

# **CSE 145: Developing a Multi-Faceted Integrated Navigation System For Triton AI Racing Milestone Report**

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To review, here are my milestones and MVP from the project specification.

## **Low Level Milestones**

- Week 4: Complete a background study, get familiar with hardware and firmware, and complete preliminary tests
- Week 5: Test GNSS Atlas, Test GNSS P1 SDK, Test access to different information in the fusion engine including the IMU and GNSS, inspect the fusion engine APIs, learn ROS2 topics and ROSViz, Access the IMU data independently and display it
- Week 6: Work with the team to integrate the Atlas, with complete GNSS/IMU integration into the vehicle cart and test it
- Week 7: Ship the go-cart and go back to working on the scaled P1 driven test robot.
- Week 8: Compare IMU data from the P1 with that of the Artemis
- Week 9: Learn how to fuse razor IMU with LIDAR Livox MID360 to enable odometry
- Week 10 Complete Project Report and finalize collecting all data

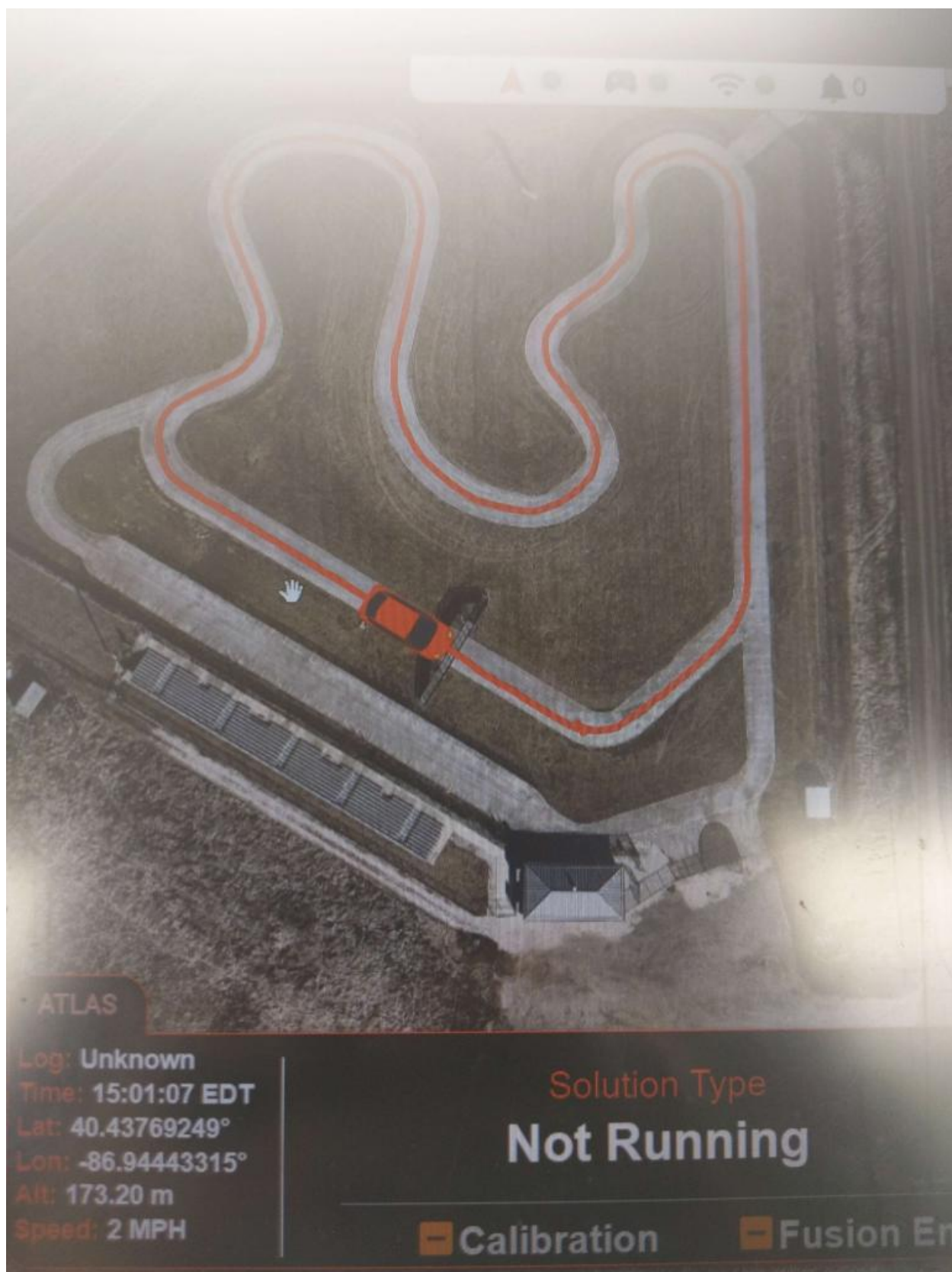
## **Key Milestones**

The first milestone of this project is to successfully fuse the IMU and GNSS in the Atlas system to create the MVP. Testing will be conducted incrementally until the feature is successfully implemented and all necessary data is collected. The deliverable for this milestone will be a report containing the test data, as well as results from larger scale vehicle tests with the project's system integrated. The target completion date for this milestone is Week 6.

The second milestone involves completing testing on the IMU/GNSS Fusion on both the Artemis Board and P1 SDK Board, and comparing the findings of all three using test data and quantifiable comparisons. The milestone will be completed once testing involving the different hardware is complete and a report is submitted. The target completion date for this milestone is Week 8.

The third milestone is to fuse the Razor IMU with LIDAR Livox MID360 to enable odometry on the vehicle. Research will be conducted on LIDAR and odometry prior to testing, and a report containing test data and results will be submitted in my final project report as the deliverable for this milestone. Video footage can also be included in all three milestones.


In terms of progress I have completed the first key milestone and my MVP which is fusing the IMU and GNSS in the ATLAS system in a meaningful way. Here are pictures which show the GUI view of the ATLAS mapping the track and displaying the route. This demonstrates a working fusion between the IMU and GNSS systems.




ATLAS

Log: Unknown  
Time: 15:01:07 EDT  
Lat: 40.43769249°  
Lon: -86.94443315°  
Alt: 173.20 m  
Speed: 2 MPH

Solution Type  
**Not Running**

 Calibration

 Fusion Engine



Unfortunately, due to illness I have fallen behind with the other milestones however which has forced me to revise my schedule as such.

Week 9: Work with Cara to analyze IMU quality of the GNSS systems of the Atlas and P1

Week 10: Complete Project Report and finalize collecting all data

In terms of incorporating feedback into this project plan it is worth noting that the internal details of the fusion is mostly something Triton AI has set up as it is embedded in the Atlas and P1 systems however in the next week I plan to dive deeper into this.

As far as adjusting for falling behind I worked with Jack to re-evaluate priorities given the time I was not able to work on the project and adjusted my schedule accordingly.

I will also work to create documentation as I go which I have been doing so far.

Overall, I am upset with the progress of the project but a good project is flexible and I am confident I will have some excellent deliverables to present to the class.