

An Infrastructure-Free Localization System for Firefighters

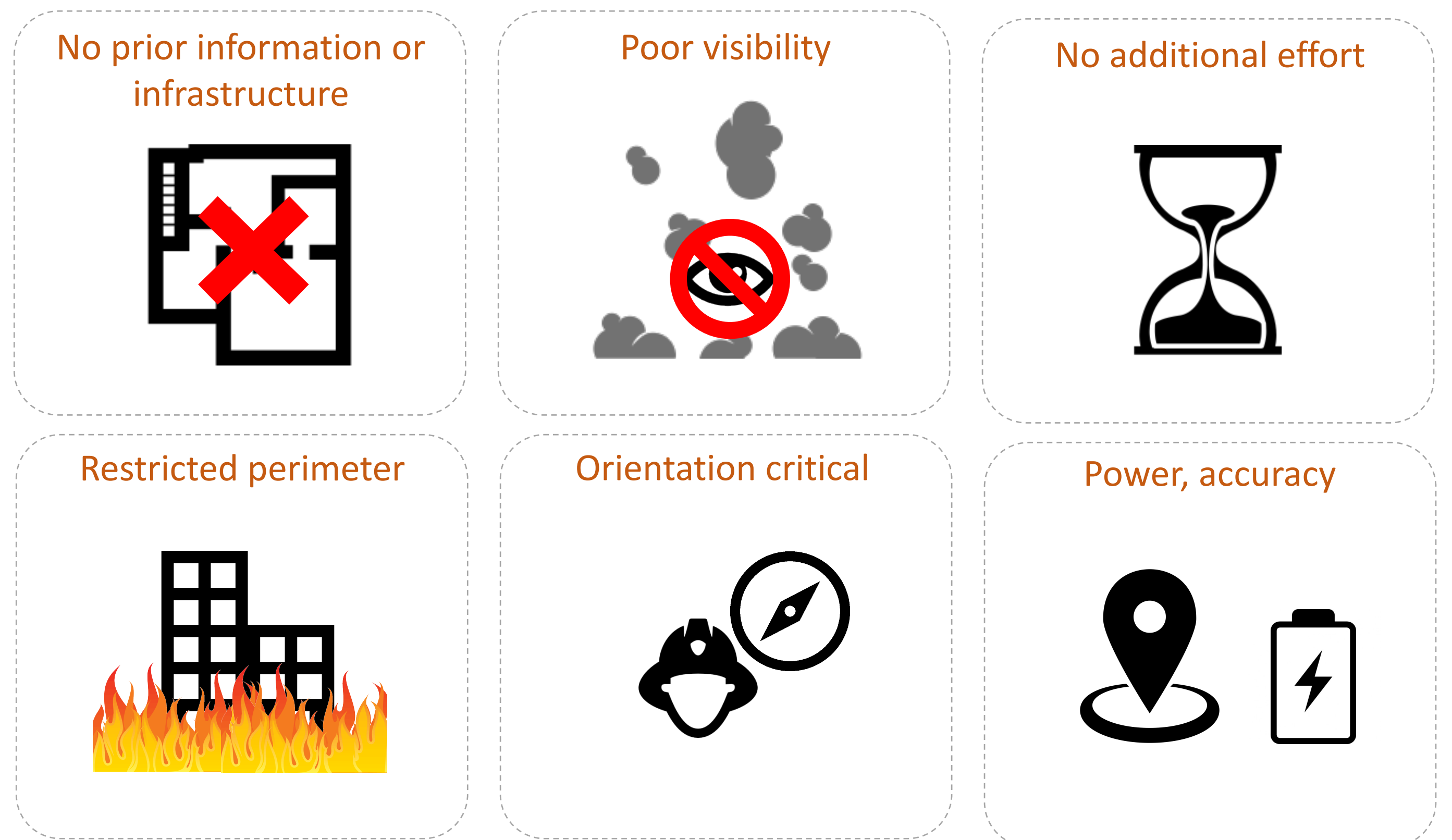
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Industrial partner
 **BOSCH**

