Development Team

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Project Description

- **Goal:** To plan against potential GPS loss, such as jamming or in locations without GPS, by acting as an alternative location tracking system.

- GPS uses satellites; Bermuda is a proof of concept that location can be found using radio emitters.
System Architecture

- KerberosSDR
- Microcontroller (Raspberry Pi 3 B+)
- Adafruit Breakout Board
- RadioFruit Emitters
- AeroVironment drone
IMU (Inertial Measurement Unit)

- know Bermuda’s absolute starting location
- + know acceleration or velocity
- + know direction
- = can estimate location

Not very accurate due to:
- wind
- drift (error accumulation)
Bermuda’s Triangulation

Requires:

● Radio emitters
● Radio emitters’ absolute location and frequency range
● Bermuda’s estimated location from IMU
Bermuda’s Triangulation

1. Determine nearest emitters. Plot them.
Bermuda’s Triangulation

2. Get direction to each emitter from the KerberosSDR.
3. Combine a point and a slope to get a line: $y - y_1 = m(x - x_1)$
Bermuda’s Triangulation

3. Combine a point and a slope to get a line: \( y - y_1 = m(x - x_1) \)
3. Combine a point and a slope to get a line: \( y - y_1 = m(x - x_1) \)
Bermuda’s Triangulation

4. The intersection is the absolute location of the Bermuda.
Current Progress

Experimentation with Hardware

Testing and Understanding Existing Software
Future Goals

End of Fall 2019 Goals:
● KerberosSDR able to detect emitters

Winter 2019 Goals:
● Triangulation and location finished
Applications

- Defense
- Warehouse Navigation
- Space Exploration
- Surgery
THANK YOU!!

- Yogananda Isukapalli, Capstone Instructor
- Aditya Wadaskar, TA
- Kyle Douglas, TA
- Phil Tokumaru, AeroVironment Project Advisor
- AeroVironment Inc, Project Sponsor
Questions?