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From: SharpShooter

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## Summary

The research was worked with 4 teams. The front-end team revised web design implementation. The IoT team devised MPLR protocol implementation. The sound detection team collected additional sound data. The paper team modified the overall paper.

## What Sharpshooter completed this week:

- Devise MPLR protocol  
Completed to devise packet architecture and packet communication logic.
- Revised web design implementation  
Handmade gun image is included to the main page. As shown in Fig. 1, the font design, size, and color of main page title is changed. As shown in Fig. 2, the 'finish shooting' button is added and shot mark is added by the canvas tool. Web logic is changed to show image clearly. At Pi 2, Python gets the width and height information of the actual image size and sends the size information to node.js through web socket. Then, react tool accepts the size information and the compacted original image is increased to the received size. Finally, the image is shown in the web page. The shooting point coordinate is also changed to conform to image standard.

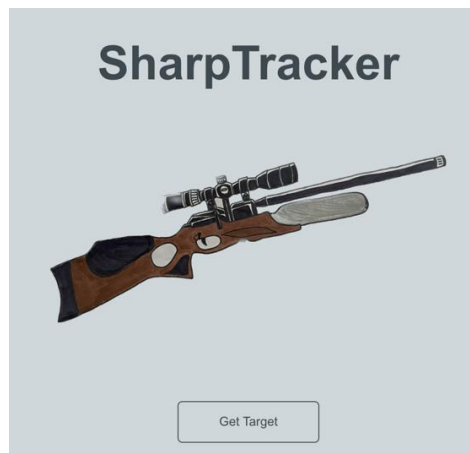


Fig. 1. Main page of the web



Fig. 2. Added the design of the target page

- Collected additional sound data to improve accuracy  
Considered the situation that uses suppressor.
- Modified the overall paper  
Compared to the beginning, the system has some changes. Sharpshooter checked the paper from the first to implementation section.
- Found DoG (Difference of Gaussian) filter to improve the image  
For edge detection enhancement, the team researched a DoG (Difference of Gaussian) algorithm. To apply this, seven parameters such as the width of gaussian to blur, the width of the gradient aligned difference of gaussian filter, and the width of the edge tangent aligned line integral convolution are required [2]. It has more parameters used than homomorphic filtering. Therefore, the proposed method was decided to maintain the existing one.

#### Things to do by next week

- Test the LoRa networking applying MPLR
- Test the overall system outdoors
- Train the sound model with additionally collected data
- Finish writing the implementation section of paper

#### Problems or challenges:

- It is inconvenient to set parameters to apply DoG and homomorphic filters because DoG filters requires more parameters than homomorphic filters. This paper will propose a way to improve the image without using parameters.
- MPLR is still devised, however implementation is not complete.

#### References

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*Computing (CPSCoM) and IEEE Smart Data (SmartData)*, 2019, pp. 937-944, doi:  
10.1109/iThings/GreenCom/CPSCoM/SmartData.2019.00166.

[2] H. Winnemöller, J. E. Kyprianidis and S. C. Olsen, "XDoG: An extended difference-of-Gaussians compendium including advanced image stylization", *Comput. Graph.* , vol. 36, no. 6, pp. 740-753, 2012.