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To: ematson@purdue.edu, ahsmith@purdue.edu and lee3450@purdue.edu
From: SharpShooter

- Donghyeon Na (201721402@sangmyung.kr)
- Hansu Jeong (201710982@sangmyung.kr)
- Minjae Kim (kmj5596@khu.ac.kr)
- Jeongwon Moon (bella7365@knu.ac.kr)
- Woojin Choi (twinsno119@sunmoon.ac.kr)

Summary
The research was worked with 3 teams. The front-end team completed the shot group calculation. The IoT team improvement MPLR protocol. The sound detection team tested the model performance.

What SharpShooter completed this week:

- Experiments
  On December 10, the outdoor test was conducted at 13626 S525 W, Romney, IN 47981. The temperature was 4˚C Celsius, and the wind direction and speed were East 13 km/h. The firing distance was 100 yards, and 5.56 mm bullets were used. The angle between the ground and the camera was 30 degrees. Fig. 1 shows environments of this experiment. The initial target image extracted after starting the system was approximately 11 KB in size and it took about 80 seconds to transmit it. No packet loss occurred in this experiment. When the gun shot, it took about 15 seconds to determine that it was a gunshot. After determining that it was a gunshot, it took about a second for the projectile position to be displayed on the web.

Fig. 1. Camera setting of the test

- Preparing for the presentation
  While preparing for the presentation and Q&A, the overall project contents were reviewed.

- Establishment Point to Point MPLR Protocol
  Based on the [1], a point to point MPLR protocol was proposed.

- Complemented web application a storage page.

The design is the shown as Fig. 2 and included the functions of bullet number and save date. Organized the overall code and all functions and hard parts of the logic are all commented out. The overall CSS of the website has been modified.

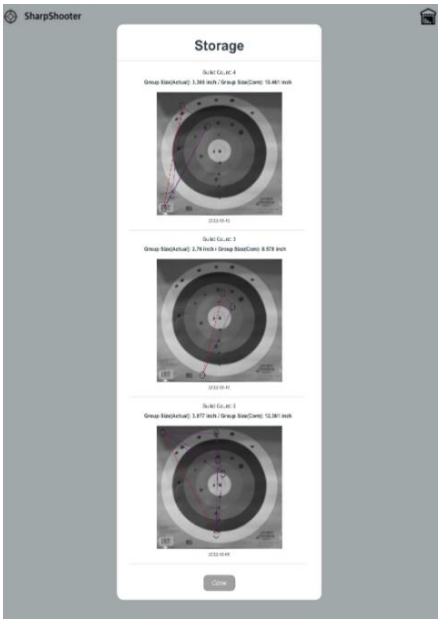

Fig. 2. Web application design

Problems or challenges:

- Even if homomorphic filtering is applied, it is difficult to set parameters. Because it is impossible to grasp the degree of illuminance and reflection outdoors correctly.

- Also, if the target detection is perfect, image communication using LoRa is time-inefficient compared to other communication.

- It is awkward to establish an environment for actual shooting for experiments.

References

[1] T. Chen, D. Eager and D. Makaroff, “Efficient Image Transmission Using LoRa Technology In Agricultural Monitoring IoT Systems,” *2019 International Conference on Internet of Things (iThings) and IEEE Green Computing and Communications (Green-Com) and IEEE Cyber, Physical and Social Computing (CPSCom) and IEEE Smart Data (SmartData)*, 2019, pp. 937-944, doi: 10.1109/iThings/GreenCom/CPSCom/SmartData.2019.00166