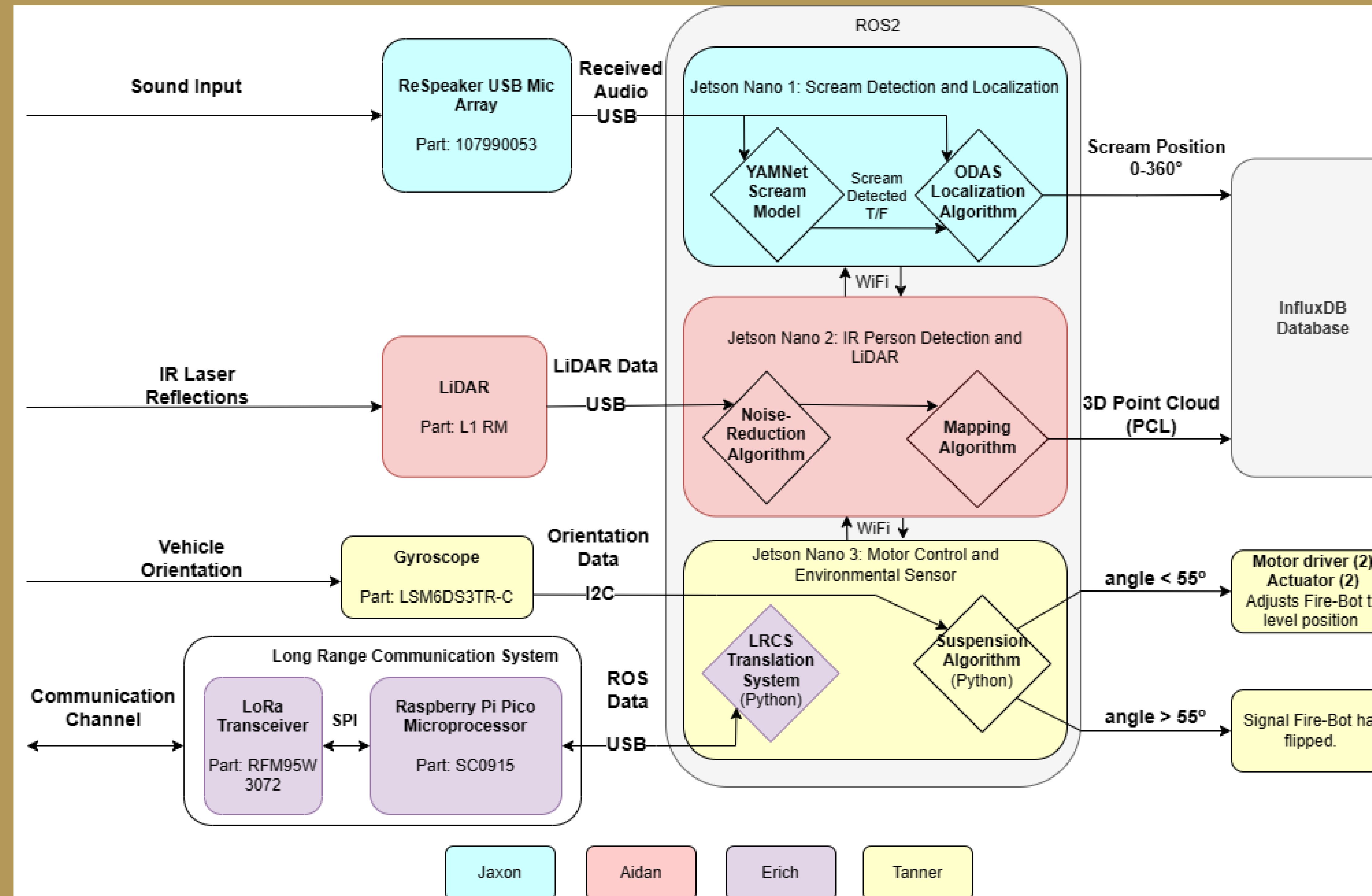


Meet the Team



Block Diagram



Project Background

- Fire-Bot is a robotic platform designed to assist firefighters locate victims inside of burning buildings.
- Our project seeks to improve Fire-Bot's capabilities by enhancing its ability to detect people, navigate buildings, and communicate to first responders.

