micro-usb, compass, proximity sensor, ambient light sensor.



Jabra Step Wireless Headphones

Jabra takes a Step towards our wireless audio future

DETAILS

- Price: £59.99
- Manufacturer: Jabra
- Website: www.jabra.co.uk/
- Required spec: Bluetooth audio device

A few months ago, I covered the Jabra Rox headphones and was suitably impressed. However, at more than £100 a pop, these weren't the cheapest means of getting audio through a Bluetooth connection.

Jabra clearly considered that a cheaper option might be very popular and designed the Step Wireless to fill that gap for under £60.

Having been close-lined and tangled by wired headphones on a number of occasions, a headset that isn't limited in this fashion is a godsend, and no longer does removing my backpack involve a phone/headphone decoupling exercise.

The style that Jabra went with is a combination of earbud and ear-loop, where the loops stop the inserted part of the device from coming loose while you exercise or move.

Personally this reviewer doesn't like earbuds, but these initially appeared comfortable for short periods, and the

sound production through them is impressive. However, the back of the hooks has a sprung tensioning strip that applied pressure to the back of my ear, and after an hour's use caused

discomfort. This was only on one ear, curiously, so it might be something I could overcome.

As with most earbud designs, they come with three sizes of ear gels (S,M and L), covering the majority of human ear canal sizes, if not exactly mine.

What's good about the Step Wireless is that Jabra designed a small control element into the cable that connects both earpieces, and using it you can adjust volume, pause, play, track jump and even answer your phone. This is intuitive and works well once you get used to blindly locating the control.

The biggest problem with these wasn't the four-hour

battery life or the mildly uncomfortable 'Gelhooks', but the generally poor Bluetooth connection. With my phone in my breast pocket the distance between it and the Step Wireless was less than 30cm, but it still dropped out on a regular basis. This is a 'through body problem', where the signals don't travel well through the mostly water content of our own physiques.

Placing the phone in the top of my backpack improved things, but Jabra needs to do some serious work on improving the reception or buffering the data flow – possibly both.

As the Jabra Rox headset wasn't so obviously impacted by this problem, I'm not sure why these would be so affected. That it has these flaws is annoying, because in many other respects these are well made, and when they're working, the sound reproduction, especially the bass, is good.

But Jabra needs to sort out the connectivity and comfort sides of the Step to make it something I'd unreservedly recommend.

mm David Hayward

Bluetooth headphones that have some connectivity problems

Specifications:

- **Wireless Technology:** Bluetooth version: 4.0 with AVRCP.
- **Battery & Power:** Talk time up to four hours, standby time up to 144 hours.
- **Charging:** Charged via a USB cable, no charger included, takes 2.5 hours for full charge.
- **Wearing Style:** In the ear.
- **Ear Cushions:** Three ear gel sizes included.
- **Dimensions:** H 2cm x W 2cm x D 1.6cm.
- **Weight:** 16.4g.



Intuos Pen & Touch

Michael tries out his artistic skills with a Wacom tablet.

DETAILS

- Price: £89.99
- Manufacturer: Wacom
- Website: www.wacom.com
- Required spec: Windows Vista or later / Mac OS X 10.6 or later

The Intuos Pen & Touch has been designed as a more natural environment for sketching and drawing on a computer. It achieves this aim by taking control of the cursor and giving the user access to a drawing pad work area. With a choice of small or medium versions, this kit consists of a graphics tablet and pen-shaped stylus with cloth material holder, micro-to-standard USB lead, quick start guide and a PDF version of the user manual on a CD. This review is based on the small version of the product.

With dimensions of 210 x 177 x 8mm (W x H x D), the tablet gives you a working area of 152 x 95mm. Its weight of 463g is less than a number of Android tablets I have used. Running across the top of the active area is a 4cm wide strip featuring light indicators for power and data transfer on the front and a compartment on the rear. This compartment can be used when you need to replace the pen unit tip and also holds in place the holder for storing the pen stylus. Incidentally, the pen stylus can support up to 1,024 pressure levels to produce different types of lines and effects.

Unless you purchase the optional wireless connectivity module, this graphics tablet needs to be connected to a computer via a supplied USB

lead, as was the case with my review sample. As this lead measures just 92cm, you may wish to substitute a more lengthy one to give greater freedom when positioning the graphics tablet within your work area. While on the subject of the host computer, I felt this tablet was more suited to being used with a laptop rather than a desktop unit.

An internet connection is required when setting up this product with your computer, as the necessary drivers are downloaded. For reasons I have yet to get to discover, my first attempt at installation was a total failure. Following a system restart, my Windows 7 work system returned with a deactivated mouse, leaving just the pen and tablet as my only means of control. A second reboot returned control to the mouse and displayed a message stating that the tablet driver could not be loaded, with the result no tablet could be detected. Switching to a second system running Windows 8.1 and a third system running Windows 7 produced trouble-free installations with cursor control

shared between the mouse and graphics tablet.

While you could use this kit for basic desktop navigation, it's far better suited for use with your favourite graphics program. During my testing of this product, I've been using it with programs such as Photoshop Elements, ArtRage and Paint Shop Pro with no problems. Windows 8 users can download a free-of-charge Bamboo Page app from the Windows Store. This app allows you to create notes and sketches on different types of paper with a limited range of colours and various pen thicknesses.

This Pen & Touch product is not going to magically turn you into an artistic genius, but it does give you a friendly environment in which to

develop what artistic skills you possess. The kit also supports gestures as you rotate, scroll and zoom with a single or two-finger motion, plus there is an ExpressKeys feature, whereby you can create up to four user-specified actions.

mm Michael Fereday

A useful tool for the budding computer artist



Cougar 700K Mechanical Gaming Keyboard

Cougar sinks its sharp claws into the mechanical keyboard market

DETAILS

- Price: £89.99 (Ebuyer)
- Manufacturer: Cougar
- Website: www.cougargaming.com
- Required spec: Windows XP or later, USB port



From the earliest PC days, keyboard had processors, even if most people weren't aware of them. They couldn't be used for much else other than polling the keys, but they were true microprocessors.

I mention this because the Cougar 700K has a processor in it that would probably see off all the 8-bit computers I owned and possibly most of the 16-bit ones too.

To make this keyboard truly programmable, Cougar put a 32-bit ARM CPU in here, along with sufficient memory to store three keyboard profiles. But custom profiles aren't much use if key actions aren't perfect.

The Cherry MX switches that the 700K uses are the same as my trusty SteelSeries, allowing me to both play games hard and type like a banshee when required.

The review model had Cherry MX Red, although you can also get this keyboard with Black, Brown and Blue MX switches if they're your preference.

Aesthetically, the 700K has gone for the stealth military styling with visible but largely symbolic rivets. It wasn't to this reviewer's personal taste, but I can see plenty of gamers finding it fitting their rig to a tee.

The keys are backlit red, and they can be programed to highlight certain keys or even animate. You don't get Corsair K70 level of control, but the lighting options are fun.

Where it really diverges from Cougar's 200K keyboard I

covered recently is in the quality of construction, as this more expensive design is far nicer. The aluminium frame and a sizable wrist rest create a high degree of stability, though the keyboard still only weighs a modest 1,200g. However, some of the more exotic features I was less thrilled about.

Cougar designed the 700K to be highly customisable, and to this end it has configurable repeat rates and six special 'G' keys, and you can program any ten keys of your own choice. There are even extra ones that allow you to record a macro on the fly.

I'm fine with most of these choices until it decided to split the spacebar, creating a 'G6' programmable key from the right-hand half of it. By default the G6 doesn't generate a space, and while it's easy to rectify that, it can be very annoying until you do.

To get the most out of the 700K, like many gaming keyboards, you need to install the maker's own management software too. Cougar's application is called UX System, and it does a few tricks that I've not seen before. One of these relates to the cable connectivity of the keyboard that connects

to both USB and the audio lines for speaker and microphone. Technically this isn't a USB hub but a pass-through for one of the two USB connections it uses, allowing you to attach a mouse to it. If that's a Cougar mouse, then the UX system can load up a gaming profile for both the keyboard and the mouse simultaneously and even share macros you've created between them.

The price compares well with other gaming keyboards, and there's plenty to like for those who want to configure every aspect of their systems. I just wish Cougar had left the spacebar alone. **mm Mark Pickavance**

An excellent mechanical keyboard for those who exclusively game



ZX Spectrum 48K USB Keyboard

Believe it or not, we're reviewing a 30-year old computer

DETAILS

- Price: £109
- Manufacturer: TynemouthSoftware/ David Curran
- Website: goo.gl/5L7jpU
- Required spec: Spare USB port, OS independent

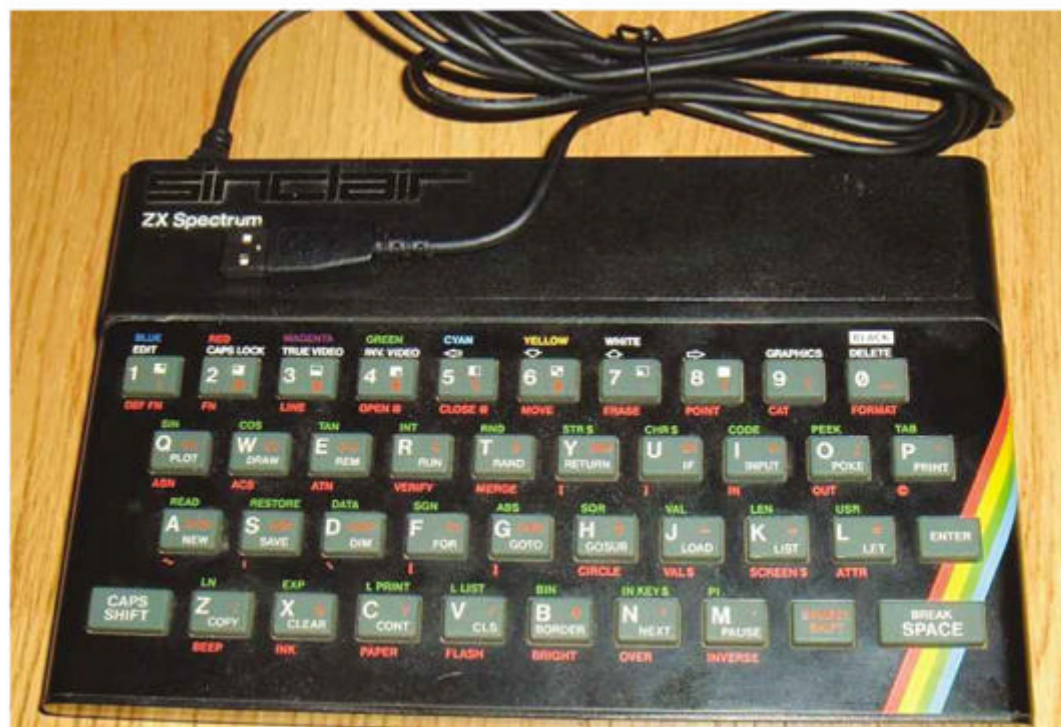
Every so often, we get something to review that's rather special. It could be because it incorporates the latest technology or has been made available to us long before it hits the shelves. Other times, though, it's just because it makes us smile.

When we first heard of a fully working USB keyboard built into the case of a ZX Spectrum we didn't believe a word of it. However, once we opened the box, we were pretty astounded by what we saw.

This is, as you've no doubt guessed, a customised ZX Spectrum that has been brought back from the dead and is now a fully working USB keyboard. We have David Curran of TynemouthSoftware to thank for this project, who by using his custom software and hardware, has managed to create something that's not only appealing to the eye but is also quite practical as well.

Basically, David takes a dead 8-bit machine, the Spectrum in this case, and removes the PCB inside. He then takes what's left of the keyboard ribbon attachments from the membrane and feeds them into a suitably sized custom built USB PCB.

The PCB used contains the relevant software needed to translate the old rubber keyboard membrane inputs into something a modern computer



can understand. Through the use of a jumper switch, located via the mic port on the back of the Spectrum, you're able to alter the hardware settings from Direct to Remapped modes. Direct will map each key on the Spectrum to a normal key on a UK keyboard, in that Caps Shift is Shift and Symbol Shift maps to Ctrl. If you were to press Symbol Shift and P in this instance, the software will send Ctrl+P to the PC.

The other mode, Remapped, will translate what is on the keys on the Spectrum to the PC. So when you press Symbol Shift and P, with the quote marks being located on the P-key, you'll get " on the screen.

As you would expect, then, when running something like Spectaculator, you can use the Spectrum keyboard in the same way as it was originally designed; in other words, pressing J followed by Symbol Shift P twice will give you Load "".

Using the Spectrum 48K as a normal day-to-day keyboard

takes some getting used to. How we ever managed it 30-odd years ago is a mystery, but suffice to say after a while it soon becomes quite fluid, although to be fair, the old rubber keys do need a good press from time to time to make contact with the membrane. Obviously that's not the fault of David; we can blame Sir Clive for that design flaw.

Naturally, being a 30-year old machine, the Spectrum you'll receive may have one or two scratches (our version was as nearly good as new), but each one is professionally turned out and cleaned by David as he builds each unit to order.

This is an exceptional project and one that certainly brings a nostalgic tear to the eye. For typing out your memoirs, the Spectrum 48K USB keyboard probably isn't advisable. However, David Curran hasn't stopped at the 48K. He also remodels the Spectrum +, Commodore 64, Acorn Electron and even the Atari 65XE as USB keyboards.

The ZX Spectrum 48K USB keyboard is a wonderful gift idea and a novelty item that's very usable and certainly a centrepiece of conversation. It might seem expensive, but remember that this is a one-man project. Either way, it's worth every penny. **mm David Hayward**

An amazing project that keeps the love for old machines alive and well



GROUP TEST

Handheld Android Consoles

Handheld consoles were generally the arena of Nintendo or Sony, but since more powerful ARM-based processors are now available, manufacturers can squeeze some impressive hardware into an Android unit.

David Hayward takes six into his hirsute hands and sees which are capable of dealing out the best mobile gaming.

Handheld Android Consoles

Archos GamePad 2

DETAILS

- Price: £141
- Manufacturer: Archos
- Website: goo.gl/sPwHSK
- Required spec: Google account, game ROMs for emulation, mini-HDMI for TV output



We reviewed the original Archos GamePad some time ago, as part of a group on open-source handhelds. Unfortunately, in that instance it didn't score too well due to some badly positioned buttons and controls, and for some reason, although the hardware on paper was good, it never really performed as well as it should have.

Now, though, we have the Archos GamePad 2, which offers a Rockchip RK 3188 quad-core 1.6GHz processor, along with a Mali 400 MP4 GPU and 2GB of memory. Internal storage is either 8GB or 16GB, but it can be expanded thanks to the micro-SD card slot, which supports cards up to 64GB.

The screen is better this time around as well, with a 7", 1280 x 800 IPS that displays a decent enough set of visuals for all but the most modern Android game. Naturally, if you're using this device for retro gaming, then it's more than enough for some of the 8- or 16-bit era classics.

The design of the GamePad 2 is much improved from the previous attempt from Archos. The poor plastic build quality of the last generation has been replaced with a good glossy-black finish and actually feels quite pleasant and solid enough to endure many happy years of gaming on.

The buttons and controllers were a bugbear the last time around, as we mentioned earlier, and have been addressed to feel better. The D-Pad is a single button and moves well, with better emphasis on being able to hit the diagonals, which were a nightmare on the original GamePad. The raised, thumb-shaped sticks are also good and have a decent range of motion while still being responsive. There's also a set of shoulder triggers, which are made of a transparent plastic; they work well enough, but the design does make you feel like they were more of an afterthought rather than part of the whole design concept. Nevertheless, they do a good enough job and are well placed.

Connectivity comes in the form of Bluetooth and wi-fi, and you'll also find a 0.3MP front facing camera. There's mini-HDMI too, micro USB for charging, a g-sensor and 3.5mm audio out. In other words, it's a perfectly capable tablet regardless of the gaming side of things.

Thankfully, the GamePad 2 uses a stock version of Android 4.2.2, which again is a vast improvement from the heavily customised version of Android found on older models. Too add to that, though, there's still the Archos GamePad button customisation and mapping software. However, we did find

this particular version of button mapping software a little buggy and completely useless when it came to remembering the mapping for the game the next time we played it.

In addition, there's a Game Zone App, which will match Android games with their 100% compatibility to the GamePad 2's controls and hardware. The selection isn't vast, though, and there seem to be a lot of modern games missing from the list.

The performance of the Archos GamePad 2 was good; it ran everything we needed without too much trouble. The problem, however, was with the appalling battery life, which lasted less than one and a half hours.

Overall, the GamePad 2 is a good improvement over the previous model. Battery life is dreadful, but it's essentially a good tablet nonetheless. However, there are better models available for less.



JXD S7800b

DETAILS

- Price: £129.99 via Funstock
- Manufacturer: JXD
- Website: goo.gl/5KgnTQ
- Required spec: Google account, game ROMs for emulation, mini-HDMI for TV output



JXD has, over the years, produced some startlingly good Android gaming tablets. The pinnacle of its success, though, is undoubtedly the JXD S7800b.

Like the Archos GamePad 2, this is a 7" IPS LCD, five-point capacitive Android 4.2.2 handheld, with a quad-core 1.6GHz Cortex A9 CPU and a Mali400 GPU. There's 2GB of DDR3 memory, and it comes in both 8GB and 16GB versions.

To complement the specs, there's wi-fi, a three-axis accelerometer, front and rear cameras (0.3MP and 2MP respectively), micro-SD card slot (with a maximum of 32GB) and a pair of stereo speakers. A mini-HDMI port, micro USB for charging and connection to a

keyboard, mouse or 3G dongle make up the connectivity.

There are two analogue sticks, a single D-pad, Start, Select, Home, control configuration and back buttons located towards the bottom of the unit with a further four-button arrangement conveniently placed at the right-hand thumb level. Two shoulder buttons on either side of the rounded edges of the unit increase the count to 14, and there are also power and volume controls on the left side of the unit.

As before, the JXD has configuration mapping software built-in, which is activated by a dedicated button. When this is pressed, a mask of the gaming

controls appears on screen, allowing you drag and drop the relevant physical control to the choices in the game. And we're pleased to say that it's a configuration that sticks with the game and works exceptionally well.

The design and aesthetics of the S7800b are really very good, considering it's a mass produced Chinese import. Usually these things reek of cheap and nasty plastic, but the S7800b is a well-built device that's solid and comfortable in the hand. Of course there are a few elements that could probably do with a bit of remodelling, but on the whole it's a good setup.

The JXD S7800b increases its appeal by being one of the best

retro handheld consoles available. As a part of the package, you'll find installed a number of emulators, which will allow you to play Sega Mega Drive, SNES, NES, PlayStation 1, CPS1/2 arcade coin-ops and even N64 game ROMs. And through other Play store installations, you're also able to accurately emulate a DreamCast, ZX Spectrum, C64 and even DOS games.

In terms of battery life, the JXD S7800b isn't too bad. After charging it for a few hours, we managed to get in a decent six or seven hours' worth of gaming and normal tablet duties before it got the point where the device had to shut down. Running it through the built-in HDMI port to the TV though and watching video did take quite a toll on the battery though and reduced the life to just over an hour and half, which wasn't great. Saying that, though, it's not that often you'll engage in HDMI to TV dual screen gaming, and even then you'll likely have it plugged in while doing so.

The JXD S7800b is an extraordinary gaming tablet that's unique and a pleasure to use. The £129.99 investment is worth every penny for the retro console emulation side of things alone, but when added to the fact that this device is more than capable of playing modern Android games as well as other Android tablet duties, its features outweigh the cost.



Handheld Android Consoles

Nvidia Shield

DETAILS

- Price: £235 for the tablet, £50 for the controller
- Manufacturer: Nvidia
- Website: goo.gl/H7ggzH
- Required spec: Google account, Nvidia GameStream for PC to tablet gaming, mini-HDMI for TV output

We reviewed the Nvidia Shield tablet and controller some months back, as a part of a static console group. It fared reasonably well but didn't quite match up to the under-the-TV console abilities that the Mad Catz M.O.J.O. could offer. As a handheld, portable gaming platform, though, it may well do better.

The two components that make up this Nvidia Shield set are the Shield tablet and the Shield controller. The tablet uses an Nvidia Tegra K1, a 192-core Kepler GPU, combined with a 2.2GHz quad-core Cortex A15 CPU, and it runs Android 4.4 (5.0 ready). There's 2GB of memory, 16GB or 32GB of built-in flash storage depending on the model; an 8" full HD screen, wi-fi, Bluetooth and a micro-HDMI.

The tablet can be used on its own and you're free to use whatever compatible Bluetooth controllers you have available. However, you won't get the full benefit of the package unless you opt for the Shield Controller as well.

The Shield Controller differs slightly in its design from the usual modern gaming controller. The D-Pad, for example, is positioned higher up on the left, where the analogue stick usually lives, and here both the

sticks are positioned towards the centre and much closer together.

This makes the controller a little difficult to get used to, if we're being honest. It's solidly built, without question, but it makes for an uncomfortable position for any lengthy gaming sessions, and it feels quite heavy as well.

It does have some interesting features, though. You can use the built-in microphone for launching apps, and there's an integrated headset port on the front of the controller, with a volume rocker-type button at the base. It's a capable controller, to some degree, but it's locked into the Shield tablet and has extremely limited functionality when attempting to pair with anything else.

The tablet is an open Android 4.4 (KitKat) base, with the Nvidia elements and apps already installed on the home screen. This makes it quite a versatile Android gaming device, and there's also the ability to stream games from a PC with the Nvidia GameStream technology. While this worked well enough for games that didn't require

“ You can use the built-in microphone for launching apps ”

a huge amount of power, the more high-performance PC titles didn't do too well. Android titles, though, were extraordinarily good, and the Shield just ate them up without even flinching.

While we're focusing on the negatives, although the pair (tablet and controller) are a good combination, they don't have quite the same level of portability as the other consoles here. Setting everything up on the commute, for example, requires more work than simply getting the device out of your bag and playing it.

The Shield tablet itself will set you back around £235 and around £50 for the Nvidia Shield controller. £285 is rather expensive for a device that only really covers a fraction of the features the previously reviewed devices have. It's

more powerful, but it's lacking somewhat in usability.

The Shield is a good tablet and the Shield controller a reasonable gaming peripheral. The pair work well enough when the setup is ideal, but that's often not the case when you fancy a quick spot of gaming, and the setup is far too expensive to use in these instances.



GPD G5A

DETAILS

- Price: £310
- Manufacturer: GamePad digital/Lekaicn Corporation
- Website: goo.gl/OGiqeS
- Required spec: Google account, game ROMs for emulation, mini-HDMI for TV output



There are a million and one obscure, Far East, Android-powered imports available.

Some of them are good, but the majority are really quite shockingly bad.

The GPD G5A, from GamePad Digital, a part of the Lekaicn Corporation, is a gaming handheld that boasts an ARM Cortex A9 1.5GHz processor with a Mali 400 GPU and 1GB of system memory. It comes with 8GB of storage, running either Android 2.3 or Android 4.4.2, depending on the model you end up with.