Problem

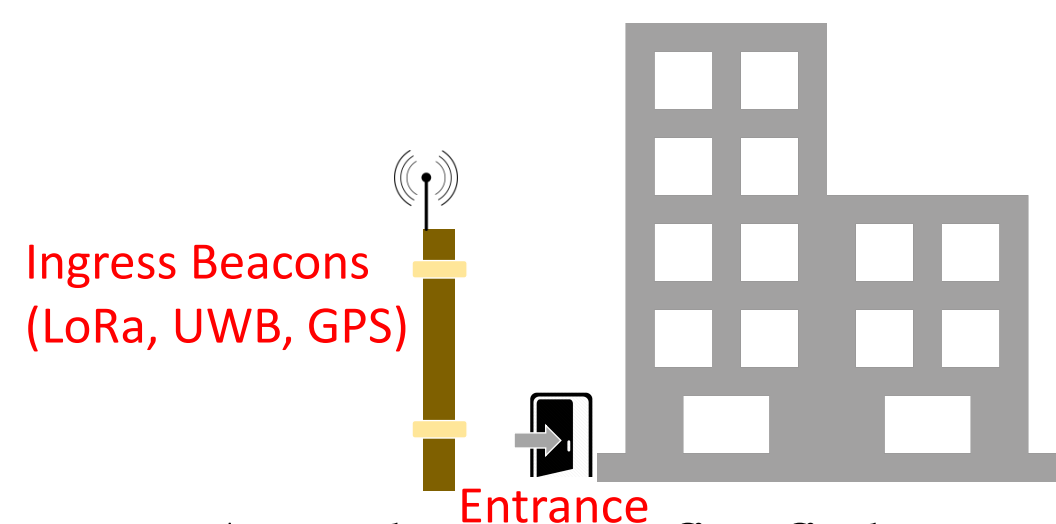


Challenges



Our Approach

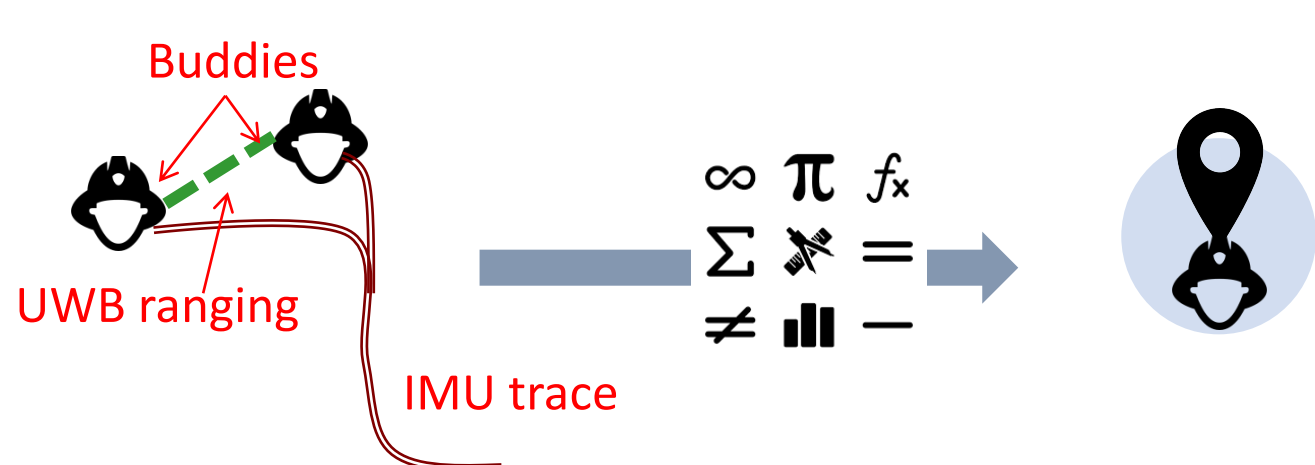
Step 1: Deploy beacons at building entrance



