Firefighter Indoor Navigation: Development Plan

Team Members: Nawar Mikha
                          Jordan Shimel
                          Thomas Anter
   Zachary Freeman

Client: Mostafa Daneshgar Rahbar
GTA: Samira Taghavi

Overview

- Vital to know the location of firefighter(s) at all times
  - Currently, using GPS is unreliable
- With that location, still difficult to navigate to reach that point in an unknown building
- Project Focus
  - Use camera to create real time mapping and navigation for firefighters in an unknown building

Overview

ubuntu + ROS

point-to-point Wi-Fi

on-site computer: ubuntu + ROS
where SLAM is done
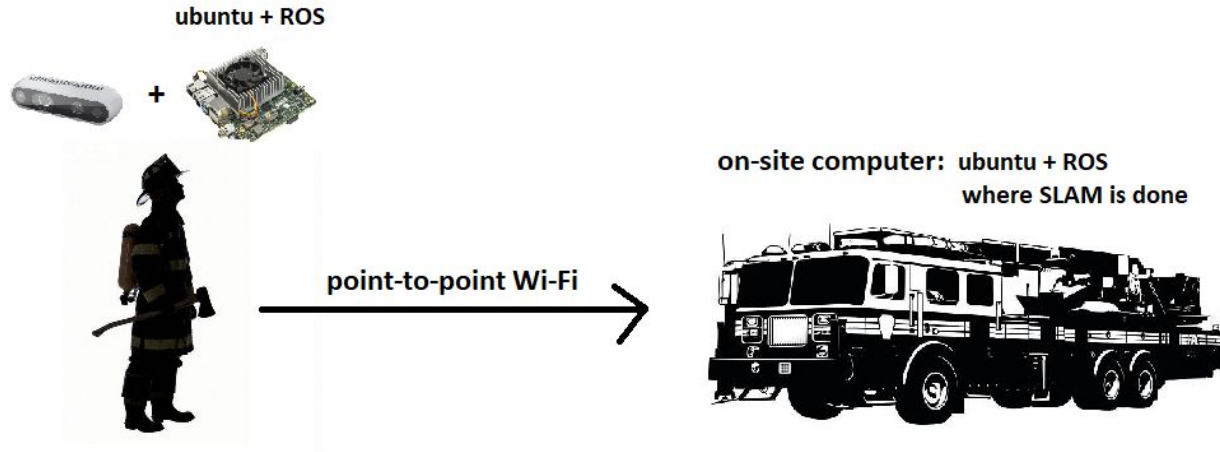
Purpose

- More efficient firefighter navigation leads to improved outcomes and is potentially life saving technology
- Better team coordination and less wasted time
- Provides a better alternative to GPS
- Localization will help team coordinator

Scope

- Short-term
  - Digital mapping and path tracking of the camera in relation to the building layout
  - Point-to-point Wi-Fi connection between camera/UP board and the main console
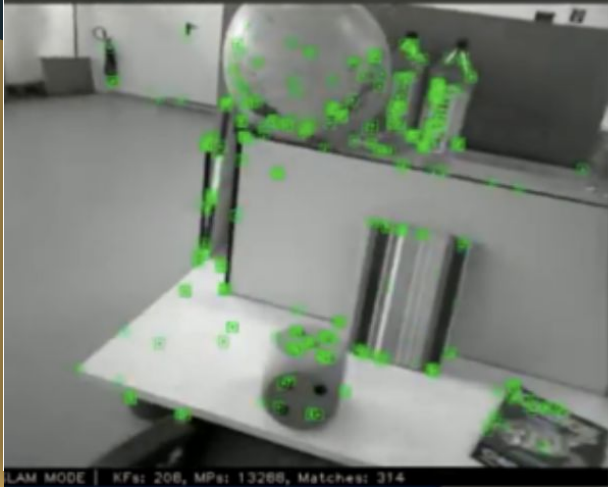 - GUI on main console displaying camera feed and digital mapping

Speed x7

ORB-SLAM2 Map Viewer

Follow Camera
Show Points
Show KeyFrames
Show Graph
Localization Mode
Reset

ORB-SLAM2: Current Frame

SLAM MODE | KFs: 208, MPs: 13288, Matches: 314

RGB-D

Scope (Continued)

- Long-term
  - Synchronize data from multiple cameras
  - Augmented reality feature for the base unit and for the firefighters
  - Locate and map the heat sources
 - Upgradable, scalable, and modular for future teams will inherit the project

Objectives

- Deliver a fully functioning application that meets the requirements of our client by the end of the semester
- A camera and UP board that can transmit video as a ROS bag and software that can read the data and display it in various ways
- Smooth development process where problems are handled promptly to avoid lost time
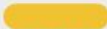
8