There's wi-fi available, along with a g-sensor, mini-HDMI, a 0.3MP rear camera, micro-SD card slot with support for up to

32GB cards and a mini USB port for charging and connecting to external peripherals.

The design is unique, to say the least. The device itself is shaped a bit like a mix between a Mega Drive, PlayStation and GameCube controllers, all rolled into one, with a 5", 800 x 480 screen sitting in the middle.

Either side of the screen are the two analogue sticks, with a D-Pad on the left and four buttons arranged on the right. Along the bottom of the screen you'll find a set of buttons for Select, Start, power and a volume rocker, with a tinny set

of speakers located on the hand grip sections. There are also a set of trigger and shoulder buttons along the top, which are surprisingly quite good and very responsive, considering the quality of the rest of the controls.

This is an exceedingly cheap and nasty device, it has to be said. The D-Pad rarely worked, one of the sticks didn't work at all, and the buttons had so much travel in them they were nearly pushed through to the back of the unit. It was also poorly constructed and frequently required squeezing together as the top section

often popped away from the base.

The battery life was virtually non-existent too. After leaving it to charge for over four hours, in which time it wouldn't even boot up until it had a 90% charge, playing a few retro games and an Android game drained the battery down to 3% in less than an hour. It also got extremely hot to the touch as well, which we thought was a little worrying.

In terms of performance, the GPD G5A didn't fare too well either. The Master System and Mega Drive titles ran well, but modern games, even *Angry Birds*, barely worked at all. Swiping the screen was like watching *The Hobbit* load on a Spectrum, and despite the box stating the device's abilities to run Dreamcast, Nintendo 64 and PS1 games, there was really no way on earth this device could manage it.

There's little to recommend this device, even as a paperweight. Despite the half-decent specifications, there's something drastically wrong with the GPD G5A. And to add insult to injury, this device will set you back somewhere in the region of £300, which is an absolutely ridiculous amount for something of this shoddy quality.

In short, avoid. For this price, could pick up a pair of KXD S7800b units and still have change left over.



Handheld Android Consoles

Megafeis G810

DETAILS

- Price: £56.57
- Manufacturer: Megafeis
- Website: goo.gl/9l60KV
- Required spec: Google account, game ROMs for emulation, mini-HDMI for TV output

The Megafeis G810 is very much like the previously reviewed GPD G5A, in that it's a Chinese import that you'll find either via Amazon or through translating the original Megafeis website to English.

The G810 uses an older ARM Cortex A8 1GHz single-core CPU, with an even older SGX531 GPU and a rather paltry 512MB of system memory that attempts to run Android 4.0. Internal storage is just 8GB, but as with the other examples we have on test, the micro-SD card will support and boost the storage up to 32GB.

The 7" capacitive screen is capable of 800 x 480 resolutions, but you'll be able to output to a TV or monitor via the mini-HDMI port. There's also a g-sensor, 0.3MP front and rear

camera, wi-fi and mini-USB for charging and other connections.

The design is similar, in some respects, to that of the JXD. There's a large D-Pad in the upper left, made up of four separate buttons, which makes moving in diagonals difficult, accompanied by a single analogue stick below. The opposite side features a four-button array, below which you'll find Start, Select and Home buttons. Along the top are a pair of trigger buttons, which are well designed and feel much better than what we were expecting.



To be fair, although this is another one of those obscure Chinese Android devices, the G810 is quite well built. It's made from cheap plastic, as you would expect, but it doesn't necessarily feel like it is. The buttons are firm, with very little travel, and they're responsive too. They aren't brilliantly placed (the analogue stick being in the bottom left is very awkward), but they are decently constructed.

The real problem with the G810, though, is the fact that it's so slow. This is naturally down to the use of the older CPU and GPU and the fact that 512MB isn't really enough these days to play anything other than the most meagre of Android games. In truth, it's barely enough to run Android 4.0, let alone any games.

The retro emulation side of things is adequate, but this device, like the GPD, lacks any means to accurately map the buttons, despite stating that it can. Emulation isn't everyone's cup of tea, though, and unfortunately the G810 simply doesn't cut the mustard when it comes to being a

decent tablet, regardless of the gaming features.

It's a bit of a shame admittedly, as the device only costs around £56. But you get what you pay for, and for something this cheap you're really only getting a very lightweight performer.

The Megafeis G810 therefore is cheap, not necessarily nasty, but inadequate for running modern apps or operating systems. If you're more into retro emulation, then in all honesty spending £70 pound more will buy you a far more capable device in the form of the JXD, which will also run more recent software.



JXD S5110B

DETAILS

- Price: £74.24
- Manufacturer: JXD
- Website: goo.gl/S1Wrzc
- Required spec: Google account, game ROMs for emulation, mini-HDMI for TV output

This last device we're looking at is another JXD, one from the past as it turns out. The JXD S5110B is the older brother of the excellent S7800b, in terms of hardware at least, but it still has its place in the Android handheld line up.

The S5110B has an older Amlogic MX-S dual-core 1.3GHz processor, together with a Mali 400 MP2 GPU and 1GB of system memory running Android 4.1. It comes as an 8GB unit, but you can expand the storage to 32GB with the right SD card.

Wi-fi, as well as mini-HDMI out and a g-sensor are available, along with a rear 0.3MP camera and a single speaker, which is pretty tinny to say the least. The screen is a 5" capacitive touch LCD, with a maximum resolution of 800 x 480.

There are a pair of analogue sticks, a four-buttoned D-Pad and a four-button arrangement, along with Start and Select buttons located toward the bottom. In terms of design, it works reasonably well, but rather than the analogue sticks being placed in a more comfortable higher position, as they are on the JXD S7800b, in this instance you'll find them awkwardly arranged below the D-Pad and four buttons. We did find the shoulder buttons to be a little

wobbly in their mounts, and to add to that, there was an awful lot of travel in them too.

Although the design isn't quite as well thought out as the S7800b, this JXD model isn't too bad. It doesn't feel particularly cheap; in fact it's very well constructed, especially the front facing buttons and analogue sticks. The only design and construction problem is the shoulder buttons.

In terms of performance, the JXD S5110B isn't brilliant, but it's far better than some of the devices in this test. The slightly aged dual-core CPU can just keep up with most of the latest Android games, although to be fair the more demanding titles do struggle to run. The Android 4.1 OS works well enough, though, and as with the newer JXD model, there's a huge amount of emulation available and downloadable through the use of the Happy Chick app.

Happy Chick, we have to state, is a game emulator app and a product we absolutely despise, due to its odd behaviour and the fact that it rarely seems to work for us

without something untoward going on with the device it's running on. Anyway, the point is the hardware itself is okay, and you can get away with some light entertainment and retro emulation.

The JXD S5110B is a reasonably good Android handheld, but it's not great. A few years ago it would have been top of its game and worth every penny, just as the S7800b is now, but today it's starting to look its age, and the mobile platform world moves extremely fast. You can pick one up for around £75, which again is quite a lot for yesterday's technology.

So although good, you're much better off saving a little longer and buying one of the more recent JXD models.





JXD S7800b

The JXD S7800B is a fantastic Android handheld. It's designed for retro gaming, as well as more intense Android games, and will undoubtedly last you for the next couple of Android generations to come.



Archos GamePad 2

Although the battery life on the Archos GamePad 2 was pretty poor, it's still a more cost effective, all-in-one Android gaming unit than the equally scoring Nvidia Shield.

On the other hand, the Shield is by far the most powerful device in the group. Overall, though, we think the Archos can provide the best of both handheld gaming and tablet worlds without the extra expense and inconvenience.

How We Tested

Each tablet was tested with a selection of retro emulators: MD.emu Mega Drive and Master System, Snese9x EX+, Mupen64+AE and Reicast. For Android gaming we tested each tablet with *Angry Birds Star Wars*, *Knightmare Tower*, *Asphalt 8* and *Plants Vs. Zombies 2*. We also tried out a selection of everyday Android apps, but they weren't as interesting as the gaming side of things.

	Archos GamePad 2	JXD S7800b	Nvidia Shield	GPD G5A	Megafes G810	JXD S5110B
Price	£141	£129.99	Total £285	£310	£56.57	£74.24
Screen Size	7", 1280 x 800	7", 1280 x 800	8", 1920 x 1200	5", 800 x 480	7", 800 x 480	5", 800 x 480
Dimensions	200 x 154 x 9.9mm	245 x 120 x 16.5mm	221 x 126 x 9.2mm	195 x 105 x 36mm	236 x 122 x 18mm	195 x 86 x 17mm
Weight	400g	500g	390g	300g	350g	232g
CPU	1.6GHz quad core	1.6GHz quad core	2.2GHz quad core	1.5GHz quad core	1GHz single core	1.3GHz dual core
GPU	Mali 400 MP4	Mali 400 MP4	Nvidia Tegra K1	Mali 400 MP4	SGX531	Mali 400 MP2
Memory	2GB	2GB	2GB	1GB	512MB	1GB
Android Version	4.2.2	4.2.2	4.4 (5.0 ready)	2.3 or 4.4.2	4.0	4.1
Button Mapping?	Yes	Yes	No	No	No	Yes
Wi-Fi	Yes	Yes	Yes	Yes	Yes	Yes
Bluetooth	Yes	Yes	Yes	No	No	No
HDMI	Yes	Yes	Yes	Yes	Yes	Yes

Your Letters

Full Steam Ahead

I was reading *Micro Mart* a couple of weeks ago when I saw a linux article talking about upcoming distribution releases and it mentioned SteamOS with the ending question being "does anyone actually use SteamOS?"

So, I'm writing in with my family's SteamOS story for you. In February 2014 my eight year old son was talking about Christmas, as eight year olds do when there is nearly 10 months to go, and mentioned that we should get a Playstation4 for the family.

As the PS4 was over £400 at the time and games are also expensive, I was at a loss, but I had heard about Valve's weird fallout with Windows 8, and its BETA operating system kicking around. So I turned to my son and broke the bad news about affording the PS4, but asked "Why don't we build a Steam machine together instead?"

Our plan was simple, we would buy a single component each month (CPU, motherboard etc..) and my Son would build it himself (with me carefully guiding him through each step), once complete we would bung SteamOS on it and be sorted for a family machine under the telly.

It ended up only taking three months to put the Steam machine together (based on an i5 and Nvidia GTX 750ti, as we cut a few corners here and there, using a re-certified hard drive, second hand case and so on, but we ended up with a working steam machine with plenty of games (since Steam has sales all the time we spent three months watching and pouncing on the best deals).

If I'm being honest, we ended up spending about the same money we would have on a PS4, but we had caught the the building bug, and we next tried to build a

Steam machine on the smallest budget possible using gumtree, and he managed to put together another machine to go up in his room for just over a hundred pounds (a modest Athlon x3 and GTX 645).

This is now spreading, and just under a year down the line we have built five machines so far for friends who have shown interest, and we have both been happy to chuck PCs together for people.

Our original machine has received a couple of upgrades too: it now sports more RAM and a better graphics card – which is something that you can't do with a PS4...

So yes, we are using SteamOS, and we do so with the full knowledge that if it crashes and burns. then all we have to do is pay Microsoft their fee and stick Windows10 on them at some point..

Alec Smales

At A DOS For Words

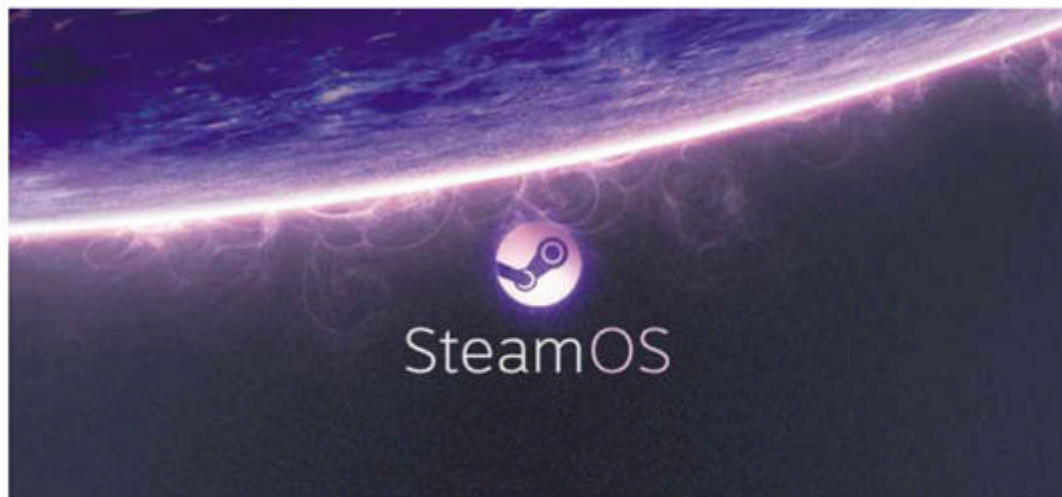
In issue 1349 under the heading 'Remembering', you had an article on Windows for workgroups. Connected with that there have been similar recent articles about the dawn of the graphics interface.

However, I have seen no mention of 'dosshell' which was my personal introduction to using a GUI and mouse controller on a PC. I seem to remember it was included on DOS 5 onwards.

Before that I had used an Atari ST and Commodore Amiga, and could see very little use for the IBM and it's compatibles outside the pure business environment.

We all make mistakes!

John Cully



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Pi

Now In Different Flavours

Chris Salter explores the benefits of the Banana Pi micro computer

When the Banana Pi was released in February 2012, demand far outstripped supply for the diminutive computer. The little credit-card-sized board was created with the aim of helping to educate school children in the basics of programming, but a large number of people saw that this little device would be able to do a lot more than that.

It rapidly became a huge community item, helped in no small part of the Raspberry Pi foundation. Part of its rapid success is due to a combination of reasons. These can essentially be boiled down to the following:

- **Cheap** – The Raspberry Pi Foundation's aim was to reduce the cost of the device as much as possible, to allow schools to buy them. At about £30 for a Model B+, they're cheaper than most other components for a full-size computer.
- **Ease of use** – The Pi is extremely simple to set up and run, and the community has helped to make this even easier by creating programs and guides to get Linux distributions onto an SD card and get the Pi set up and running. There are plenty of guides on the internet as well. Even getting the image onto the SD card is easier than installing a normal operating system.
- **Versatility** – The Raspberry Pi is an extremely versatile beast. The small computer can run a full Linux operation system and comes in

a number of configurations (the A+ and B+). In addition, it adds on GPIO (General Purpose Input/Output) pins that allow hobbyists to use it to drive a range of home automation, monitoring and robotics projects, among others. The device is a low-power-drawing device and can happily be solar powered or run off a battery pack.

All these factors have seen the Raspberry Pi take off. However, while the Pi is a great micro computer, there are a number of limitations it suffers from.

People have been using the Pi as a media centre and NAS; projects exist on the web telling you how to achieve both. Some shops will even sell you the kit to make a Raspberry Pi media centre. However, especially as a NAS (and so as a media centre, if you're streaming data to it), you face the limitation of the 10/100Mb Ethernet connection. In addition, the Raspberry Pi shares the bandwidth of the USB slots with the networking port. This means that heavy network traffic can slow disk read/writes to USB and vice versa. Overall, this isn't a deal breaker if the Raspberry Pi is used as a NAS for irregular access (backups, etc.), rather than high speed streaming around the house, but it can cause slowdowns.

The other problem can be the lack of RAM – 512MB of RAM in the B+. Depending on the usage, the Raspberry Pi can use all of this and start hitting the swap space. This can be detrimental to the SD card that the operating system is running off and again cause slowdowns.

While we can't have our cake and eat it, considering the cost of the Raspberry Pi, the limitations aren't deal breakers, and a lot of people, me included, make use of the Raspberry Pi daily.

Riding the coat tails of the Raspberry Pi's success are a new wave of micro computers. I've experimented with some of these in the past, but a new one may offer some additional perks not in the Raspberry Pi.

Banana Pi

The Banana Pi is a Chinese-made (remember, the Raspberry Pi is made in Wales now!) micro computer. It bears a striking resemblance to the Raspberry Pi, and the hardware is that similar, that the Raspbian images made for the Raspberry Pi will actually boot on the Banana Pi!

The basic specifications of the Banana Pi are slightly different to the Raspberry Pi. These are:

Component	Raspberry Pi (Model B+)	Banana Pi
CPU	ARM 1176JZF @ 700MHz	ARM Cortex A7
CPU Cores	1	2
RAM	512MB	1024MB
Ethernet	10/100Mb	10/100/1000Mb
Storage	Micro SD card	SD card

This shows that the Banana Pi has a number of improvements over the Raspberry Pi, specifically a faster processor (with an additional core), an extra 512MB of RAM and gigabit Ethernet. It also has a number of features not on the Raspberry Pi

including, significantly, the addition of a SATA port (and a power adapter to drive a 2.5" SATA drive). This means that the Banana Pi can actually power and run a laptop SATA drive, opening up some faster storage options than USB 2.0. These improvements could make the Banana Pi a better proposition for a home NAS or media centre. I'm not saying the Pi cannot perform that role successfully (it does in my house currently), but on paper, the Banana Pi should be able to offer some improvements on the Raspberry Pi's performance.

All of these additional features don't break the bank either – the Banana Pi can be purchased for the same price as a Raspberry Pi. I bought mine from NewIT in the UK for £30, though I did spend some extra to get a certified 2A power supply, rather than rely on the USB chargers I had already, because the additional features of the Banana Pi can require a larger power draw than the Raspberry Pi. While the Banana Pi is similar to the Raspberry Pi, it's slightly larger and therefore will not fit in the same cases or fit all the same accessories. Bear this in mind when ordering one.

The Banana Pi is as easy to use as the Raspberry Pi. The operating system and start-up data is contained on an SD card. The Banana Pi maker, Lemaker, has a number of download links on its website to various versions of the Linux that can be used. Simply changing operating systems is as easy as writing a different image onto the SD card. While there isn't a large community currently for the Banana Pi, there are a few forums and places one can go to for help if needed.

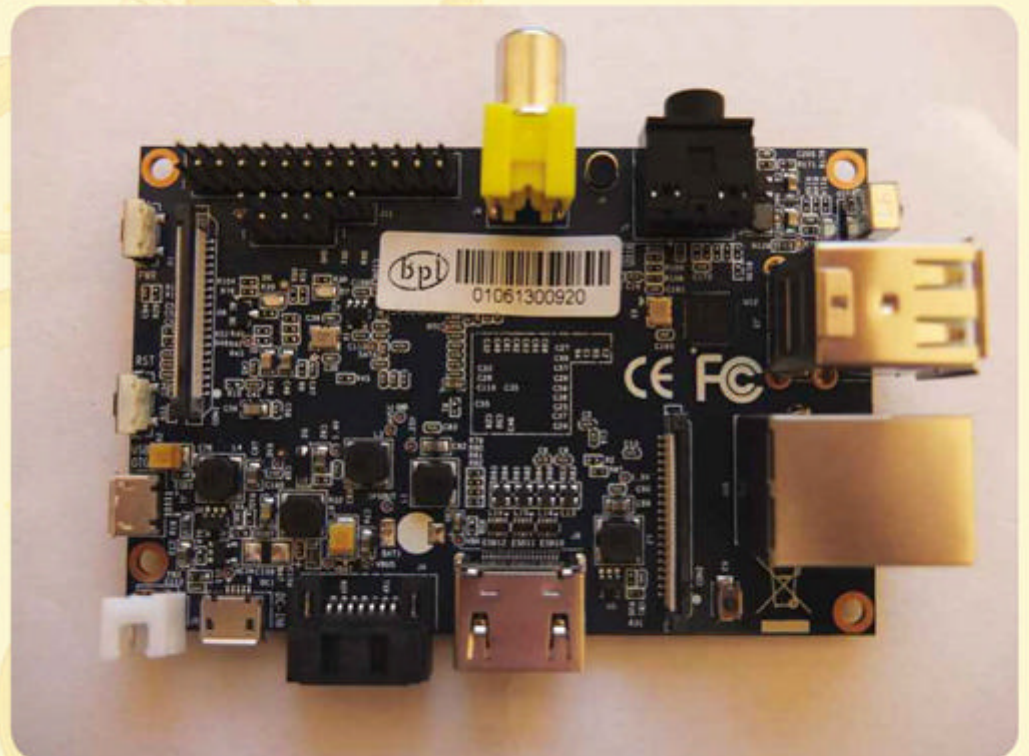
In this regard, the Banana Pi is almost identical to the Raspberry Pi and should, if the performance is better, be a worthwhile investment.

Performance

How does the Banana Pi compare to the Raspberry Pi? A number of benchmarks can be run to test the performance and compare against the original Pi.

In both cases, Linux (Raspbian for both tests) is installed on a 16GB Class 10 SD card, and on boot up, the file system is expanded to fill the whole drive. This will allow the later tests to take place.

To test the performance, various software is installed. The majority



Computer	Sysbench (1 Thread)	Sysbench (2 Threads)	7Zip Compression	MP3 Encode	OpenSSL
Banana	273.8726s	136.0694s	597 MIPS	162.98s	6.60 signs/s
Raspberry	500.8182s	501.6790s	191 MIPS	374.99s	1.90 signs/s

of this is accomplished using programs already on the Pi and my Mac (Linux will have these programs built in as well). However, other results are gathered from the Phoronix Test Suite. These are all in the Raspbian repository.

CPU Speeds

To test the CPU, a few different tests are run. These use a range of tests; sysbench, for example, benchmarks the CPU with a view towards running a database server:

```
sysbench --test=cpu run --num-threads=1
```

And the Phoronix tests are run using the following commands:

```
phoronix-test-suite benchmark pts/  
compress-7zip  
phoronix-test-suite benchmark pts/  
encode-mp3  
phoronix-test-suite benchmark pts/  
openssl
```

Each command is designed to test various aspects of the Pi that might be

used day to day. For example, the Pi might decompress a zip file, encode an MP3 (unlikely but possible) or use OpenSSL to sign code or websites.

These commands give the following results. In all instances, other than the 7Zip compression and OpenSSL benchmarks, smaller values are better.

These benchmarks only give an indication of real-world performance, as benchmarks can never fully replicate day-to-day use. However, Phoronix

Pi Flavours

The Raspberry Pi was initially released in two flavours: the A and B models. These differed in that the B contained two USB ports and a 10/100Mb Ethernet port. Both started off with 256MB of RAM, but the B was later updated to 512MB. Recently, the Raspberry Pi Foundation released the A+ and B+ models, which tweak the initial design and replace the SD card slot with a micro-SD slot and add an additional two USB ports onto the B+.

The Banana Pi also comes in two flavours: the Banana Pi and the Banana Pro. The main difference is that the Banana Pro comes with a built-in wi-fi adapter.

“ For the same amount of money, getting a Banana Pi over a Raspberry Pi gives a number of advantages ”

benchmarking does try to demonstrate as closely as possible how the computer will perform, by using benchmarking tests that use everyday tasks.

The results of these tests show that the Banana Pi clearly has an advantage over the Raspberry Pi in terms of computational power. Note, that the Raspberry Pi 2, which has recently been released, may have better benchmarks (see boxout).

