CITS3200 Team 4
Minutes of Meeting 1 held July 31, 2024

Present: Katrina, Fred, Jack, Susheel, Bob, Lilee, Jim Catelli
Absent: n/a
Location: UWA EZONE Room 102A

Agenda Items:
i. Questions for client Jim Catelli
ii. Elect a project manager and go over team roles
iii. Discuss our planned approach to the project (technologies, etc)
iv. Plan what we need to achieve by the end of each deliverable
v. Distribute initial tasks to team members (see action items)

Meeting started: 2:00pm

1.1 Meeting with Jim Catelli
- Questions from the agenda document were asked and notes recorded by Fred
- Quickly ran over a few of Jim's points to clarify them after he left

1.2 Discussion of group roles and project manager election
Fred
- Katrina will be the project manager at least until the second meeting

1.3 Discuss Planned Approach
Bob
- First week should be a research/planning period
- Next meeting arrive with an understanding of the concepts, split up the problem into achievable subproblems

1.4 Goals to be achieved by end of Sprint 1
Fred
- Connecting one LoRa device to base station and having it push data to cloud

Lilee
- There are 5 additional deliverables due at the end of Sprint 1, see the project page

Action Items:

Action Item	Owner	Deadline	Status
Research LoRa and Meshtastic functioning, come up with ideas for project	ALL	Next Meeting	Incomplete

Notes:
Client In Depth Meeting Notes
- **CSU**
    - Lots of radio and IT experience in the unit if we have questions we can ask them
    - FOV - Forward operations vehicle search teams are based in, equipped with a Starlink, two radios, mapping tools, lots of screens, etc, expect to put 10 or 12 out for a search but don't deploy them for every search, work best with line of sight - range is a concern which is why meshing works quite well, never too far away from a vehicle, usually 15km search areas for search teams which is achievable with a good probability of detection
    - The FOV is deployed to a search base - so you can have a base station communicating with the FOV

    - Starlink (low orbiting satellite)
    - Satellite trailer with OneWeb (slightly higher orbiting satellite) - less connection drops, satellite on horizon for longer
    - Clark Mast on CSU repeater trailer (not relevant?) - VHF and UHF mobile repeaters for improved radio coverage, placed in preparation for an incident to improve comms - gives incident control vehicle coverage of a fireground, also placed in high-risk areas, unencrypted (don't broadcast sensitive data), nothing saying we can't put a mobile base station up on a repeater
    - SHADMap planning for VHF and UHF coverage

    - About $3.5k of Azure credits available, will have to vet what we are putting up

- Azure SSO is recommended for authentication
- IoT gateways in Azure, MQQT - monitoring information that sends info through JSON to an MQQT server

- Tracker -> Base stations are third party vehicles with 4g connection -> FOV
- Meshtastic is in alpha - buggy, maybe recommend just looking at LoRa instead - LoRa protocols

- Right now they use Garmin GPS units, but they have to go back to base to upload the data
- 10x 1 base station + 1 LoRa

- We will need lots of **specifics about the physical technology,** specifically the nature of the LoRa devices they are using currently, as well as the mobile base station?
- Do we need to know about the **models or firmware of the devices**?
    - ESP32s with 915mhz radio attached
    - Meshtastic open source application using LoraWan to communicate with eahc other
    - Heltech ones, GPS built in or not - got a few we can borrow plenty of them for proof of concept
    - Devices have wifi, bluetooth and LoRa
    - The mobile base station would be placed on a vehicle, communicate with the search teams devices
    - Powered off a USB bank
    - LoRa has specific rules for how often it can be polled, 915mhz, open frequency

- **What type of reports** do you need (e.g., real-time, daily summaries, historical data)?
- Besides location tracking, are there **other types of data or metrics** you require to transmit? (battery status, signal strength, environmental data like temperature, air quality)?
    - GPS data
    - Voltage, current would be handy for equipment
    - Temperatures and air quality, for search team precautions during fires - smoke means air quality goes down and temp goes up

Data Transmission and Logging:

- How frequently should the devices transmit data?
- What is the expected range and coverage area for the devices?
    - Search areas are 3.5km between vehicle and search area tracker, going through LoRa, because tracking teams do not have internet connection
    - Vehicle to FOV depends, could be within 5km, needs to communicate through internet

- Are there any specific security or encryption requirements for data transmission and storage?
    - Keep security in mind
    - Meshtastic is encrypted
    - Azure SSO is recommended for authentication
    - Have a look at usage limitations for LoRa polling rates, one ping every minute is probably fine

User Interface:

- Are there any specific software platforms or tools you want to use for data visualization and analysis?
    - Vesmaps? Fesmaps? Can export search grids out into something like google maps
    - Recommending google maps etc

Risks:

- Are there any known challenges or risks you anticipate with this project?
- Mitigating these risks?
    - Radiowise - line of sight will be one of the biggest barriers, our expectations is not that we would need to worry about antennae and improving signal strength
    - Getting it working across an oval is a good starting point, and getting it to mesh to another device

First Goal:

- Connecting one LoRa device to the base station and having that push something to the cloud, perhaps from just across an oval - then maybe have a couple LoRa devices meshing with each other
- Lots of nice-to-haves to move into nearer the end of the project
- Jim is at UWA on Tuesdays and Fridays most weeks, will bring a couple more LoRa's on Friday for testing purposes

Mentor Meeting in weeks: 3,6,9

Auditor Meeting in weeks: 6,9,12

Next Meeting Details: 4:00pm, August 7, 2024, EZONE Room 102A