EE/CprE/SE 4920 STATUS REPORT 4

10/3/24 - 10/31/24
Group number: 22
Project title: CyRide Visualization
Client: Mohammed Soliman
Advisor: Mohamed Selim

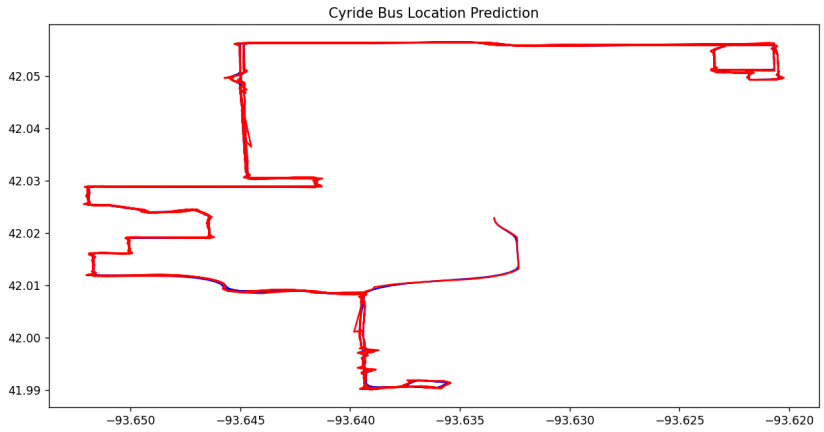
Team Members & Role:
Braden Buckalew: Programmer
Endi Odobasic: Programmer
Evan Schlarmann: Programmer
Andrew McMahon: Programmer
Chiran Subedi: Programmer

Week Summary

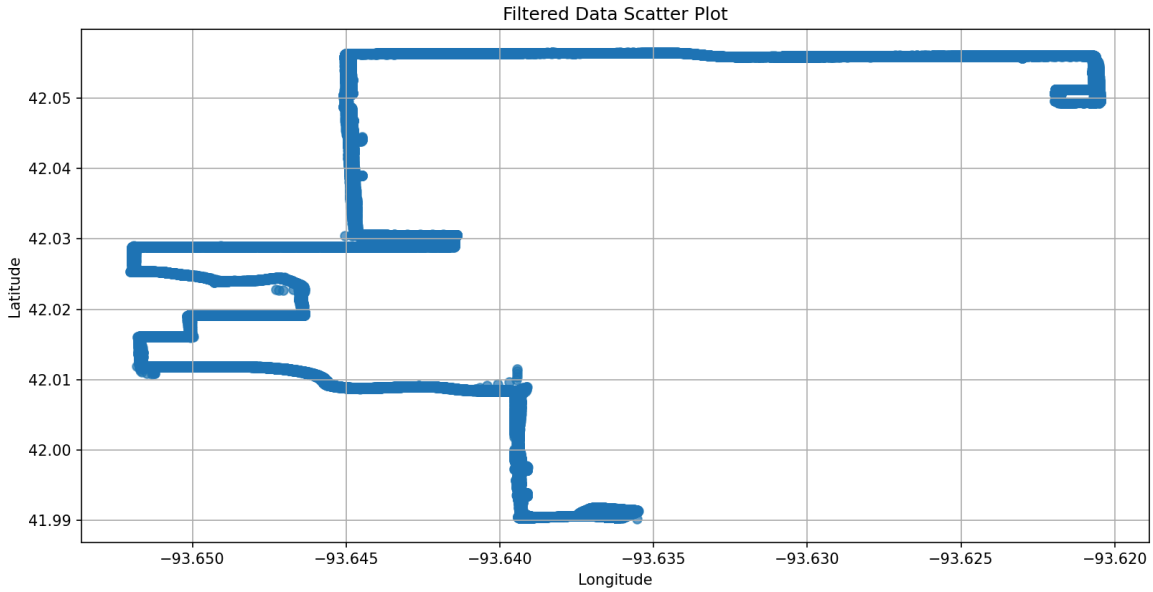
Our team worked towards creating filtered data from the historical data to reduce it to brown route only. We also worked towards creating a fit ML models to predict bus locations.

