

## EE / CprE / SE 491

# Machine Learning Heterogeneous Computing

## Week 10 Report

Time: Sep. 2 - Sep. 16  
Client: JR Spidell  
Faculty Advisor: Diane Rover

### Team Members:

Sandro Panchame  
Rudolph Nahra  
Alek Comstock  
Jeffery Kasper

### Past Bi-Weekly Accomplishments

**Jeffery K:** Created a Vivado project. Using this project I created a hardware definition for the FPGA within the Kria SOM chip.

**Sandro P:** Finished going through tensorflow for model training. Found a dataset that compiled data from other existing datasets. Larger dataset had mostly annotated information, went and found the original datasets from the collection. Came up with possible avenues to try and improve the accuracy of the model.

**Alek C.** scanned through some example code from Xilinx themselves from their github in hopes of being able to better understand how their API works. I am trying to see if I can figure out where the created 'endpoints' are stored.

**Rudolph:** Had lengthy discussion with client about the feasibility of Marabou - they have decided that the current state of machine learning research is not able to meet their needs, so they are no longer having NN analysis with Marabou as a requirement. That said, I have moved to assisting on board development. Compiled custom petalinux kernel, though more work is needed to use the kernel on the board as well as implement the features that were enabled by the custom kernel. Spent time learning how to compile the ML model for use on the board.

### Pending Issues

**Sandro P:** Will need to go through the data and see what can be used.

**Alek C.** Need more time to look at the code; it is long and there are a few C functions I have not seen yet, but more importantly it does not glean much info about the inter-storage mechanisms. They also overwrite a lot of the API calls provided in their (separate) documentation so it's a little confusing.

**Rudolph:** Need to make sure custom kernel is bootable.

**Jeffery K.** Issues creating Petalinux project. I am having version issues with yocto but have not been able to find a viable solution.

## Individual Contributions

Team Member	Contribution	Weekly Hours	Total Hours
Sandro Panchame	Found some avenues to try and improve accuracy of the model. Found a larger dataset to work with. Finished going through tensorflow to train the model.	12	67
Rudolph Nahra	Compiled custom petalinux kernel, though more work is needed to use the kernel on the board as well as implement the features that were enabled by the custom kernel. Spent time learning how to compile the ML model for use on the board.	6	87
Alek Comstock	Deciphering example code to better understand API calls for use	5	50
Jeffery Kasper	Creating vivado project and trouble shooting project creation.	8	65

## Plans for Coming Weeks

**Jeffery K :** Continue troubleshooting version issues and create a petalinux and vitius project.

**Sandro P:** Start training the model with the new dataset and submit the code into the repository. The goal is to improve the accuracy of the model.

**Rudolph:** Test custom petalinux kernel. Establish basic functionality of the DPU (on the FPGA) by running any inference of our model.

**Alek C.:** I wish to update my slides of openAMP API calls, and to deeply understand how openAMP API calls work. Figure out where endpoints are created, how messages are stored/queued, etc.