Network Speeds

To test the network speeds, I ran a few tests. To maximise the speeds, all networking is done on a wired network from my Mac to the Pi, through my Virgin Media router. While I’ve tried to minimise network traffic while these tests are run, such as turning off Dropbox and other cloud programs, the tests may have been affected by other network traffic.

The first would create a file using the dd command to create a 1GB file on a Samba mounted folder.

This is achieved with the following command:

dd if=/dev/zero of=Test.file bs=1g count=1

This creates a file of empty data at the location specified. This will be created on the SD card of the Pi, though you could specify a location on an attached drive – on the Raspberry Pi, this is likely to reduce the speeds even more, as this shares the bandwidth with the networking port, so you’re downloading the file and trying to write at the same time.

In addition, I’ve performed an rsync operation, copying a copy of a film from my iTunes folder to the Pi’s to see how long transferring a file would take, and I’ve performed another sending my ebook folder to the Pi. Both features are reminiscent of the network traffic a NAS might undergo. The movie file is 4.17GB and the ebook folder is 1.68GB, with

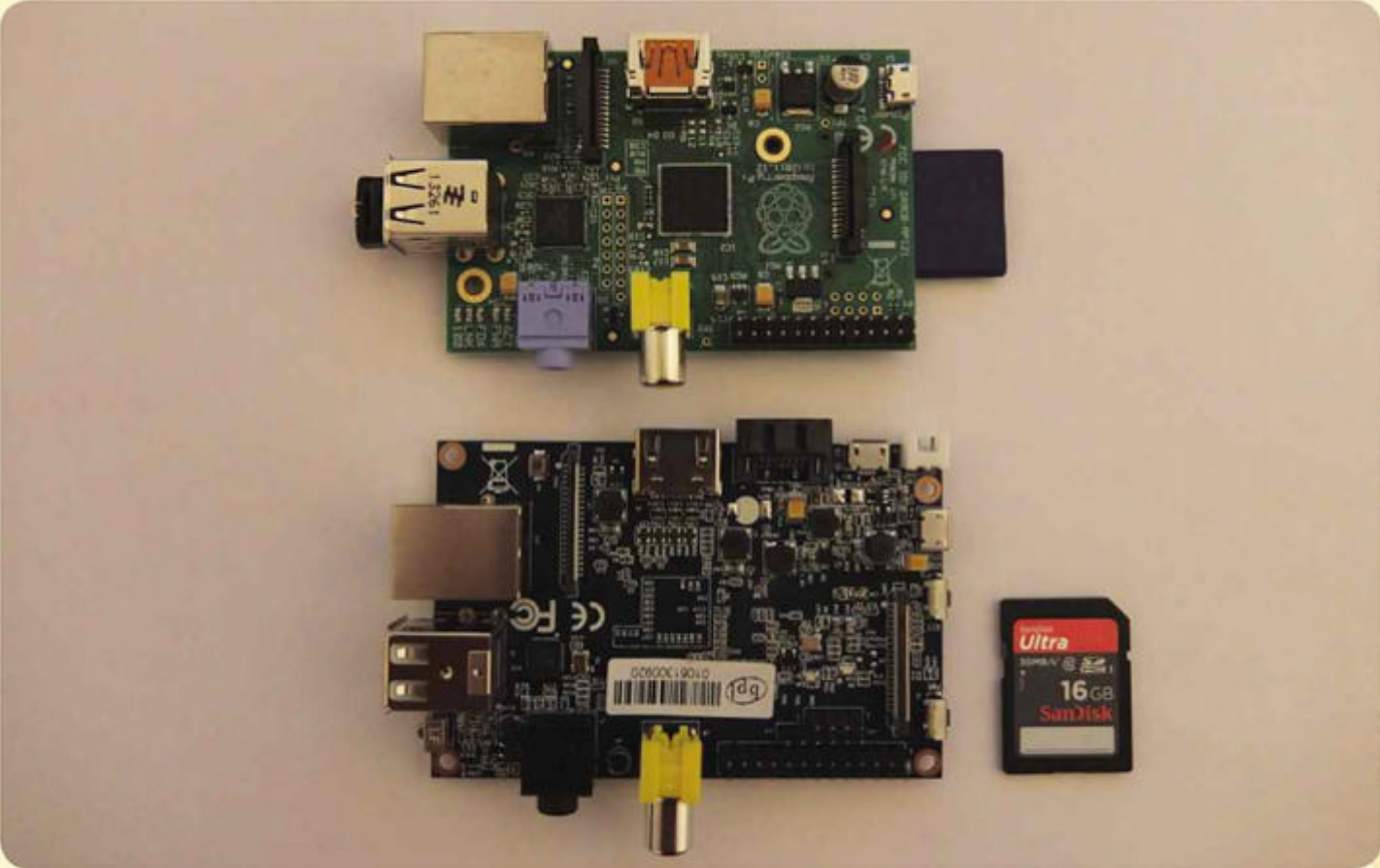
Computer	dd (SD Card)	Movies	Ebooks
Banana	39.5s	5m 0.6s	2m 37.4s
Raspberry	103.6s	12m 25.6s	5m 57.2s

1,092 items in the folder. These are copied to the SD card, rather than an attached USB. Timing was achieved with this command:

time rsync -av --progress /file /NAS/ Location

Raspberry Pi 2

During the writing of this article, the Raspberry Pi foundation announced the production of the Raspberry Pi 2. This differs from the original Pi in that it contains a quad-core 900MHz CPU (compared to the 700MHz single-core in the original) and a 1GB RAM. The increase in power of the CPU could potentially mean that the newer Pi is able to outperform the Banana Pi in terms of computation.





Power Draw

Both Pi units are low-power, single-board computers that draw a fraction of the power of a desktop machine. However, the additional features of the Banana Pi come at a slight cost in terms of power draw.

While this is a large percentage in terms of value (36%), in general the value is significantly less than that of a full-size PC. It does mean, though, that the Banana Pi would perhaps not be the best option for a battery-powered project, unless the extra performance is required over the Raspberry Pi.

Conclusions

While this test wasn't able to assess the SATA drive functionality, it does show that the Banana Pi has a number of advantages over the Raspberry Pi.

The CPU testing shows that the Banana Pi's dual-core CPU offers a number of advantages over the standard Raspberry Pi. Even with the Banana Pi restricted to using a single core for some of the testing, the Banana Pi provides better results in all instances. While these don't really compare to an Intel- or AMD-powered desktop, the smaller machine that costs the same as the original Raspberry Pi provides a better experience. However, as noted, it does draw more power than the Raspberry Pi, so the faster speeds do come at a price.

“ The Banana Pi has a number of improvements over the Raspberry Pi ”

The gigabit Ethernet shows that the Banana Pi has faster network access than the Raspberry Pi – perhaps not ground-breaking speeds, considering the potential maximums of gigabit networking, but it is a noticeable advantage over the original Pi. This is likely to be more pronounced when writing to attached USB drives, as the network bandwidth is shared with the USB bus on the original Pi.

Overall, for the same amount of money, getting a Banana Pi over a Raspberry Pi gives a number of advantages that are only really weighed up against the disadvantage of a slightly higher power draw and a smaller community base. Getting up and running with a Banana Pi is as easy as getting started with a Raspberry Pi and is certainly worth considering over the Raspberry Pi, especially, if it'll be put into areas where networking speeds are important, such as NAS work. **mm**

Computer	Power (max)
Banana	4.9W
Raspberry	3.6W

Phoronix Test Suite

Benchmarking means that you have to keep everything the same to provide the same test across a range of different computer profiles and setups. Phoronix attempts to do this by creating open-source benchmarking tools, available to all. These tools can be downloaded from the website **www.openbenchmarking.org** and can be run on Linux, Mac and Windows to provide a comparison against a range of different tests. However, not all benchmarks can be run on all operating systems.

Other ARM Based Systems

The Pi isn't aren't the only other single-board ARM processor machines available. A number of manufacturers have created single-board machines that are similar to the Pi. Cubiebox is a small, cube-shaped ARM-based machine that retails at a higher price than the Pi but features gigabit Ethernet, faster CPUs and more RAM, all in an included case. Beagleboard offer a range of possible alternatives, and Parallella offers a Pi-sized computer with 18 cores for high-performance computer use and learning. All of these have similar but different features to set them apart from the Pi.

DOES METRO

HAVE A FUTURE?

Mark Pickavance analyses the direction that Microsoft is taking and if this will deliver a future for its tablet environment

With Microsoft offering a zero-dollar pricing for Windows 8 on 9" devices and smaller, many are wondering if its vision of muscling into Apple and Google's mobile platform market might just be possible. But before that can happen, Microsoft's tablet interface and apps have numerous other hurdles to overcome.

Return To Sender

After lots of initial blustering from Microsoft after the launch of Windows 8 and the departure of its chief architect, Steven Sinofsky, the general view projected by the company was that the tiled interface and full-screen apps probably went a bit too far.

In hindsight, selling an OS whose major feature is touch when 99% of the systems out there don't have that technology seems broadly bonkers now. And the fact that touch and full-screen applications aren't really suitable for typical desktop PC work, Microsoft's traditional homeland, obviously didn't register at its decision making level sufficiently.

As with Vista before, Microsoft needed to move smoothly from 'This is the best version of Windows yet' to 'We've made a horrible mistake, and we'll fix it ASAP'.

But the reality is that Windows 10 will turn up three years after Windows 8 launched, which is roughly the time it was always destined to arrive.

As with any battle lost, the losing side retrieves what resources and honour it has left and retreats to fight another day.

That's exactly what Microsoft did, deciding what parts of Windows 8 were worth hanging on to and those bits it's less keen on saving. Very early on in this process, Microsoft made the call that it wouldn't ditch the Metro (Modern, Win8, whatever...) applications and their associated interface; instead with Windows 10 it would try to make these things relevant to the desktop user.

But to truly understand how they can turn this around, it's important to appreciate why this solution hasn't chimed with tablet owners and software developers.

Why Microsoft Isn't Big In Tablets

With the Metro interface and tablet systems in the wild for more than two years, it must worry Microsoft that they've not been a huge success. Is this a brand issue or is there a deeper problem?

Here are just some of the reasons that Windows isn't punching its weight in the tablet or phone market.

The Microsoft Store

Very early on when it first appeared on the Lumia phone range, I noticed that the entire structure of the Metro application store seemed (and I'm being kind here) amateur.

Not only was it difficult to find things, it was also hard to find out what the actual apps did or really any solid information about them. It was assumed by many, me included, that when this progressed to Windows 8 it would radically improve, along with a massive expansion in available applications.

► The HP Stream 13 is the logical replacement for the PC notebook, with the added bonus that it can be converted into a tablet when required. Will people buy these and embrace the Metro application ecosystem, or will they just use it to run Chrome and access Google's services?



▼ The HP Stream 8. Built around Intel's quad-core Z3735G Atom processor, it comes with Windows 8.1 with Bing, 32GB of RAM, 3G, a year's worth of Office 365 Personal, 1TB of OneDrive space and a 1200 x 800 IPS 8" multi-touch display. All that costs just £159



Microsoft has promised to fix this, but surely unification should have been a priority from the outset?

According to the latest figures available, there are currently some 585,000 apps in the combined phone and Windows 8 stores. However, that number gets rapidly whittled down when you consider the amount of overlap between the two, multiple releases of the same app (as in 'lite' and 'pro' versions), and a large number of either abandoned or never downloaded apps.

There are roughly 200,000 Windows 8 Metro apps, which compares with about 1.5 million Android apps and about 1.4 million iOS ones. That's a big deficit, but Microsoft users would probably be happy if they had a solid selection of good-quality apps. Unfortunately, they don't.

One website covering the woes of the Microsoft store in August 2014 described it as "a Cesspool of Scams", where numerous applications purported to be legitimate wares were designed purely to entrap the unwary.

What made this worse was Microsoft's very odd choice to initially ignore this proliferation and the number of critical apps that aren't on this platform that users would invariably search for.

Since then, Microsoft has made a greater effort to remove scam applications, though why it allowed it to get in such a mess it's never attempted to explain.

The Microsoft store and the vast majority of contained apps aren't going to convince anyone to ditch Android or iOS, at this time.

iOS And Android

The tablet market was created by Apple, when it convinced a huge number of people that \$499-\$849 was a reasonable price for a computer built from phone parts that didn't come with a keyboard.

It's better on Windows 8.1, but it's not as slick as either of the main competing platforms, and it still isn't easy to find the important applications you want.

And, a bit unexpectedly, it isn't the same store for Windows 8 as it is on the Windows phones or the Xbox One, confusingly.

“ As with any battle lost, the losing side retrieves what resources and honour it has left and retreats to fight another day ”



“ One website covering the woes of the Microsoft store in August 2014 described it as “a Cesspool of Scams” ”

After a few years of total domination that, along with the iPhone, propelled Apple to be on the most profitable companies on the planet, Google came along with Android and made tablets more generally affordable.

Since then, Apple's market share has dwindled somewhat, and Android is now the dominant force, since it delivered a good app selection and a much greater range of hardware choices.

The problem these competitors represent is that they very effectively throw a blanket over the tablet market, providing a solution for almost every potential customer out there. Apple is dominant in a certain affluent sector and has even made some headway into the business sector, where BYOD (bring your own device) has made the iPad a supported device on many corporate networks. Android, in its many varied brand forms covers just about everything else, from ultra-cheap almost disposable mini-tablets to 28" touch monitors. There is

truly something for everyone and at whatever price they can pay.

With two such powerful companies occupying tablet space, is there really room for a third player that isn't just for niche customers?

Microsoft Surface

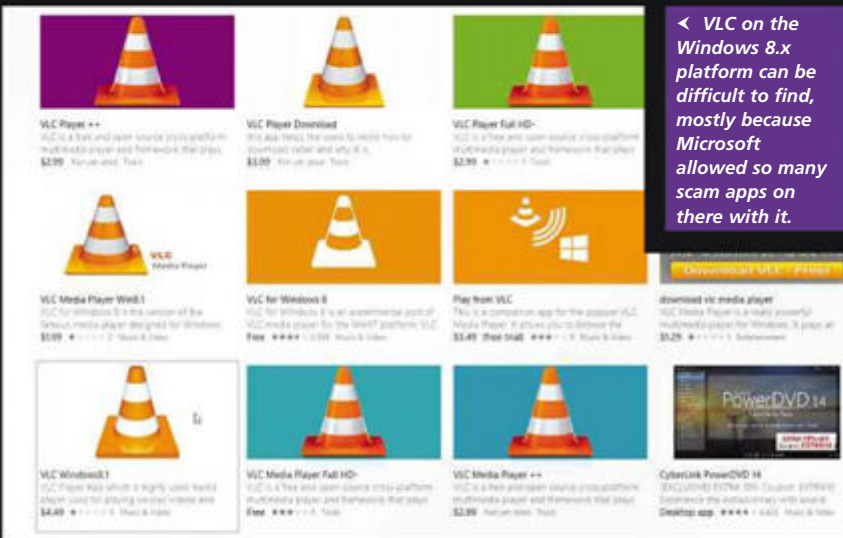
Traditionally, all new Windows releases are very much a partnership between those who make PCs and Microsoft, through a mutual appreciation society, because in the past new Windows meant new a PC to run it. Those that sold hardware usually made a killing on replacement systems and upgrades.

With Windows 8, things were different, because Microsoft decided with Surface to compete directly with its partners, who weren't exactly thrilled at this development. Logically, PC makers decided to look after their own and didn't promote touch devices, and they also pandered to the user instinct to stick with Windows 7.

Their concerns about Surface were generally unfounded, because selling it was into a market that was highly price sensitive. In this context, the Surface seemed both expensive and rather limited as both a tablet and a PC.

What made things worse was the curious choice to make the entry-level versions ARM-based, stripping them of their full PC status. What really confused some people who bought the original Surface and

▲ Surface and Surface 2 owners won't be thrilled to hear that they won't be progressing to Windows 10 alongside desktop PC owners



▲ **Microsoft's plan is a bold one – so bold that it's chosen to support other platforms with its touch-based Office ahead of its own**

Surface 2 machines is that Windows 8 on them had a desktop, even if you couldn't install any desktop applications on them.

Microsoft resolutely refuses to talk sales numbers for Surface, but it took a \$900 million write-off on stock for the first batch in its accounts. The second release didn't make things substantially better, even if the machines generally got a better reception. And since then, it canned the Surface Mini just 48 hours before launching it, has released a high-end Surface Pro 3 and officially ended the company's excursion into ARM technology on tablets.

While describing the Surface Pro 3 as a success, Microsoft still won't actually substantiate that claim with any concrete sales figures. And it's also admitted that the ARM-based hardware it's sold won't be invited to make the move to Windows 10 along with its x86 products.

Prior to the launch of Surface, analysts saw Microsoft gouging a 20% or greater stake in the tablet market in the first three years, but the reality is that in 2014, Windows tablets made by all hardware makers represented just 4.6% of the overall market. These are the sort of numbers that destroyed BlackBerry in the smartphone market, and its percentage of the phone sales is even lower.

The currently optimistic projections are that Windows tablets might reach 11.4% by 2018, a full six years after Windows 8 first launched.

Surface was meant to be the flagship product to usher in a new direction for Microsoft, and instead what

it achieved was to annoy its partners and demonstrate it didn't really understand the tablet market.

Windows 8 Public Perception

Even before Windows 8 was officially launched, it was taking heavy flak from some quarters, mostly for the tiled menu and touch focus. What really annoyed many users is that Microsoft released a Public Preview ostensibly to get user feedback. Once it got that, it then entirely ignored it.

People didn't like the Charms bar, the lack of a Start menu and a whole slew of other things, but they all made it into the release version of Windows 8 regardless and almost entirely unaltered from the preview.

At the time, the company made the argument that it was a radical departure that people would learn to love, yet few did. Instead, Windows 8 mostly got the sort of bad press that is difficult to shrug off in the opinion-driven world of technology.

Under its much criticised skin, Windows 8 isn't that different from 7, which was itself a reworking of Vista. The difference is that generally people didn't like two of those operating systems, and they refused to buy into almost any aspect of Windows 8.

Once that mud stuck, however hard Microsoft scrubbed, it wouldn't come off, and eventually even it had to accept that Windows 8 wasn't popular. That failure tarnished Windows as a brand and also undermined Microsoft's ambitions for the tablet and mobile market.

Google

Google's multi-pronged attack on Microsoft's entire model has really started to hit home in the past couple of years. Its strategy is entirely based on distributing its services as widely as possible, and it's become exceptionally good at it.

This has effectively moved the technology goalposts, because where five years ago a popular software platform needed to run on Windows, these days it can be completely platform agnostic. Microsoft's whole model was based on controlling Windows, because without that you couldn't run the apps you needed – chief among them its own Office suite.

Proof of how much these things have altered can be seen in the dramatic growth of Chromebooks, especially for educational use. It was always argued that Linux would never succeed in the desktop and laptop market, because these systems could never be 'Windows'. But that missed a critical point, because what people use computers for today is to access the internet and its services (often Google), and that function is no longer the preserve of Windows or Intel's x86 architecture.

The reality check for Microsoft is that while many people still buy Windows machines, out of habit and availability, they then use them to access Google's services. Therefore, a tablet is defined by how well it gives you access to those services, even if Microsoft has competing versions that aren't as popular.

Timing

I was one of the people who suggested that the iPad would fail, because from my perspective I couldn't envisage people

paying that sort of money for a very limited device. I'd also factored in the tablets that Microsoft pushed a decade earlier, which had stotally failed.

But what Apple got so right was the timing, because the arrival of the iPad coincided with a massive expansion of internet consumption, for which these devices were ideal.

Having Apple create the market, Android tablet makers have been able to access those people who wanted similar functionality but who wouldn't pay the Apple premium.

Had Microsoft entered the market earlier, possibly about the time that Android did, it might command a bigger slice. But by the time Surface arrived, the growth in tablet sales was already flattening out, and last year Apple iPad sales actually declined.

When any market is undergoing massive expansion, there are niches for many different products, like the 8-bit computer market of the 80s. The tablet market has now matured, so breaking into it was always going to be more difficult, since buyers are now on their second, third or more devices.

The mistake Microsoft made was actually in respect of its smartphones. Had it developed the Windows Phone 7 technology a couple of years earlier, it would have migrated it to the tablet quicker, and it might not have missed the critical part of the tablet growth curve.

Being late to this party and dropping the mobile ball entirely is what it's paying for now.

Not Done Yet

Given the very modest market penetration that Microsoft has achieved, one would reasonably think that it would reconsider its overall tablet strategy.

Yet you only have to look at Bing and how that's entirely failed to usurp the search engine market, despite the money thrown at it, to realise that Microsoft doesn't do retreat well.

With Windows 10, it's doubling down, not only in releasing another touch-based OS, but also with its plans to unify its app store and deliver a common core across all its devices – PC and mobile.

That makes Microsoft seem very single minded, but it's also hedged some of those bets by supporting both iOS and Android with its mobile Office suite.

At stake here is the continued relevance of Microsoft in the future, and at this point it looks very much like the company is willing to sacrifice Windows or at least the profit it makes to achieve that.

It's a massive gamble, though clearly some at the company must believe it has a chance to turn around the company's fortunes if it only sticks at it.

Why It Might Succeed

Actually, at this point it has failed, so really what we're talking about is the likelihood of a Lazarus-like return from the dead. There are some positive signs, but do these actually constitute the start of a turnaround?

Since Microsoft stopped charging hardware makers for Windows 8 on smaller devices, the number available has skyrocketed. Today, it is possible to get a 10" tablet with 32GB of storage running Windows 8.1 on an Intel x86 Atom processor for £150 or less.



“ Actually, at this point it has failed, so really what we're talking about is the likelihood of a Lazarus-like return from the dead ”

▲ Metro apps seems to be a massive opportunity for crapware installs by the PC makers, rather than anything users might want

When you factor in that these come with a single-user, year-long subscription to Microsoft Office 365 Personal and 1TB of OneDrive storage, then that is one hell of a deal. Incidentally, there's a trick where you can buy a one-month subscription to Office Home (five user), and it will stack on Office Personal for just £7.99, making this an even more amazing offer.

When you combine that sort of aggressive marketing with Windows 10 being free for all home Windows 7 and 8.x users (not corporations, though), then suddenly the picture looks much healthier. Or at least it does in terms of the number of potential systems that Microsoft might exploit with its tablet ecosystem.

With more systems out there and some significant effort going into its software development tools, Microsoft should be well placed to encourage the quality of Metro apps that users might reasonably embrace.

Where Surface was aimed at matching Apple, these new cheap devices are toe to toe with Android, except they also can run x86 applications, which might be critical for some users.



^ Windows 10 is set to allow you to rescale Metro apps, though it doesn't make them as elegant or as screen efficient as desktop apps

“ Google’s multi-pronged attack on Microsoft’s entire model has really started to hit home ”

However, as Microsoft pushed heavily with the ARM-based Windows RT machines, surely the point of these devices is that they don’t need the crutch of Windows desktop apps, as the touch tablet environment is what they’re really built to support.

