Dwight Look College of ENGINEERING
TEXAS A&M UNIVERSITY

Team 36: Self-Navigating, Obstacle Avoiding Robot
Bi-Weekly Update 2

Teammates:

Arkadi Zhanov

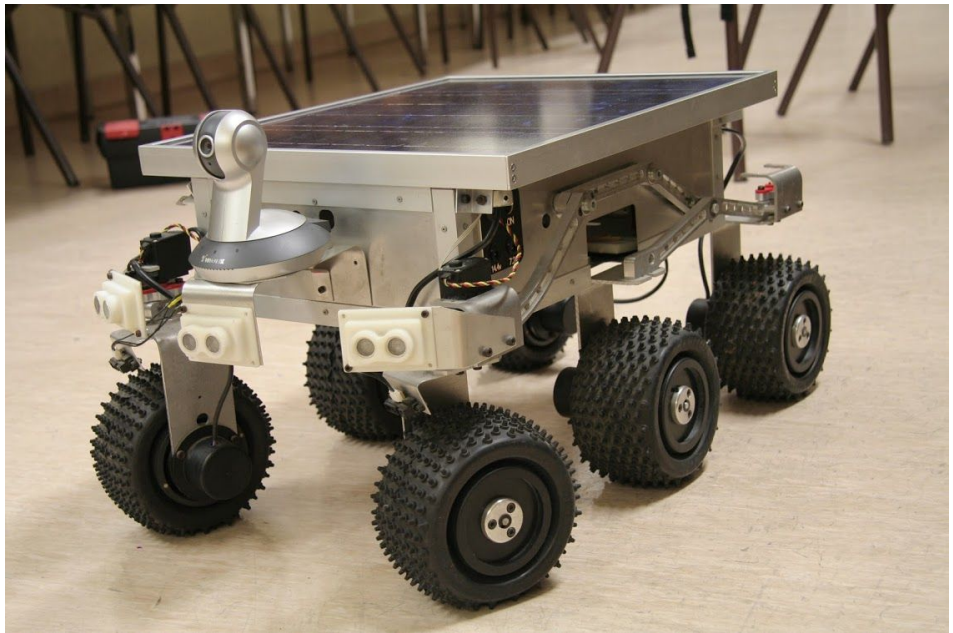
Nathan Sommer

Nikolai Paderin

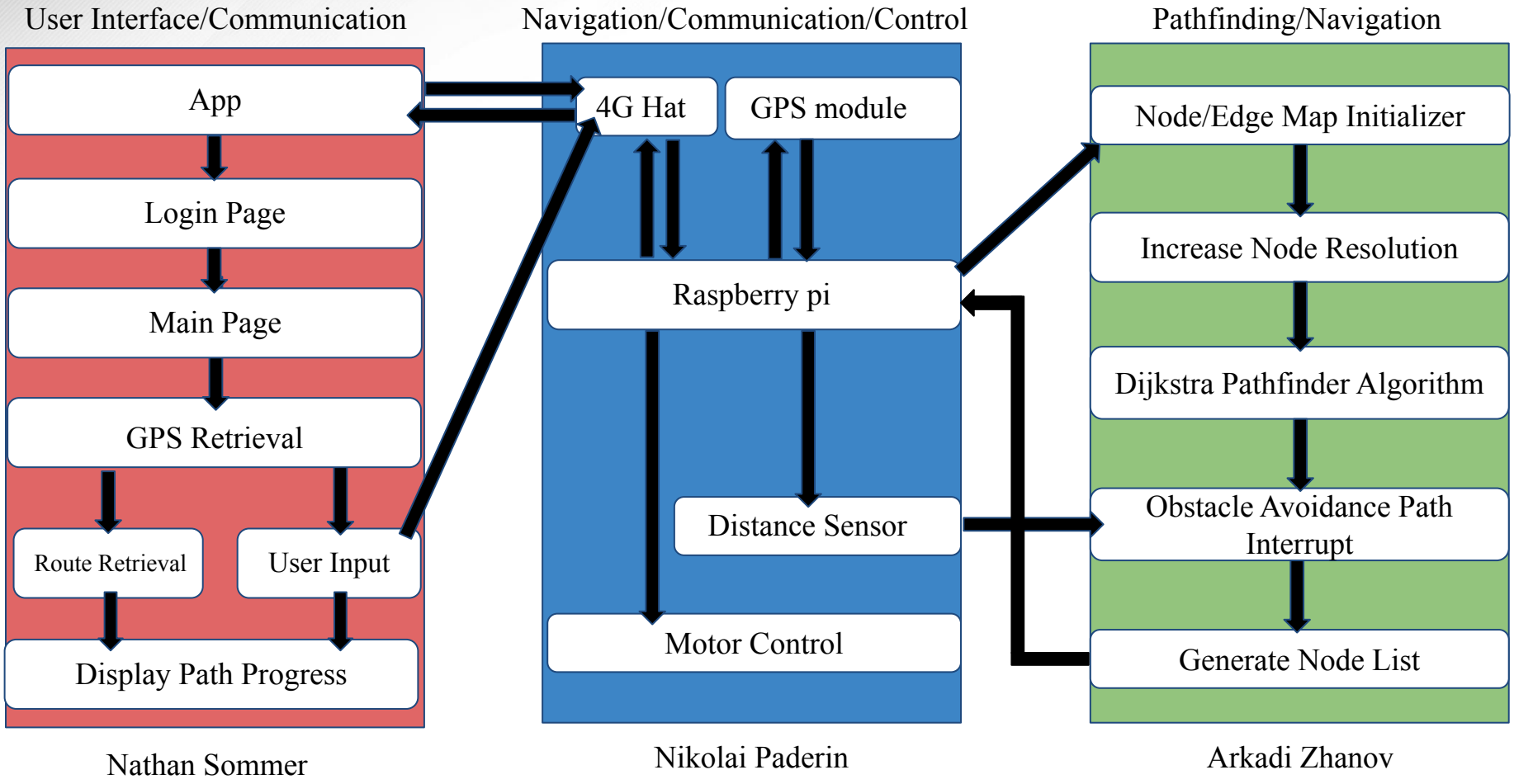
Sponsor: Stavros Kalafatis

Project Summary

- Create a system that takes in a point on a map as the rover's destination, creates a route for the rover, and gets the rover to its destination and back while avoiding obstacles.
- The main motivation for this project is for application in military settings such as aid delivery to wounded soldiers in the battlefield or local, residential delivery of food or mail.



Project/Subsystem Overview



Nathan Sommer

Nikolai Paderin

Arkadi Zhanov

Project Timeline

(Green done, yellow underway, red in trouble, white not started)

Subsystem Designs and Testing (completed 9/11)	Integrate Pathfinder and Movement/Controls and test (to complete by 9/20	Integration with Android App and Raspberry Pi using cellular data (to complete by 10/5)	Final Integration (to complete by 10/15)	Systems Test (to complete by 11/2)	Validation (to complete by 11/26)	Demo and Report (to complete by 12/5)

