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Project Progress Timeline

This report explains what has been done recently. To write better final report, many professional terms need to be known.

1. The principle of LoRa has been known, such as it allows long rang communication (more than 200 meters) of small amounts of data low bandwidth) and it has low power requirements. It is not suitable for projects that require high dat-rate transmission, need very frequent transmissions and in high populated networks. Consequently, it is a good replacement to LTE in the project.

In contrast to this, WiFi has less range and must remain within 300 feet (91.44m) of a wireless router to maintain wireless network functionality.

2. The impact of the environment on the signal has been investigated. Water conducts electricity, so it can reflect radio waves. Water vapour also absorbs the energy of radio signals and turns them into heat. The dense biomass of a forest contains a ton of water, so the trunks and leaves of trees combine to reflect and absorb radio signals.

UHF signals are line-of sight. There are three kinds of obstacles: reflection, scattering, and diffraction. The most common limitation on the cell reception is the presence of physical obstructions. A mountain between the UAV and the survivor will prevent radio waves from reaching UAV, even if it is within a short distance.

By raising the antenna from the ground can reduce the influence, which is called height gain. UAV has a height advantage so it might benefit from it.

3. RSSI is the abbreviation of Received Signal Strength Indication, it can be used to judge the quality of connection. In the project, it is used to measure the distance between sender and receiver. Since different places have different environments, it is better to calculate some variables before each signal detection. In this case, the result can be more precise.

Since it only has a scalar distance, the approximate location can be measured by trilateration algorithm. The maximum likelihood estimation which based on trilateration algorithm might can be used in this part to increase precision. The original thought about the position of UAV is to use GPS. Knowing that Gyro could be used in LoRa, it will be studied later.

When UAV approximate the distance, the performance of greedy algorithm will be tested in modelling to find the final position.

4. AirSim has been installed successfully in Ubuntu and it work well. (Ubuntu 18.0 has much better UI deign than 16.0) UAV can be controlled in AirSim now and the way to code will be studied later.

5. Industrial Scientific Medical Band has been learnt so the chosen band is known to set to 2.4GHz.

6. The principle of Doppler shift is learnt. It was tried to be used in the project but it seems that it was not very useful in distance measurement.

More details will be illustrated in Critical Review. I required a Arduino USB battery shield before but I suddenly found that mobile power can be a perfect replacement. One more problem is the place to do the test. Gordon Square might be a good place and I will have a try. Hope to complete the signal modeling in the next few days.