Overview of ADB

Software Engineering CSE435
Michigan State University
Fall 2025

Team members:

Project Manager: Anthony Ghaith

Facilitator: Naod Ghebredngl

Artifacts Manager: Seth Neubauer

Customer Liaison: Almostafa Aalabdulrasul

Configuration Manager: Matthew Vazquez

Customer: Mr. Jacob Rhodes

Instructor: Dr. Betty H.C. Cheng*

*Please direct all inquiries to the instructor.

Project Overview

- The Adaptive Driving Beam (ADB) System provides maximum visibility while preventing glare to drivers
- Motivation for project
  - Better visibility at night
  - Improve safety and comfort during nighttime driving

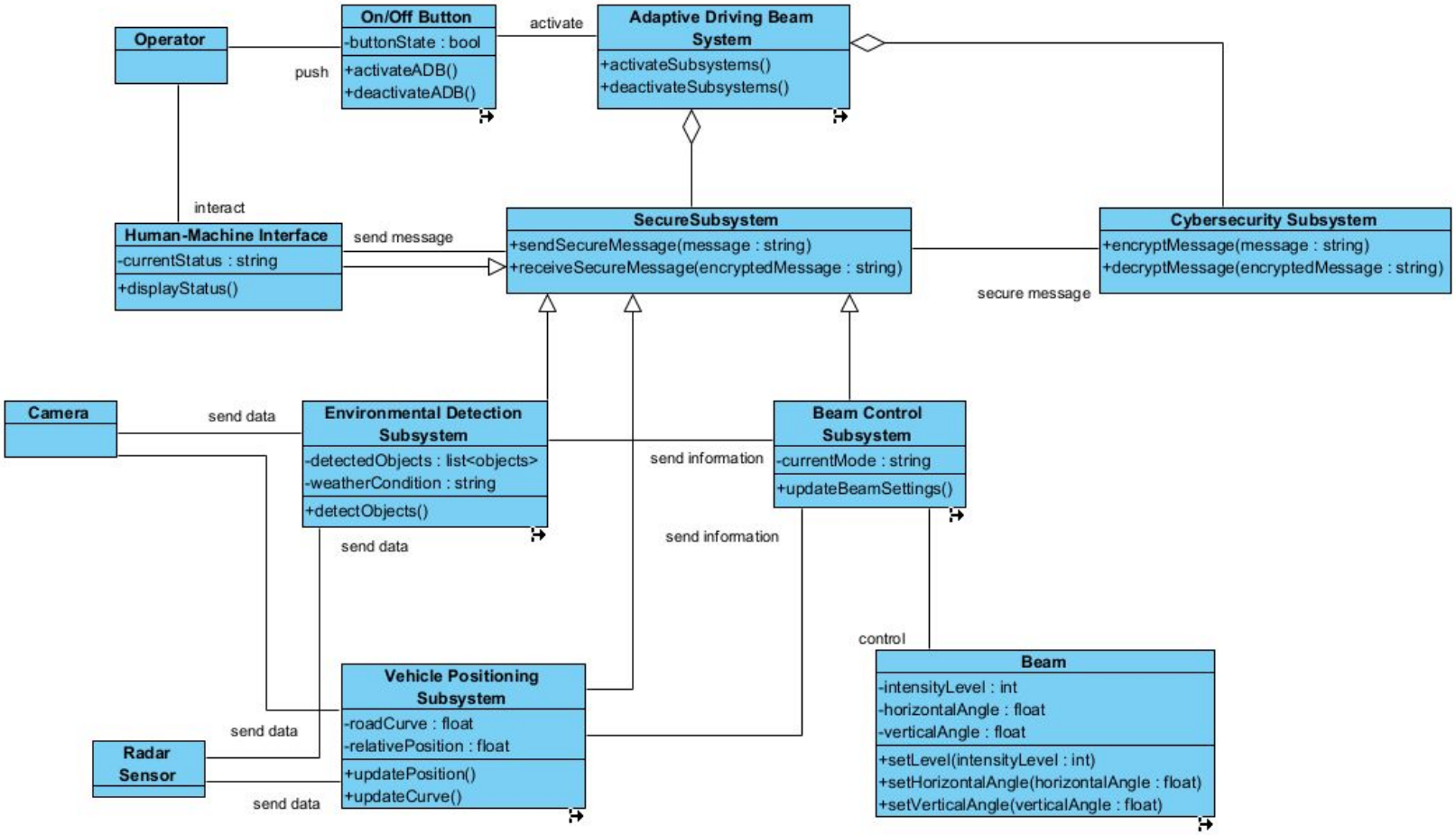
Overview of Features

- Aligns beam angle with curvature of the road
- Adjusts illumination levels to improve visibility
- Updates beam pattern according to the current weather conditions

