BLOGS

JB's Circuit

"The Function of Form" Flashback

Back in the early '00s, I covered the latest in wearable wireless technology (see below, "The Function of Form...

WWED Group Blog

Women in Electronic Design!

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EDA Thoughts

EDA without using the Acronym EDA

Two press releases came out today and they were both from major EDA companies that are now starting to position themselves...

Collaborative Advantage

New OpenDFM Standard: Much More Than A Spec

Today, Si2 announced the first official release of the OpenDFM standard -- an open,

• ARTICLE

[Printer Friendly]

Plessey Semi and University of Sussex Propel Sensor Leap

Sensor technology detects changes in electric field, in contact, at a distance, through clothing and even through walls

Plymouth, ENGLAND – 10 November 2010 – Plessey Semiconductors and the University of Sussex today announced a new, innovative and disruptive technology called the **Electric Potential Sensor** (EPS). This is a completely new area of sensor technology that measures changes in an electric field in a similar way to a magnetometer detecting changes in a magnetic field. The sensor, which requires no physical or resistive contact to make measurements, will enable innovative new products to be made such as medical scanners that are simply held close to a patient's chest to obtain a detailed ECG reading or devices that can 'see' through walls.

Professor Robert Prance of the University of Sussex, explained, "We created this technology initially as a non-invasive non-contact sensor for measurements in fundamental physics research. However, we quickly realised the many important applications for which this technology could be utilised. Our Research Councils UK Basic Technology programme has allowed us to develop a generic Electric Potential Sensor and we have been able to demonstrate its application in a number of areas where the non-contact detection of electric fields can be used to deliver new innovative solutions and products. For example, these include medical diagnosis and imaging, security, and the human-machine interface. We are delighted to have found a partner that we can now go forward with to develop this unique technology into innovative product solutions for the marketplace."

Dr. Keith Strickland, Technology Director for Plessey Semiconductors, said, "The EPS technology created by Professor Prance's team at the University of Sussex is a significant innovation that will have a wide-ranging disruptive impact in the sensor market. In conjunction with the University of Sussex, Plessey will be developing an exciting range of EPS sensors utilising our in-house expertise in semiconductor process technology and design. In particular, our expertise with CMOS image sensors will enable us create very large chips with arrays of EPS sensors. We expect to have our first product prototype available in Q3 of next year for a medical diagnosis product that will significantly advance the ease and quality of cardiac measurements."

EPS technology

Until recently, measuring electric field was either done with very insensitive detectors that measured in the hundreds of volts range to check for potential electrostatic discharge that might damage sensitive equipment or with large laboratory electrometers that needed frequent recalibration. The University of Sussex solved the recalibration issue with a patented combination of techniques that prevent electrostatic build up and electrostatic damage so that the new EPS technology is intrinsically stable and does not need calibration. The EPS technology is at the final stages of being granted worldwide patents.

Professor Prance added, "In the 1950's, there was research into low voltage electric fields for the creation of photocopiers but once perfected there was very little done until we started a blue sky research project that was operating at minus 269 degrees Celsius so we had to invent a measuring technology that was ultra stable as you could not access it to constantly recalibrate. It was a forgotten area of science until we rediscovered it and realised its huge possibilities."

The EPS technology works at normal room temperatures and functions

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as an ultra high, input impedance sensor that acts as a highly stable, extremely sensitive, contactless digital voltmeter to measure tiny changes in the electric field down to milliVolts. Most places on Earth have a vertical electric field of about 100 Volts per metre. The human body is mostly water and this interacts with the electric field. EPS technology is so sensitive that it can detect these changes at a distance and even through a solid wall. Thus, for example, in a fire situation, it could be possible to determine if there any people in a smoke filled room before opening the door.

Initial application areas

The initial application areas for EPS will be in medical and sports. Key to this is that EPS detects the voltage change in muscles and nerves without electrical contact so there is no need to have electrodes on or in the body to detect current changes. Examples of possible products include:-

1) *Twin sensor Electrocardiograph* (ECG) where the sensors can be worn with one on each wrist (no conducting gel required) which can then provide output similar to a standard ECG. This has the advantage that it can be worn 24/7 with complete freedom to move around to study the ECG over long periods of time and a variety of real life conditions. It could also be used to monitor an athlete's heart and even gait with appropriately placed sensors.

2) *Contactless ECG* where an array of EPS sensors can just be held over the patient's chest to obtain readings to give the equivalent of a 12 lead ECG without a mess of wiring and electrodes that can easily become detached.

3) *Electrooculograph* (EOG) where sensors on the head can detect eye muscle movements. This data could be used for new human machine interfaces for gaming or for the disabled. As no conducting gel is required, the sensors could even be built into a pair of glasses as this would position the sensors appropriately to obtain readings.

4) *Electromyograph* (EMG) where sensors detect nerve impulses and muscle contractions which could be used to control artificial limbs from a simple pad on the surface on the skin, i.e. no need to implant electrodes and no possibility of skin irritation as the sensors are chemically and biologically inert.

The University of Sussex has already negotiated license agreements with a number of OEMS who will be bringing these kinds of products to market and is in active discussion to exploit the many other application areas where EPS provides novel solutions.

Video demos at
http://www.plesseysemiconductors.com/media_video.html

Sensors

The initial sensors were hand made by the University of Sussex to test and improve the EPS technology. These are currently the size of a small coin. Plessey Semiconductors will be developing and manufacturing next generation, silicon based sensors at its facility in Roborough, UK. These will integrate the circuitry that is currently discrete components into a system on chip solution with appropriate microcontrollers and software. The next phase to be developed by Plessey and Sussex will be multi-element sensor arrays that will enable 3D video imaging to be created with effectively each sensor generating a pixel of information, which will open up even more possible application areas.

Delivering products from science fiction

Michael LeGoff, CEO of Plessey Semiconductors, concluded, "This is just the sort of innovative, completely new technology that made Plessey Semiconductors famous. We have only just begun to imagine the products that can be designed to use the unique sensing capability of EPS. It is tremendous that two British organisations are working together on a genuinely disruptive technology that can deliver products that were previously not possible and in the realms of science fiction."

About Plessey Semiconductors Limited

Plessey Semiconductors are the leading experts in the development and manufacture of semiconductor products used in sensing, measurement and controls applications. Plessey's products are found in a wide range of markets including communications, manufacturing, medical, defence, aerospace and automotive. Plessey designs their products specifically for high performance applications and include image sensors, RF components, and power management devices. The suite of state-of-the-art high precision, high voltage products are available in high temperature and radiation tolerant options.

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