Accomplishments

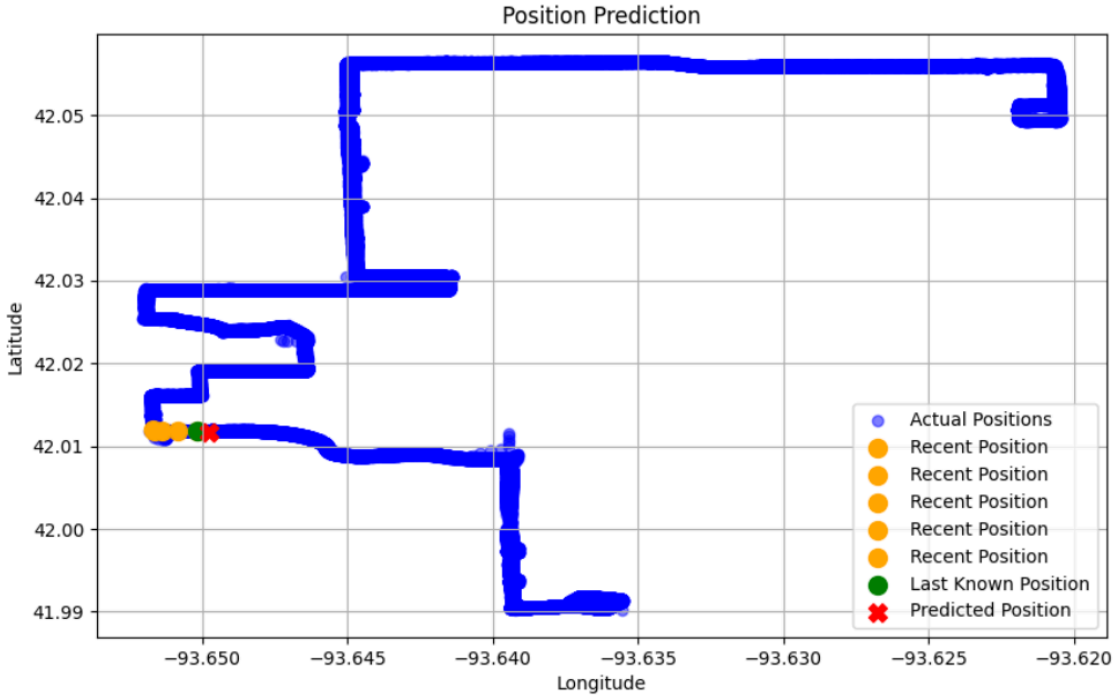
Our team started working on the machine learning model to forecast the location of a bus given the time. This model uses the historical CyRide data to train and fit the model. Below is a figure that shows how fit the ML algorithm is on a subset of the historical data that was provided. This is an example of the brown route.



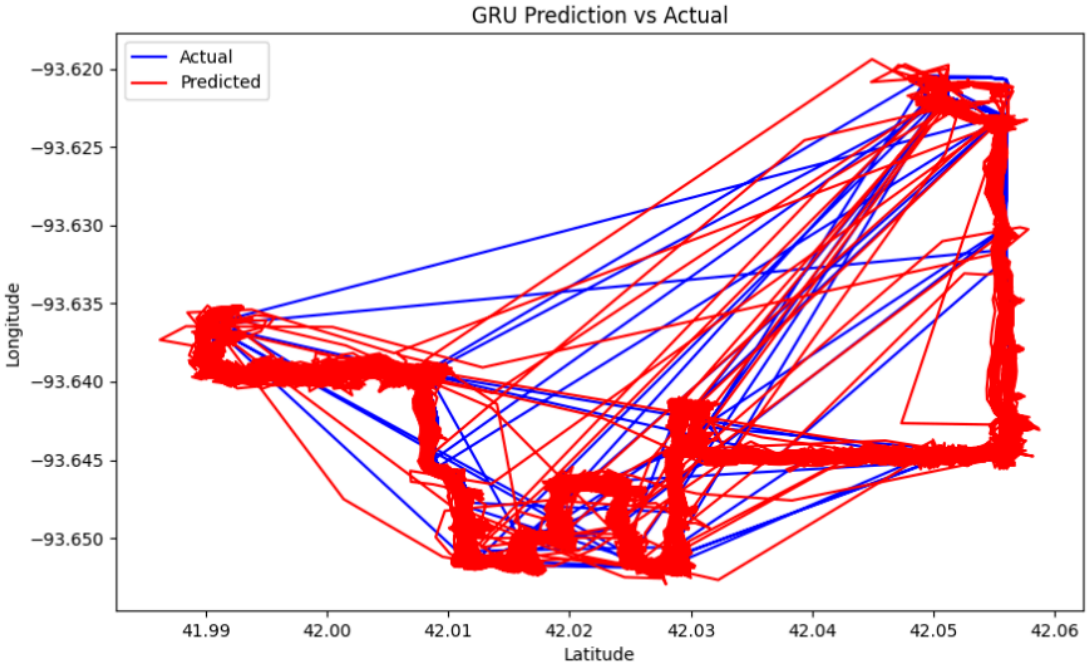
Data filtered out from the original csv file to match the brown route.