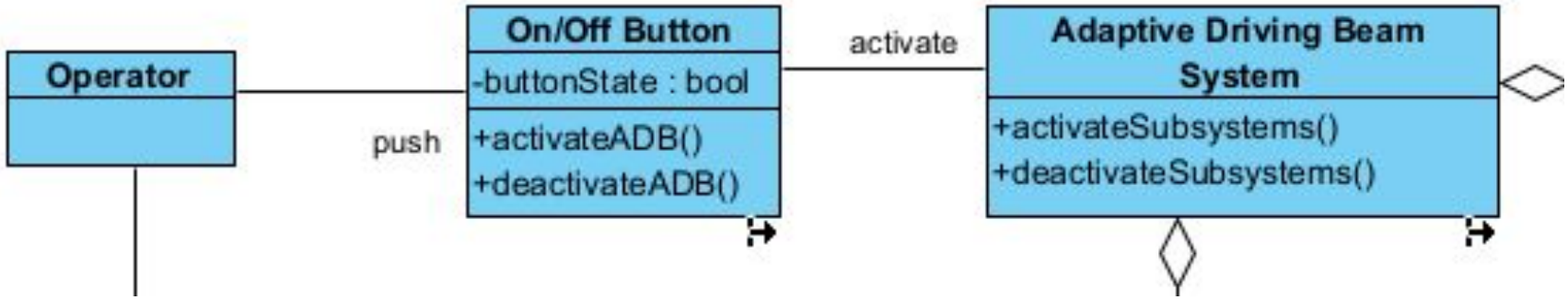
Domain Research

- Investigated headlight functionality and restrictions
- Needed to apply functionality to scenarios
- Project Constraints
  - Must minimize glare to oncoming vehicles
  - Must fail safely if sensor fault detected
  - Detect conditions with vehicle's built in detection hardware

