

USING *ITS* RADAR IN RAIL APPLICATIONS

ADAPTATION OF *INTELLIGENT TRANSPORTATION SYSTEMS (ITS)* RADAR
FOR RAIL APPLICATIONS

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OBJECTIVE – NON-EMBEDDED VEHICLE PRESENCE DETECTION FOR FOUR-QUADRANT GATE CROSSINGS

- Timed-mode operation encourages vehicle drive-arounds, with a tendency to trap vehicles
- When one vehicle drives around lowered entrance gates, other drivers attempt to do so as well
- VPD allows entrance and exit gates to descend almost simultaneously – discouraging drive-around tendencies
- Alternatives to buried loops and magnetometers were desired





IslandRadarFilms

WAVETRONIX RADARS IN *ITS* APPLICATIONS

SmartSensor® HD

Arterial and Freeway



Dual Radar Highway Traffic Analysis
Spans up to Twenty-two Bi-Directional Lanes
Measures Vehicle Speed and Flow
Detects Lane Occupancy

SmartSensor® Advance

Dilemma Zone Protection



900 ft Range
Multi-Lane Coverage
Dynamic ETA Tracking of Vehicles

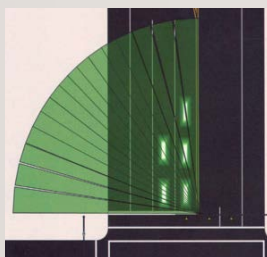
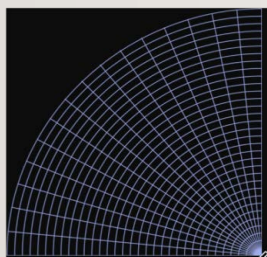
SmartSensor® Matrix

Intersection Control



Sixteen Solid-State Radars
16,000ft² Detection Area
Quarter-Circle Shaped Footprint
Up to Ten Lanes, Sixteen Zones

WAVETRONIX SMARTSENSOR® MATRIX RADAR



Replacement and upgrade to embedded inductive loops
Covers ten lanes of bidirectional traffic
Sixteen individually configurable detection zones

16 separate radars in each sensor, no scanning
90° x 140-foot detection pattern – 15,386ft²
MTBF > 10 years, MTTR < 6 hours, 99.99% Availability

Proven in thousands of ITS traffic intersection applications
Moving and stationary vehicle detection
Multiple sensors (up to 8) can be used together