D1 Accomplishments

- Placed all of Fire-Bot's existing software inside of Docker containers.
- Detect the location of sounds by using Fire-Bot's microphone array.
- Obstacle detection via 3D LiDAR
- Control of Fire-Bot's active suspension system via software.
- Sending and receiving of data via the LoRa-based Long-Range Communication System.

Subsystems

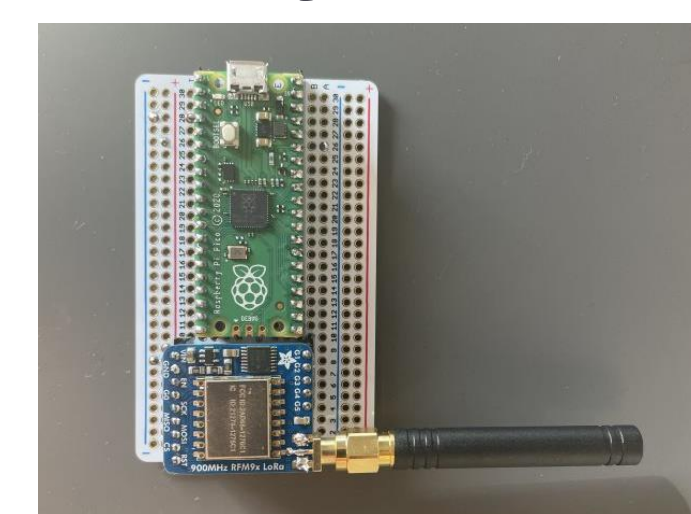
- **Long-Range Communication System:** Augments Fire-Bot's WiFi based communication with a LoRa-based encrypted link.
- **Direction Aware Scream Detection:** Allow for Fire-Bot to detect direction from a heard scream.
- **Gyroscopic Suspension System:** Automatically control Fire-Bot's active suspension system based on terrain.
- **3D LiDAR Room Mapping:** 3D room mapping and obstacle avoidance.

Plans for D2

- Locate the direction of screams via Fire-Bot's existing scream detection system.
- Room mapping with Fire-Bot's 3D LiDAR system.
- Automated suspension control to improve Fire-Bot's ability to navigate uneven terrain.
- Integration of subsystems with the Long-Range Communication System.

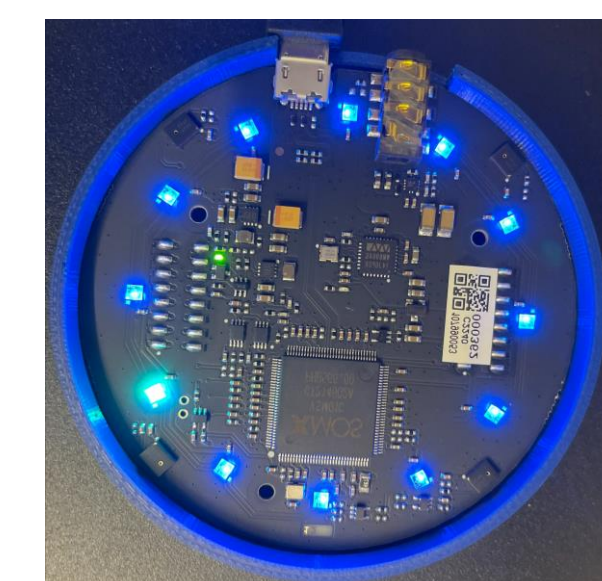
Individual Subsystem Showcase

Long Range Communication System



- Uses RFM95 LoRa modules.
- All data is encrypted with ASCON.

Direction Aware Scream Detection



- Uses a 4-microphone array to detect screams and localize their position.
- Used to create graph of sound direction.

Gyroscopic Suspension System



- Uses a gyroscope and actuators to automatically level the Fire-Bot on uneven terrain.

3D LiDAR Mapping



- Unitree 4D L1 RM
- Needs to be placed 6" above any other object on Rover

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