Firefighter Indoor Navigation

Team Members:

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Team Member Roles

- Nawar Mikha; Team lead, Presentation lead
- Thomas Anter; Documentation lead, Backend lead
- Zachary Freeman; UI lead, Frontend lead
- Jordan Shimel; Testing lead, Integration

Purpose

- Use computer mapping technology to improve indoor navigation for firefighting, search-and-rescue, and similar operations
- Enable improved coordination between multiple individuals in these situations.
- Assist off-site support by improving remote access to important situational information.

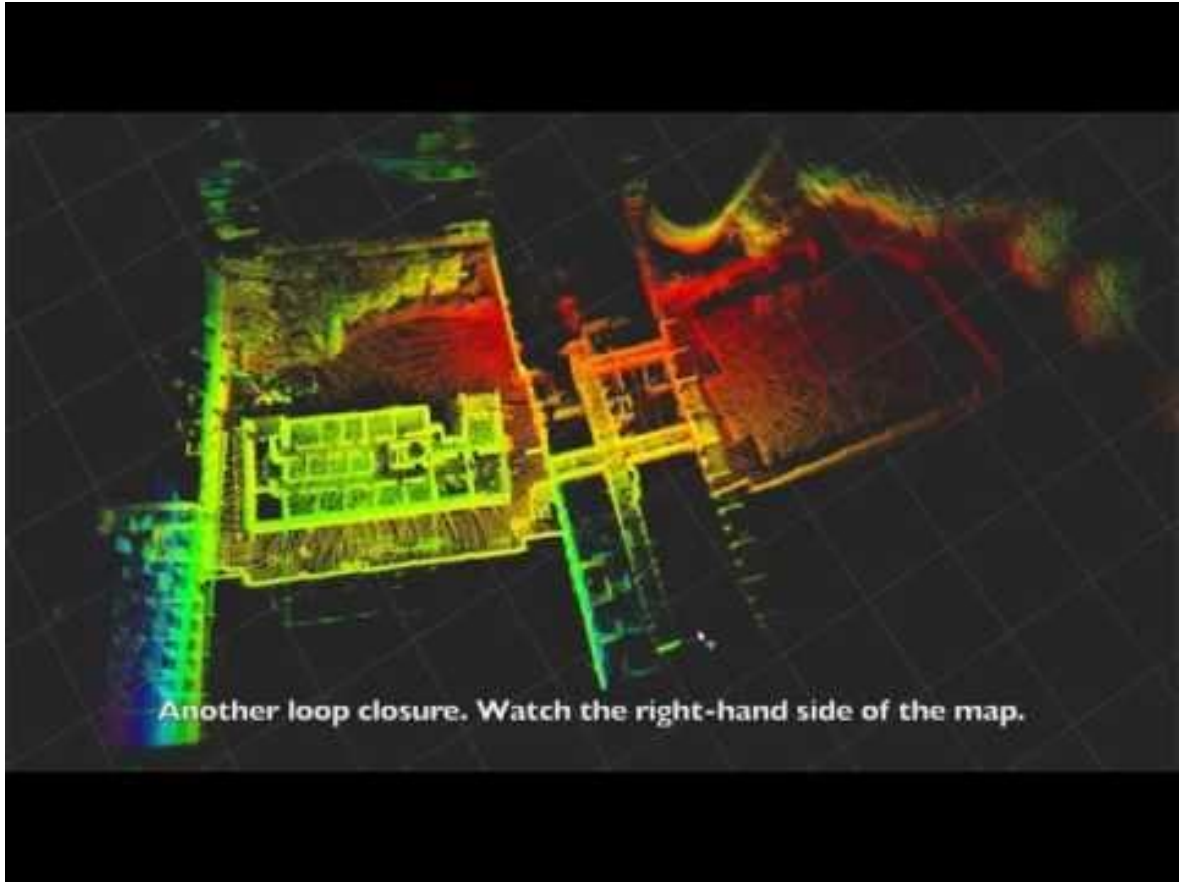
Broad Requirements

- Create 3D map from camera data
- Plot the firefighter's location in the virtual environment
- Coordinate data from multiple cameras
- Map the building environment and heat sources
- Relay navigation information to the firefighters
- Synchronize data with central command
- Augmented reality feature

Technologies

- Intel RealSense Depth Camera D435i
  - Real-time 3D position tracking
- UP Board
  - Computation for modeling the 3D environment
- Intel APIs used for camera interface
- Provisional plans for C/C++ and Python

  as language


Another loop closure. Watch the right-hand side of the map.

Resources

- Open source 3D SLAM project from UC Berkeley student Erik Nelson, from previous video
  - https://github.com/erik-nelson/blam
- Udemy courses to better familiarize ourselves with SLAM (Simultaneous Localization and Mapping)
  - ROS for Beginners: Basics, Motion, and OpenCV
    - https://www.udemy.com/ros-essentials/
  - ROS for Beginners II: Localization, Navigation, and Slam
    - https://www.udemy.com/course/ros-navigation/#instructor-1
- Intel documentation and sample code
  - Measuring point depth, capturing motion, using two cameras simultaneously, using data to create point cloud, camera orientation
  - https://github.com/IntelRealSense/librealsense/tree/master/examples