Below is an example of the LGBM model predicting he next bus location.



Below is the test run of GRU trying to predict ~32,000 points



Pending Issues

Currently there is no API for getting data from the UE.

Individual Contributions

NAME	Individual Contributions	Description	Week Hours	Cum. Hours
Evan Schlarmann	1. Adding pinging to the GPS API 2. Created Sarima ML model 3. Created LGBM ML model 4. Refine Sarima ML model	1. The data retrieval API now pings the UE to test the connectivity. If connected, it will retrieve the bus data. 2. Created the Sarima model that uses historical bus location data to forecast the next position. It uses the time series model to determine the position given the time. 3. Tried making an ML model using LGBM. This model uses features about the data to train the model and predict locations. 4. Tried to refine the Sarima model to predict	24	107

		farther into the future and have more accurate predictions.		
Braden Buckalew	1. Analyze Historical Data	1. From the previous week, I added regional zones that match the roads of our route. Filtered out the data again. The next week I went through each day that still had data points and filtered out the ones that did not have a complete circle of the brown route 2. Repeated the process above but for the historical pinging data and setting up automatic filtering.	25	101
Endi Odobasic	1. SARIMA 2. IGBML	1. Worked with SARIMA machine learning model and tried to get the model to get it to better predict future lat/long pair points but after a while, it still hasn't been working, and don't think this is the model for us. 2. Then started to get an understanding on the other machine learning model we had used. With this one, I have been working on getting the model to better predict further into the future.	11	90
Andrew McMahon	1. Prepare frontend for historical data 2. Develop script for data cleaning	1. Learned frontend syntax and prepared all endpoints for historical data display 2. Began to format script for data cleaning with Braden. Since the historical data is uncleaned and contains multiple routes, we need to develop this script to map individual route data for display	7	75
Chiran Subedi	1. Frontend Improvements 2. Developed API for the UE 3. GRU Model Creation 4. GRU Model Testing	1. Improved the frontend by removing unnecessary React elements and added real-time vehicle location display. Also added myself to the Senior Design and project websites. 2. Developed the API to enable data transmission from the UE to our backend. During the client meeting, I addressed a few technical issues that arose to move forward. 3. I built a GRU model using TensorFlow. I prepared both training and testing datasets from	25	38

		the cleaned UE data, allowing for comprehensive model training and validation. 4. I tested the GRU model by training it on 80% of the data and then assessing its predictive accuracy on the remaining 20%, specifically focusing on location predictions.		

Plans For the Upcoming Weeks

- Continue working on the machine learning model to predict locations accurately.
- Create an API on the UE to send live data
- Start creating test infrastructure
- Start creating presentation

Weekly Client/Advisor Meeting Summary

During the meetings, we focused on the brown route. This makes the focus on cleaning the historical data for the one route so that the Sarima model can predict the route accurately. This reduces the overhead of including all CyRide routes in the prediction data. We are also working on refining the machine learning algorithm so that it can be used to predict the locations of the bus given certain times on the route. We also have discussed the need to build an API for the UE model that either the ARA team will build, or specifications will need to be provided to our team.

Our team is working with an ARA member to gain access to the UE so we can create an API. This API will send the most recent location of the UE and its connectivity when queried. To round out the application, we are going to build testing infrastructure. We have also decided to create a draft presentation to combine all the application progress.