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NATIONAL INSTRUMENTS

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measX
Measurement System Experts

ADAS Innovation in Test

- Sensor Simulation
- Sensor Fusion
- V2X Communication
- GNSS Simulation
- Data Management
- Data Analysis
- Data Organization
- HIL Test Systems

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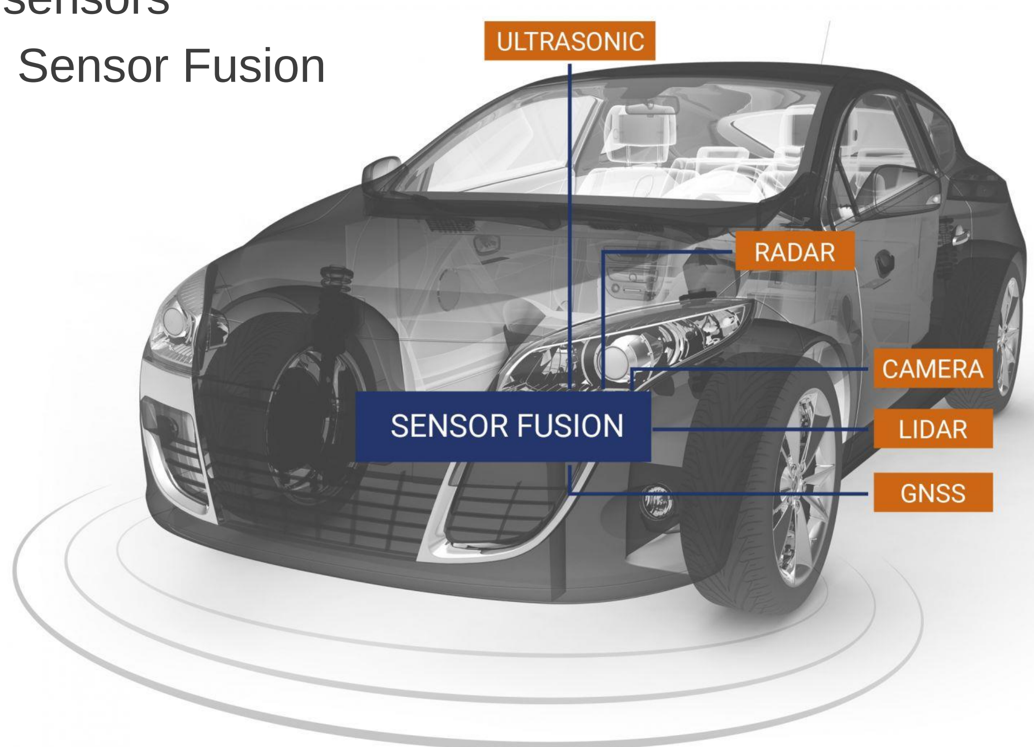
INNOVATION IN TEST