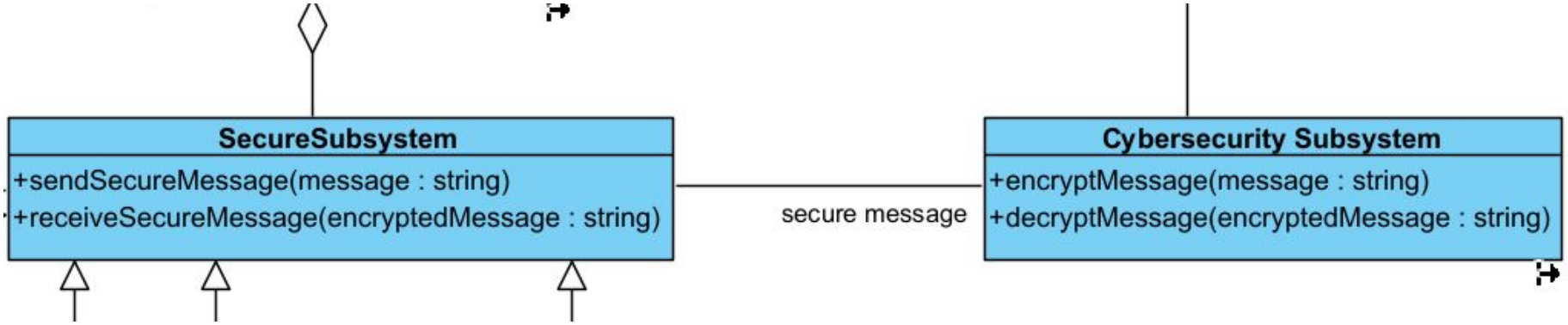
Part II: Model-based View of System



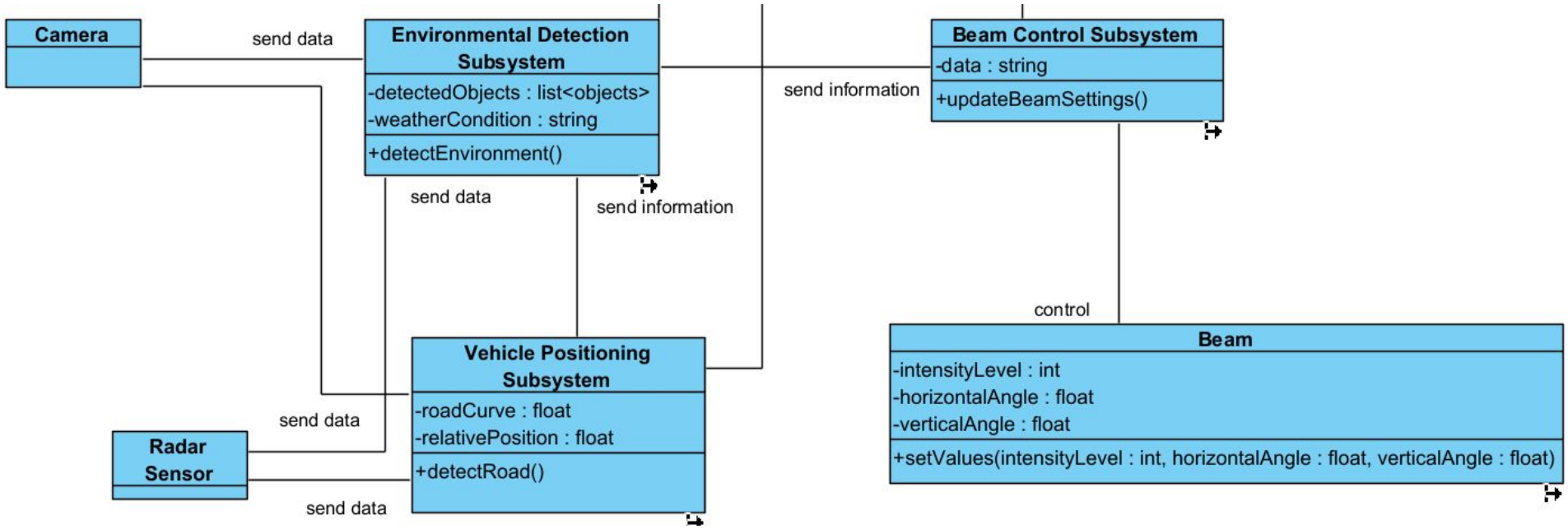
Activating System



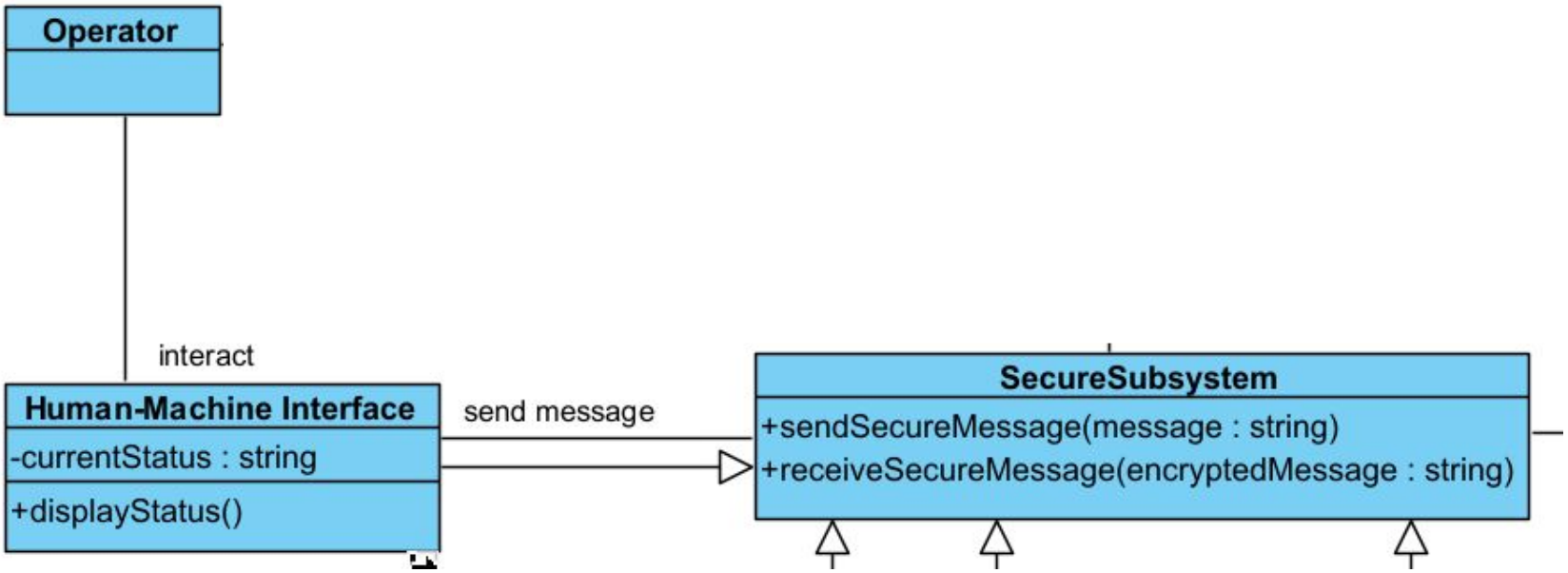
Securing Messages