ADAPTING THE SMARTSENSOR MATRIX RADAR TO RAILROAD APPLICATIONS



Wavetronix SmartSensor Radars

Radar-Based Vehicle Detection Detection



Dynamic Exit Gate Operating Mode
Blocked (Obstructed) Crossing Detection

Radar-Based Train Detection Detection

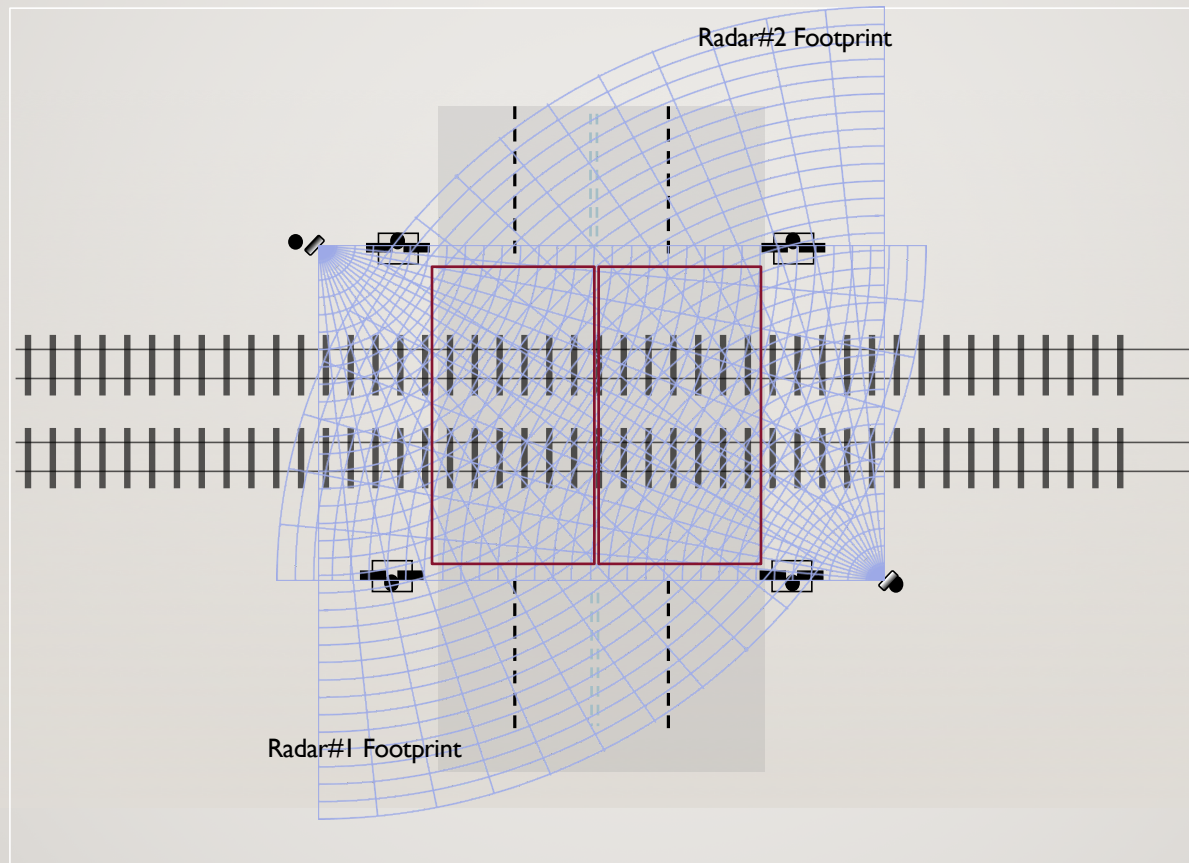


Train Detection in Interlocker Dead Sections

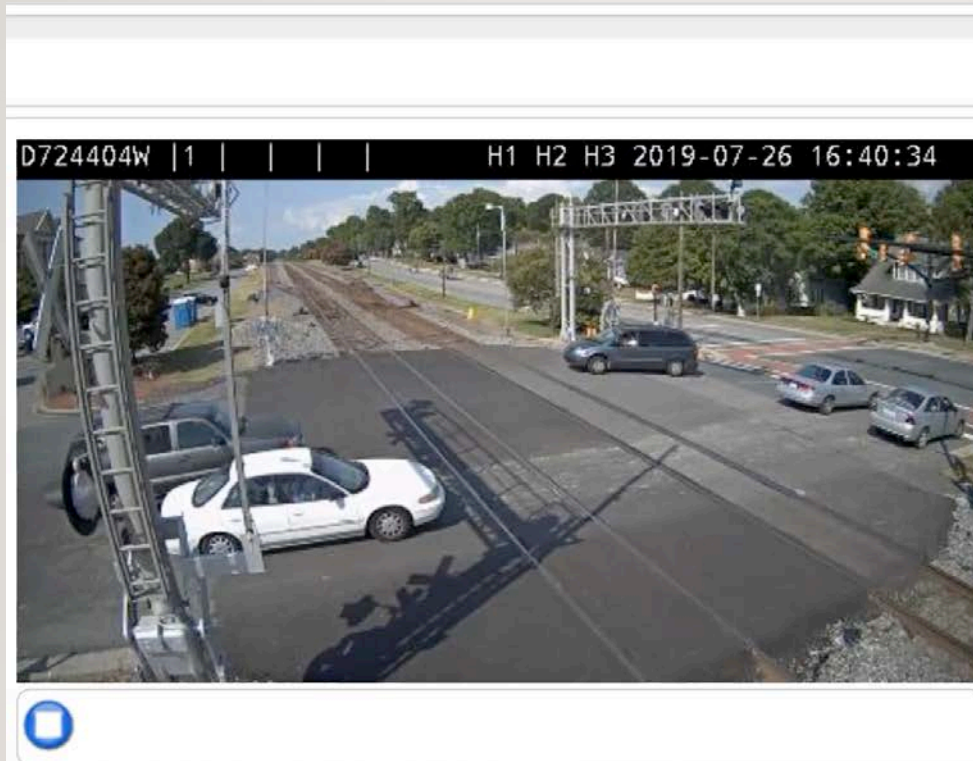


AREMA-Compliant
VDR24 Dual Radar Controller

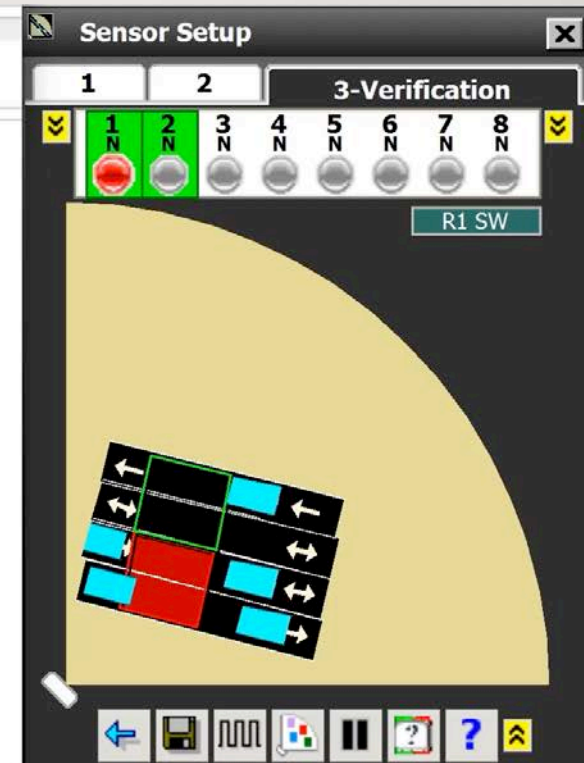
DUAL RADAR VPD CONCEPT



HOW THE ISLAND RADAR SYSTEM DETECTS AND TRACKS VEHICLES



Live View



Radar Config App View

- Functional Testing with >1,000,000 vehicles