Simulation of Targets

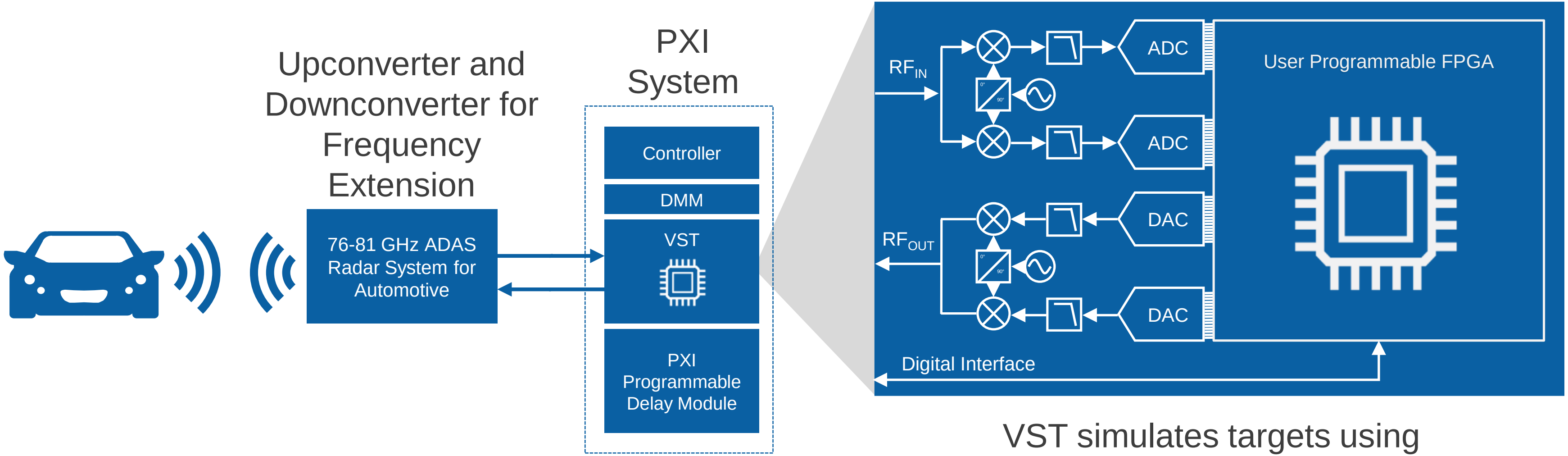
- Simulate complex automotive scenarios in the lab
- Emulate driving scenarios in real time
- Quickly and efficiently validate sensors
- Combine sensors and test with Sensor Fusion



Radar Target Simulator

- 76-81 GHz
- mmWave front end
- Vector Signal Transceiver (VST)
- Variable Delay Generator (VDG)
- Target generation and measurements with one system
- A flexible and extensible solution
- Same platform for R&D through Production

