sdmay18-03: Use of imaging devices and machine learning software to assist in autonomous veh
Week 5 Report
September 28 - October 4

Team Members
John Orefice — *Communications Lead*
Souparni — *Meeting Facilitator*
Fahmida — *Tester*
Ashley — *Document Manager*
Eric — *Webmaster*
Bowen — *Hardware Maintainer*

Summary of Progress this Report
We meet our client and discussed some of the issues we had in having the darknet installation recognize the GPU and how it was giving us a frame rate of only 4-5 frames per second. During this discussion our client suggesting looking into another open source neural network: Darkflow. Darkflow was created by the same research group who developed Darknet and it is supposed to perform better than Darknet according to its documentation. So our team decided to experiment with Darkflow as well. We were able to set up darkflow locally and it was able to draw bounding boxes in real-time . Also, we found at from our client that the 360 degree cameras that our client wanted to use did not yield favorable results.Hence we suggested the use of stereo cameras instead to implement the distance determination system and we will be looking into specific stereo cameras more deeper in the near future. We also learned from our client that the GPS they are using are Starfire 6000 from John Deere and it gives an accuracy of approximately 2 inches. This information will be very valuable to us when we are implementing our depth determination system.
During this work week we split into three sub teams.
Team 1 focused on understanding what makes a good training set.
Team 2 focused on creating an automated system to attain images for the training set.
Team 3 focused on understanding the darkflow neural net and getting it up and running.
Throughout the week we met as sub teams and began reading up on the various topics and implementing some "hello world" style proofs of concept. We also successfully acquired around 400 images of fences, ditches and terraces for the training set.
We were also able to successfully set up and run dark flow on our computers.

Pending Issues
Currently, darkflow runs at about 0.5 FPS on a modern CPU, and we are having issues getting it to run on a GPU. We also find that this speed it too slow for our purposes and need to look into other neural networks.

Plans for Upcoming Reporting Period

We plan to continue researching different methods for acquiring a training set that will lead to accurate object detection.
We will also try to get darkflow running on a GPU and investigate alternative neural nets which could offer better performance.

Individual Contributions

Team Member	Contribution	Weekly Hours	Total Hours
John Orefice	Set up a working proof of concept for darkflow. This takes in either a prerecorded video or live stream from a webcam through OpenCV, and runs it through the neural net. The results are then processed and bounding boxes are drawn in real time to represent objects of interest.	7	30.5
Souparni	Tested OpenCV interfacing OpenCV with darknet. Created a script which takes live video from OpenCV and saves them frame by frame to a folder to allow darknet to classify the images. Experimented ways in which specific frames can be chosen to classify in order to maximize performance	6	28.5
Fahmida	Researched datasets such as Pascal VOC to see if they had images of fences and ditches. Ran a python script to collect images of fences and ditches and uploaded them to Google Drive.	5	25.0
Ashley	Continued researching methods to gather training data and began experimenting with data augmentation for the training set	6	22
Eric	Updated team website to include weekly reports and project plan. Also added some UI improvements to make the website easier to navigate.	6	24
Bowen	Setup darkflow and did basic hello world with it and began testing of Mobile-SSD. Also read a paper on YOLO and did some additional research to understand the concepts behind it.	6	24.5