Step 2: Attach tag to firefighters air pack



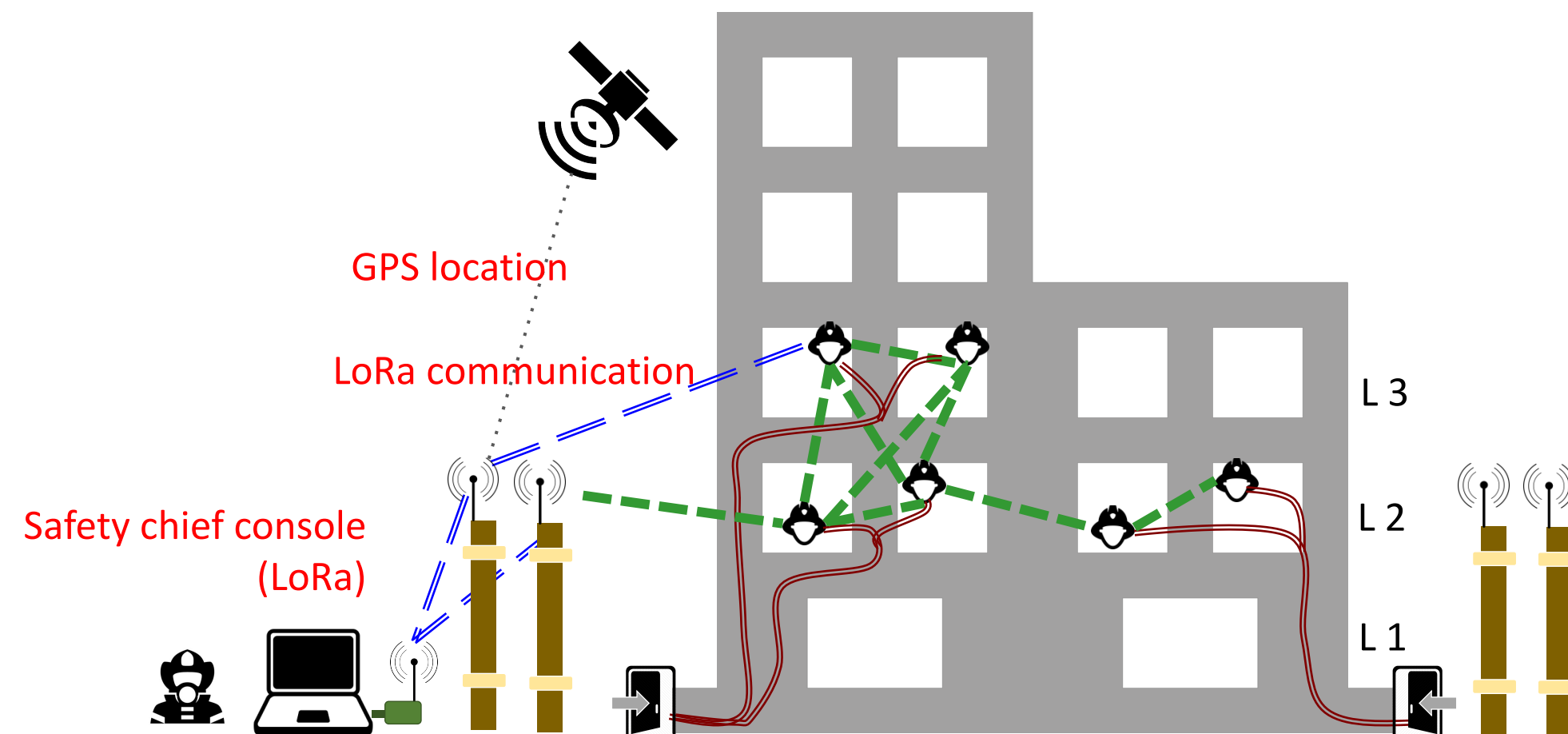
Step 3: Utilize sensor data to localize firefighters