If lots of these devices get sold but very few people use the x86 capabilities because the screens are too small and they’re not touch friendly, then that’s not the victory Microsoft is looking for. Delivering even more devices for people to access Google services isn’t a positive result for the company or its app ecosystem.

Why It Might Fail

The worst scenarios for any person or company are those where the destiny is in the hands of others, and the future success of Microsoft’s tablet strategy probably falls into that category.

For it to succeed from here, probably both Apple and Google need to make a disastrous mistake that would actually dwarf the one Microsoft made with Windows 8.

As the minor share holder in the tablet market, it’s not well placed to make headway, as the two other parties aren’t going to make it easy for them.

Apple, with the possible exception of a few apps like iTunes and Safari on the PC, doesn’t support any platforms other than its own, so many of their home-grown tools are unlikely to appear on either Android or the Windows tablet platform any time soon.

Google isn’t quite as isolationist, but it doesn’t offer its apps on Microsoft’s mobile platform, and it seems unlikely to ever embrace Metro.

It can make that choice, because it succeeds on the Windows platform without needing Metro apps and

takes the view that if people want its services, they always have web options.

Microsoft, however, can’t be so choosy, and the touch version of Office arrived first on Apple iOS and then on Android, but it has yet to appear on its own tablet platform, oddly enough.

The Office division is therefore being very business orientated in supporting the competing platforms ahead of Microsoft’s own. That hints, perhaps, that it’s not 100% confident that much of a market for the Metro version exists at this time.

That lack of confidence also extends into the other parts of Microsoft, if rumours suggesting that it’s done a deal with Samsung to put its apps onto the next Galaxy phone are true. If Microsoft software is available on Android and iOS, then what is the compelling reason to go to its own mobile platform?

In a desperate attempt to get its products in front of people, it might be undermining its own endeavours elsewhere. If it doesn’t believe wholeheartedly in its future plans, why would anyone else buy into it?

Final Thoughts

As we progress towards Windows 10, there is clearly some nervousness about the whole Metro side of the Microsoft equation and if it will ever fly.

At this time the majority of users of Windows 8 on the desktop don’t use these features at all, and the indications are that they wouldn’t even if the quality and selection available were improved.

Windows 10 will introduce Metro-style apps to the Windows interface, allowing them to be rescaled like a desktop app, but will that make them any more popular? I doubt it, because desktop users inherently don’t need them and have both web-based and proper x86 apps to use instead.

Therefore the only potential salvation must come from tablet and phone users, as they’re more likely to use them. For this to gain any momentum, the quality of the apps available needs to radically rise, and the support of the most popular titles on Android and iOS is critical.

This could make the upcoming Microsoft Build conference and the story it tells developers the pivot point around which the fortunes of this technology will rotate.

Microsoft has a reputation among developers that stems from the many years when the company called the shots on API and SDK releases, ignoring entirely the wishes of those in the development community adversely impacted by constant changes.

With Windows’ entirely dominant ecosystem, it could afford to be cavalier with its developers’ wishes, but the boot is most certainly on the other foot now.

Without the support of developers its previously annoyed, customers its irritated and, ironically, competitors its previously tried to crush, it’s almost certainly stuffed.

On the balance of probability, that would make its Metro model nothing more than another technical curiosity in the history of personal computing, rather than the foundations of another Microsoft dynasty. **mm**



Do You Need A Download Manager?

Yes, there are many benefits, even with today's fast broadband internet connection. **Roland Waddilove** tries four free tools

Back in the days when everyone used dial-up internet through a modem, a download manager was an essential tool to have on your computer. The internet connection was slow and unreliable, and connections were often dropped. A download manager enabled you to fetch big files much more easily. Most people today have the luxury of fast broadband internet access, and with the rise of fibre connections you may wonder whether a download manager is still needed.

There is no doubt that the importance of the download manager has declined in recent years, and many people can manage quite happily without one, but they still have their uses, and in this article I'll examine some of the ways in which they can help, no matter how good your internet connection is.

Although dodgy internet connections and download reliability problems have mostly gone away, the files that we access on the web are much larger than they used to be. *Minecraft* is 0.6GB, *Call of Duty 4: Modern Warfare* is 1.37GB, Linux Mint 64-bit KDE is 1.6GB, openSUSE Linux is a DVD-filling 4.7GB, to mention just four popular programs you might have downloaded to your PC. When downloads are measured in gigabytes, a download manager utility can help in many ways.

Scheduled Downloads

At one time, you could only download a couple of hundred megabytes during the peak hours of the day from 4pm to 11pm before you were penalised. This took the form of limiting your bandwidth, which slowed internet access by as much as 75%. It's good to see that many popular ISPs no longer have traffic management systems, and they do not limit the bandwidth at peak times of the day. This may not be true of all ISPs, though, and you should check the terms and conditions, which can usually be found on their websites.

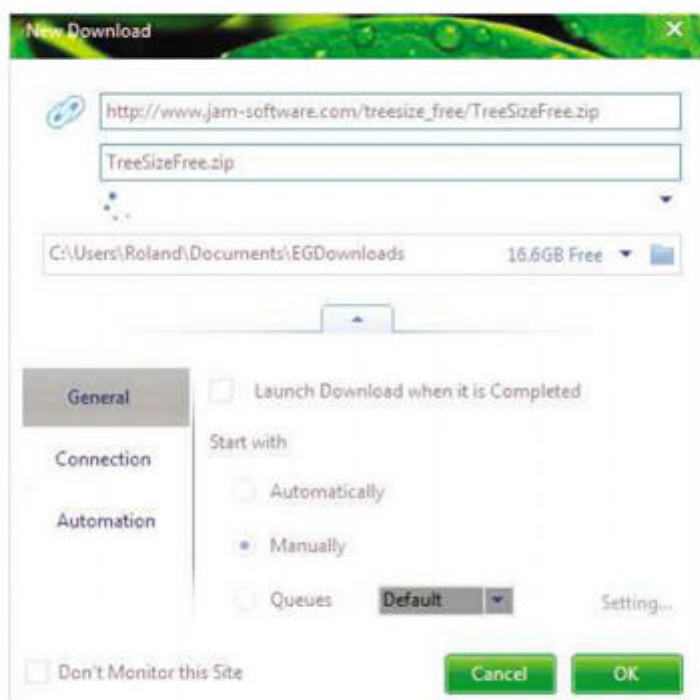
If you have an old contract with your ISP and a regular broadband connection, the old terms and conditions with bandwidth limitations might still apply, so don't assume you can download as much as you like at peak hours without checking.

A download manager enables you to schedule downloads to occur at a time of the day that is most convenient for you. This is a core feature of all download managers, and it's one of the most useful. You can create a list of files that you want to download and then schedule them to occur when you're asleep at night or out at work during the day. Most download managers have another useful feature, which is the ability to switch off the computer when all the downloads have been completed. You can therefore set it going and go to bed or to go to work, and your PC will fetch the files and then switch off.

Scheduling downloads avoids peak hours, and even if your ISP does not impose restrictions, there are other reasons for avoiding peak hours. During the evening, many people watch online movies and TV using services like Netflix, BBC iPlayer and so on. If you're downloading big files from the internet on your computer while someone else in your home is watching streaming HD video, it might cause them to experience problems like stuttering and buffering, even if you have a reasonably fast broadband connection. Schedule that 4GB Linux distro download to occur later at night, and you'll avoid the problem.

Free Download Manager lets you schedule a download when an item is added, or you can add downloads and then set the schedule later. It can be set to any time and date. The download can be repeated on a schedule, which could be used for a file that's regularly updated to ensure you always have the latest version. It can shut down the computer when downloads are complete.

Download Accelerator Manager has a scheduler, but it's not quite as comprehensive. It doesn't repeat downloads, for example,



▲ Downloads can be started immediately, added to a list or queued and scheduled for later

but downloads can be set to start at any time and on any day. The PC can be shut down or put into standby or hibernate mode when downloads are complete. Download Accelerator Plus has similar facilities, and there's a global scheduler that enables you to set a time of the day or night when downloads will start. It's straightforward to set up and add scheduled downloads, and the PC can be switched off when the last one has finished.

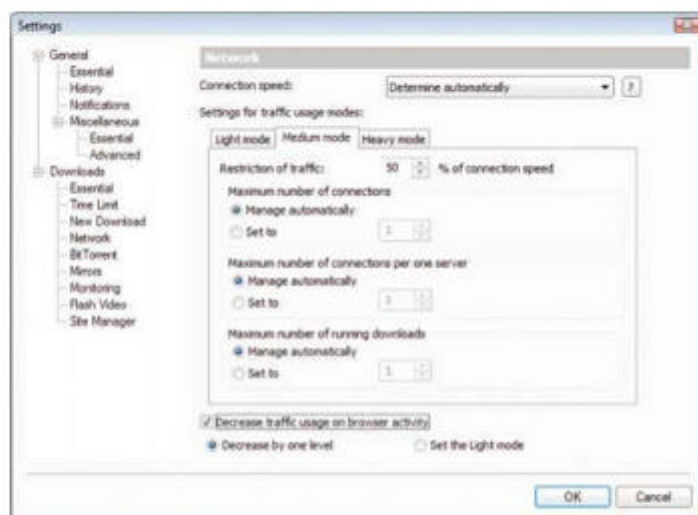
EagleGet has scheduler, and instead of downloading immediately or adding a file to a list, it's added to a queue. The queue can be started and stopped at set times, so you can easily define the hours of the day or night during which downloads take place. It doesn't allow individual files to be scheduled, though.

Bandwidth Management

Scheduling downloads to occur when you're asleep or out is not always desirable, and sometimes you want the download immediately rather than waiting until tomorrow. A large download, such as a Linux distro or movie, can put a heavy load on the internet connection, and doing anything else on the computer that uses the internet, like browsing the web or fetching your email, can be slow and tedious. Bandwidth management solves the problem.

Some download managers can set a different download speed for each item. Setting a low speed means that you can browse the web, watch YouTube or Netflix videos and so on at the same time. This is a useful technique, and downloads trickle down in the background. You could even set a large download, like a Linux distro, to run slowly in the background all day while smaller ones download at normal speed.

Free Download Manager and Download Accelerator Plus have global user-configurable connection modes that determine how much bandwidth the program uses. Free Download Manager is easier to use, though, and you can instantly switch modes by clicking buttons in the toolbar. You can also set individual speed limits for each download. EagleGet has one global setting, which you have to go into the settings to change. Download Accelerator



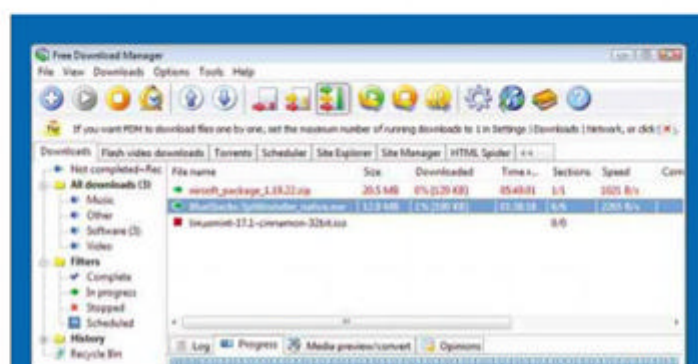
▲ Three modes with different bandwidths can be set in Free Download Manager

Manager does not have any bandwidth management at all, and it downloads at maximum speed all the time, which is disappointing.

Categorised Downloads

Is your Downloads folder an untidy mess? A common problem is that you download lots of files and then forget them or don't have time to view or examine them all. The Downloads folder fills with files with obscure names, whose purpose you have forgotten. A download manager solves this by assigning downloads to subfolders. They typically have folders for software, music, video and other files. When adding a download, you can specify which folder to place it in, but even this isn't always necessary, and some programs can automatically assign the right folder based on the file extension (.exe is software, .mp3 is music and so on).

Free Download Manager categorises downloads automatically, and you can override the selection and choose your own folder. Instead of using your private Downloads folder, it stores downloads



Free Download Manager

Free Download Manager (freedownloadmanager.org) worked well with Firefox, and it installed an add-on and intercepted download links that were clicked in the browser. It did not work so well with Chrome. It opened Chrome during installation to add the extension but then froze. The solution was to manually install the extension from the Chrome Web Store and manually configure the integration. It provides a fine degree of control over each download and has an excellent range of features.

in C:\Downloads, which is irritating and is accessible to anyone who uses the computer. Download Accelerator Manager automatically categorises downloads, and although the Documents folder is the default location, you can easily change it to your Downloads folder.

Download Accelerator Plus downloads to a single folder in Documents by default, but it's possible to enable categorised downloads in the settings. The program will automatically assign a category, but you can manually select one yourself too.

Download Mirrors – Fastest Download

Many file downloads are available from several websites, and a download manager can examine these and select the fastest one. The sites are called mirrors, and it can be useful to find the fastest mirror if speed is important

Free Download Manager supports download mirrors, and you can manually add and configure them. You do need a bit of technical knowledge to do this, but it's possible. Download Accelerator Manager and EagleGet do not support mirrors, but instead download from the URL that is given. Download Accelerator Plus automatically searches mirrors and uses them where possible.

Security Issues

Most of the software on the internet is thankfully free of malware, but if you download a lot, you will occasionally come across a rogue program. Anti-virus software will check downloads as they're written to the disk or accessed afterwards. However, it's also possible to configure a download manager to use anti-virus software installed on the system to scan each download as it's completed. All the download managers tested have an option to pass the file to an anti-virus program for scanning. You need to go into the settings and configure it, but it isn't difficult.

Some download managers have extra security features, and Free Download Manager has a community feature that enables you to write comments about a download and to read what others have written. You can read them and see if anyone has reported that a download is malware. Not all comments are useful, but it is an extra tool for spotting bad downloads. Download Accelerator Plus lists the top downloads in several categories, and the user ratings for each program are a useful way to find good downloads and avoid bad ones

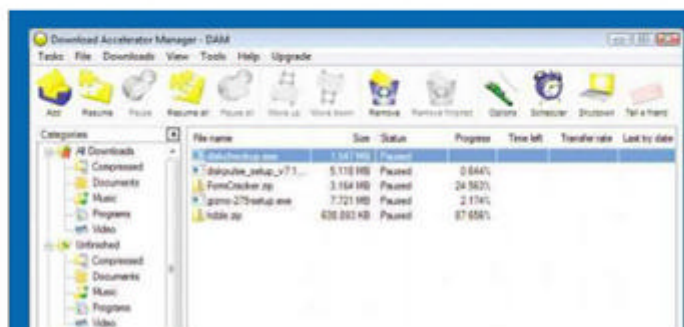
Video Downloads

Some download managers are able to download streaming videos in addition to files. For example, YouTube, Vimeo, Dailymotion, Facebook and others. Instead of streaming your favourite video clip yet again, you could simply play a downloaded copy stored on the disk drive, saving bandwidth and lessening the load on the website.

Although video downloading works well with the most popular websites, it doesn't work with all video sharing websites. There are also legal issues, because the videos may be copyright, or the terms and conditions of the website may not allow downloading. Be careful not to break the law when saving streaming videos.

Free Download Manager can download Flash-based videos from the web and convert them to several other video formats. You just copy the URL of the web page and paste it into the program. It lists everything it can find, and you choose the file to download, which is usually the biggest one. It isn't perfect, and adverts can cause problems; you might only download the advert and not the video.

Download Accelerator Manager has a media grabber function, and as you browse YouTube, for example, it adds the videos to a list. You can then download them either all at once or individually. It seems to cope well with videos that have adverts at the start,

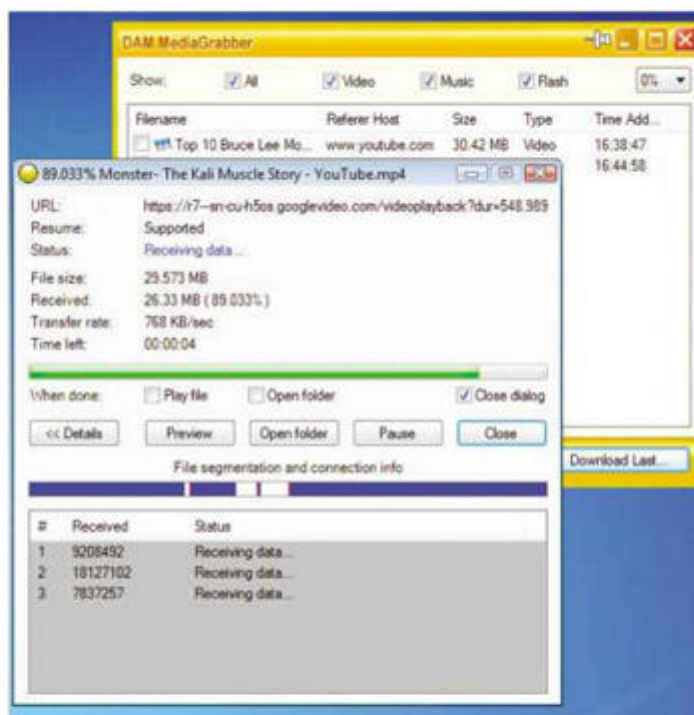


Download Accelerator Manager

Download Accelerator Manager (tensons.com) has fewer features than Free Download Manager, and it doesn't have bandwidth management, download mirrors or BitTorrent facilities, for example. It doesn't integrate into Chrome, which is probably a security feature of Chrome, but it's fine in Firefox. Download links can be always be dragged and dropped on the target in the bottom-right corner of the screen for unsupported browsers.

and it cleverly skipped them. The ease with which videos can be downloaded is the program's best feature, although you have to use Firefox rather than Chrome.

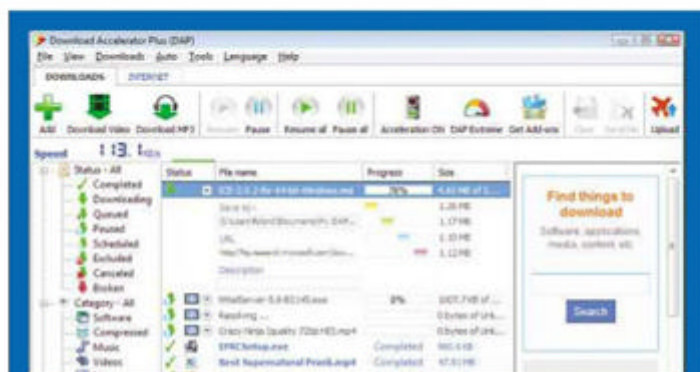
Download Accelerator Plus was also good at downloading online video, especially YouTube. You can copy the URL of the page containing the video into the program, but there was an even better way. On a page of thumbnails, such as a search result, you can right-click a video thumbnail and download it without even going to the page or watching the video. EagleGet is another good tool for downloading YouTube and other videos. It has a media sniffer function that detects videos and other files, and you can select and download media files linked to on the page. It's slightly better than the other tools for sites other than YouTube.



▲ Download Accelerator Manager lists the YouTube videos you view and can download them

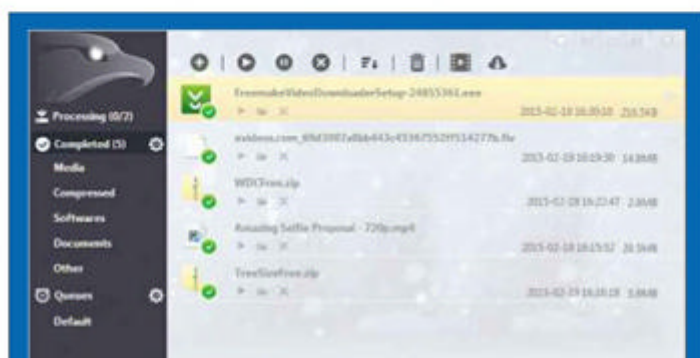


▲ **Download Accelerator Plus strips the audio from streaming videos and saves them as MP3s**



Download Accelerator Plus

Download Accelerator Plus (speedbit.com) has a good range of features. The free version has a large advertising panel, but there's a premium version costing £18.95 that claims to offer even faster downloads. It works with Chrome and correctly installs an extension, and Firefox is no problem as usual. Free Download Manager lets you configure downloads individually, whereas this utility only offers global controls.



EagleGet

EagleGet (eagleget.com) stands out from the others because of the non-standard interface. It is designed to be customised, and you can choose from several colour schemes and skins, and you can even load your own images to be used as a skin. One slightly irritating feature is that downloads start straight away while you're thinking about which options to set. There are pros and cons, and a small download is finished before you have set the options.

Music Downloads

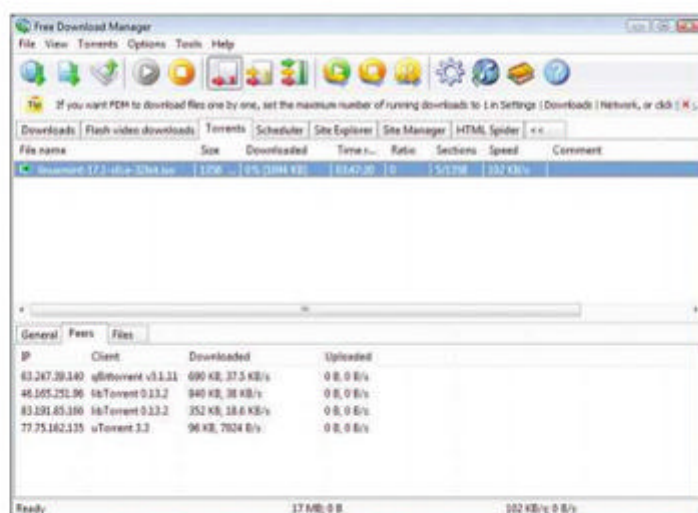
Free Download Manager and Download Accelerator Plus can both download streaming video from sites like YouTube and then strip out the audio and save it as a separate file in several different audio formats, such as MP3. As with video downloads, it isn't perfect and success is not guaranteed. YouTube is the best supported site for video, and music downloads from others may or may not work.

Be aware that most music is copyright, and while the facility to save music tracks in videos may be available in the download manager, it may be illegal to use it in some circumstances.

BitTorrent

BitTorrent is a type of file sharing networking protocol that works over the internet, and it's useful, reliable and good for large downloads. Linux distros, which are often over a gigabyte in size, are often available as torrents, for example. BitTorrent is the best way to download them.

Free Download Manager has BitTorrent facilities built in, and a torrent URL can be added or the torrent file can be saved to disk and then loaded into the program. It works well, and bandwidth settings and other rules let you determine the download speed. It has most of the features of a dedicated BitTorrent utility, so you don't need a separate program for torrents. Download Accelerator Manager, EagleGet and Download Accelerator Plus do not have BitTorrent support.



▲ **You can download large Linux distros via BitTorrent in Free Download Manager**

Final Thoughts

Not everyone needs a download manager, and people on fibre connections with unlimited downloads will find them the least useful. However, it all depends on the size of the files and how many people in your home are sharing the internet connection. Anyone not on fibre should definitely install a download manager. With download speeds of around 17Mb at best and possibly half this if you are unlucky, it's easy to overload the connection and prevent anyone else in your home from accessing anything while you're downloading.