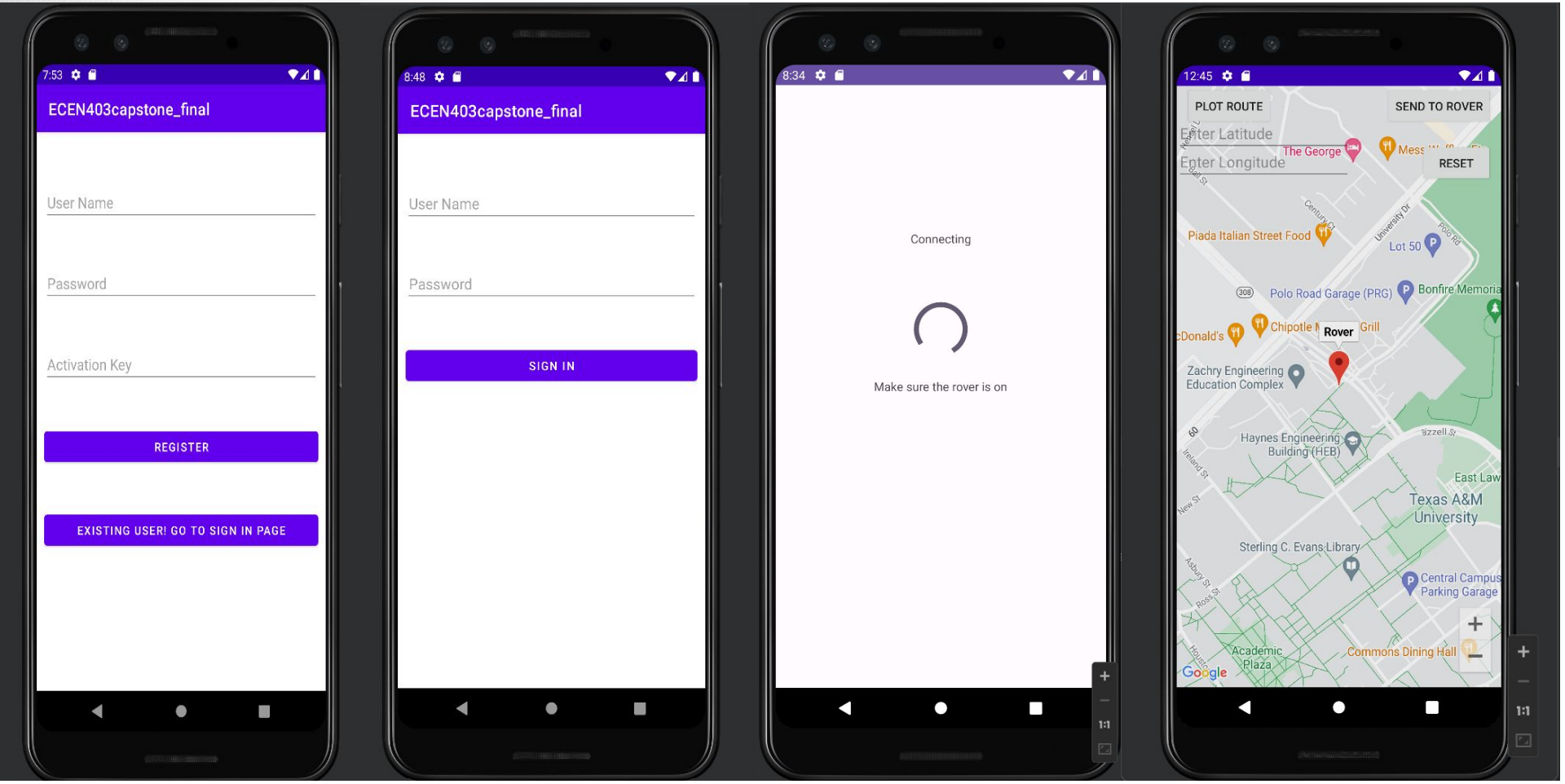
Interface and Communication

By Nathan Sommer

Accomplishments since 403 8-10 hrs of effort	Ongoing progress/problems and plans until the next presentation
Created the connection page where the connection with the rover will connect with the app Helped complete the pathfinding/navigation subsystem in preparation for integrating with the rover	Create a connection between 2 devices over cellular data Send and receive data between devices Integrate to Raspberry Pi - GPS retrieval - Route Retrieval

