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Summary

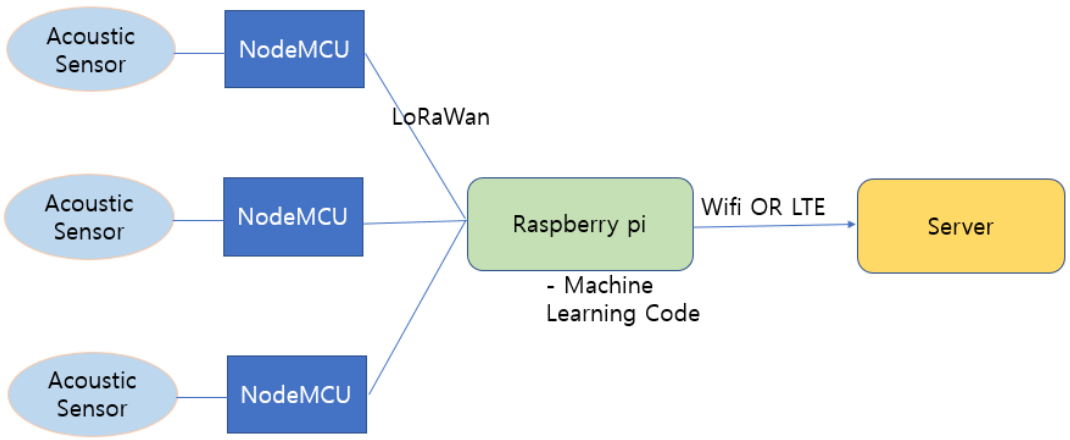

Fig. 1. Architecture of IoT and Network

First we set up a concrete structure of the project, we talked about technical skills we will use and estimated problems. Then we did research about LoRaWAN, acoustic localization methods like triangulation or trilateration and sensors we could use in our project[1]. Also we started a prototype experiment to test our localization algorithm.

We met our Purdue student, Justin. We scheduled his time to contribute to our project and he gave a lot of thoughts and ideas related to localization and networking. His assignment will be researching algorithms and networking methods.

Professor Anthony Smith introduced the LoRaWAN system including Senet and The Things Network. He also provided us with the equipment to experiment and get used to LoRa. With the insight professor Smith gave us, we could clarify what we are going to do in this project more specifically.

What Coyote Team completed this week:

- Decided how we install the sensors (coverage)
- installed RaspberryPi Os[2][3]
- Connected USB microphones to Raspberry Pi [4] [5]

- Decided which way is the right way when we figure out the distance from sensor to noise resource between Trilateration and Triangulation.
- Discussed the system architecture with the Coyote machine learning team.

Things to do by next week

- Do research about acoustic sensors that has enough threshold for outdoor use.
- Find & improve localization algorithm(which runs on arduino&node-mcu).
- Find out FFT library for nodeMCU to filter out background noise and get a right snippet of the audio file.
- Apply our prototype project to the nodeMCU & microphone sensors.
- Test LoRaWAN platform(e.g. Senet, The Things Network) with wireless transceiver.
- We have to study how the LoRaWan works.

Problems or challenges:

- LoRa cannot transmit big data files such as video and long audio file. We should find or make algorithm which breaks it into pieces or select certain part of the it to send.
- Raspberry Pi might be not appropriate to run image or audio classification models.

References

[1] D. Gusland. “Arduino Sound Localization” Github.com, Jan 6, 2019 [Online]. Available: https://github.com/danielgusland/Arduino-sound-localization#

[2] C. Carnino. “Control the Raspberry Pi 2/3 GPIO pins with Swift 3.0 on Ubuntu 16.04” medium.com, Aug 4, 2016 [Online]. Available: https://medium.com/@ccarnino/control-the-raspberry-pi-2-3-gpio-pins-with-swift-3-0-on-ubuntu-16-04-c66ada06efe

[3] Ardumotive_com. “Raspberry Pi Tutorial: Real VNC” instructables.com, Accessed Sep 14, 2022 [Online]. Available: https://www.instructables.com/Raspberry-Pi-Tutorial-Real-VNC/

[4] Google Assistant Library, “Configure and Test the Audio” November 10, 2020 [Online]. Available: https://developers.google.com/assistant/sdk/guides/library/python/embed/audio

[5] P. Singh. “Connect, Configure and Test USB Microphone and Speaker with Raspberry Pi”. Jun 30, 2018[Online]. Available: https://iotbytes.wordpress.com/connect-configure-and-test-usb-microphone-and-speaker-with-raspberry-pi/