***EE/CprE/SE 491 BI-WEEKLY REPORT 2***

***Start Date – End Date : 9/13/21 - 9/26/21***

***Group number: 09***

***Project title: Magic Sensors***

***Client &/Advisor: Daji Qiao***

***Team Members/Role:***

* Ryan Lanciloti-Report Manager
* Ben Pierre-Webmaster
* Abdelaziz Hassan-Power Systems
* Chinar Kaul-Meeting Facilitator
* Alyssa Marshall-Meeting Scribe and Team Manager
* Jared Hermon-Test Engineer

o **Weekly Summary**

Our objective for this period was to establish data harvesting, set up our machine learning backend on our server, and finalize our comprehensive test plan. The group was able to make significant headway on these goals. In terms of data harvesting we now have a reliable data harvesting system capable of harvesting data at a rate that exceeds our restraint requirement. Data harvesting is also making headway on pre-processing this data to allow higher throughput. Backend was able to get a docker file written to deploy the backend server application effortlessly on any server. Modifications will need to be made to support the changes in the machine learning algorithm. Machine learning linear regression model is set up to make predictions based on live data, and can be trained using dataset stored in CSV file. As a team, we discussed some of the requirements, metrics, and process for the test plan.

o **Past week accomplishments**

∙ Ben Pierre: Figured out our issue with the ESP32s not posting data to the server. Our packets contained mis-formatting the JSON and our end point was set up to require valid JSON. Established NTP link on our data harvesting, this allows us to label packets and ensure we are processing current packets. Set up MAC address filtering - Despite our ESP32s being on their own independent network we were still seeing cross talk with other devices. We are now capable of filtering incoming CSI preambles by MAC address to ensure we only process data that directly pertains to us. Began working on Kalmans algorithm and Principal Component Analysis. This will allow us to cut our data into approximately ⅓. Doing so will allow us to collect more data points, construct more relevant inferences, as well as make them faster.

∙ Alyssa Marshall: Started to discuss using copper tape for the reflector on the door. Copper tape provides the adhesive needed for easy stick and removal to not interfere with the design of the door. Began deciding the overall metrics that will be used for acceptance testing with the team and the client. Determine which features will be analyzed during the testing process. Testing multiple features along the chain will allow the team to determine where a failure actually occurs if applicable.

∙ Chinar Kaul: Switched to using Scikit-learn library instead of Tensorflow for linear regression model because Scikit-learn models are more straightforward to implement. Added endpoint allowing for prediction to occur when live data is received. Modularized machine learning code for organization.

∙ Ryan Lanciloti: Wrote a docker file which allows us to deploy the backend server application to any computer. This will allow current group members and future groups who adopt this project to deploy an environment with our server effortlessly.

∙ Jared Hermon: Began solidifying exact numbers for the test plan requirements. Discussed these with the team to get the final thoughts and suggestions.

. Abdelaziz Hassan: working with reflector team to do testing we will have variety of testing plan, when we have ready for CSI will start test

o **Pending issues** ∙ Ben Pierre: Waiting on Dr Daniels to reply to either email or the class discussion board post about the verbiage of this report. Need a more in depth understanding of PCA.

∙ Alyssa Marshall: Verify adhesive doesn't strip any piece of the door with tests. Begin writing test cases and continue working on progress of test plan with the test engineer.

∙ Chinar Kaul: Need to integrate machine learning model progress with backend server progress.

. Abdelaziz Hassan: after CSI team finish with their part will start to test

∙ Whole team: Waiting for Dr. D to reply to our emails / discussion board post. The verbiage in this document is confusing.

o **Individual contributions**

| **NAME** | **Individual Contributions** | **Weekly** | **Cumulative** |
| --- | --- | --- | --- |
| Ben Pierre | Established data harvesting link, established MAC filtering, established debug visualization tools, began work on PCA of data as well as Kalmans algorithm. | 13 | 22 |
| Jared Hermon | Developed test plan requirements | 6 | 12 |
| Alyssa Marshall | Test plan- metrics and outline, Reflector Choices | 6 | 12 |
| Abdelaziz Hassan | Currently planning for testing upcoming weeks | 6 | 12 |
| Chinar Kaul | Established endpoint allowing for live prediction when data is received, improved linear regression machine learning model | 8 | 14 |
| Ryan Lanciloti | Worked on Docker File  Updated the backend server to support tensorflow | 7 | 13 |

o **Plans for the upcoming week**

∙ Ben Pierre: Have a meeting with members of the genetics department about PCA analysis. Continue research into Kalmans algorithm. Migrate testing suit to a permanent location

∙ Jared Hermon: Work with the other team members to help fill in the gaps where needed until the system is ready to be tested.

∙ Chinar Kaul: Meet with the backend team (Ryan) to discuss integrating the machine learning model with the server. Integrate machine learning prediction endpoint with existing server.

∙ Alyssa Marshall: Run tests with copper tape to verify that adhesive doesn't damage the door. Continue to progress with test plan documents and write test cases.

. Abdelaziz Hassan: Run tests with copper tape to verify that adhesive doesn't damage the door.

. Ryan Lanciloti: Begin writing up documentation for how to deploy the backend application and use our application from start to finish. This won’t be technical documentation, it’ll be documentation that’s easy to follow and should allow any future groups to pick up our project. Also, integrate Chinar’s model into the backend.

o **Summary of weekly advisor meeting**

The team met with our client [Daji Qiao](mailto:daji@iastate.edu) and relayed our progress, our plans for the coming period, and got advice on how to conduct PCA testing.