Interface and Communication

Nathan Sommer



Pathfinding and Navigation

Arkadi Zhanov

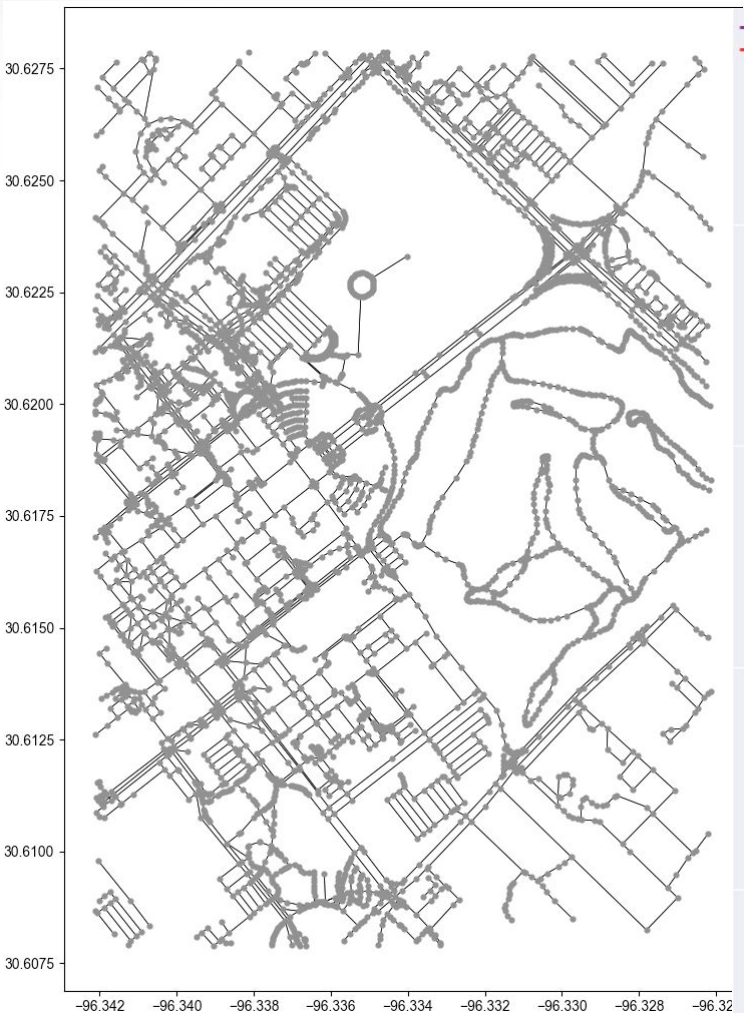
Accomplishments since 403 10 hrs of effort	Ongoing progress/problems and plans until the next presentation
- Collected data to experimentally confirm best pathfinding algorithm for integration with Movement/Control subsystem - Completed and improved pathfinding subsystem by increasing node resolution in preparation for integrating with Movement/Control subsystem	- Integrate Pathfinder with Control subsystem for Navigation functionality - Test integrated Navigation system - Assist with code development of integrated Pathfinder and Control systems obstacle avoidance

