

Radar Toolbox Release Notes



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Radar Toolbox Release Notes

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R2021a

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R2021a

Version: 1.0

New Features

New Radar Toolbox

The new Radar Toolbox features a comprehensive set of algorithms and tools for designing, simulating, analyzing, and testing multifunction radar systems.

Radar Designer App: Model radar gains and losses and assess performance in different environments

The **Radar Designer** app is an interactive tool that assists engineers and system analysts with high-level design and assessment of radar systems at the early stage of radar development. Using the app, you can:

- Assess and compare multiple radar designs in a single session
- Add smart radar, environment, and target “Radar Designer Configurations” to jump-start your analysis
- Incorporate environmental effects due to Earth's curvature, atmosphere, terrain, and precipitation
- Add custom target radar cross-sections, antenna/array models, and both range-independent and range-dependent losses
- Export and save results, sessions, models, and plots to continue your analysis

Evaluate Radar Performance

Radar Toolbox gives you tools to evaluate the performance of radar systems. You can find these tools in “Radar Systems Engineering”. Significant capabilities allow you to:

- Evaluate the radar received signal-to-noise ratio as a function of transmitted power and target range (radar equation)
- Derive detection and tracking statistics
- Evaluate antenna and receiver gains and losses
- Compute attenuation losses due to atmospheric effects, clutter, and weather
- Compute signal processing gains and losses for synthetic aperture radars

Create Radar Scenarios

Use the Radar Toolbox to create realistic radar scenarios. Functions for creating radar scenarios can be found in “Scenario Generation”. You can:

- Model platform motion and orientation based on waypoints and trajectories or by simulating inertial navigation systems
- Use `radarScenario` and other functions to create realistic radar scenarios for airborne, ground-based, and shipborne platforms and targets
- Employ plotting functions to visualize the evolution of the radar scenario over time

Simulate Radar Data

The toolbox helps you create simulated radar data using the functions in “Data Synthesis”. With these functions you can:

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- Simulate radar data at probabilistic or signal levels.
 - Generate signal and track data and object detections
 - Simulate signal data including effects of multipath propagation, clutter, and interference
 - Simulate target echoes from simple geometric shapes or complex structures such as a walking pedestrian or a moving bicyclist

Signal and Data Processing

The toolbox lets you perform signal processing operations on simulated radar data. See “Signal and Data Processing” for a description of the signal and data processing functions. Among the capabilities are:

- Perform matched filtering and stretch-processing, pulse compression, coherent and noncoherent pulse integration
- Estimate target range, Doppler and angle
- Employ constant false alarm rate (CFAR) techniques to reduce false detections
- Cluster neighboring detections into single extended detections
- Create, delete, and manage tracks for multiple objects

Applications

Radar Applications

- “Simulate Radar Ghosts due to Multipath Return”
- “Highway Vehicle Tracking with Multipath Radar Reflections”
- “Radar Signal Simulation and Processing for Automated Driving”
- “Track-to-Track Fusion for Automotive Safety Applications”
- “Adaptive Tracking of Maneuvering Targets with Managed Radar”
- “Labeling Radar Signals with Signal Labeler”
- “Spaceborne Synthetic Aperture Radar Performance Prediction”
- “Airborne SAR System Design”
- “Synthetic Aperture Radar System Simulation and Image formation”

Radar System Engineering

- “Radar Architecture: Part 1 – System components and requirements allocation”
- “Radar Architecture: Part 2 – Test automation and requirements traceability”
- “Radar Link Budget Analysis”
- “Modeling Radar Detectability Factors”
- “MTI Improvement Factor for a Land-Based Radar System”
- “Sea Clutter Simulation for a Maritime Radar System”
- “Introduction to Modeling the Propagation of Radar Signals”
- “Receiver Operating Characteristic to Tracker Operating Characteristic”

Scenario Generation

- “Radar Scenario Tutorial”
- “Radar Performance Analysis Over Terrain”

Data Synthesis

- “Simulating a Scanning Radar”
- “Simulating Passive Radar Sensors and Radar Interferences”
- “Transitioning From Statistical to Physics Based Radar Models”