Sending Commands to Beam

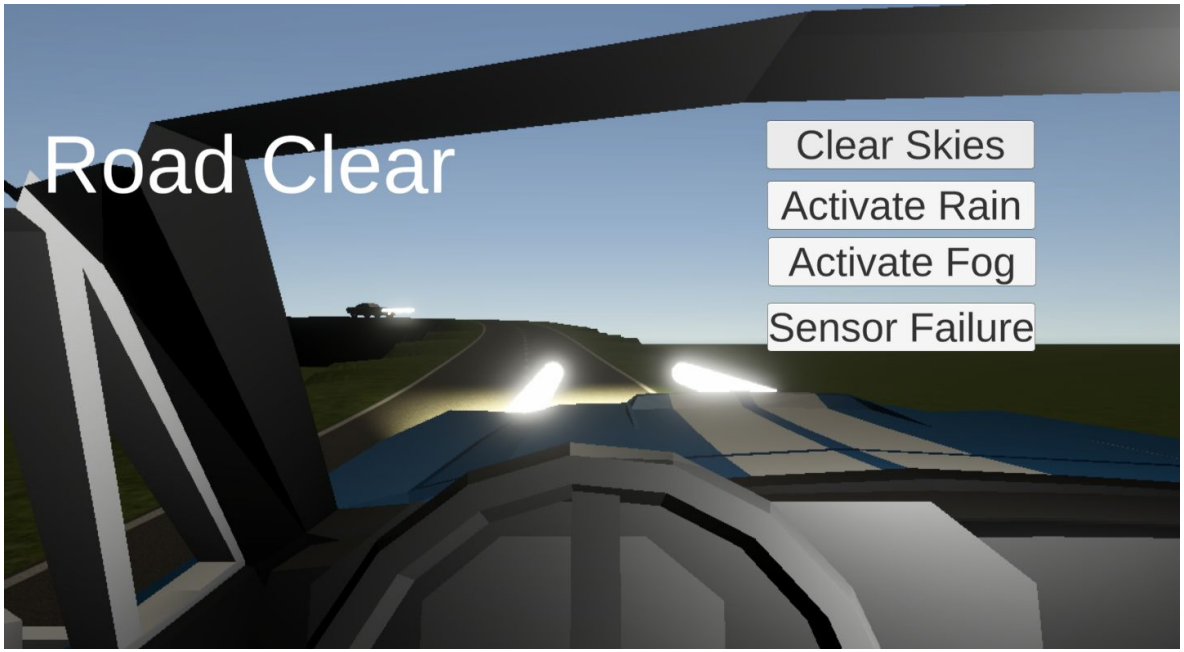


Alerting Driver



Part III: Demonstration

- The demo showcases a car on a track
- Buttons allow user to interact with environment



