

Smart Fire Trucks and Smart Firefighter Tracking

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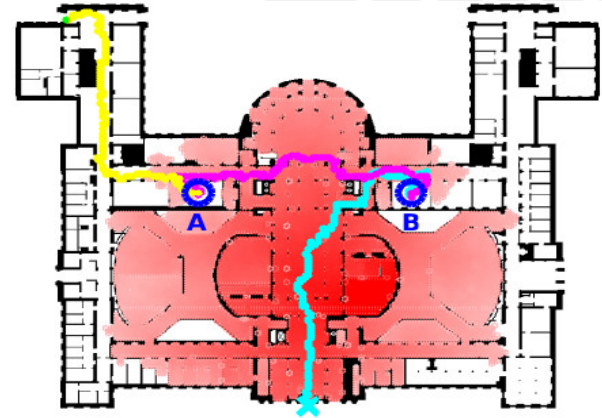
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Objectives/Value Proposition

- Smart fire trucks with sensors and intelligence
 - Introduce sensors, i.e. cameras, radars, LiDARs, to detect pedestrians and obstacles in all blind spots of a truck driver.
 - Develop intelligent algorithms for cross traffic monitoring, collision avoidance, and advanced driver assistance.
 - Evaluate the technology on WPI's autonomous vehicle platform.
- Wearable device for firefighter tracking
 - Build on WPI's previous research experience from the "Precision Personnel Localization" (PPL) project.
 - Develop new sensor prototype by combining GPS, inertial measurement unit, laser rangefinder, infrared cameras, etc.
 - Propose new algorithms of precise motion tracking using machine learning, simultaneous localization and mapping.

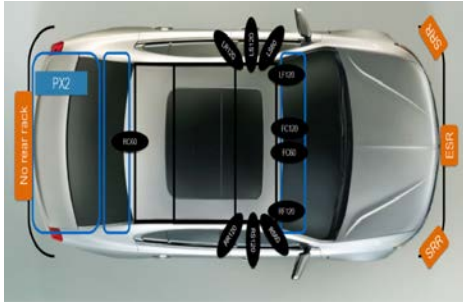
Motivation



Smart fire truck: add sensors and intelligence from our current research on autonomous vehicles

Wearable firefighter tracker: multi-sensor fusion and machine learning for precise localization

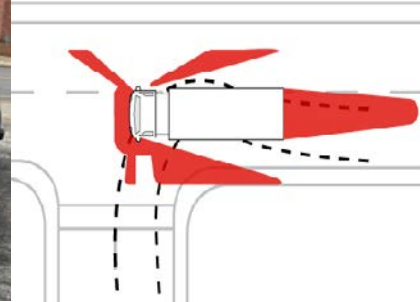
Approach



Autonomous vehicle sensors



Data collection and experiments



Collision avoidance



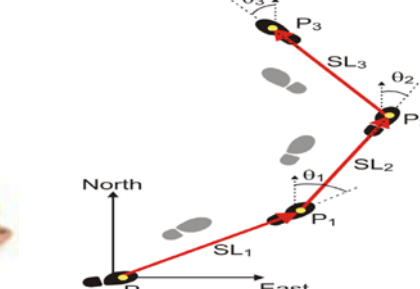
Fire truck applications



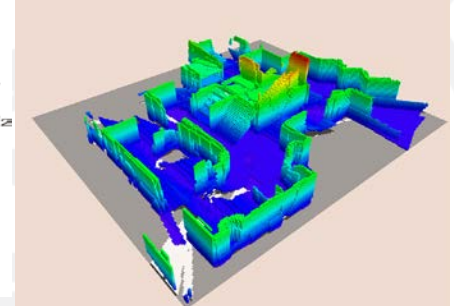
Firefighter localization



Wearable sensors



Classification and tracking



3D building mapping

Seed Grant Activities

- Formed multi-disciplinary research team
 - Faculty members from FPE, ECE, ME, and CEE
- Recruited 2 PhD, 2 MS, and 2 MQP and IQP teams.
 - The student team will travel to Tsinghua this summer.
- Conducted preliminary research
 - Review WPI's Personnel Localization (PPL) project and Michigan's Pedestrian Dead Reckoning (PDR) project.
 - Research on vehicle perception from camera data and LiDAR data for pedestrian/vehicle/road detections.
 - Build deep learning platform on DrivePX2 embedded platform for in-vehicle high-speed data processing.
 - Experiment outdoor localization using GPS, IMU, and simultaneous localization and mapping.