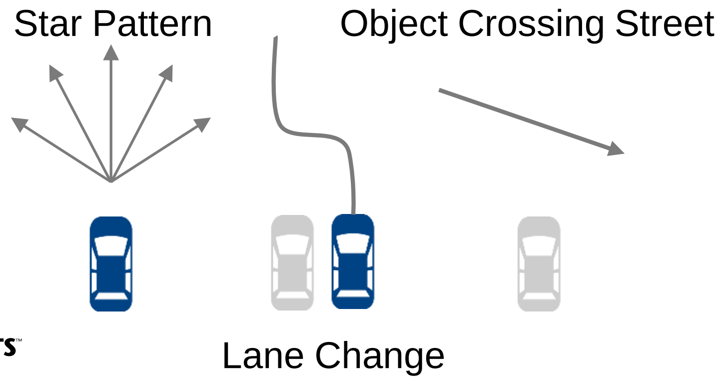
Testing Radar Systems

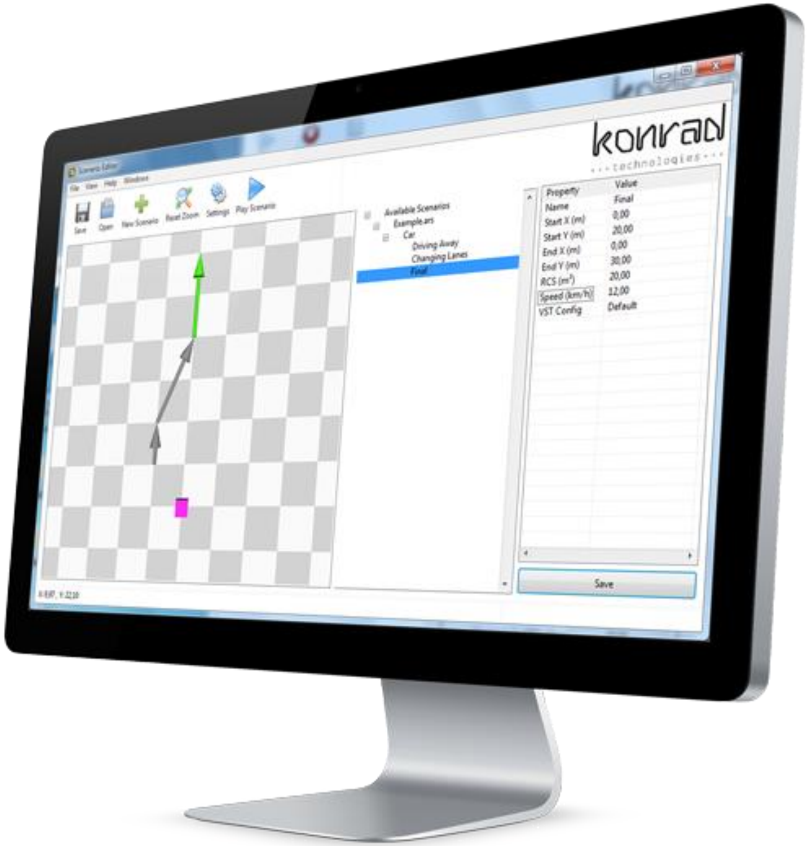


VST simulates targets using FPGA-based signal processing

Target Simulation Suite

- Scenario editor
- Take RF measurements
- Perform object simulation
- Implement custom simulations
- Cover NCAP requirements
- Use LabVIEW based software



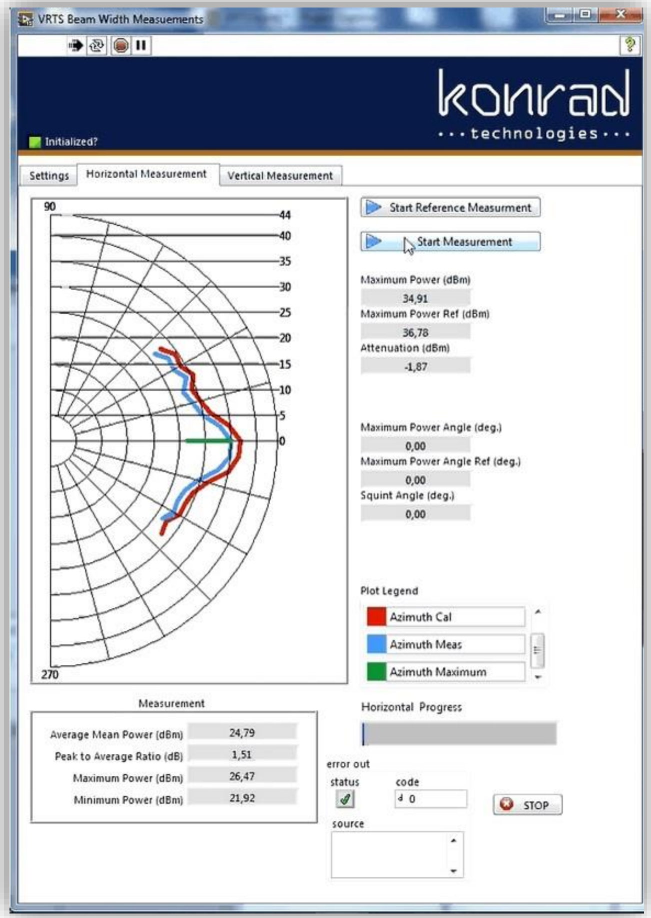


Typical Radar Measurements

- Frequency Domain Analysis
  - EIRP, Occupied Bandwidth, Phase Noise

- Time Domain Analysis
  - Update rate, pulse width, ramp bandwidth, rising or falling FM ramps
  - Detect signal anomalies

Occupied Bandwidth



Beam Analysis

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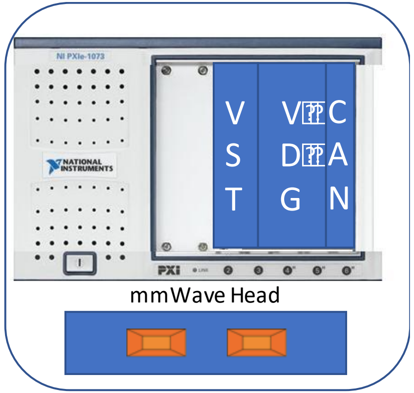
Flexible and Extensible Solution

- HIL integration
- Plugins for various automotive BUS interfaces: CAN, Ethernet, LIN
- Support for custom applications
- Antenna can be positioned at the desired location in the chamber
- User-defined configuration for:
  - Number of targets
  - Object scenarios
  - Angle of Arrival (AoA)