- Engineering Validation Testing

- NEMA 250 and 4X Weatherability
- RFI: FCC Part 15C, 15.249
- Fast Transient and Burst Immunity per IEC 61000-4-4
- Surge Protection per IEC 61000-4-5 Class 4
- Surge Withstand per AREMA 11.3.3
- Environmental per AREMA 11.5.1 Class C
- MTBF >10 Years per MIL-HDBK217F, FN2

- Watertight per NEMA 250
- External Icing (Clause 5.6)
- Hose Down (Clause 5.7)
- Corrosion Protection (Clause 5.10)
- Gasket (Clause 5.14)
- Drop Withstand - 5ft)

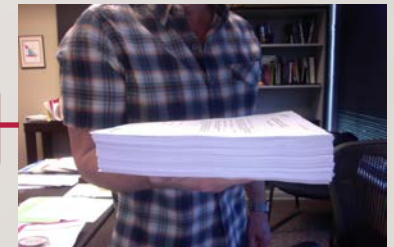
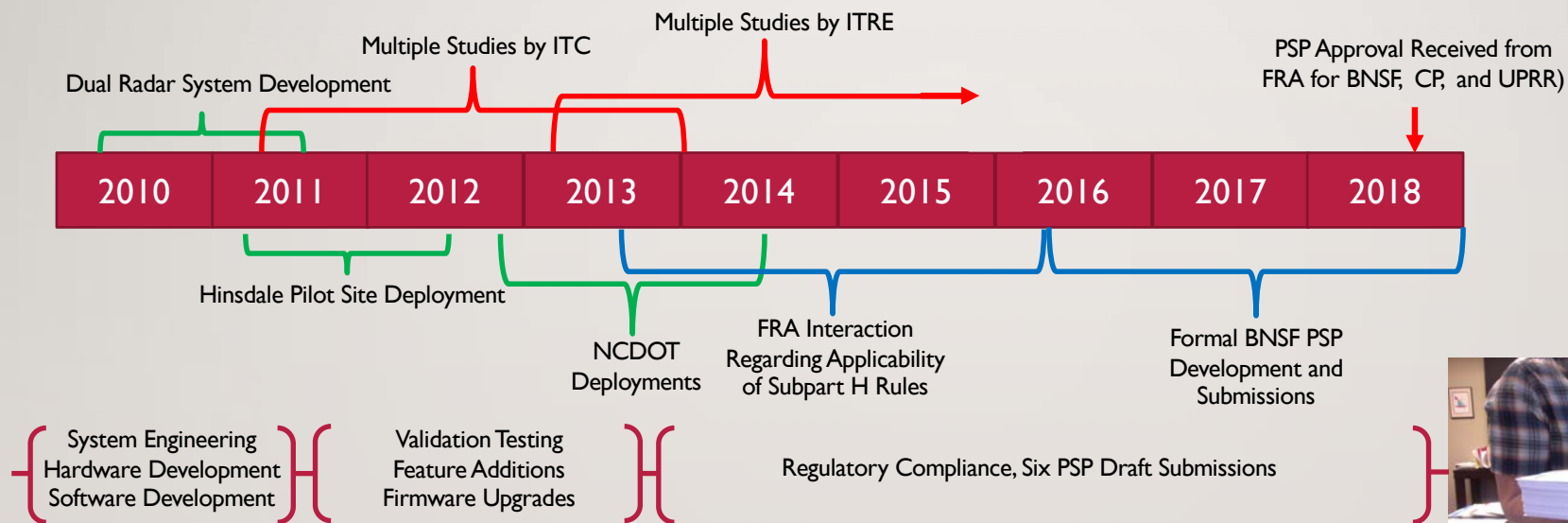
- Temperature
- Humidity
- Vibration and Mechanical Shock
- EMI/RFI
- Isolation and Dielectric Withstand

