Mines Formula Field Session Request

Deep Dive Into Aero Maps

Company Background:

Mines Formula is a student club at the Colorado School of Mines in Golden, Colorado. We are made up of students from a variety of engineering majors including mechanical, electrical, chemical, petroleum, and environmental. We range from incoming first year students to graduate students. We participate in the annual Formula SAE competition.

The Formula SAE competition entails the design, manufacturing, and racing of an open wheel, internal combustion engine race car. Each year, hundreds of schools from around the world meet to see who created the best vehicle. Teams are judged on their design presentation, cost analysis, business proposal, and vehicle performance. The four day competition tests the students' engineering and teamwork skills.

Project Description:

Students will explore the documentation and code for an Assetto Corsa (a racing simulator) modification known as the Custom Shaders Patch (a physics extension for Assetto Corsa) to identify the requirements to implement aero maps as part of an in-game model for the Mines Formula vehicle to increase the simulation accuracy compared to the real-world counterpart.

Aero maps are a multidimensional description of an object's downforce in response to speed, steering angle, roll, etc. Currently, software exists to take in a variety of real-world vehicle parameters and output an appropriate model that is drivable in Assetto Corsa, but these parameters do not include aerodynamics data. A thorough investigation into the inner workings of the Custom Shaders Patch as well as relevant documentation is necessary to identify how to construct appropriate aero maps for a vehicle. During this investigation, students should compile documentation, identify units (ex: Newton meter vs pound ft) used by the game engine, and construct algorithms for the creation of files that should accompany the existing model in-game,

and if this is all achieved, potentially modify the existing software written in Java to accept aerodynamics data from this year's car.

Deliverables:

- Improved documentation
- Algorithmic process to convert known aerodynamics data to Assetto Corsa's format
- Different downforce levels mapped for
  - Ride height
  - Velocities
  - Yaw
  - Pitch
  - Any other fields listed in documentation
- Potential to feed CFD data into the mapped fields

Desired Skill Set:

a. Interest in Mines Formula or simulation or video game modification
b. General Programming Abilities
c. Experience with video game modification
d. Interest in vehicle dynamics/cars

Team Size:

The desired team size is four students.

Location for Work:

   The working location is extremely flexible and the students will have the opportunity to either work in person on campus or remotely whichever works best for them.

Faculty Advisor - Dr. Gregory Bogan

Mines Formula Lead Engineers - Gavin Graff & Dominic Mobley & Alex Edwards

Contact Information - minesformula@gmail.com