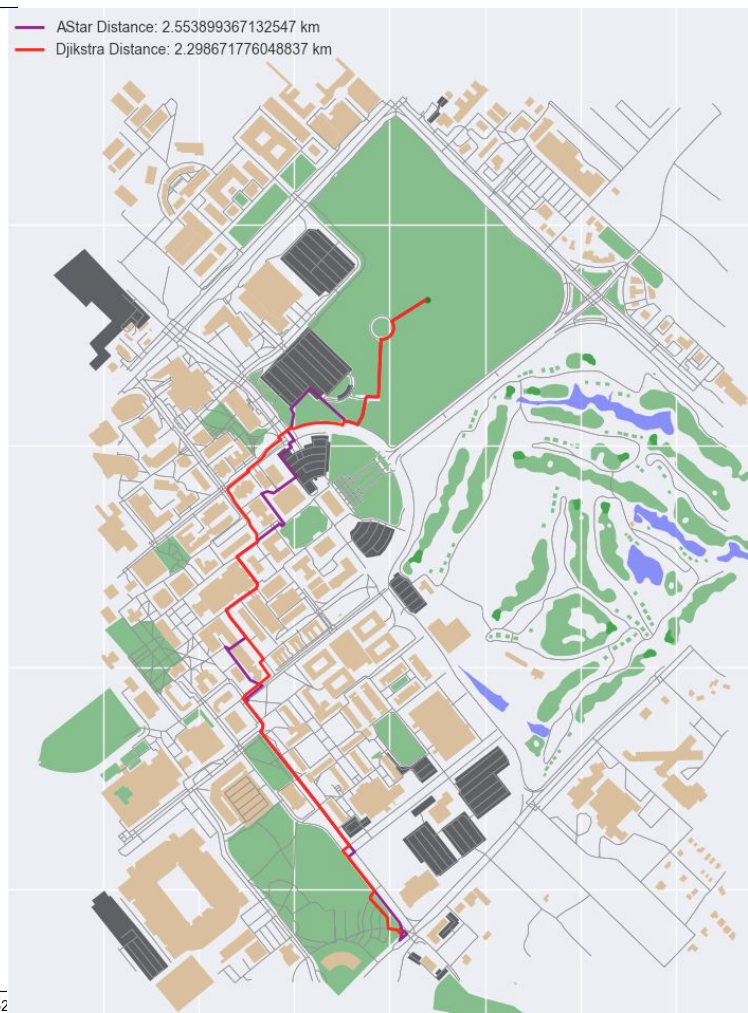
Pathfinding and Navigation

Arkadi Zhanov

Case	AStar Dist (km)	Dijkstra Dist (km)	Verdict
1	0.2263934748	0.2263934748	Same
2	0.3212610785	0.326455148	AStar
3	0.2868503222	0.2868503222	Same
4	1.474095566	1.46573356	Dijkstra
5	0.3818585828	0.2715571012	Dijkstra
6	0.343212842	0.3423236149	Dijkstra
7	0.9376575704	0.7802984641	Dijkstra
8	2.553899367	2.298671776	Dijkstra
9	2.368168802	1.71826304	Dijkstra
10	1.632029511	1.346387209	Dijkstra

Table 1. Experimental data collected to determine the better algorithm by running multiple pathfinding cases





Navigation/Movement/Control

Nikolai Paderin

Accomplishments since 403 7 hrs of effort	Ongoing progress/problems and plans until the next presentation
Sensor rewiring + 3D printed Built a new frame for rover Movement code adjusted Node navigation code started Ordered all remaining parts	Finish the node navigation code. Establish connection from Pi to App Finalize object avoidance algorithm Test rovers automated movements