Four free download managers were tested, and the open-source Free Download Manager was the best for general downloads. Download Accelerator Manager, EagleGet and Download Accelerator Plus were good at downloading online video. Which one you choose, if any, is ultimately dependent on what you need. mm



Social Media Apps For iOS

Get the most from your public persona with
**Keir Thomas's round-up of six of the best
social media apps**

Whether we like it or not – and quite a few people don't – the likes of Facebook and Twitter have redefined how we live our lives online, if not in the real world. In this week's apps group test, we take a look at several apps that enhance or provide access to social media services. Some provide cool new features, while others simply provide a way of creating and checking your updates without using the official apps.

As usual, all the apps reviewed below are available in the App Store and are free of charge. All were tested on an iPhone 6 Plus and a Retina iPad.

Hootsuite

It's not surprising that an app exists to aggregate your social media feeds in one place and also let you post to each service simultaneously. Add into the mix the ability to schedule posts for a future time/date and Hootsuite begins to sound very enticing.

You can connect to multiple Twitter, Facebook, LinkedIn and Foursquare accounts, and you also have the ability to connect to Facebook Pages – although annoyingly

this involves logging in with Facebook for a second time, at which point you're informed that Hootsuite has already been connected. The app quit unexpectedly while we tried to connect to LinkedIn, which might have been because Hootsuite connects via the actual web page entrances of the social media services rather than via their application programmer interfaces (APIs) or via iOS's own functionality. In other words, to get the data and post on your behalf, Hootsuite pretends to be a browser. It's a bit of a hack.

Even though an icon is provided, you can't yet connect Google+. Apparently, this is on its way, even though the app is over five years old. However, let's be honest: if you like chatting to a handful of people while tumbleweeds blow past, then you should move to rural Texas.

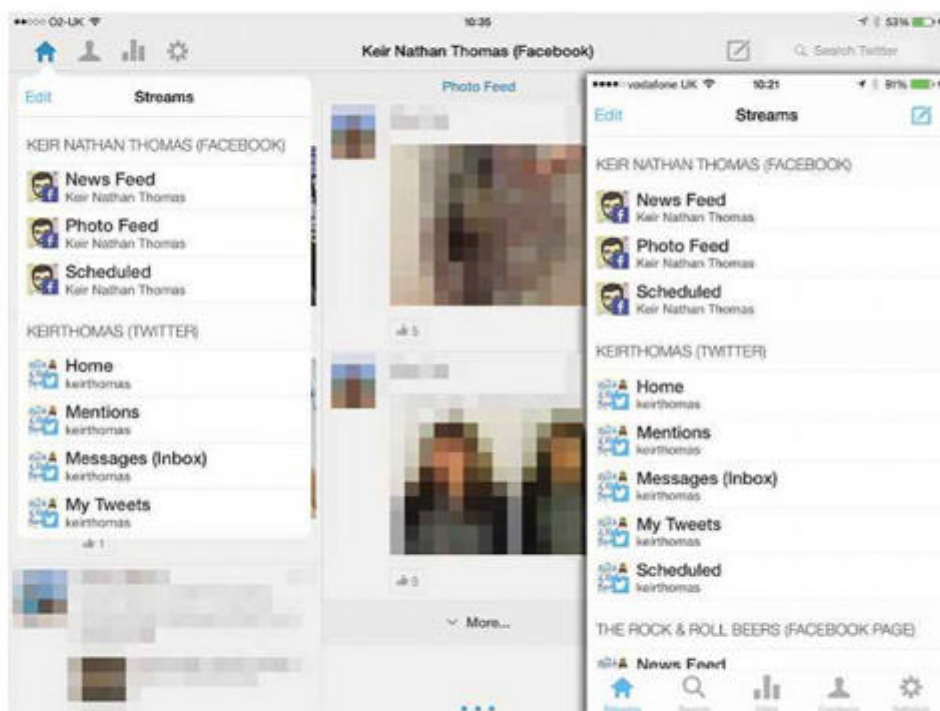
We're not sure if there's iCloud syncing or not. Following setup on our iPhone, on our iPad Hootsuite somehow logged into Twitter automatically (no Twitter account was already set up on the iPad), while Facebook required the same protracted setup procedure – with the result that we were told once again that we'd already authorised Hootsuite.

The app store description says that three accounts can be connected free of charge, but we had no problems adding five accounts – or 'streams', in Hootsuite's parlance. This might have accounted for some of the problems we had, but no warnings were given or instructions to the contrary. In fact, a little more hand-holding during the setup procedure would have been very welcome.

We were entirely unable to comment on Facebook postings on either iPad or iPhone. When we tried, we got the following error: "Unable to Post Message at this time. Please try again later." The same happened when we tried to Like something. If we tried to post to Facebook alone, we got the same message, but if we tried to simultaneously post to Facebook and Twitter, we were told the FB posting had succeeded – even though it disappeared into a black hole. The posting did appear on Twitter, however.

In other words, it's all a bit of a mess. In the world of apps, users shouldn't need to investigate problems or apply sticking plasters to fix things. Things should just work.

And this is a shame, because Hootsuite is a well designed app. On an iPad in landscape



▲ Hootsuite shows that good design and clever thinking mean nothing if the software is buggy and requires the user to fix silly problems

orientation, the screen is split into columns showing your Home stream (i.e. postings from you and others), Photo Feed if you're accessing Facebook (that is, postings with photos), Mentions if you're accessing Twitter (that is, postings that @mention you) and so on. On an iPhone, you can swipe left/right to move between these. Rather strangely, there's no way to aggregate the streams into one. You must individually check Facebook and Twitter and LinkedIn.

HootSuite stinks of an app that got off to a good start but which has perhaps not been given the love it needs in recent times. Give it a try if you want scheduled posting and a quick way to read up on postings – our issues with Facebook might be unique to us – but using Hootsuite didn't leave us with the best of feelings.

Pixable

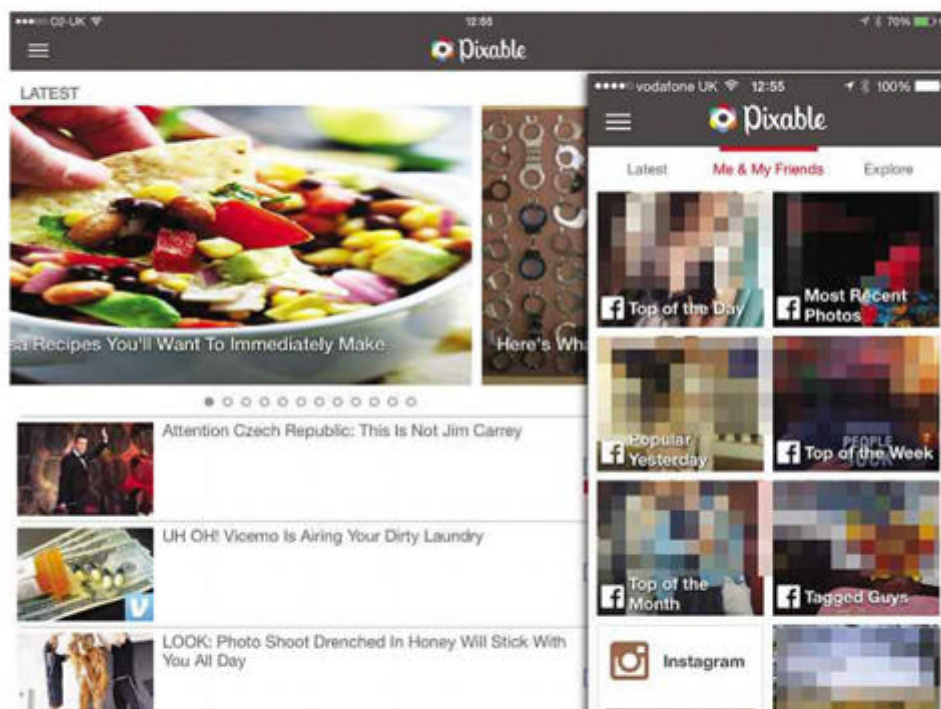
One of those apps with a genuinely intriguing premise, Pixable focuses on aggregating images shared on social media services. Obviously this is nothing new to the Instagram generation (a service that's supported within the app), but it's worth reflecting that a contributing factor in Twitter and especially Facebook's success is that they make sharing photographs easy and convenient. Incidentally, those are the only three services supported by Pixable. Google+ / Picasa, Flickr and users of sundry other services need to look elsewhere.

Setting up the app is easy, because it ties in with your existing Facebook and/or Twitter

login already set up on the system (and if these aren't set up, then Pixable demands you do so via the main iOS Settings app). The exception is Instagram, which Apple has not yet seen to support within iOS. Therefore, you must log in manually via Pixable. The use of existing logins on the system makes life easier but has a drawback in that you can't configure multiple accounts

from the same provider. You can only add one Twitter account to Pixable, for example, even if you have two set up on the system. However, set up on two devices is made easier because – rather sneakily – Pixable automatically creates an account for you when you log in via Facebook or Twitter and stores your authentication details in the cloud. This also means you can log into the Pixable website automatically (www.pixable.com), but we just hope storage of our details is secure.

Pixable isn't just about showing images from social media. It also operates as a kind of Reddit/Imgur site and presents popular pictures arranged into categories such as Funny, Cute, Celebs, Space and Astronomy and so on. On an iPad, these pictures dominate two thirds of the screen, while on an iPhone you can swipe between headings. And it's the Me & My Friends category most people will be interested in. The great news is that this has been implemented in a clever if questionable way. Pictures are arranged into categories such as Top of the Day, Most Recent, Popular Yesterday and so on. Tapping each then shows a grid of photos, and it's here you begin to realise that Pixable encourages a kind of voyeurism. It's pictures first and comments/descriptions if you want to read them. This voyeurism became especially evident with one of the default categories on my test installations: Tagged Ladies. This showed pictures from my social media feed in which females have been tagged. We



▲ Pixable provides an alternative way of accessing your social media sites based purely on photos posted by others

guess this is based on gender and sexual preference details raided from Facebook, so heterosexual women will see a Tagged Men category. Still, it's creepy to the point of inducing shudders. Pictures tagged with children pop up, for example, but viewing any picture based purely on the gender of the participant can't be considered healthy. Luckily you can turn it off by tapping the Customise Feeds button.

Pixable isn't just about viewing, and you can post comments or responses to pictures. You can also tap the menu button, then the camera icon to take and submit pictures to social media. Unfortunately, the camera function is as basic as it comes; you can snap a pic but not edit it or apply a filter.

As an alternative means of accessing your social media outlets, bearing in mind you'll be missing any posts that are 'just' text, Pixable is surprisingly useful, as well as fun and well designed to boot.

Faceboost Magic Liker

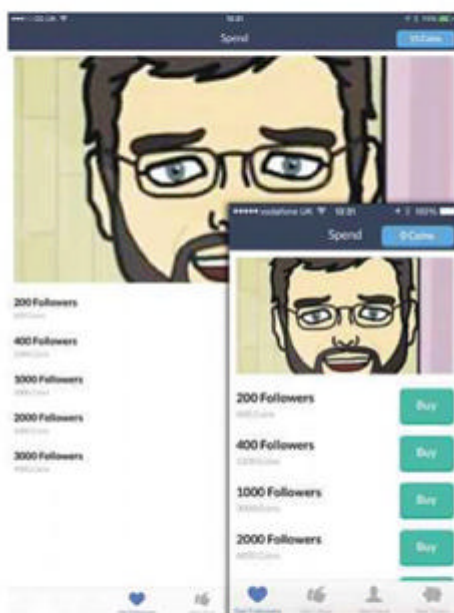
Pity the socially inept. At one point we only had to worry about the number of friends we had out there in – you know – the real world. Nowadays we also have to worry about friends and people liking us in the online world too. Well, worry no more. Faceboost Magic Liker is here to help – all while making a profit, of course.

All the app does is let you buy Likes on your photos or posts made to Facebook or buy fans for Pages you've created. Yes, this must involve the system being gamed somehow and rules getting broken. We're a little surprised that Apple even allowed the app into the App Store.

You pay for Likes or fans using coins, which are purchased in the app. The starting rate is £1.49 for 200 coins, but that won't buy you a great deal – the cheapest deal for getting any Likes will set you back 200 coins for 100 likes. Getting fans is even more pricey, with the cheapest deal being 200 fans for 600 coins.

You can earn coins by sharing details of the app on social media apps and writing reviews. We tapped to share on Facebook (with a warning that people should ignore the posting) and got only 15 coins for our effort. In other words, share every day for two weeks and you'll get enough for a single transaction in the app.

For the app to work, you need to make your Facebook account public, and this might hint at how the app manages to find those hundreds if not thousands of likes and fans. Either the app developer has created dummy accounts – and we're fairly sure Facebook doesn't like that kind of thing – or the developer has rather cleverly turned every



▲ If you worry about not having enough fans or Likes on Facebook, then Faceboost is a one option worth investigating – possibly

user of the app into a network of bots. In other words, the app may like on your behalf stuff by people you don't know. And who knows what that content might be about? Full marks for chutzpah on behalf of the developer if this is the case, but poor marks for ethics.

If you have a sufficiently long enough barge poll and are desperate enough, then you might choose to give this app a try. It's partnered by iLiker and TwitterFollower in the App Store. These game Instagram and Twitter in similar ways. Do read reviews on the App Store first, though – there are a handful of stories of people handing over cash only to find their coins disappearing without explanation. And also bear in mind that writing reviews is one of the ways of earning free coins...

Everypost

Describing itself as a social media management tool, Everypost lets you simultaneously log into Facebook, Google+, Pinterest, Tumblr, LinkedIn and even Dropbox, which is used to store files you acquire. That's an impressive list and the most comprehensive among the apps reviewed here.

First things first, however, and it's important to know this app's limitations. It runs only on an iPhone, with iPad support apparently coming soon. Second, as its title suggests, Everypost is mostly about posting stuff across your social network accounts and also scheduling posts. There's no way of viewing other people's postings or tweets. In other words, this is an app you'll probably want to use in concert with others.



▲ If you absolutely need to simultaneously post to most of the popular social networks then Everypost is for you

The app has another curious aspect too, which is that it lets you search YouTube, Flickr and Grooveshark to find multimedia. You can then share these on your social networks. You can also post your own images or videos, either those you record within the app or those that are on your camera roll. Unfortunately, there's no effects or editing offered with the camera tool, though.

The basic screen of the app shows a composing screen, along the top of which are icons for the services you're signed into. Tapping these activates or deactivates posting the current message to them. Signing in is done during setup and, as with Hootsuite, is achieved by logging in via the web interface of each rather than via the API or iOS's built-in functionality. This meant that our initial attempt at logging in via Facebook failed, although we succeeded when we tried again.

Swiping left or right on the compose screen lets you set specific options for each service, such as adding hashtags. You can also see the character count for services like Twitter, for example. This is a pretty clever approach, as is the method of posting your composition, which is achieved via a virtual switch – slide the switch right and you'll post instantly. Slide the post left and you can schedule the posting for some time in the future.

That's about all there is to say about Everypost. Dig into the settings menu and you can do things like set the pixel count of images or activate URL shortening, but mostly this is a simple yet clever app that does a few things very well.

Friendly

This app can be neatly summed up by saying that it's a third-party client for Facebook. How it works is interesting, because it mostly appears to provide access to the usual mobile interface of Facebook, just like a web browser, but with a few very useful options added on. Crucially, Friendly is also very fast in operation, to the extent that we reckon it might even be faster than Facebook's own app.

Setup involves choosing a colour to theme the interface (at last, you're no longer stuck with Facebook blue!) and optionally setting a four-digit passcode to lock the app. You can then agree to Friendly notifying you of birthdays, status update notifications, friend requests and messages.

Finally, setup steps ask you if you want to order the feed by most recent or by top stories and offers an option to remove Facebook ads. Before you get worked up about this latter tool, however, you'll spot almost instantly when the app loads your feed that Friendly inserts its own banner ad at the top of the screen. Not only that, but attached to each ad is an advert for an in-app purchase of £2.29 that will remove Friendly's advertising!

Hmmm... Moving swiftly on, the app looks mostly like the Facebook site when accessed

through a mobile browser. Status updates can be posted at the top of the list, and status updates from friends appear below. Tapping the floating icon of your own profile picture at the bottom will slide out a panel showing your friends list, where you can tap to go straight to their wall. You can also search here in a variety of ways, including via Google (and Google News), searching the App Store, searching Twitter or YouTube and finally searching Facebook itself.

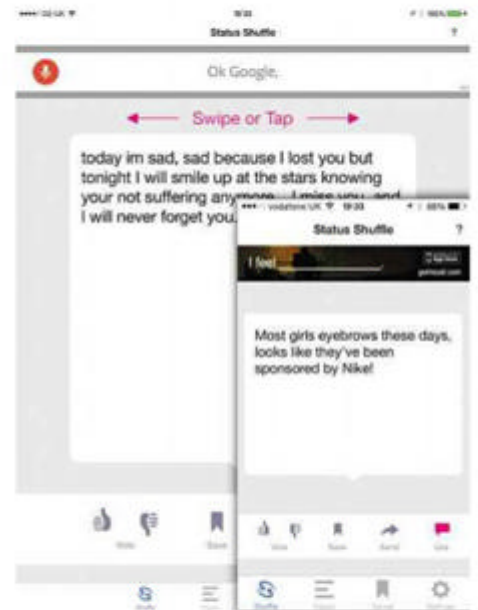
There are a couple of lovely features in the app. Rotate your iPhone or iPad, and a lock icon briefly appears on screen. Tap this, and the app becomes locked to that orientation, avoiding the need to lock the whole device. The symbol again appears if you rotate the phone, even if the interface itself doesn't rotate this time, and tapping it will unlock the app's orientation.

We also liked how you can activate or deactivate individual notifications for each update or item you've commented on. This is possible in the main Facebook app, but only in a roundabout way. In fact, we reckon Facebook is missing a trick here.

If it wasn't for the ridiculous advertising, we'd be recommending Friendly wholeheartedly. However, turning off Facebook's own ads and then demanding £2.29 to turn off your own seems cynical. Whether you agree will ultimately decide whether you install this app.

Status Shuffle Lite

Do you have problems thinking up Facebook postings? No, me neither, but for those



▲ If you can't be bothered making up Facebook updates, then Status Shuffle Light can provide hundreds, free of charge

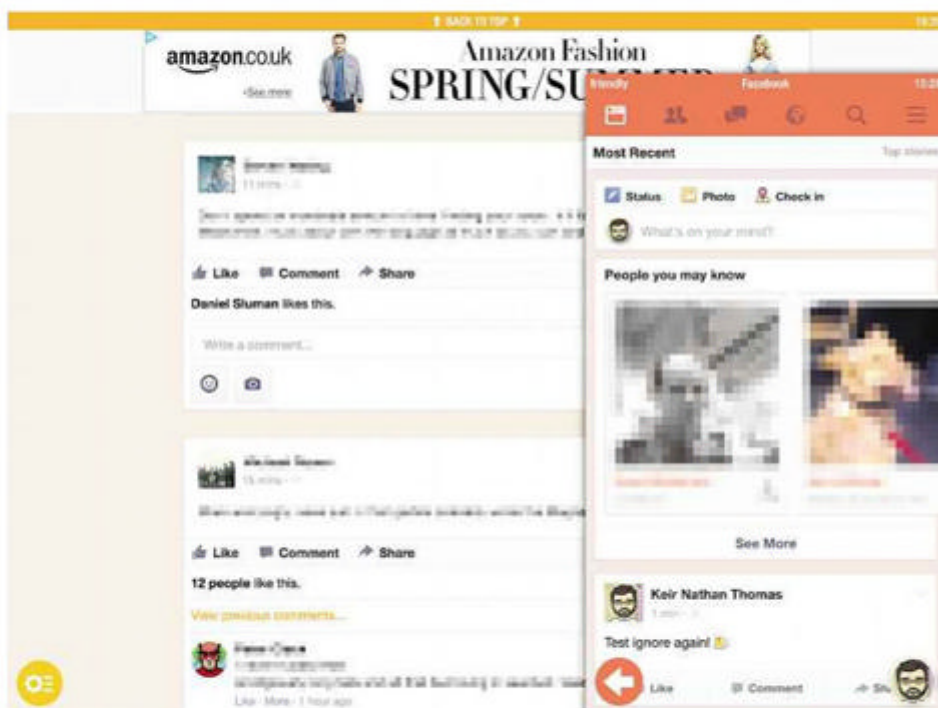
that do – and who also fancy sounding like a limp stand-up comedian or a new-age guru – Status Shuffle Lite can provide the goods. Put simply, it hooks into your existing Facebook login and lets you post readymade status updates. You can choose from literally hundreds of categories, depending on your mood. Not all are humorous – the abused-women category (yes, really) lets you post somewhat pleading messages of healing, while the addiction category posts messages about recovery.

You can filter by popular topics, however, and here you find the heart and soul of the app, with categories such as bitchy, coffee and humour-sarcastic-life-funny. Some of the postings are pretty ribald, and there's an option within Settings to hide 'obvious profanities'. Alas, there isn't an option to correct awful grammar that's straight of the Dictionary of Text Speak.

Once you've selected a category, you can swipe left and right to see others. Once you find one you like, just tap the Use button and then drag the status down to the box at the bottom of the screen to post it.

The app is supported by banner ads and full-screen ads that are somewhat intrusive. Handing over 79p will buy you the non-Lite version, which not only removes ads but also removes a limit on the number of times you can shuffle in one go.

To be fair, Status Shuffle Lite is entertaining and some of the statuses are pretty witty. It just isn't an app with any kind of lasting value. In fact, its longevity can probably be measured in minutes, rather than hours. [mm](#)



▲ Friendly is a third-party client for Facebook that, among other things, lets you alter the colour scheme

Remembering...

The BBC Micro

David Hayward recalls those hazy days spent in computer studies lessons

If you were lucky enough to have a forward thinking school back in the early 80s, then the chances are that every computer studies lesson was spent sat in front of a BBC Micro. Usually there were three school children to every computer, crowded around the tiny square monitor and staring at the screen – with one or more of those getting increasingly frustrated by the slow typing of the one in control of the keyboard.

The school computer was an amazing thing. It helped many of us get to grips with a concepts beyond the games-playing 8-bit machines of the day (chiefly the Spectrum and C64) and it allowed us to smirk at the teacher who ended up getting a little hot under the collar when the computer did something he or she couldn't get to grips with.

If you close your eyes you can almost place yourself back there: in the computer studies lesson, with the acrid smell of an overworked room full of BBCs, the chug chug of the big 5¼" floppies whirring to load up last week's BASIC. Also though, the two-tone beep of a booting BBC – maybe even the occasional blip of someone trying to get through a level of *Chuckie Egg* before being kicked off for playing a game instead of doing their school work. Let's not forget the ear chattering noise of a tractor feed printer spitting out homework, or even lines, though.

History

The BBC Micro came about as a result of the BBC Computer Literacy Project, wherein the Acorn team was commissioned to create a computer that could be used by to help the next generation of users embrace the micro computer revolution. The 'Beeb', as it was known, thus became the must-have educational machine for British schools in the early to mid-eighties, thanks in part to the heavily subsidised educational pricing, which pretty much paid for half the machine.

