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To: ematson@purdue.edu, ahsmith@purdue.edu, lhiday@purdue.edu, lee3450@purude.edu

From:

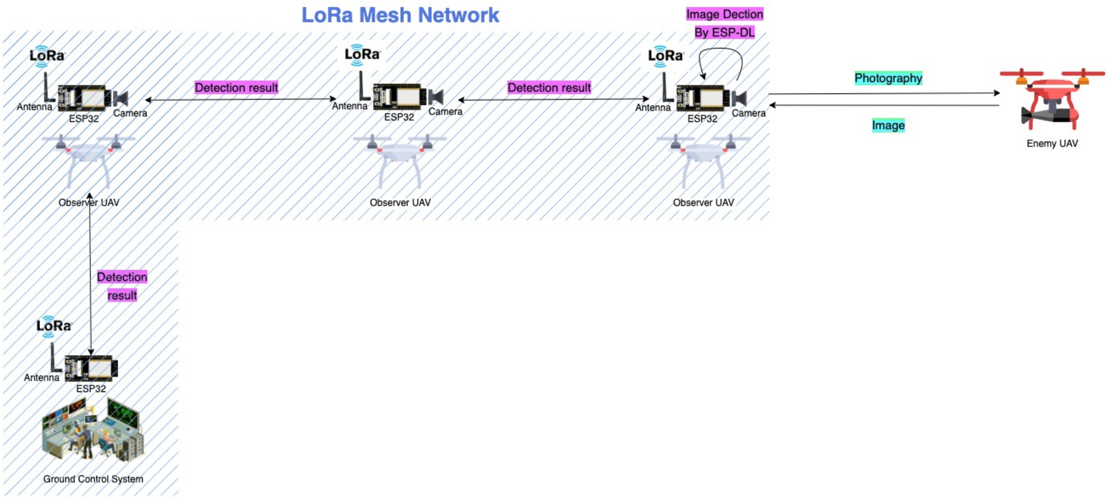
- Soonchan Kwon (182575@jnu.ac.kr)
- Gihwan Kim (201701981@o.cnu.ac.kr)
- Nahyeong Kim (nhkim5697@o.cnu.ac.kr)
- Nawon Kim (201600@jnu.ac.kr)

Summary

- Materialize ideas for the project.
- Studied on the technologies that will be used for the project.
- Requested the order for the required parts.

What BTT completed this week

- Materialized for the project. Protocol to implement mesh network was changed from WiFi to LoRa, and deep learning model will operate on micro processor. Low power consumption for UAV and long distance communication in the air will be the novelty of our project.



- Soonchan Kwon
  - Read up on the way to implement WiFi mesh.

- Studied Painless Mesh library for WiFi mesh implementation.[1]
- Read up on ESP32 API to disable WiFi and Bluetooth modules in chipset and to turn the display on the board off.[2]
- Researched on ESP32 board that have the camera module and is compatible with LoRa transceiver.
- Found the exact models of ESP32 development board, LoRa transceiver and LoRa antenna that can satisfy the project requirement. - Asked for advice to choose the UAV model that can fly, lifting the development board from professor Matson.
- Asked for advice to choose the reasonable network parts from professor Smith.
- Read up on the camera modules compatible with the development board.[3][4]
- Requested order for the required parts.
- Drew the diagram of project.
- Set up environment for programming for the ESP32 based board on a local laptop.
- Wrote development setting guide for the project.

- Gihwan Kim
  - Researched on FPN and YOLO series for UAV object detection.
  - Read up on Overleaf documentation and converted old weekly report to new Overleaf style.
  - Read up on the related research papers concerning the capabilities of computing detection and classification on ESP32 board.
  - Investigated ESP32 boards which could attach a camera and the LoRa for computing object detection and networking.
  - Researched on APIs for detection and classification on the development board of project.

- Nahyeong Kim
  - Set up the environment for RoboMaster programming.
  - Studied how the UAV is connected and provides video streaming in RoboMaster SDK.
  - Researched on the performance of WiFi mesh networks compared with other mesh networks.[6]
  - Researched on PainlessMesh library that enables us to create Mesh Network with the ESP8266 and ESP32 board.
  - Installed the ESP-IDF environment for programming to develop the ESP32 board.

- Nawon Kim
  - Read up on how RoboMaster TT sends the video data.
  - Read up on the video annotating/labeling tools, which is open-source and automatic.
  - Installed video annotating tool, ‘Label Studio’, and tried to labeling video dataset.
  - Read up on the projects that detection using ESP32-CAM.

Things to do by next week

- Set up ESP32 environment for programming on local laptop.
- Optimize ESP32 chipset by disabling unnecessary module for efficient power consumption.
- Research into ESP-IDF frameworks and sub-libraries.
- Research into examples of detection and classification on ESP32-WROVER CAM board(development board for UAV detection).
- Implement LoRa mesh network.
- Build the board with camera, LoRa transceiver and LoRa antenna.

Problems or challenges

- Networking
  - How much antenna we bought work well.
  - How much we can optimized chipset for power consumption and performance.
  - GPS module will be added.

- Detection
  - How to manage tiny memory and CPU resources for UAV detection on low power system.
  - How to implement a detection methodology on low power system.

References

[1] M. Germán. *painlessMesh*. (2019). [Online].
Available: http://painlessmesh.gitlab.io/painlessMesh/index.html

[2] Espressif. *ESP-IDF Programming Guide*. (2016). [Online].
Available: https://docs.espressif.com/projects/esp-idf/en/latest/esp32/get-started/index.html

[3] Espressif. *ESP32-WROVER Datasheet*. (2022). [Online].
Available: https://www.espressif.com/sites/default/files/documentation/esp32-wrover_datasheet_en.pdf

[4] HOPERF. *RFM95W Specificaton*. (2019). [Online].
Available: https://www.hoperf.com/modules/lora/RFM95.html

[5] HOPERF. *RFM95W Specificaton*. (2019). [Online].
Available: https://www.hoperf.com/modules/lora/RFM95.html

[6] R. Riggio, D. Miorandi, G. lacovoni, I. Chlamtac, N. Scalabrino and E. Gregori, ”Performance Measurements of Multimedia Flows over a WiFi-based Mesh Network”, Proc. of MediaWiN 2006, April 2006.