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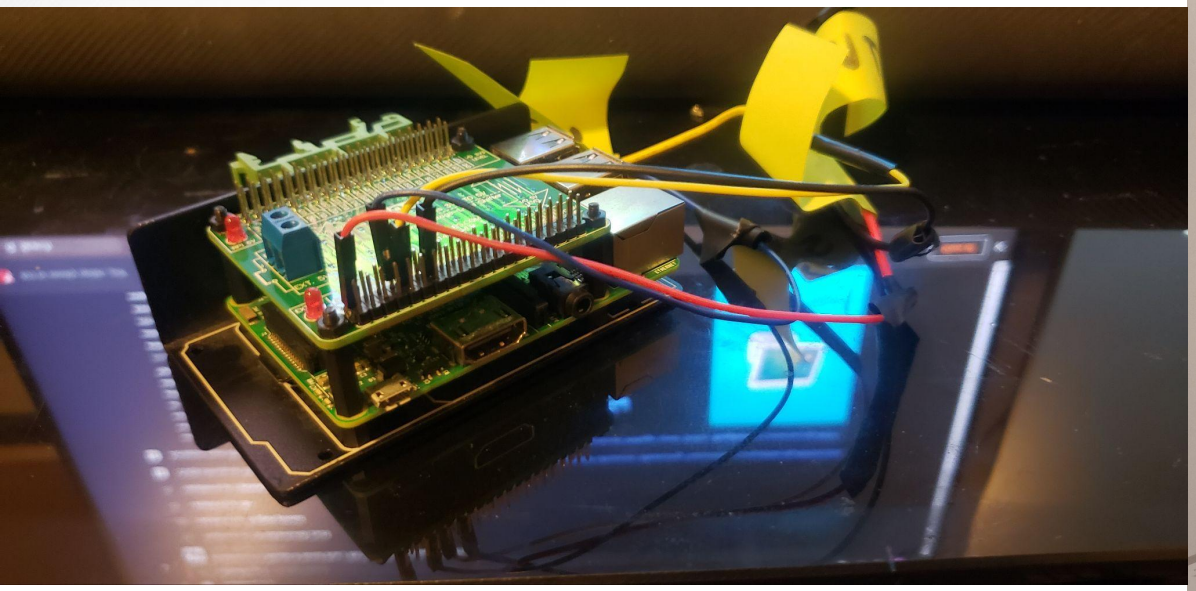
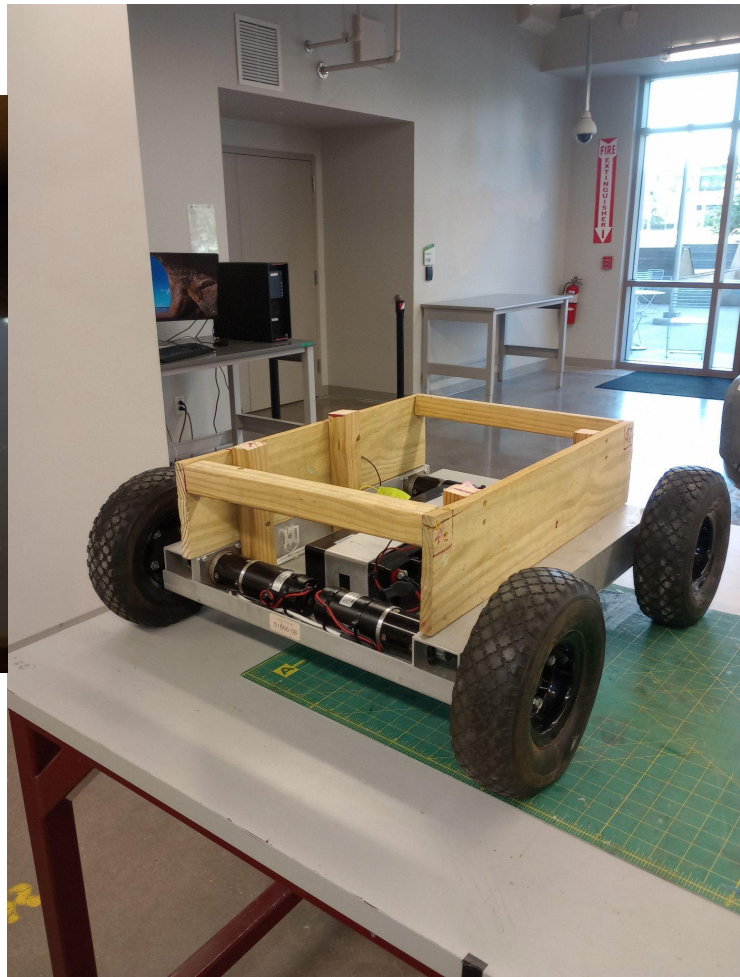
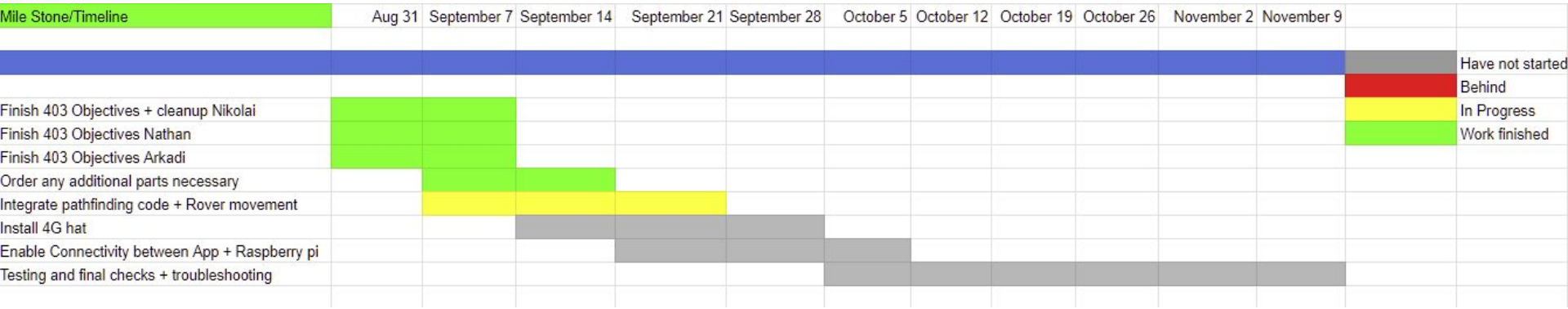
Navigation/Movement/Control

Nikolai Paderin





Execution & Plan



Thank you for your time and patience!
Any questions?