

CprE/SE 491 Weekly Report 16

Dates: 9/14/2017 - 9/20/2017

Dec1709 - ALVINN

Autonomous Vehicle Mission Processor with Machine Learning

Team Leaders:	Bijan Choobineh Darren Davis	Advisors:	Dr. Jones & Dr. Zambreno
Communicator:	Tracy La Van	Client:	Josh Bertram - Rockwell Collins
Key Concept Holders:	Jesse Luedtke David Schott	Email:	dec1709@iastate.edu alvinn@iastate.edu
Webmaster:	Robert Stemig		

Weekly Summary:

This week the group started making headway with getting the board (Jetson TX1) up and running. Due to a constraint on memory, additional memory was added to the board so David's code from summer could be implemented on the board. The group had success with video in real-time; however, we are still working to get video streamed from a flight simulator.

The group has begun to implement agile practices in our weekly meetings. We decided it would be best for focus on stand up meetings where everyone stated the following three times: 1) What did you do this past week; 2) What do you plan to do next week; 3) What are your sticking points/Where do you need help. We hope this process will help streamline our meetings.

Past Week Accomplishments:

- **Bijan Choobineh:** Analyzing X-Plane flight simulator to stream data to use with our neural network. Also looked into getting video streaming from a host computer to the Jetson TX1. Jesse ended up finding the solution with GStreamer.
- **Darren Davis:** Bought a USB hub and connected a flash drive and sd card for more memory. Tried various methods to capture the screen or window and stream it to the board. Looked into OBS Studio, VLC Media Player, and GStreamer on both the sending and receiving sides as well as OpenCV and RTMP server with nginx for receiving. Had some success at home between two computers over wifi but latency was around five seconds. We weren't able to duplicate this in the lab with a connection between my Windows machine and Ubuntu on the board. We did get GStreamer working between a Ubuntu machine and the board with minimal latency and fair video quality. I installed X-Plane to try streaming to verify video quality but my computer isn't capable of running it. However, the download included images of planes that are used in the simulator which I ran some through ImageNet to see if it would classify them. It classified them as planes with a 50-60% confidence level. I then started looking into feeding the stream from GStreamer into the ImageNet-Camera and DetectNet-Camera models.

- **Tracy La Van:** Worked on reading through Python Machine Learning by Sebastian Raschka.
- **Jesse Luedtke:** Installed and explored using flight simulators for dataset creation, specifically X-Plane and FlightGear. Also worked on using GStreamer to transfer video data from a host computer to the Jetson TX1.
- **David Schott:** Stuck in interviews, preparing for career fair, etc. I transferred over my work over the summer, as well as some images.
- **Robert Stemig:** Worked with X-Plane demo for potential use in final demo, seeing if flight controls allow for easy live demo. As well as looking at other simulators that allow for AI air traffic for better visuals in demo other than tracking a single plane.

Pending Issues:

- **As a Group:** N/A

Plan for Coming Week:

- **Bijan Choobineh:** Learning More about GStreamer and what data we can pull from X-Plane. Will be limited on time to work due to midterms and interviews.
- **Darren Davis:** Will be working with GStreamer and the model code figuring out how to pass our stream into the models. The models are setup to currently read from the on board camera dev/video0. We need to direct dev/video0 to be our stream or change the code to input our stream instead of the cameras.
- **Tracy La Van:** Will work on reading Python Machine Learning by Sebastian Raschka. I will also be digging into the code that David wrote over the summer and looking over the sources he used to come up with the code. This will allow me a better understanding of the code we currently have and how we can use it to implement the recommendations from Raschka.
- **Jesse Luedtke:** Learning more about GStreamer so we can feed video data into our neural network.
- **David Schott:** Seeing if I can setup the environment on the board to run the code I wrote this past summer.
- **Robert Stemig:** Working with GStreamer in tandem with flight simulators to test video output quality. As well as GStreamer windows to Linux systems possibilities.

Individual contributions:

<u>NAME</u>	<u>Individual Contributions</u>	<u>Hours This Week</u>	<u>Cumulative Hours</u>
Bijan C.	Flight Sim and Video transfer	4.0	10.0
Darren D.	Video stream and testing simulator images	14.0	32.0
Tracy L.	Python Machine Learning by Sebastian Raschka	5.0	10.0
Jesse L.	Flight simulators and GStreamer	10.0	25.0
David S.	Transferring files over, exploring environment	3.0	28.0
Robert S.	X-Plane, GStreamer	4.0	7.0
Totals:		40.0	112.0

Comments and Extended Discussion:

Upcoming concerns: Midterms are beginning so people need to be careful with how they are scheduling their time (make time for exams and for senior design). This past week, many members were preparing and attending the career fair, along with interviewing with companies. Some members will still be interviewing this next week.

Summary of Weekly Advisor Meeting (9/15/2017):

- Absent: Bijan, Dr. Zambreno
- Discussed final decision to split groups
 - Darrent, Robert, Bijan are in the "Demo" team
 - David, Jesse, Tracy are in the "Neural Network" team
- Discussed methods for sending flight simulator video from PC to board and video quality.
 - Ethernet connection should be good enough
 - Team talked about trying Gstreamer which is installed on the board
 - Jones suggested looking into OpenCV instead of Gstreamer
 - Jones stated we might not need a very high frame rate 30fps or even less should work
- Don't train on board check with other team about using the HPC
- Need more space on board before we can run our own models
- Goals for coming week
 - Video streaming from PC to board
 - Video from board to TV

Summary of Weekly Client Meeting (9/19/2017):

- Absent: Darren D., Josh B.
- TODO: Need to ask Josh again about obtaining the Python scripts he used over the summer