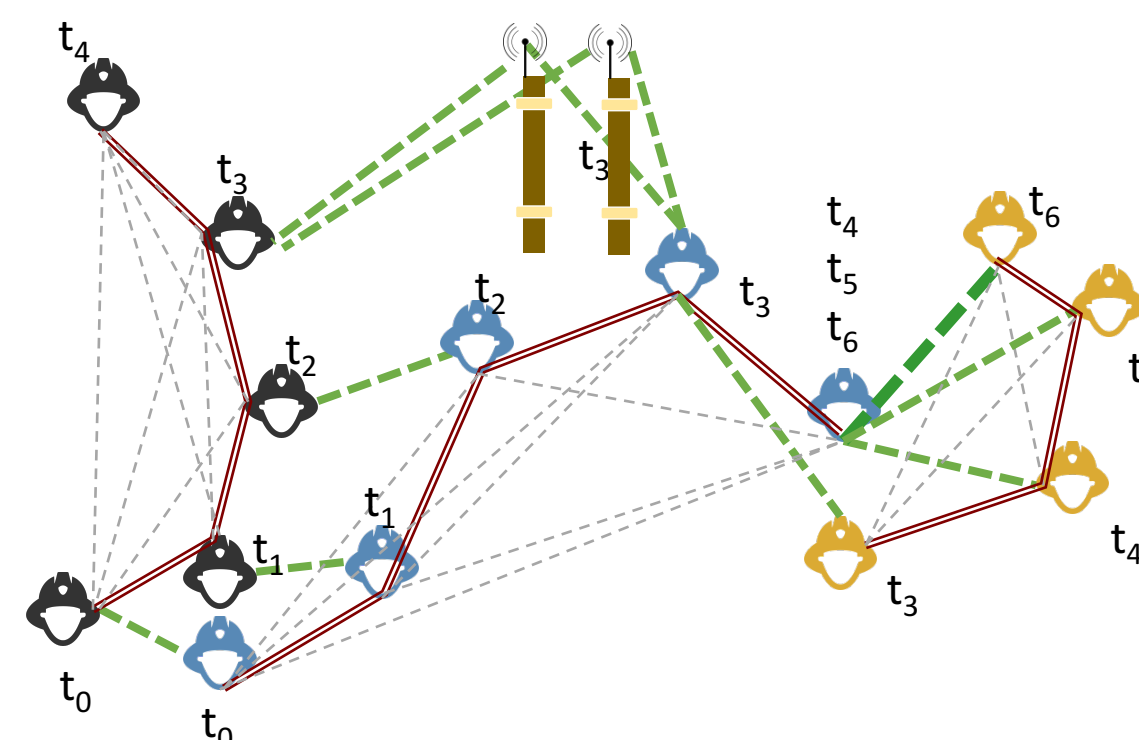
Challenge : In reality, IMUs drift over time and inter-device connectivity is sparse

Insight : Combine IMU data with inter-device ranging, leverage the buddy system, apply theory from SLAM, network localization to solve the framed mobile sensor network localization problem

Main components of system



Resulting mobile sensor network localization problem under our framework

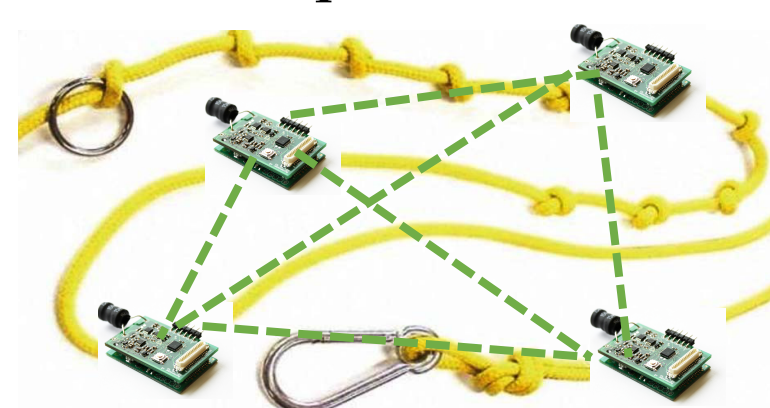


Expected Outcomes

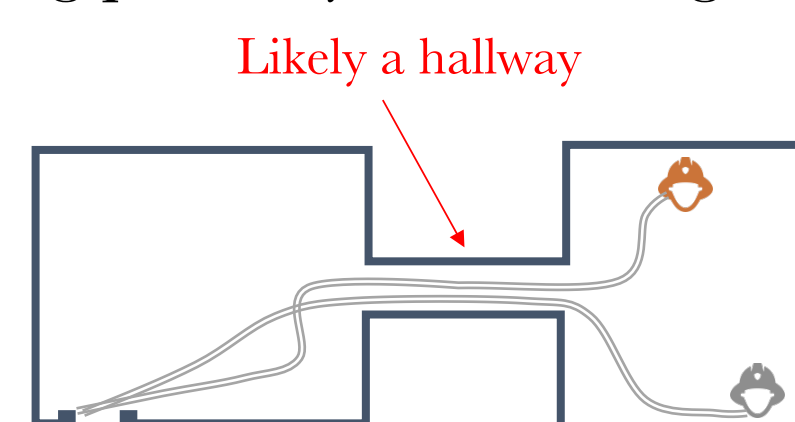
- Wearable hardware module (processor + IMU + UWB + LoRa + firmware for inter-node ranging & communication)
- External ingress beacon
- Commander console with a laptop + LoRa radio receiver
- Solver for mobile network localization
- Test dataset
- Evaluation report, video documentation

Enhancements

Digital search rope



Inferring pathways in buildings



Indoor Localization Experience

David Lawrence Convention Center, Pittsburgh
1.5M ft² → 350 beacons