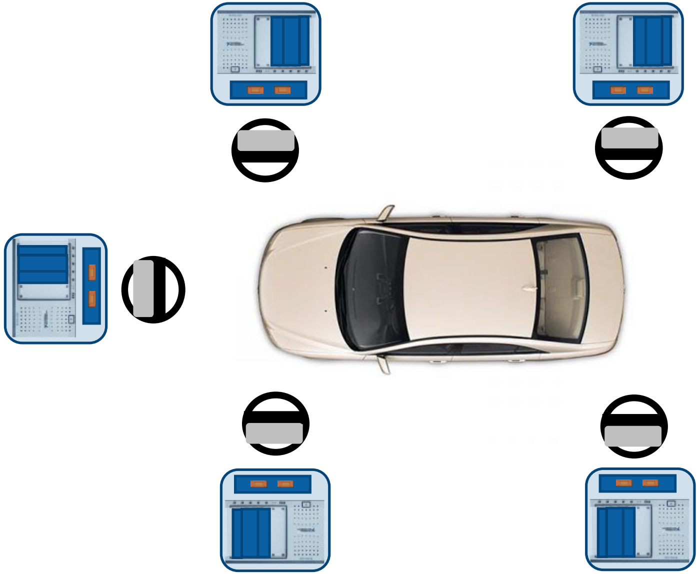
Automotive Radar - Target Simulator for Production Environment Integration

- Konrad Technologies VRTS 24 or 77 GHz Radar Target Simulator can be built into production systems.
- 19” 6HE Rack, all electronics and RF components integrated in one box.
- Antenna can be positioned at the desired location in the chamber.

Example Setup for EOL Calibration Solution



System in Housing



Traditional Camera Testing

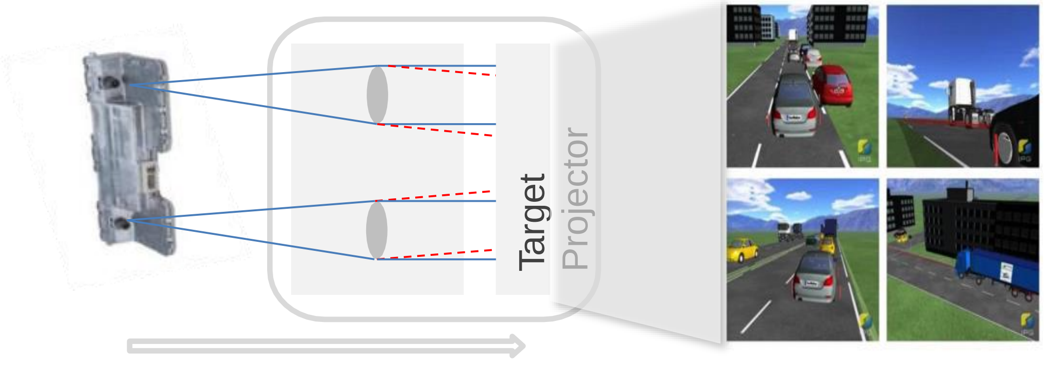
- Traditional simulator replays recorded video
- Video is shown on LCD screen
- Dynamic scenarios are not possible

Camera Target Simulator

- Camera distance to projector minimized to 5 cm
- System can be used on engineering desk
- Optical design inside of target projector transfers the image focus into infinite range

Camera Target Simulator

- Finite-Infinite MTF test
- Short DUT – Target distance
- Controlled LED back light
- Rotation
- XY
- Low distortion lens package



Lidar Target Simulator

- Target simulator for lidar sensors
- Vary the laser distance
- Measure intensity of sensor
- PXI or ABex system
- Optical receiver - transmitter

Lidar Target Simulator

- 6 channels per slot
- 1 lidar trigger input
- Maximum 128 channels per chassis
- Range simulation: 15-115 m
- Light can be fully modulated
- Adjustable light power

Max. simulation distance:	115m
Min. Simulation distance:	15m (5 m advanced version)
Resolution :	4cm (<1 cm advanced version)
Abs. Accuracy :	tbd

Sensor Fusion

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Sensor Fusion Live Demonstration