Integrity Monitoring Methods in Cooperative Intelligent Transport Systems (CITS)

Elizabeth Smith
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CITS

Transmissions

Vehicles
- Position
- Heading
- Speed

Infrastructure
- Hazards
- Traffic
- Weather
Vehicle Sensors

- Global Navigation Satellite System
- Inertial Navigation System
- Camera
- Lidar
- Radar
- V2X
GNSS Error Sources

- Clock
- Ephemeris
- Atmosphere
- Equipment
- Multipath
- Interference
GNSS Error Detection

- Clock
- RAIM
- Dual Antenna
- Chi-Squared Test in Kalman Filter
- Sensor Fusion
- Equipment
- Ephemeris
- Multipath
- Atmosphere
- Interference

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INS Error Sources

- Bias/Drift
- Noise
- Integration
- Equipment

Gyroscope frame
Spin axis
Gimbal
Rotor

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INS Error Detection

- Bias/Drift
- Noise
- Integration
- Error modelling
- Sensor Geometry
- Sensor Fusion
- Equipment

Gyroscope frame
Spin axis
Rotor
Radar Error Sources

Clutter
Radar Error Detection
Visual Error Sources

- Weather
- Bright Light
- Low Light
- Poor Line Quality
- Calibration
Visual Error Detection

- Weather
- Image Processing
- Poor Line Quality
- Sensor Fusion
- Thermal Camera
- Night Vision
- Bright Light
- Standard Calibration Techniques
- Low Light
- Calibration
Lidar Error Sources

Clutter
Lidar Error Detection
V2X Error Sources

- Packet Loss
- Multipath
- Noise
- Hidden Terminal
- Software Error
V2X Error Detection

- Packet Loss
- Narrow Bandwidth
- Improved RF Front End
- Noise
- MAC Layer Protocols
- Directional Packet Forwarding
- Packet Delivery Monitoring
- Carrier Sensing
- Hidden Terminal
- Multipath
- NLOS Detection
- Software Monitoring Program
- Software Error
Next Step
Thank you 😊

Elizabeth Smith

University of New South Wales

Elizabeth.a.smith@student.unsw.edu.au

Defence Science and Technology Group

Liz.smith@dsto.defence.gov.au