- FRA BAA Research Report
- 3rd Party Transportation Institute Studies
 - Illinois Center for Transportation (ICT)
 - Institute for Traffic Research and Education (ITRE)





CHALLENGES AND HEADWINDS

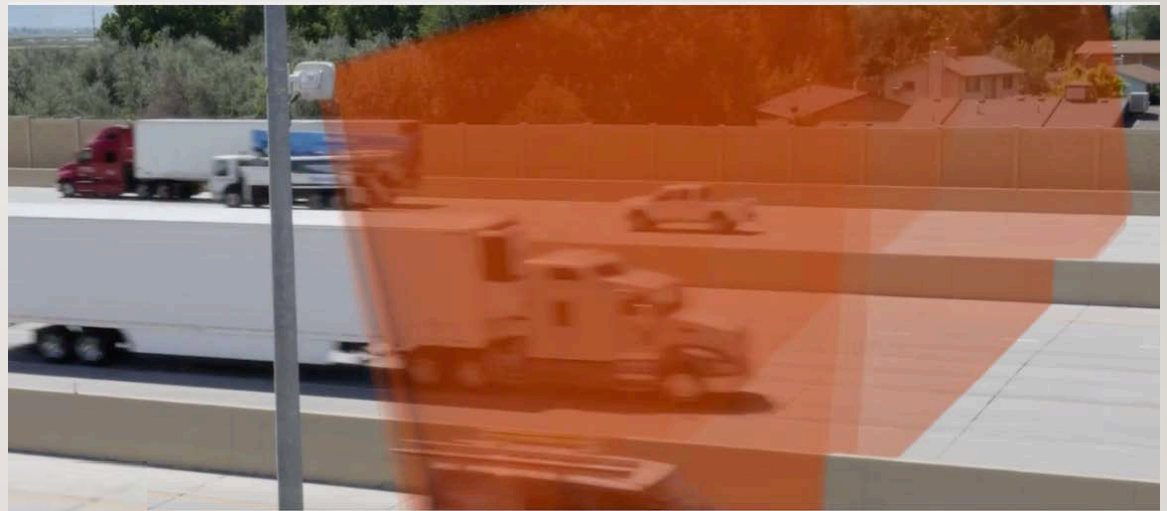


FUTURE TRENDS AND DEVELOPMENT PROGRAMS

EXAMPLE

- Use of Radar for Non-Track Circuit Train Detection
- Advanced Preemption
- Low-Speed Crossing Activation
- Busway Detection and Crossing Activation
- Island Detection, End of Train Detection
- Blocked Crossing Detection

Wavetronix HD Side-Fired Radar



Detects vehicles, vehicle lengths, flow, volume, and speed across up to 22 lanes of bidirectional traffic, at highway speeds.

A FINAL VIDEO