It still wasn't cheap unit, though, costing somewhere in the region of £400 – before the school had factored in a printer, setup charges, other peripherals and consumables. It was probably one of the most expensive things your school bought.

Mind you, the Beeb was rock solid. Not just in terms of software, but also physically. With its solid steel construction, full travel

mechanical keyboard – complete with the red function keys along the top – and a similarly rock solid, metal encased, monitor there's every reason to expect a BBC Micro could have survived a direct hit from a nuclear bomb.

Accordingly, it's lifespan stretched well into the nineties. Then the BBC Master took over, before it eventually made way for the emergent PC concept, which was fast becoming the norm – and offered a cheaper school computer option.

The Good

BBC Micro Basic was amazing. You could mix BASIC commands with assembler using square brackets to enclose the assembler portions of the code within a BASIC listing. What's more, as we've commented, it was bomb proof. We even witnessed someone standing on one once. We wouldn't recommend trying that these days.

The Bad

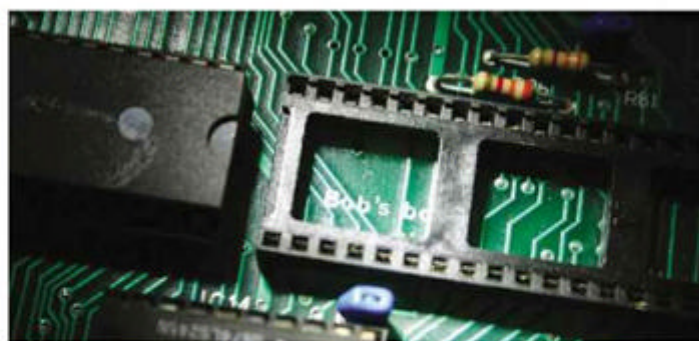
They did get a little hot at times, and a room full of them could develop a distinctive odour.

Conclusion

The BBC Micro was an amazing computer. It fed our young minds with thoughts of becoming proper programmers, and steered on a course into computing that would last a lifetime. Thanks, Acorn.



▲ Dual floppy disks! Flashy



▲ Bob's Board could be found under certain models

Did You Know...

- Apparently, the Acorn team only had a week to build a BBC model from design to presentation, which it did (naturally) and won the contract to build and supply the 'Beeb'
- There were over 1.5 million Beebs sold
- The today's equivalent cost of a BBC Micro Model B would be about £1,300
- The speech synthesizer upgrade featured the voice of Kenneth Kendall, then a BBC newsreader
- On some models, printed under certain chips (which you have to remove), or under the motherboard were the words "Bob's Board"

The Things That Frustrate Us About... Pinterest

It's one of the fastest growing social networks, but is it too annoying to be worth the hassle of actually using it?

If nothing else, you've got to give Pinterest credit for not being another pointless Facebook or Twitter clone. What it does, it does differently from other social networks. So there's that.

It's set out as an online pinboard, a place you can save ideas or compile lists of things you'd like to see, do, make or eat – and it makes it easy to see lots of inspiring things other people are interested in. There's not really room for mean comments, just loads of pretty pictures. What could go wrong?

Quite a bit, it turns out. Leaving aside the issues of copyright infringement, and the bizarre kind of lifestyle envy it can provoke – never mind the fact that most of the stunning-looking recipes posted there seem to be physically impossible to recreate – these are some of the things that we find most irritating about Pinterest:

Argh! Pinned And Lost Forever

Supposedly, Pinterest compiles pinboards of things for future reference, much like you might cut out a recipe from a magazine to make at a later date. However, finding something you've pinned can be tricky.

The search function supposedly lets you search your own pins, but it's finicky, and will often return null results even when you know for sure you've pinned exactly what you're now looking for. If you've pinned a lot of stuff, having to scroll through it until you something is annoying. Plus: why are all searches split into individual words? Even using quote marks can't convince Pinterest to search for phrases.

Fix it: Honestly? The easiest thing to do is probably to type your username, 'Pinterest', and the search term you're after into Google.

Um... My What Now?

Speaking of Google, if you search for 'pin twin', you'll find lots of people baffled by the term. Social media has taught us lots of new vocab – 'retweet' and 'DM', for example

– and to redefine words like 'friend', but Pinterest slang hasn't quite taken off yet.

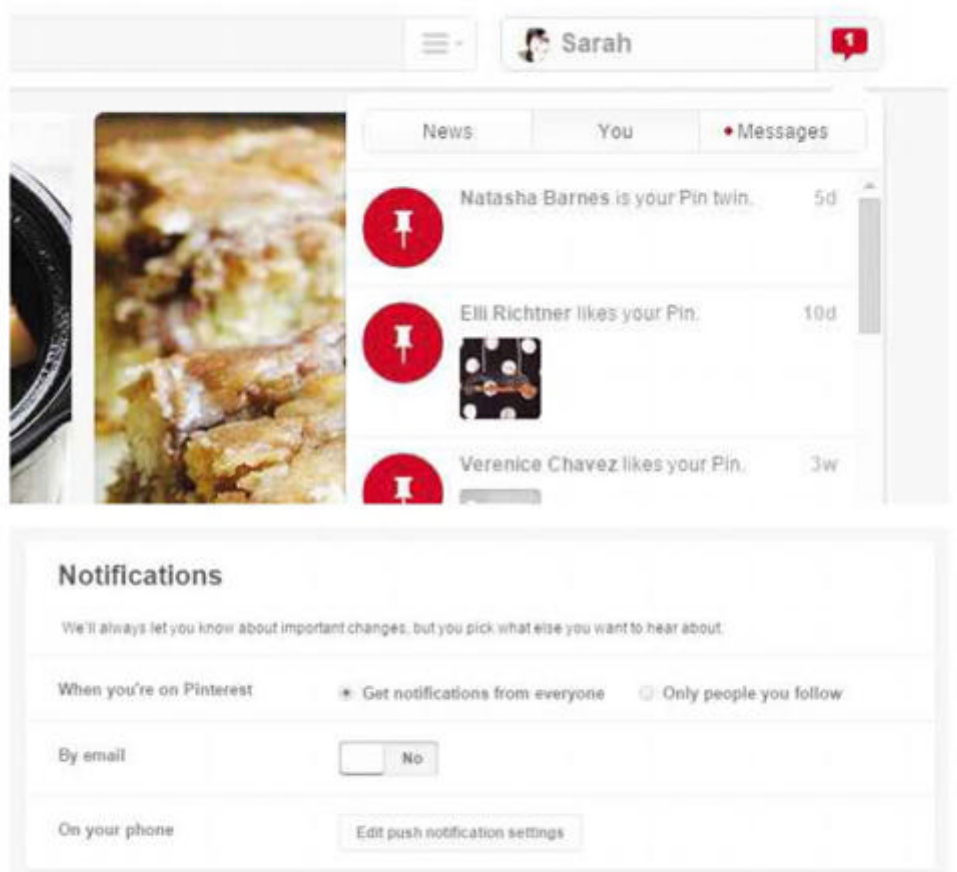
For reference, a 'Pin Twin' is someone who pins similar things to you, and whom Pinterest thinks you might be interested in following. If you've installed the app on your phone, it'll also send notifications to let you know about them. Because we don't get enough useless notifications already, right?

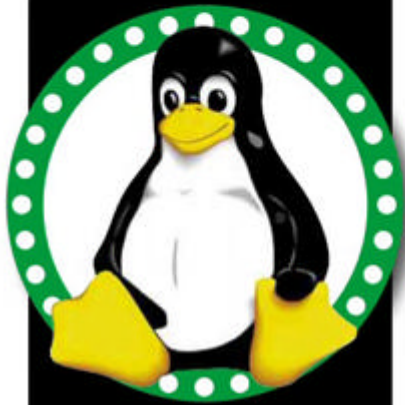
Fix it: To turn off irrelevant notifications, go to your profile, click the settings icon, and go to Account Settings > Notifications. Here you can turn off email notifications and also decide what notifications you want sent to your phone, i.e. none.

Nrgh! Shopping fail

Perhaps the most annoying thing about Pinterest, this: it's possible to find a pinned item that is exactly what your life is missing. Could be the perfect pair of shoes, could be your ideal sofa. Yet, nine times out of 10, you'll find you can't just buy it. Either there's no link or item description added, or when you click through, you'll find the link has expired and the item is no longer for sale. It's infuriating.

Fix it: Pinterest is working on a 'Buy' button, which may at least let you know if you *can* buy your dream item. We won't be holding our breath, though. [mm](#)





David Hayward has been using Linux since Red Hat 2.0 in schools, businesses and at home, which either makes him very knowledgeable or a glutton for extreme punishment

Linux

Clockapocalypse

2038, the Y2K of the future?

I was reading the other day about the ill-fated clockapocalypse, which will occur after 03:14:07 UTC on 19th January 2038. Of course we're talking about a potential problem that will happen in twenty three years' time, and since the issue is remarked as being very similar to the Y2K bug, there's an overriding feeling that very few people care.

Apparently, the problem is the fault of the 'time_t' codes used by Unix and Linux systems. The codes are calculated as 32-bit integers from the number of seconds since midnight on the 1st of January 1970. As a result, the Unix Time format cannot handle a value bigger than the aforementioned date and, as a result, all the systems that aren't updated will revert back to the 13th December 1901 when the time passes that – specifically to a quarter to nine in the evening.

Linux Kernel adviser, Jon Corbet, thinks developers should be doing something about the issue now, rather than later. Quite rightly, he has stated that there are Linux system being developed and

put into place now that will still be active and in use in 2038, and that the more of these that there pottering on with this inherent flaw, the more difficult it's going to be to manage all these instances when the clock does strike the allotted hour in twenty three years' time.

It's an interesting thought, actually, and I think Jon Corbet has raised a good point here. While it's easy to foretell aeroplanes falling from the sky, and the old Reagan inspired Star Wars laser system suddenly pointing earthward and letting loose with the scary equivalent of both barrels, there are other systems in place that can go unnoticed. Specifically, Corbet mentioned the Linux-like systems that are being used in cars now and in smart TVs. Plus, there's also the Unix/Linux based navigation systems used by commercial shipping. Although a sudden date change isn't going to have drastic Hollywood-style consequences, there will no doubt be considerable annoyance to the users of these systems should they not be updated by 2038.

Run For The Hills?

Then again, 23 years is a long time from now. By then I'll be 64 and, to quote one or two of the Linux oldies I share a pint with from time to time, "If I manage to live that long, I really wouldn't care less".

While it's good to be aware of the issue and to start implementing a patch to such systems that will most likely be around in 2038, there's fast becoming a doom and gloom Y2K feel to the 2038 date problem. Even among the systems that were affected by Y2K, the worst results involved some letters going out dated 1900 – although there was that rumour of NORAD picking up some phantom images on radar – and a few traffic light problems.

Do we want a new panic on our hands, one that will cost umpteen billions to patch like Y2K did? Or can we just get over the fact that it's hardly an earth-shattering issue and isn't much to worry about?

Either way, if something does go terribly wrong in 2038 you have my permission to write in to *Micro Mart* and tell me off.



Apple Car

The first Apple product has arrived that boasts wheels, but how does it compare to the company's Macs and iPhones?

It's 2020 and the new Apple Car finally arrived last night. Long-rumoured, it represents a brave new frontier for the American giant after years of relative failure. After all, shareholders won't let beleaguered Apple CEO Tim Cook forget about the eleven people on earth who point-blank refused to buy an iPhone 8s last summer, and his slip-up in a recent earnings call where he suggested people "probably didn't really need to buy an Apple Watch for every limb".

The new car is, as you'd expect from Apple, a piece of stark and striking design minimalism, once more sparking rumours that Apple design chief Jony Ive is in fact a holographic disc that's been skipping in its player for several years, never quite managing to move on to the next track and therefore reveal the 'next big thing in design'. So the new vehicle's available in any colour you like, as long as it's brushed aluminium, and is the "thinnest car ever", regardless of any practical drawbacks that might create.

Since yesterday's launch event, Apple has revealed in a press release that the company has already sold three million of the Apple Cars, which experts have simultaneously argued proves Apple is doomed due to only securing a relatively

small amount of the world's total marketshare in vehicles, and yet gives Apple an estimated 96% of the entire industry's profits — through a single day's sales.

Inevitably, perhaps, there have been hiccups with the new technology, and countless complaints can be found under the trending Twitter hashtag #cargate. Users have been shocked that the entire Apple Car interface has already been redesigned twice for no obvious functional or practical advantage, managing each time to become increasingly minimal and yet also far more gaudy. Estimates suggest the entire interface for Apple Car will be a single shade of shocking pink by April 2021.

There was also surprise that Apple Car comes with no additional storage of any kind. It was assumed that Apple might relent with its 'closed box' philosophy when working on a motor vehicle, but instead the company reasoned that should you want to transport any goods, you should instead use Apple's iSend delivery service (currently available in the USA, but due for a worldwide rollout at some point in the future).

Judging by early tests, there are some ongoing bugs, with it likely to 'sync' only

approximately 98% of your starting items with what you end up with at your destination. In other words, you get dropped packets.

Frustration has also surrounded Apple's security policies, which ape those found within OS X. Presumably because people basically cannot be trusted with the technology they own and try to operate, the car's default settings only 'Allow Apple Car to be driven to Apple approved destinations'. It turns out most of these in the UK are Apple Stores, and even getting to those can be hairy, given that Apple Car finds its way around using Apple Maps, which remains the navigational equivalent of Russian roulette.

Nonetheless, queues several miles long remain at every outlet stocking the vehicle, with eager punters desperate to drive away their own Apple Car, which they can unlock with their Apple Watch, check the charge of with their Apple iPhone, and then realise how little money they have left in the bank when their Apple Pay 'low funds' warning alarm repeatedly goes off.

▼ *Imagine this but bigger and with four wheels, and that's Apple Car. Coming in 2020, probably*



Craig Grannell is a writer, designer, occasional musician and permanent loudmouth. He's owned Macs since 1996, when Apple was facing certain doom, and is therefore pleasantly surprised by its current success. Find Craig on Twitter at @craiggrannell



Mac



Ian is a professional IT analyst, a semi-professional writer and a pretty amateur electronic musician. He likes gadgetry and loves making gadgets do things they were never designed to do

Mobile

Kick Off

Ian McGurran looks at some of the most interesting mobile Kickstarter projects

Since its inception in 2009, Kickstarter has been the starting ground for many interesting and exciting projects that may not have otherwise seen the light of day. From e-ink smartwatch trailblazer Pebble, to Android console Ouya, Kickstarter projects have had their notable results – not to mention musician Neil Young's Pono audiophile media player, that is now finally seeing the light of day. At any one time there are hundreds of projects all begging for your backing, with the mobile field particularly popular. Here's a few of the interesting ones.

Displio – we've seen small notification devices before; hipster favourite, Little Printer being a stand-out example. Displio isn't a printer, but rather an e-ink based device that's essentially a second screen, albeit with limited use.

Roughly the size of a box of matches, the little display can be used to show a variety of information, from weather updates to Twitter feeds, calendar events to your ever-dwindling PayPal balance. If you've got OS X you can even use it to display a WebClip widget (a small frame of a web page that updates – the given example being the price on an eBay auction). It's already backed, but you can still get one at \$99 for a regular unit (in seven colours) or in wood for \$119. Check it out at displ.io

Hive – No, not the fancy British Gas thermostat with the twee advert, this Hive is a combined

home automation and audio solution consisting of two parts, the Hive Hub and the Hive Sound. As its name suggests, the Hub is the centre of it all, and both controls the systems and aggregates the sensor data.

This is all controlled via the Hive Cloud application, which allows the setting of different tasks for different systems, depending on what is required – so the dream of one touch putting the TV, closing the curtains, dimming the lights and muting the phones is now closer to reality. It can even lock doors and windows, and register them as such, stopping those “ooh I think I left the window open” moments.

The Hive Sound aspect adds a Sonos-esque touch, allowing music to be pumped to different speakers throughout a home. The clever touch here is that those same speakers can also alert the listener to Hive alerts, such as calls or changes to weather, for example. The Hub or Sound alone is expected to be offered at \$299, the both at \$499, though super early backers could have got them for a very tasty \$149. You can find out more at hiveconnected.com

Goodnight Lad – Strangely, not an automated tucking-in machine for Gromit, Goodnight Lad is actually a book for children that can be read as itself, but when combined with a tablet or smartphone, the book comes to life with augmented reality. It's not a new concept, Sony's PS3-based Wonderbook ploughed a similar furrow, but *Goodnight Lad* is notable

for its beautifully drawn and animated augmentation. To a child's eyes, it must be nothing short of magical to see this book come to life. There's a demo on Google Play used in conjunction with a demo page on the site goodnightlad.com, if you want to see for yourself.

The good news is the project is already funded, with a June 2015 release date for the initial investors, and later in the year for everyone else.

Kickstarter is a fascinating breeding ground for all sorts of interesting ideas, some so out there that the only way they can ever be made is by a handful of people stumping up the cash for what can become bespoke builds. It happens, and while it can be expensive, sometimes it's the right tool for the job. Other times products like the above capture the wider imagination and look like going on to become part of the tech landscape, and, in the case of Pebble, directly inspire the next.

Do be aware though that for all the successful projects, there are many that never reach their target. Those projects should be refunded via Kickstarter themselves, but do beware of those projects that are successful in funding but later fail, as it is much more of a grey area. Essentially, any money you invest in a Kickstarter project should be money that you're prepared to lose. Don't let it put you off though, backing the right project at the right time can reap large savings, as well as letting you be part of something big.

KICKSTARTER

Why The Fuss?

Andrew Unsworth swaps his Pot Noodle for a storm in a tea cup

I'm sure that by the time this edition of *Micro Mart* has hit the newsstand the furore surrounding Nvidia's GeForce GTX 970 graphics card will be well known and understood. If not, then essentially, the controversy centres upon the amount of RAM installed on the device, among other things.

The GTX 970's spec tells us it's equipped with a generous 4GB of RAM, which is true, but some users had noticed that it tended to use only 3.5GB of that memory and that if it did access the remaining 512MB then data transfer to and from that portion of RAM was noticeably slower than from the other 3.5GB. Although it has 4GB of RAM installed, the GTX 970's RAM is intentionally split into two segments, with the first 3.5GB being the workhorse and the last 512MB being reserved for use when things get hot.

Nvidia has even been issued with a class-action law suit in the US because of this controversy, and the internet is awash with

claims that GTX 970 owners are demanding refunds. Nvidia's Jen-Hsun Huang blogged that the confusion stems from a marketing mistake (tinyurl.com/n8nnu83) and that a lesson was learned. It's true that lessons do have to be learned, but I can't help feeling this is all a bit of a storm in a tea cup.

The GeForce GTX 970 is still a phenomenally good mid-range graphics card. There are faster, more powerful graphics cards that play the most graphically challenging games at ultra-high resolutions, and there are cheaper cards that are better value for non-enthusiast users, but the GTX 970 delivers stunning and efficient performance for its price, size and wattage.

If I had to get a graphics card I'd shop for a Titan Z or an AMD Radeon 295X2, obviously, but I'd buy a GTX 970. I've reviewed both the GTX 970 and the GTX 980, and I found that although the GTX 980 provided higher frame rates, what the GTX 970 **could manage** really wasn't that far behind – yet it

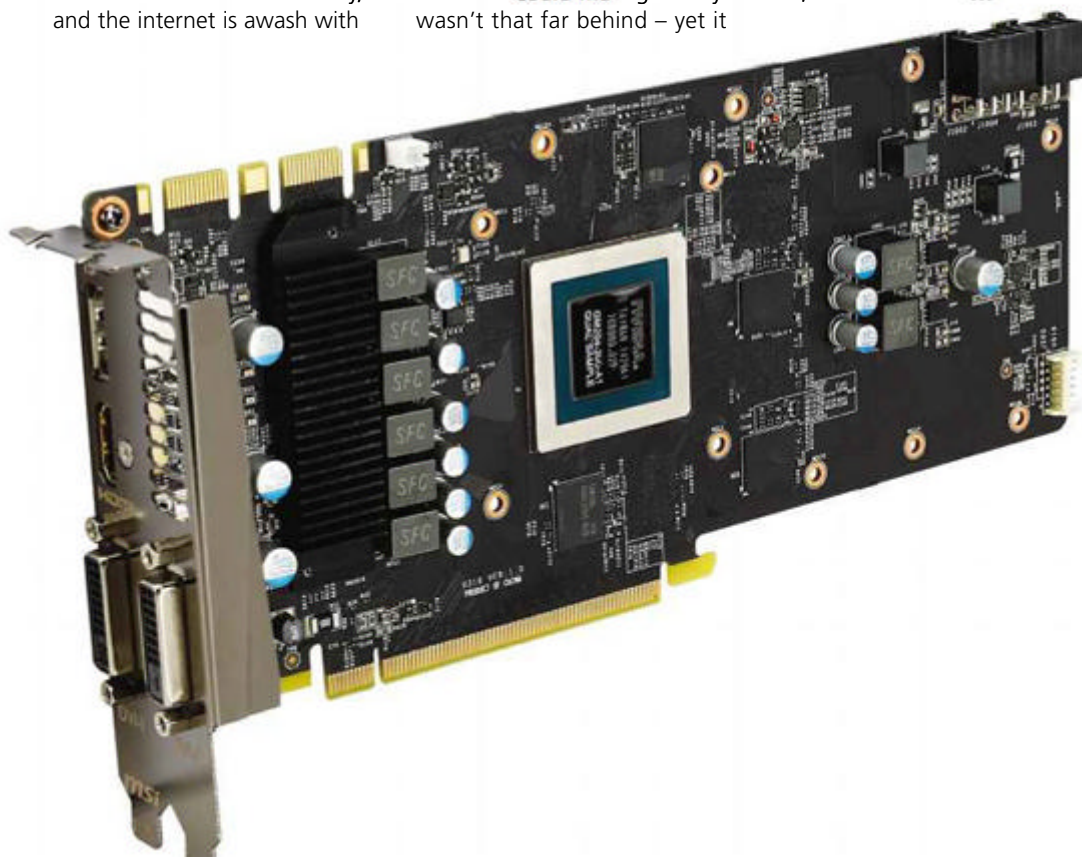
was much cheaper, making the GTX 970 much better value.

One thing that irked me, however, was that the reviewer guides and spec sheets issued to the press at the GTX 970's launch said nothing of the GTX970's RAM segmentation or any other shortcomings (something Jen-Hsun Huang notes in his blog). As a reviewer, it's my job to take a product and what the manufacturer says about it, and communicate that products strengths and weaknesses, backing up claims with evidence in the form of benchmark results and real-world experience of the product. When it comes to specifications and the way a product's features work we sometimes have to trust manufacturers to give us the correct info.

Nvidia didn't make journalists aware of the GTX 970's limitations initially, but it did release a "technical description of the design" a couple of months later. Was our trust in Nvidia misplaced? I don't think so, but once bitten...



