Background
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System Description

- UMRR Radar Unit
- 802.11p Modem
  - Cooperative Awareness Messages (CAM)
  - Basic Safety Message (BSM)
- Embedded Solution
  - Raspberry Pi
  - CAN-bus Shield
Communication and Verification Test

- ITS-G5 Implementation and Communication Test
  - RSU broadcasting ITS-G5 frames (CAM Messages)
  - Drive C2X receiver saving received frames
  - Wireshark successfully dissected the data

- Verification Test
  - Drive C2X Volvo car driving and broadcasting
  - RSU detecting and broadcasting
  - Drive C2X roadside receiver saving received frames

Accuracy Tests

- Objectives
  - Measure the accuracy of the RSU in time and spatial domains

- Methodology
  - Log car coordinates and time with GPS
  - Log car coordinates and time with RSU
  - Compare in time and spatial domain
Accuracy Tests – Single Measurement

Accuracy Tests – Measurement Error
Accuracy Tests – Total Error

Conclusions

- Road Side Unit (RSU) Implemented
  - UMRR radar
  - 802.11p modem
- Functional Tests
  - ITS-G5 protocol implemented
  - Detects and reports vehicles
- Accuracy Tests
  - Promising results
  - $\sigma_x = 89$ cm and $\sigma_y = 38$ cm
- Increase early penetration rate of Intelligent Transportation Systems