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.

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o **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.

o **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. Recorded data for ML Model
    b. Designed, manufactured, and tested servo arm
    c. Designed, manufactured and tested switch holder
    d. Designed, manufactured and tested battery holder
2. Isaac Stich
    a. Recorded data for ML Model.

   b. Asked around for data collection from friends.
3. Eric Reusch
   a. Finished Python Data Collection Program with James
   b. Asked around for data collection from friends
4. Frankie Mago
   a. Took the current amount of recorded samples, around 490, and added them to our synthetic samples.
   b. Mixed all the samples together with background noise and uploaded into Edge Impulse. Sorted them into testing and training data as evenly as possible.
   c. Tried various model testing parameters, and reached a 86% rating.
   d. Tried experimenting with the Neural Network architecture in hopes of increasing accuracy, further testing needed.
5. James Gossling
   a. Finished Python Data Collection Program with Eric and distributed it
   b. Got full prototype working
   c. Sent out information asking for voice recording volunteers
6. Hailey Lucas
   a. Created test programs for our hardware prototype
   b. Got full prototype working with Arduino Uno
   c. Recorded data for ML model
7. Christian Williams
   a. Recorded data for model and trying to convince roommates to contribute
   b. Made a mostly working PCB file, and will update it if the circuit changes
   c. Looked into PWM libraries for our Arduino boards

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

o **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: _____

CyMail

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2 messages

James Gossling <jgos@iastate.edu>
To: Diane Rover <drover@iastate.edu>

Hi Diane, we need your 'signature' reply for this report, thanks.

📄 **Team10_GroupReport_3.docx**
149K

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

James,

I'm satisfied with the progress of the team.

Dr. Rover

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