Andrew Unsworth has been writing about technology for several years, he's handy with a spanner, and his handshaking skills are second to none



Hardware



Ryan Lambie has loved videogames since he first stared up in awe at a *Galaxian* arcade cabinet in his local chip shop. 28 years on, Ryan writes about gaming for Micro Mart. He's still addicted to chips and still useless at *Galaxian*

Hell Hath No Fury

British developer Ninja Theory has been trying to make a AAA-level game with a 12-strong team. The result: fantasy beat-em-up, *Hellblade*

This week, Ryan takes a look at Ninja Theory's forthcoming hack-and-slash game *Hellblade*, and takes to the skies with the fantasy MMO *Worlds Adrift*...

Plug & Play

When a major game can cost anywhere upwards of \$200m to make, it stands to reason that its investors will want a major return on their investment – and as a result, that puts pressure on developers to please the largest possible audience rather than innovate. Smaller games studios, on the other hand, simply don't have the funds or the resources to compete with those kinds of game. It's a climate that former *Battlefield* developer David Goldfarb recently called, "The AAA equivalent of the one percent."

"...for people who don't have that kind of capital," Goldfarb said in an interview with **GamesIndustry.biz**, "you're not really in a practical success loop. AAA is the equivalent of the One Percent right now. It comes with all these caveats. You can't make the crazy stuff really."

Goldfarb does, however, see an opportunity in the space between small, \$1m indie games and nine figure games like *Call Of Duty* or *Destiny*. "I do think there's a spot between the \$100-\$200 million dollar AAA games and the \$1 million indie games that is not being adequately explored," Goldfarb

said. "To me that's a really rich field to plow and you can do awesome stuff there."

Cambridge-based developer Ninja Theory is doing exactly this. Previously known for major titles like *Enslaved* (featuring motion capture work by Andy Serkis) and *DmC*, the reboot of *Devil May Cry*, the studio's attempting something a little different with its current project, *Hellblade*. While a greater part of the studio earns its bread-and-butter by making a *Disney Infinity* game, a much smaller team of about a dozen staff is working on a beat-em-up based on Norse legend. Their ambition is to make something with the same qualities of *DmC*, but with a greatly reduced budget – thus allowing Ninja Theory to make the game independently.

To keep costs down, Ninja Theory's set up its own motion capture studio – something it would have previously outsourced – and worked out cunning ways to build large levels out of modular chunks of scenery and set-pieces. This way, they plan to create a large open world with just one landscape artist, and from the little we've seen from the game so far, the level of detail looks stunning

– Ninja Theory even plan is to release a PC version capable of supporting a 4K resolution.

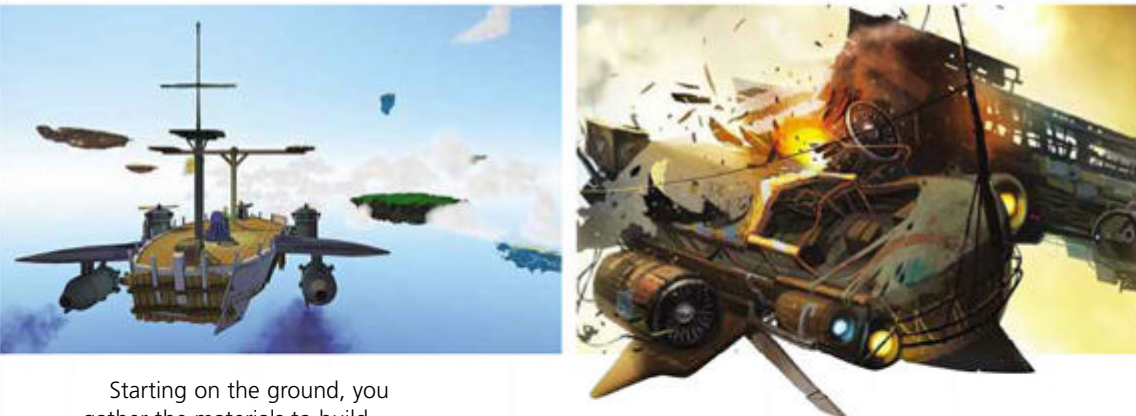
Based on the Unreal 4 engine, *Hellblade* will see a fearsome female warrior, Senua, wade into battle against an army of humanoid, demonic beings. The hack-and-slash gameplay looks like a combination of *DmC*-style combos and the blade-based combat of an early Ninja Theory title, *Heavenly Sword*. *Hellblade* is still in its early stages, but it's already looking like an intriguing game – and if it proves to be a success, it could inspire other studios to take a similar approach to development.

You can follow the company's progress on *Hellblade* over at **www.hellblade.com**.

Online

Minecraft provides the tools to make all kinds of buildings and objects, from life-size cities to surprisingly complex computers, but what if there was an online game where you could build your own flying machines and take to the skies? This is the concept behind *Worlds Adrift*, a forthcoming game from Bossa Studios – the team behind *Surgeon Simulator* and the quirky *I Am Bread*.

Bossa Studios is designing an open-ended MMO where you build and fly wooden airships. Even in its early stages, it looks like an exciting concept



Starting on the ground, you gather the materials to build your own flying ship from wood and engine parts; the next stage of the game sees you explore the skies, which is full of other nomads in their own ships.

Set in an open world of flying islands, *Worlds Adrift* will, Bossa says, be largely open-ended, with players free to craft, explore and fight as they see fit. "We want it to be a freeform exploration and adventure game where players create their own objectives," the studio writes on its developer blog, "because we believe those are consistently the most rewarding and empowering goals to attain."

Bossa also talks about returning "to the roots of online multiplayer games," with *Worlds Adrift* lacking many of the trappings we commonly see in modern fantasy MMOS. There will be, the studio says, "no quest hubs and no NPCs standing around forever, waiting to give you tasks. There are no low-level zones and high-level zones, because there will be no levels. There are no static, choreographed environments and events that replay for every new player."

Instead, the game lives by the mantra "swing, soar, explore", which describes *Worlds Adrift's* mix of on-foot exploration – where you can swing from flying island to flying island with a

Bionic Commando like grappling hook – and travel in your airship, which you can arm with cannons to defend yourself. The idea of ship-to-ship combat alone sounds like an attractive proposition; each craft will gradually fall apart as it's pounded with cannon fire, which should make for some nail-biting action.

Like an increasing number of games made by relatively small developers, *Worlds Adrift* uses procedural generation to create its landscape. While the game's still in its early stages (as you can

see from this video – youtu.be/qFU_cZaGmeQ), Bossa has big plans for the game, with "creatures that eat and live and die, and trees that grow, and ruins that hold secrets."

Like *Ninja Theory* and *Hello Games* (with its potentially mind-boggling space exploration game *No Man's Sky*), Bossa's attempting to make something huge with limited resources. So, if you're intrigued as we are by what's possible within *World's Adrift*, you can find out more at www.worldsadrift.com.

Incoming

If you've been secretly pining for the kind of pure arcade adventure experience that Nintendo have perfected in its *Legend Of Zelda* series, then the forthcoming indie game *Oceanhorn: Monster Of Uncharted Seas* is well worth checking out. Closely modelled on *Zelda* outing *The Wind Waker*, *Oceanhorn* has all the trappings you'd expect from the *Zelda* series: a sprawling open world, dungeons full of traps and monsters, and colourful non-player characters to converse with.

Oceanhorn originally came out on iOS, where it garnered plenty of praise, and now it's coming to PC in overhauled form, with improved graphics and revised controls. The game won't win any prizes for originality – and indeed, we half wonder what Nintendo's legal team will make of it, given how annoyed it was by *The Great Giana Sisters* back in the 1980s – but Finnish studio Cornfox & Bros seem to have crafted a genuinely pretty, captivating little adventure here.

You can check out the updated *Oceanhorn: Monster Of Uncharted Seas* from March 17th onwards.



▲ Ignore the name: Finnish indie game *Oceanhorn* could well be the closest we'll ever get to a classic *Zelda* adventure game on PC

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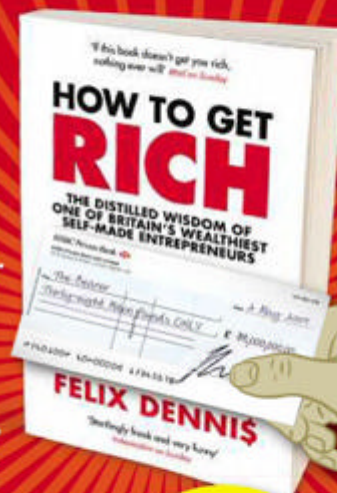
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XFX GeForce Nvidia 8800Gts Graphics Card For Sale. £40.00 + Post. In perfect working order Email: ken.toole1@virginmedia.com

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Intel 3930K processor. Used, but not overclocked. No box or fan. £220 ono. Will ship to UK address.
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Nuance Omnipage 18. OCR for Windows 8, 7, Vista or XP, Original CD with unused product key £25.
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Please try to keep your queries brief and limit them to just one question per letter, simply so we can squeeze in as many as we can each week. Please include relevant technical information too.

Aaron

Come Again!

I have an A10-6700 on an ASUS A88X-PRO board, works fine (at 1333). I removed the APU and replaced it with an A8-7600 APU, with no other changes made.

On powering up, it didn't even begin to boot the BIOS. The fans were whirring and I got the impression that it was trying to start the BIOS but failing, in a cycle. Nothing appeared on screen. I swapped the A10 APU back and everything was fine again.

Any ideas?

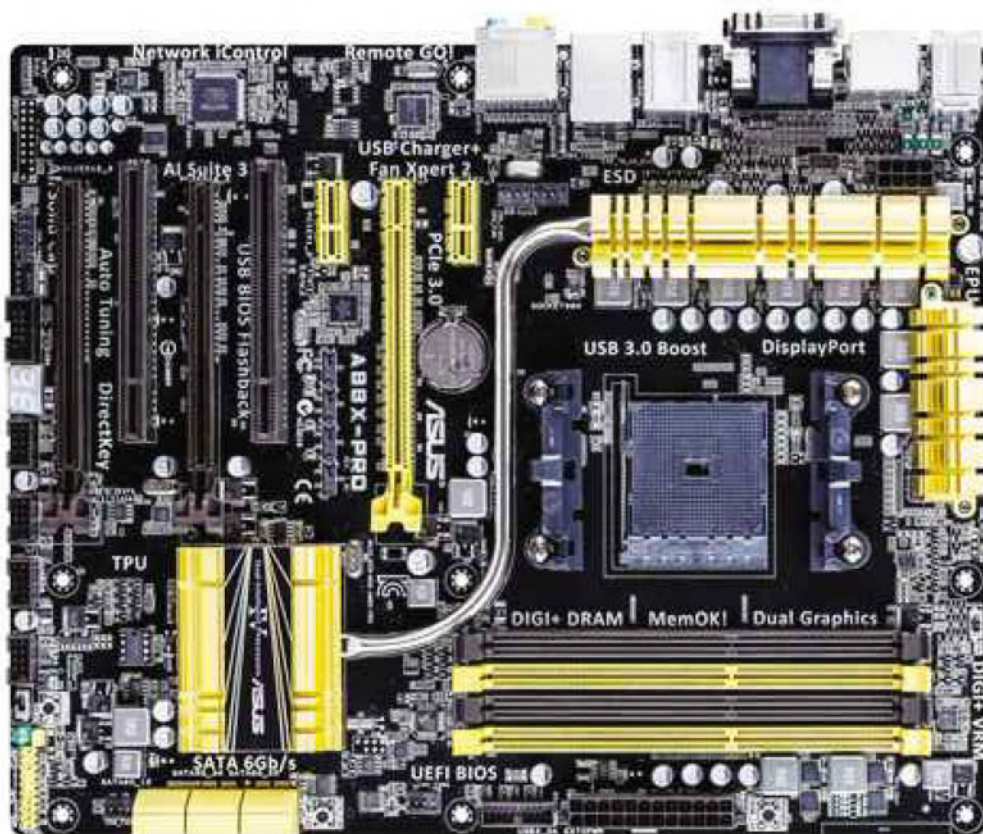
Brian

It would appear as though the problem you're having here is with the motherboard firmware. Asus' website lists compatibility for your motherboard and the various CPU/APUs, and

although your board will run perfectly fine with the A10 chip, this runs using firmware version 0303, which I assume you've got installed, as you noted that you'd made no changes prior to installing the new APU. The A8-7600, however, is only supported from version 1001 onwards, and the latest firmware released by ASUS is version 1703, which was made available on the 5th of February.

So, you should visit the ASUS website and download the latest firmware for your motherboard (you can get it at tinyurl.com/ne3l6wj). Once you have it, upgrade your motherboard (the old APU will still work with the new firmware), and once done, install your A8 APU and give it a whirl.

▼ **Installing new CPU/APUs can often require an update to a motherboard's firmware**



Consolidated Mail

Regrettably, I'm currently in the process of migrating from Windows XP and Outlook Express to a new PC and current Windows OS, namely Windows 7, and later in the year to Windows 10, no doubt.

I've used OE for many years and I've found it ideal for my needs, which are to import my several POP3 TalkTalk accounts plus several Gmail IMAP accounts into common Inbox, Sent, Deleted, Drafts; etc. folders for all accounts. Both my Android phone and tablet provide an email client that offers combined folders.

Can you recommend any email clients for Windows that will provide the same setup as I have with OE? I've set up Thunderbird on a spare PC to experiment with, but it doesn't appear to me to offer the equivalent of what I have with OE..

Don

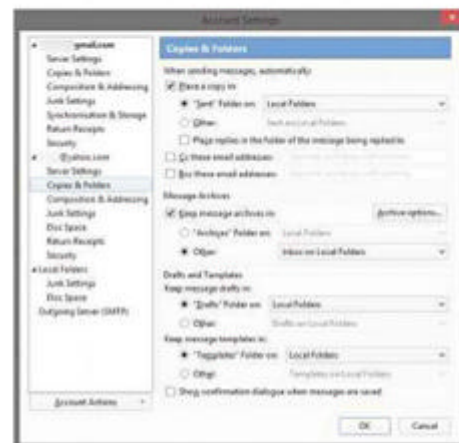
I'm surprised you're not a fan of Thunderbird for this task, Don. With the right setup, it can actually do what you need, and can combine emails into a shared set of folders. You can do this using the local folders option.

Simply create the folders you need in the Local Folders group, and then go into the preferences section for your various email accounts. Once there, look in the 'Server Settings', and 'Copies & Folders' sections. In Server Settings, navigate to Message Storage > Advanced and choose the option 'Inbox for different account' and select Local Folders. Next, in the Copies & Folders section, use the Local Folders option for storing copies of sent items, archived messages, and drafts/templates. You can also move junk mail to the Local Folders via the Junk Settings section.

Alternatively, should you prefer this method, you could also create various rules for your accounts to move new items into another folder. This would give you full, manual control over this process, and you could also use it to filter out emails should you wish.

Whichever way you go, all the flexibility you need exists within Thunderbird, try out these tweaks and get back to us to let everyone know how you got on.

► **Thunderbird can group various email accounts into a set of single folders**



Firefox Down

I've been experiencing constant crashes with Firefox recently, and there doesn't seem to be a pattern to it. Sometimes I can use Firefox with no problems for hours on end, and others it seems to lock up and crash every hour or so, and I have to recover and send an error report. Sometimes, when I select the option to restore tabs, it works fine, and other times it fails, and I have to start from scratch and open a new window.

I've not done anything to Firefox myself, so I'm not sure why the issue has arisen. I always update Firefox when needed (it's set to do this automatically), and I don't use any other browsers. I'd appreciate any help you can provide.

Key

My first thought here would be to consider any plug-ins or extensions you have installed, as these are often the cause of such problems. This is a good place to start, as it's easy enough to narrow down any potential problems. All you need to do is go to Firefox's add-ons section and disable any plug-ins you have installed, such as Flash, Adobe Acrobat, and others, as well as extensions like antivirus scanners and Adblock Plus.

An easy way to do this is to use Firefox's Safe Mode. This will start the browser up without any additions loaded. To use this, click the options button at the top-right of the window and select Help. Now click 'Restart with Add-ons Disabled' and Firefox will restart.

With all of these disabled, try running Firefox for a while and see if the problem resurfaces. If not, you'll then need to reactivate your plug-ins and extensions one by one, testing the browser for a while afterwards to see if the crashes reoccur. As soon as one does, it's likely the recently reactivated addition was causing the problem.

So, you'll need to remove it and find an update to reinstall it or use an alternative.

Of course, the issue may not be with a plug-in or extension, and it may simply be an problem with Firefox. This will be especially apparent if you still experience problems while running in Safe Mode. The best way to remedy this would be to perform a full uninstall of the browser, reboot, and then reinstall a new version and go from there.

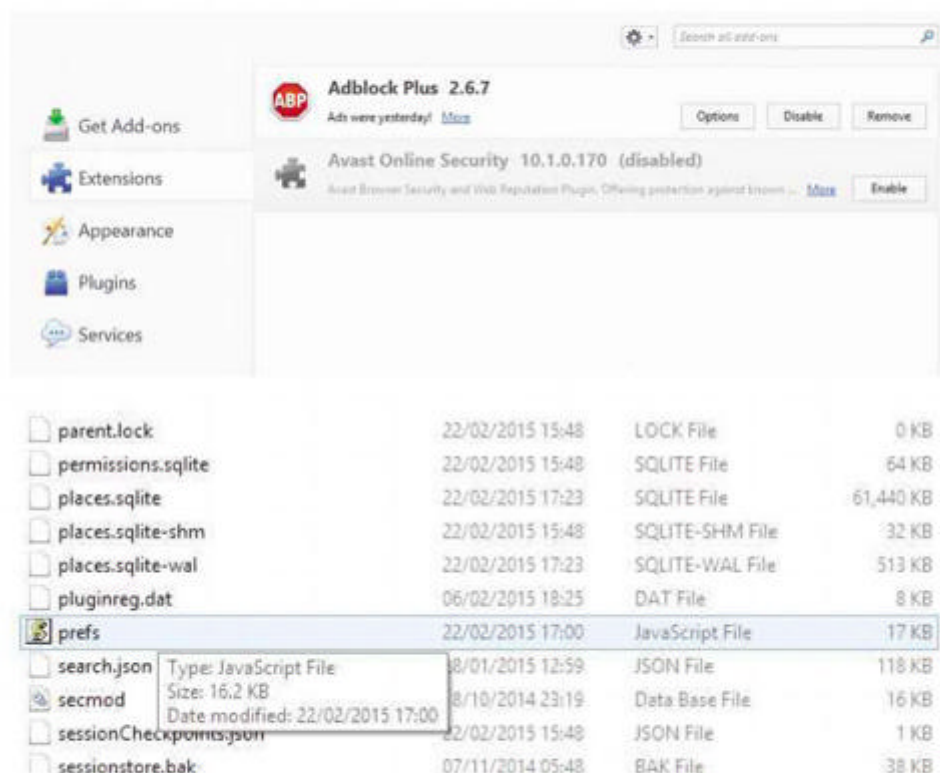
Before you perform a reinstall, though, you may want to try and reset Firefox's settings to default, in case any changes made in the past have caused unexpected

▼ **Firefox plug-ins and extension can cause stability problems, so disabling then is a good way to check for the source of a problem**

problems down the line. To do this, visit tinyurl.com/cgy2fn4 and click the 'Refresh Firefox' button. This will automatically refresh the browser to defaults for you. You should also follow the second step on this page, which is to delete Firefox's preference files. To do this, click the menu button again and go into help, then Troubleshooting Information. Underneath Application Basics click Show Folder. Close Firefox, and within the window that opened, locate the prefs.js file and either rename or delete it.

This will clear the preferences, and the next time you open Firefox, it'll create a

▼▼ **Delete or rename Firefox's preferences file so it can create a fresh, new one, thus solving some problems**



ASK JASON



Meet Jason D'Allison, a veteran of Micro Mart's panel of experts. He's here to help with any technical questions, including anything to do with tablets or smartphones, as well as PCs

Send your questions to:
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Micro Mart
Dennis Publishing
30 Cleveland Street
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W1T 4JD

Contact Jason by email at:
jason@micromart.co.uk

While we try to cover as many questions as we can, we regret that Jason cannot answer your questions personally, but he'll cover as many as he possibly can each week. Please ask one question per letter and remember to include the full specification of your computer, including its operating system.

Jason

A Piece Of The Pi

I've just bought a Raspberry Pi 2. My plan was to put Android on it, but it seems that's a non-starter. But why? The heart of the Pi 2 (and of the original Pi, for that matter) is an ARM SoC, just as found in a smartphone, so I'd assumed Android support was a given. But it seems it's Linux, RISC OS or bust. The situation's mind-boggling, especially as Microsoft says the Pi 2 will be getting Windows 10 – for free. Can you shed any light? Is Android support ever likely to materialise?

M Waters, Gmail

As you've found, there's no official Android port for the Pi (any model), and the Pi Foundation claims Android support is 'dormant'. See bit.do/Zyxb. The Razdroid project has a port of Gingerbread (v2.3.x), but it's unstable and slower than a wet weekend in Weymouth. The port of Ice Cream Sandwich (v4.0.x) isn't even as far along as that, and from what I can tell, progress is dead. See bit.do/ZAL4.

The Pi Foundation says it wants to put its limited resources behind software and tools that nurture programming and development. The Pi was always envisaged as an educational tool, after all, yet I

fancy Android would be used by most people simply as a media streamer. That role is ably filled already by HDMI sticks such as the £29.99 Chromecast or even the £14.99 Nurvo-D1. Or a £35 smartphone. For media duties on the Pi there's the official OpenELEC and Raspbmc/OSMC Linux distros, but unlike Android, of course, those aren't able to tap into the likes of Netflix, Hulu, and Spotify (not easily, anyway).

The GPU on the Pi (all models) is Broadcom's VideoCore IV (at 250MHz). Much of the documentation and some of the source code for this is in the public domain, but not enough to allow open-source developers to write a driver with hardware acceleration. Without such a driver, Android is unusable.

