

sdmay19-08: IC Chip: Automated Clay Target Scoring System

Week 6 Report

10/20/2018 - 10/27/2018

Client: Dr. Henry Duwe

Faculty Advisor: Dr. Henry Duwe

Team Members:

Eva Kuntz – Software Architect Lead; Report and Communication Manager

Cole Huinker – Software Architect, Data Analysis, Computer Vision

Steven Sleder – OpenCV and Machine Learning Lead; Data Analytics Lead

Michael Ruden – Hardware Architect Lead; Prototype Manager

Philip Hand – Device Connectivity Lead

Keith Snider – Software Architect; Webmaster

Weekly Summary:

This week was spent on verifying the mobile application requirements, in addition to creating and refining the mobile application test plan. The test plan includes tests for each mobile application requirement, in addition to test steps for each test case. Our team is in the process of confirming a date to collect data with the ISU Trap Club, in addition to experimenting with 3D modeling software to get a better insight into camera angles and field of view. During our meeting with DR. Duwe and the Iowa State skeet shooting team we found that placing the cameras inside the High and Low houses would offer a clean line of sight of the target. It would also offer protection to the device from any debris.

Past Week Accomplishments:

- Mobile Application
 - Discussion of possible use cases and corresponding screen flows.
 - Named Application “Gemineye”.
 - Created mobile application test plan, including test cases for each requirement (functional and nonfunctional) and the steps and end goal of each test case.
 - Validated mobile application requirements with client.
- Hardware
 - Named ground station “Houston”
 - Determine a new location for the cameras in the High and Low house.
- Computer Vision Model
 - Trained YOLOv3 on a subset of the training data
 - Tuned hyperparameters such as batch size and network shape to reduce the resource consumption of YOLOv3
 - Shrank the model size to fit on an Nvidia Jetson TX2
 - Imaged the Nvidia Jetson TX2, considering disabling X11 to free up more resources
- Data Labelling and Collection
 - Discussed protection for the camera
 - Discussed meeting with the skeet team to collect more data.

- Went over ideas for a data collection plan.

Pending Issues:

- Need more data for our model to train on.

Individual Contributions:

| Team Member | Contribution | Weekly Hours | Total Hours |
|---------------|--|--------------|-------------|
| Eva Kuntz | Discussed screen flow for mobile application; white boarded screen flow for some use cases; drafted and revised mobile application test plan; experimented with Maya for modeling skeet shooting field and camera angles. | 8 | 48 |
| Cole Huinker | Worked on data collection plan; Used 3d modeling software to simulate cameras in the skeet field ; Worked on sockets in Xamarin. | 7 | 45 |
| Steven Sleder | Finally compiled YOLOv3 with all dependencies to utilize OpenCV and CUDA. Trained a model on our lower-quality training set for five days. Continued to attempt to train group members on how to use my frameripper program with the data-labelling software I provided to fit the necessary scheme. | 10 | 48 |
| Michael Ruden | Attended a meeting with Dr. Duwe and the Iowa State skeet shooting for collection of data. Learning how to use Simulink for modeling. | 7 | 34 |
| Philip Hand | Python, Framripper, and data labeling | 7 | 31 |
| Keith Snider | Met with appdev team to discuss future development ideas. Discussed app screen flow. White boarded screen flow for some use cases. Worked on Project Plan | 6 | 38 |

Plans for the Upcoming Week:

- Eva Kuntz – Mobile application.
 - Collaborate with mobile application development team to create screen flow diagrams.
 - Create first draft of classes used in mobile application.
 - Finalize/get feedback on mobile application architecture diagrams.
- Cole Huinker – focus on data collection
 - Plan to meet with the trap and skeet team to go over safety
 - Figure out protection for the camera
 - Go out in the field and collect data.
 - Work with sockets in Xamarin for Gemineye.

- Steven Sleder – Continue to tweak YOLOv3
 - Tune hyperparameters
 - Get it running on my Nvidia Jetson TX2 (image the TX2 as well)
 - Reduce the fed-in framerate of videos to meet hardware constraints
 - Ensure team members actually label data like I asked
 - Michael Ruden – Creating a Simulink system for simulation of skeet field.
 - Philip Hand – continue to use frameripper program and labeling data
 - Keith Snider – Create screen flow diagrams for Gemineye
 - Use screen flow diagrams to begin development of mobile application.
 - Create splash screen for application about safety warnings.
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