

EE/CprE/SE 492 GROUP PROGRESS REPORT

Group number: May2020-10

Project title: Embedded Systems Machine Learning

Client: Dr. Diane Rover

Advisor: Dr. Diane Rover

Team Members: Jackson Lopata, Isaac Stich, Eric Reusch, Frankie Mago, Hailey Lucas, Christian Williams, and James Gossling.

- **Project Summary:** *(Short summary about the project. What are the design goals? Have the direction or scope of the project changed? This should be about a paragraph in length.)*

This project's main goal is to research implementing embedded machine learning into the current ISU ECPE Department curriculum. Our deliverables will be:

- A prototype of a smart door lock that uses embedded machine learning to lock/unlock a door
- A schematic for a pcb board that could be used for the class
- A lesson plan for the prospective class
- A final report detailing our research/work, pros and cons of embedded machine learning
- A poster detailing our prototype

Using machine learning we will implement a smart door lock capable of locking/unlocking doors once the appropriate keyword is uttered. The design goal is to train the keyword spotter with an accuracy of 90% or greater, meaning that the door functions correctly 90% of the time when the keyword is uttered. Another design goal is to have the locking mechanism finish its locking or unlocking state in under five seconds.

- **Accomplishments** *(Please describe/summarize as to what was done, by whom, when and, collectively as a group since the last report. This should be about a paragraph or two in length. Bulleted points are acceptable as well. Please keep only your technical details related to your project. Figures, schematics, flow diagrams, pseudocode, and project related results are acceptable, but please ensure that they are legible (clear enough to read) and to provide an explanation. If researching a topic, please add a few details about what was learned and how it is relevant to the project. If two or more people worked on a single task, be sure to distinguish how each member contributed to the task. Specific details relating to the assistance provided to other members may be included here.)*

1. Jackson Lopata
 - a. Continued integration on the mechanical model
 - b. Redesigned encoder wheel
2. Isaac Stich
 - a. Reviewed the lesson plan and looked to see how it compared to other CPRE labs that I have taken.

3. Eric Reusch
 - a. Lesson plan outline created, research into general class and lab structure
 - b. Compared lesson plan to previous labs from my experience and asked group for suggestions with more integrated lab sections
4. Frankie Mago
 - a. Took all the new data record and ran it through the python script to mix in background noise.
 - b. Uploaded new set of data to edge impulse and re-ran the training using known parameters. Each training cycle takes roughly 30 minutes.
 - c. Recording more data, our cutoff is 4/20/22. At which point I will stop collecting data and processing them, fully concentrating on making the Neural Network as accurate as possible with what we have.
5. James Gosling
 - a. Got voice data collected with Python Voice Data Collector
 - b. Got circuit working completely with voice recognition and proper motor movement
 - c. Got preliminary lesson plan working with Eric
6. Hailey Lucas
 - a. Reworked the DC motor code to use PWM and modified the circuit as a result
 - b. Got three more people to record voice data for ML model
 - c. Reviewed lesson plan created by James and Eric and provided suggestions
 - d. Began work on final poster
7. Christian Williams
 - a. Began working on the final report and made a rough outline for the paper
 - b. Got some voice data from a friend with the data collector
 - c. Reviewed the lesson plan that was created and saw how it compared to other CPRE labs I have taken

○ **Pending issues** *(If applicable: Were there any unexpected complications? Please elaborate.)*

○ **Advisor Input:** It is very important that you meet regularly with your advisor. Please have your advisor select one of the options below.

_____ I am pleased with the progress the team is making.

_____ The teams progress could use some minor improvements.

_____ The team's progress has some major concerns.

Your advisor's selection must be confirmed by either an email attached to this report (merge files into a single pdf) or a physical signature obtained from an in person meeting. Please provide this report to your advisor at least 1 week before the due date so that they have time to respond.

Signature: _____

4/22/22, 1:30 PM

Iowa State University Mail - 492 Team 10 Group Update 4



James Gossling <jgos@iastate.edu>

492 Team 10 Group Update 4

Rover, Diane T [E CPE] <drovers@iastate.edu>
To: "Gossling, James L" <jgos@iastate.edu>

Fri, Apr 22, 2022 at 1:27 PM

James,

I'm satisfied with the progress of the team.

--Dr. Rover

[Quoted text hidden]