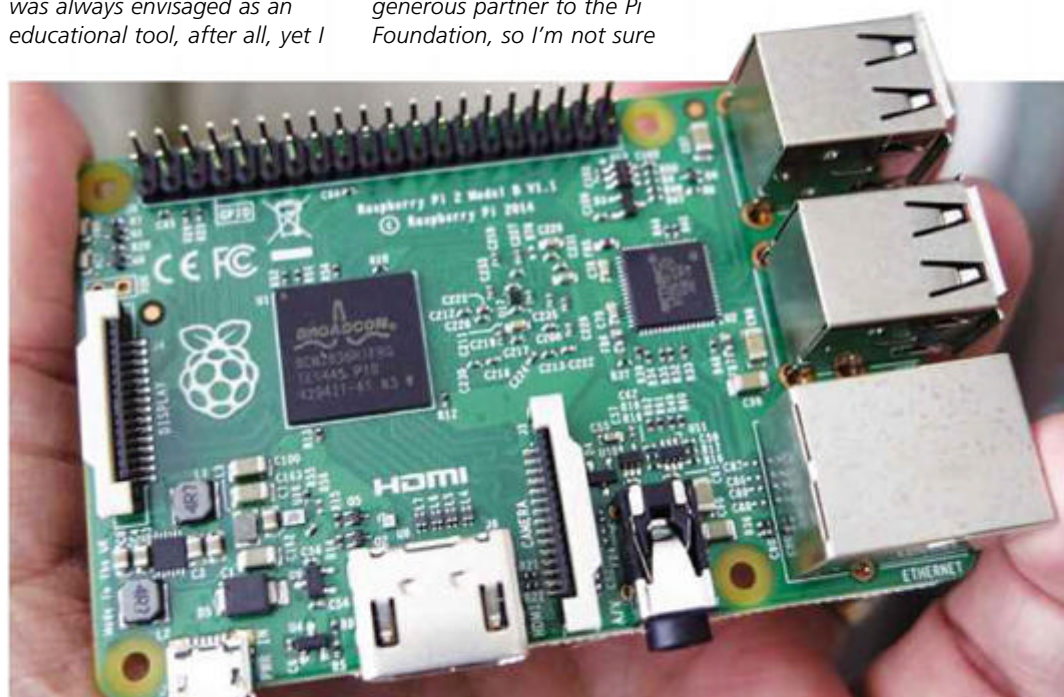
While the VideoCore IV isn't an especially popular GPU, it's used on several recent smartphones: Samsung's Galaxy Grand Neo, for example, and the dual-SIM variant of HTC's Desire 601. Both run Android without issue, even KitKat (v4.4.x). It seems these companies have paid Broadcom a fee to access the full source code, no doubt under a non-disclosure agreement (NDA). Broadcom's been a loyal and generous partner to the Pi Foundation, so I'm not sure

why it's playing rough over the VideoCore IV.

Many alternatives to the Pi – for instance, the various Banana (bit.do/ZBJJ) and Odroid units (bit.do/ZBJa) – employ Mali GPUs from ARM. By whatever means, developers have written hardware-accelerated drivers for those with little difficulty, and fully working Android ports are ready and waiting. The Pi Foundation appears to have painted itself into a corner with the VideoCore IV, as for the sake of backwards compatibility (allegedly), it's had to stick with it even for the Pi 2.

There's some positive news, however. A fella with the handle of Eric Anholt, quite the guru when it comes to drivers, recently moved to Broadcom from Intel, and he's tasked with getting the VideoCore IV driver open-sourced. Mind you, work began in June 2014, and my understanding is that the job won't be finished until at least the end of 2015. All for a driver that HTC, Samsung, and others already have. What part of this tragicomedy am I not getting?

▼ **Why can't the Raspberry Pi or the Raspberry Pi 2 run Android?**



Telegram Stan*

In issue 1,350 you brought attention to the hidden game in Android Lollipop (v5.0.x).† As cool as that game is, check out the one behind the 'site not found' page in Google Chrome (version 38.x onwards, I think). To paraphrase Thin Lizzy in 'The Boys Are Back in Town', it's so cool it's red hot

Kris, TalkTalk

If you'd mentioned this just last week, Kris, you'd have had me. A few days ago, though, my son put me onto it. I've played it many times since. For the benefit of others, if a requested site is down or no

longer exists, or if you've simply lost your internet connection, Chrome brings up a little pixellated T. rex.‡ If you watch closely, he blinks. He's the game's star.

The easiest way to play the game on demand is to temporarily turn off Wi-Fi or pull out your Ethernet plug. When you see the T. rex and 'This web page is not available' (or similar), hit the spacebar (on a phone or tablet, tap the T. rex). The game's an endless runner – a 2D variant of Temple Run. Tap the spacebar to make the T. rex leap over the scrolling cacti (on a phone or tablet, just tap the screen). The graphics are barely up to ZX81-level, though there's

sound, something the ZX81 didn't have. Well, there's sound in the sense you're granted a tinny beep whenever you score 100 points.

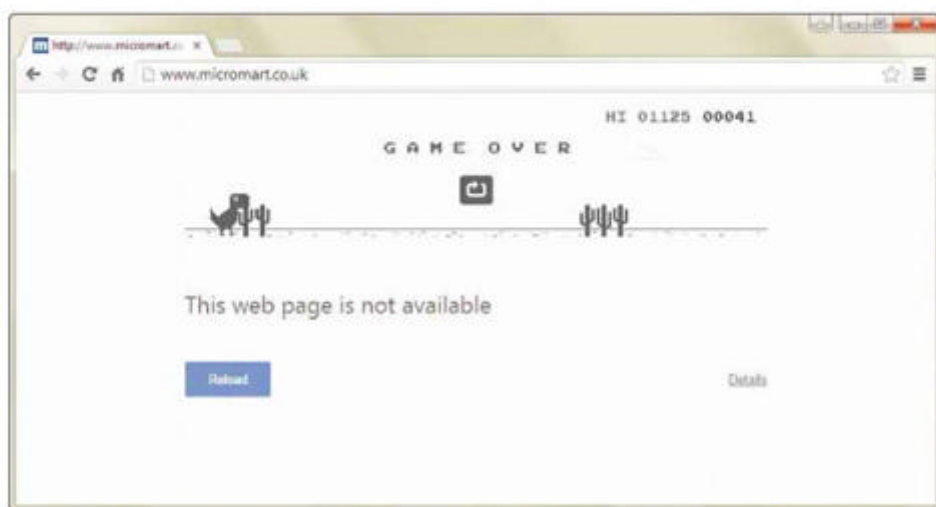
It's a super bit of fun and no mistake. The game does actually get faster, and it takes some doing to get much beyond about 1,100 points. I bet you've never done it, have you, Kris? I doubt you're as good as I am. I'm world-class. Believe it or believe it not, once I even got to the third maze on Pac-Man...

* Answers on a postcard.

† For readers who are unaware, the game, an homage to Flappy Bird, is accessed by bringing up the Settings screen, hitting About, and jabbing numerous times at the Android version number. There's been some treat or other hidden behind the version number since Gingerbread (v2.3.x).

‡ He's probably called Stan, named after the resin cast of a T. rex fossil skeleton standing in the Googleplex. The cast itself was named after a real T. rex fossil skeleton, details of which can be found at bit.do/ZJGt. If you like, you can buy your own cast – a steal at \$100,000.

< Can you beat my score? Of course you can't!



The Write Stuff

I'm contemplating buying an SSD for my laptop, probably a 240GB unit. However, I like to make whole-drive backups (clones), and every few months I also like to reinstall Windows from scratch to keep the laptop 'fresh'. Will this still be possible with an SSD, or will the repeated installations – Windows, programs, and updates – cause damage? Is it true that formatting an SSD more than once can also cause damage? I plan to fit a caddy into the laptop's DVD bay too, and put the original HDD in there. Should programs be installed to this or to the SSD?

Bryan Jones, Wolverhampton

Worry not, Bryan. Worry not. Simply carry on as you always have. Yes, NAND cells sustain only a limited number of write operations before curling up their toes, but on a modern SSD this number is high enough not to be a factor. Aided by wear-levelling techniques, an SSD should be able to write dozens of gigabytes every day for five, six, seven years (including reformat) – much more than any 'normal' user would

demand. After that length of time, your SSD will probably have been retired or relegated to secondary usage.

Programs should be installed to the SSD, at least until it's getting low on space. Installing them to an HDD would negate the reason for fitting an SSD in the first place. Fitting your old HDD into the laptop's DVD bay would be a very savvy move, though. Use the HDD for data such as music and video – files that don't benefit from the instant access times and rocket-ship speeds that are an SSD's bread and butter. This will leave the SSD free for programs.

There's a lot of bad advice still given regarding SSDs. If you're running Windows 7, 8.x or 10, it's pretty much a case of fit and forget. You should only need to

tinker and tweak if you're running Vista or, heaven help you, XP. If that's the case, Bryan, see bit.do/ZJEA for information on disabling defragging and SuperFetch, see bit.do/ZJEG for information on TRIM, and see bit.do/ZJES for information on partition alignment.

▼ A popular laptop upgrade is to fit an SSD and move the HDD into the DVD bay



Crowdfunding Corner

A pair of contrasting smartphone accessories this week – with one huge project, and one not so huge one!

Pebble Time

Announced just hours ago at time of writing, the Pebble Time has already blown past its \$500,000 target by a factor of five. Who knows what absurd heights the hardware will have hit by the time you're reading this? Whatever, this is going to be one Kickstarter it's virtually impossible to ignore.

The next generation of the beloved Pebble smartwatch, the Time, has a new design, a new 'timeline' interface that "highlights what's important in your day" (whatever that means) and comes with a claim of seven days of battery life. It's the hardware improvements that we really like, though. The display is now full-colour, there's a built-in microphone for responding to alerts, and it's fully compatible with all existing Pebble apps. What's more, it's 20% thinner than the original design, waterproof, and with quick-release watch straps – and it will come in three Kickstarter-exclusive colours. If you backed the original project, there's a special engraving available for you too. With so many good reviews for the original (not least from ourselves) and all these improvements, it's no surprise that this project is doing so well.

Early bird backers can get one for \$159 (£102), but with only a few hundred left there's little chance you'll get the opportunity to pay that much – but you might sneak in on the \$179 (£115) tier. Other packages are available.

URL: kck.st/17SMA04

Funding Ends: Saturday, 28th March 2015



I Ready O

If you've got a spare iPhone kicking around (and given the rate those things come out, it wouldn't be surprising) then why not put one to work? The I Ready O is a dock/cradle which transforms a standard iPhone into the screen of a smart radio. Inspired by retro analogue designs, the I Ready O allows you to access your phone's functions through physical controls as well as giving you access to the touch-functions and apps.

With a built-in battery and speaker as well as space to attach your charging cables and earphones, the I Ready O allows you to play your music (or videos) while providing clear, loud audio. When you're not using it, switch your phone to clock mode and keep it on your bedside table or kitchen worktop. The handle transforms into a stand and can be used as a wall hanging, giving you a number of ways to use the device both indoors and out.

The only way to get one of these devices right now is to back the Kickstarter, which will cost a minimum of CAD105 (£53) which includes shipping. Higher tiers allow you to buy multiple units at a discount. It's a simple piece of kit, but if you like the retro charm of a desktop radio that's exactly what you need. With four weeks to go, the goal is CAD60,000 (£31,000) and they've made a good start already. Get in early!

URL: kck.st/1zDoP49

Funding Ends: Wednesday, 25th March 2015



Disclaimer: Images shown may be prototypes and Micro Mart does not formally endorse or guarantee any of the projects listed. Back them at your own risk!

App Of The Week

GCSE Revision Collection

A little help in brushing up for those exams, this week

Exams, remember them? Those things that you spend your youthful years focused on, diligently working your socks off, inwardly ingesting all that accumulated knowledge? While it's been a while since we sat an exam, we imagine that the setup hasn't changed too much in the years since we attended school, and right now another bunch of teens are beginning to get nervous about this year's round of three-hour sessions in the school hall.

As we understand it, the first batch of exams will be starting around May, so they're only a few months away. So, if you're one of the bright young things getting set to sit one, you'll no doubt be spending your time brushing up on the subject as we speak. If you're a not-so-bright, not-so-young parent of a GCSE-age child, you're no doubt beginning to get nervous on their behalf. Either way, we thought using an app could help you revise and be a little more prepared for – or less worried about – the upcoming exam?

$a^2 + b^2 = c^2$

If the square of the hypotenuse, Fermat's Last Theorem or some other Pythagorean tongue twister is causing you to have sleepless nights, then perhaps the following could help you out. A brief look on the Google Play Store reveals a number of highly rated and free apps for a huge range of different subjects. For example, the GCSE OCR Additional Science app (goo.gl/6hkkFx) takes the learning from the text book and displays it in a readable and clear format on your device. From here, you can view the structure of a bacteria cell, what the inside bits of a person do (our technical term, that) and you can revise all the necessary information on forces and energy. Clever stuff.

The Maths GCSE Game app, available at goo.gl/siQJme, contains twelve different GCSE Mathematics topics with each having over forty questions in a quick bank for you to work through. You can brush up on your quadratics, fractions, calculating probabilities, stats, averages, Trig, Pythagoras and coordinates. There's even a level of competition in the form of an online

multiplayer quiz mode – and, thankfully, no in-app purchases or annoying adverts.

Deutsch lernen ist nicht schwer, as they say in Germany. Or at least we think they might. Anyway, the Lite version of the GCSE German Vocab Edexcel app (found at goo.gl/N8tjSf) is one way to help you get to grips with the finer nuances of this rather wonderful language. You'll get flash cards to help you learn, a mock test which covers 1216 words from the Edexcel syllabus and records your progress and there's even a quiz to keep your German language skills in tip top condition.

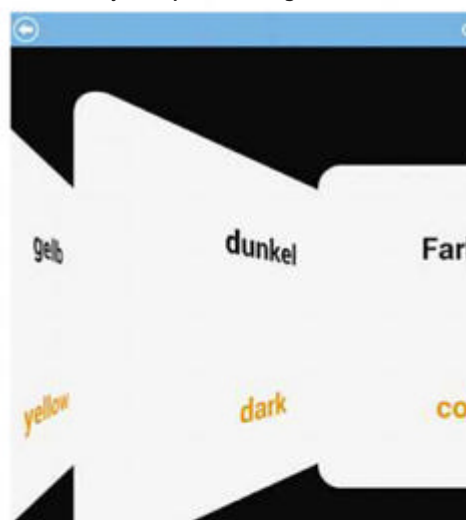
While there are countless similar apps to choose from, we recommend the GCSE French Revision for AQA app (goo.gl/PLq6ei). Here all the vocabulary revision is taken straight from the AQA tests and will help you be better prepared when your exam time comes.

Conclusion

As we said, there are tons more apps to help you revise and practise for your GCSEs, A-Levels and even your driving theory test – and this is just for Android devices. Either way, we think a little extra help or prompting won't hurt. All that's left now then is to knuckle down and good luck.

➤ You can revise any topic, from any exam board without lugging around tons of books

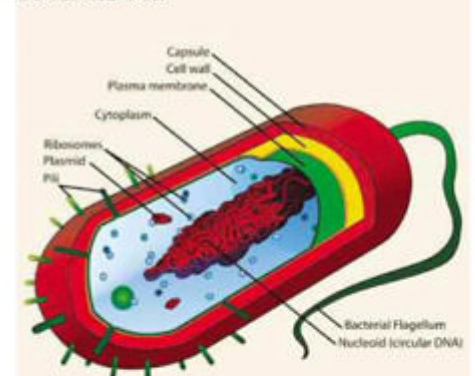
▼ Und fast jeder Sprache verfügbar ist, zu lernen



Features At A Glance

- Most of these apps are free from in-app purchases, but check beforehand
- A more convenient way to revise and can be done on the bus to school or college
- Virtually every exam from all the exam boards are covered
- Both offline and online versions of apps are available

Bacterial Cell



Structure	Function
Molecule of circular DNA	Contains genetic code for enzymes involved in respiration
Cell membrane	Allows gases and water to pass in and out of the cell while controlling the passage of other chemicals
Cell wall	Provide rigidity to maintain cell shape
Cytoplasm	Enzymes are made and reactions involved in respiration occur here

Logging Off

I've reviewed a number of Lenovo products here in the last few months, and they're often both technically interesting and competitively priced.

However, much of that good work on its part went dramatically south recently, when it was revealed that it had been installing something that on its best day constitutes malware.

Superfish, as it turned out, was much worse than typical malware, because along with providing wholly unsolicited pop-up adverts, it potentially opens the PC to much more serious software invasion.

What blew this writer's mind was that someone at Lenovo thought for whatever reason that sending out systems with a software tool that can fake the security certificates of banks, among other things, so it can decrypt the data exchanges, was somehow a good idea.

We've seen these types of debacles before, most notably with Sony, and they go through three distinct stages: first there's denial that whatever the business did constitutes a problem – or the 'What's the problem?' phase. Then once the world and his dog points out the nature of 'the problem', we move to the 'hypothetical' stage, where those responsible accept that there might be a problem, but only in a synthetic sense. And finally, as sales fall off a cliff and the Twittersphere goes into complete meltdown, we then reach the 'capitulation' stage, where it actually sinks in what a dire calamity they've made of managing their customer relationship, and they promise to wear a sack-cloth and ashes while beating themselves with a copy of the Sale of Goods Act 1979.

Lenovo went through all these phases like an exceptionally well-trained dressage pony, initially calling Superfish a 'visual search enhancement', before then accepting that perhaps if misused it could be the cornerstone of a man-in-the-middle attack. And eventually, Lenovo CTO Peter Hortensius stopped opening his mouth hoping something magical would emerge from it and said, "We messed up," subsequently promising to remove Superfish from the many millions of publicly sold PCs his company had stupidly put it on.

I don't want to get Lenovo off the hook here, but there is a person who has the power to stop these types of self-mutilation as source, and it's Microsoft's CEO, Satya Nadella.

Here's the deal, Satya: make Windows free to vendors who install it 'as is', and you charge those who want to muck it up the going rate.

The goodwill that you will harvest from sowing those seeds will massively outweigh the whining you'll suffer from the likes of

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MacAfee and their poisonous ilk. PC vendors are souring the experience for PC users globally, and they need to be stopped, before they convince us all to look elsewhere.

As CEO of Microsoft, his most challenging job is to convince its customers that they're important and his company cares about them. Surely this one change to the Windows world might do more to further that aim than probably anything else he could do.

Perhaps I'm missing some subtle legal point about what level of control Microsoft realistically has once its OS is on a PC, but surely it can decide under what terms it provides its product for resale and what is acceptable (wallpaper) and what isn't (Superfish, trial anti-virus, crapware, etc.).

Make a stand, Satya, and I'll be right behind you on this one.

Mark Pickavance

LAST WEEK'S CROSSWORD

Across: 7 Counterfeiter, 8 Medina, 9 E-Micro, 10 Darknet, 12 Turbo, 14 Loose, 16 Snippet, 19 Hollow, 20 I-O Data, 22 Bioinformatic.

Down: 1 Poke, 2 On Tick, 3 Retakes, 4 Offer, 5 Milieu, 6 Wearable, 11 Apologia, 13 Ansiart, 15 Selfie, 17 Pedway, 18 SWIFT, 21 Trim.

DISCLAIMER

The views expressed by contributors are not necessarily those of the publishers. Every care is taken to ensure that the contents of the magazine are accurate but the publishers cannot accept responsibility for errors. While reasonable care is taken when accepting advertisements, the publishers cannot accept any responsibility for any resulting unsatisfactory transactions. Is it just us, or are those 'all the tea you drink in your life could fill a swimming pool' type of statistics really very annoying? They're not amazing and they don't make you think. Well, they make you think how stupid statistics can be, but they're entirely meaningless.

Let's take the tea one, for example. What it amounts to, essentially, is that if you add lots of small things together over a very long time, they eventually add up to something that is much bigger. Wow. Mind blown. Now compare that swimming pool of tea to the entire British Channel. Or the Pacific Ocean. Doesn't look quite so significant now, does it? Here's a fact for you: if you add up all the time you'll spend in your life listening to stupid statistics, it'll probably amount to about half a day. We totally made that up, but if we hadn't told you, how would you even know? By the way, we reckon we could fill at least three pools with tea over our life. We do so love tea.



THIS WEEK'S CROSSWORD

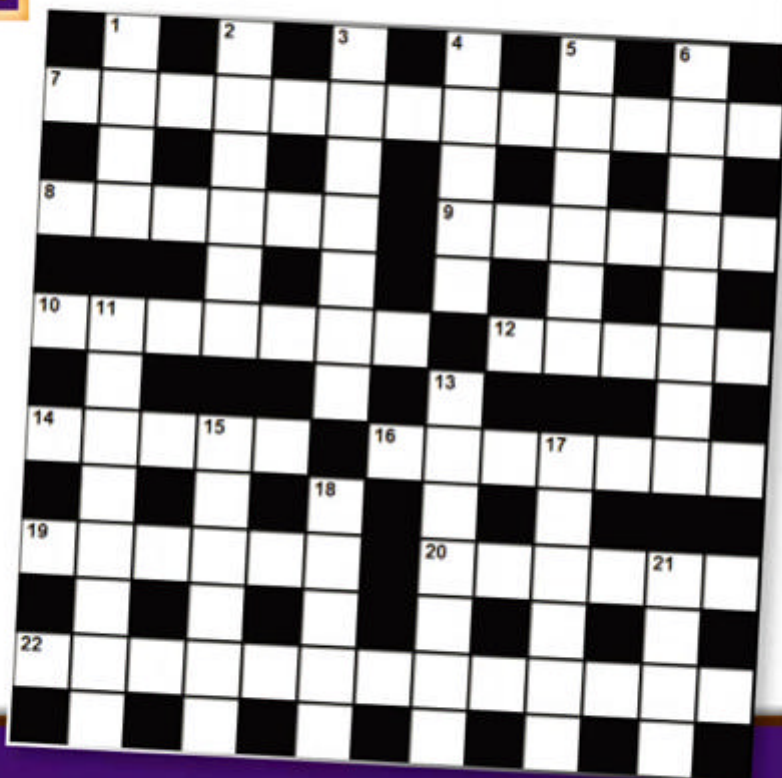
Across

- 7 A compiler or writer of a dictionary. (13)
8 Capable of being influenced or formed. (6)
9 A person who was born under the seventh sign of the zodiac. (6)
10 Having its true character concealed with the intent of misleading people. (7)
12 Excessively conventional and unimaginative. (5)
14 Robert Vaughn And David McCallum played agents of this fictional secret international espionage and law-enforcement agency. (Acronym) (5)
16 Artifacts in raster images often caused by aliasing. (7)
19 A member of the UK military police. (6)
20 A musical composition of three or four movements of contrasting forms. (6)
22 Statistical analysis of books, articles or other publications. (13)

Down

- 1 Each of the eight half-hour units of nautical time. (4)
2 A photo-sharing software program and website similar to Flickr. (6)

- 3 Produce or distribute software illegally. (7)
4 Someone who deliberately posts contentious and inflammatory remarks online in order to provoke others. (5)
5 Search & Destroy! An anti-spyware program from Safer-Networking. (6)
6 A piece of graphical information stored in a format that can be exchanged between different systems or software. (8)
11 A social network used to help people make professional business connections. (8)
13 An online music store that allows you to listen to unlimited amounts of music and download tracks for a set monthly price. (7)
15 In computing, a set of parameters that defines the user's language, country and any special variant preferences. (6)
17 Symbolic's operating system and development environment for Lisp machines. (6)
18 A composition that imitates or misrepresents somebody's style, usually in a humorous way. (5)
21 Consideration in dealing with others and avoiding giving offence. (4)



In Next Week's Micro Mart*

- Interesting uses for an old Android smartphone
- How to effectively manage your passwords
- Exploring the open-source alternative to Minecraft
- Plus the usual mix of news, reviews and advice



* May be subject to change

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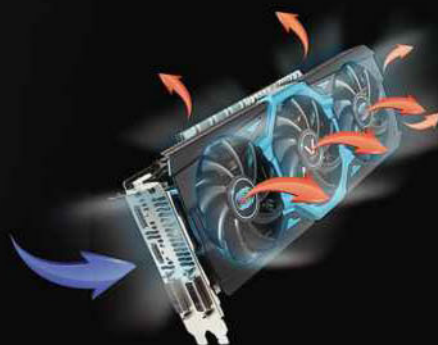
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