Team Organization
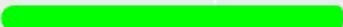
- **Nawar Mikha**
  - Team Lead
  - Presentation Lead
- **Thomas Anter**
  - Documentation Lead
  - Backend Lead

- **Zachary Freeman**
  - UI Lead
  - Frontend Lead
- **Jordan Shimel**
  - Testing Lead
  - Integration Lead

Conflict Resolution Policies
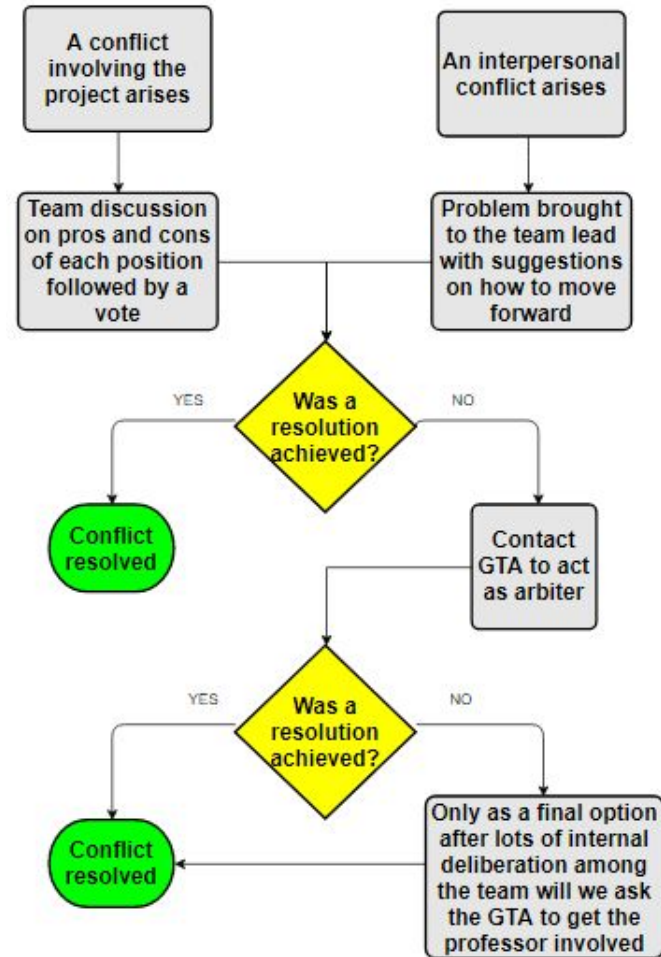
Schedule

- Team meetings
  - With GTA: Thursdays 4:00 - 5:00 pm
  - With client: Thursdays 5:00 - 6:00 pm
  - Team members: Wednesdays 3:30 - 5:30 pm
  - Team members: Saturday/Sunday (provisional)

| September	October	November	December
Meeting Client / Gathering Requirements 9/9 - 9/12			
Preliminary Research / Development Plan / Exploring Hardware 9/12 - 9/18			
V1 - Capture Stereo Video with Camera and UP Board 9/18 - 9/24			
V2 - Point to Point Wifi with UP Board and PC 9/24 - 10/1			
	Successfully Install ROS 10/1 - 10/8		
	Learn to Record Video as ROS Bag 10/8 - 10/15		
	V3 - Send Stereo Stream 10/15 - 10/22		
	Read ROS Bag as Video File on PC 10/22 - 10/29		
	V4 - Create GUI 10/29 - 11/5		
		Install OpenCV and ORB SLAM 11/5 - 11/12	
V5 - Feed Video Stream to ORB SLAM to Display in GUI 11/12 - 12/10			

12

Configuration Management Plan

- Weekly task assignments
  - Each lead will break down the tasks for his respective responsibility, then the team lead will assign each task based on the difficulty and time each task will take
  - Scrums on Wednesdays to evaluate sprints
  - Git branches will assigned to an individual for each feature, merges done during scrums on Wednesdays

Technologies

Questions?
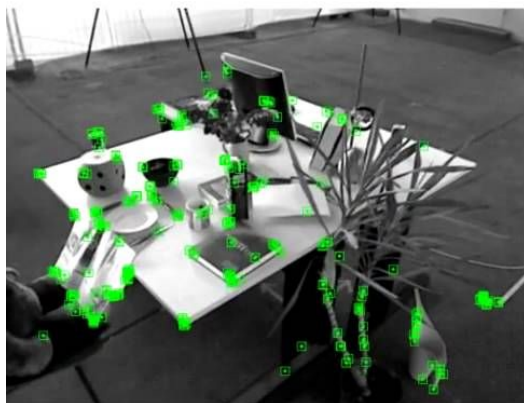
TRACKING -- KFs: 104 , MPs: 4302 , Tracked: 275