Scenario 1

- ADB system with road clear

Scenario 2

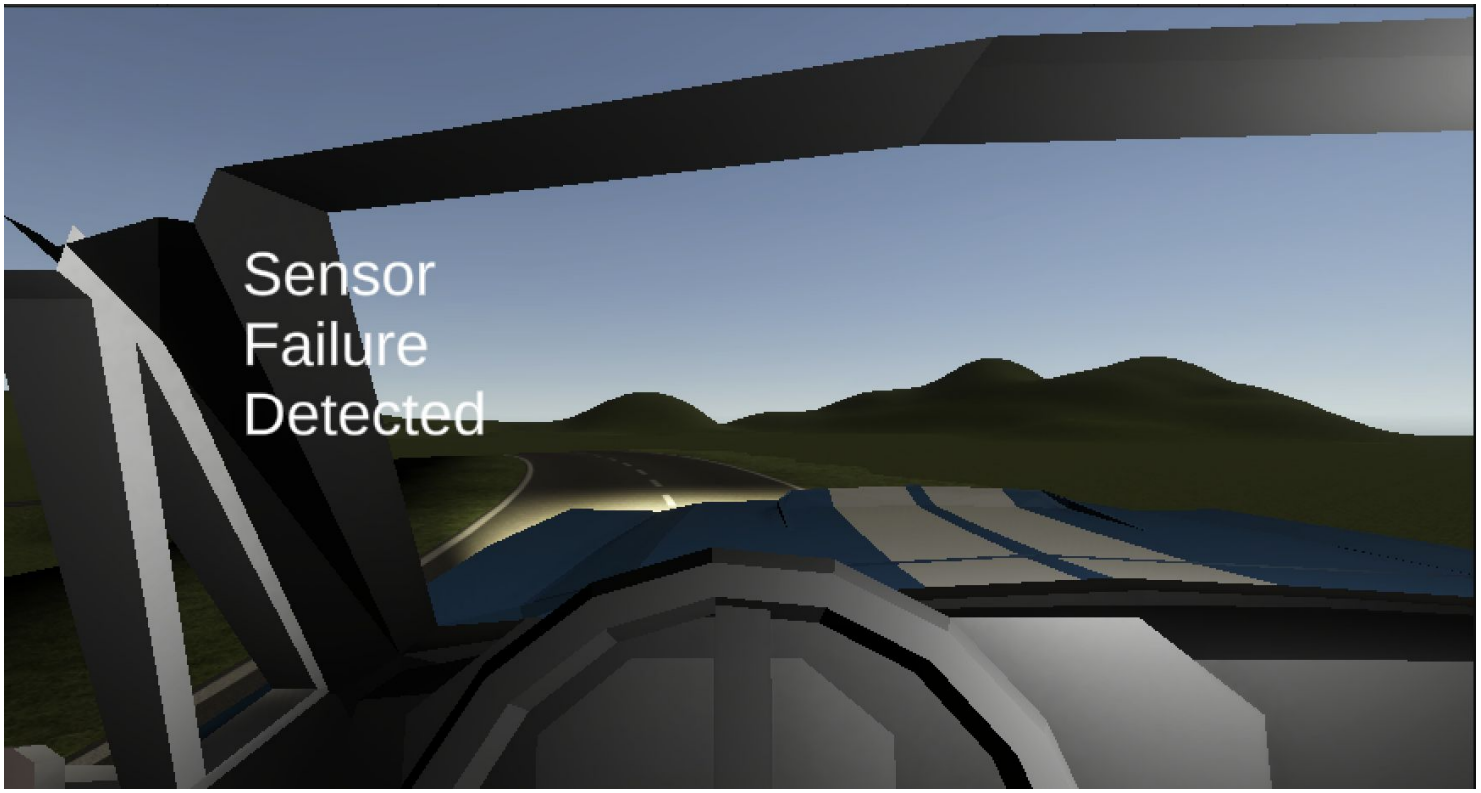
- ADB system when car detected

Scenario 3

- ADB system when curves/elevation change detected

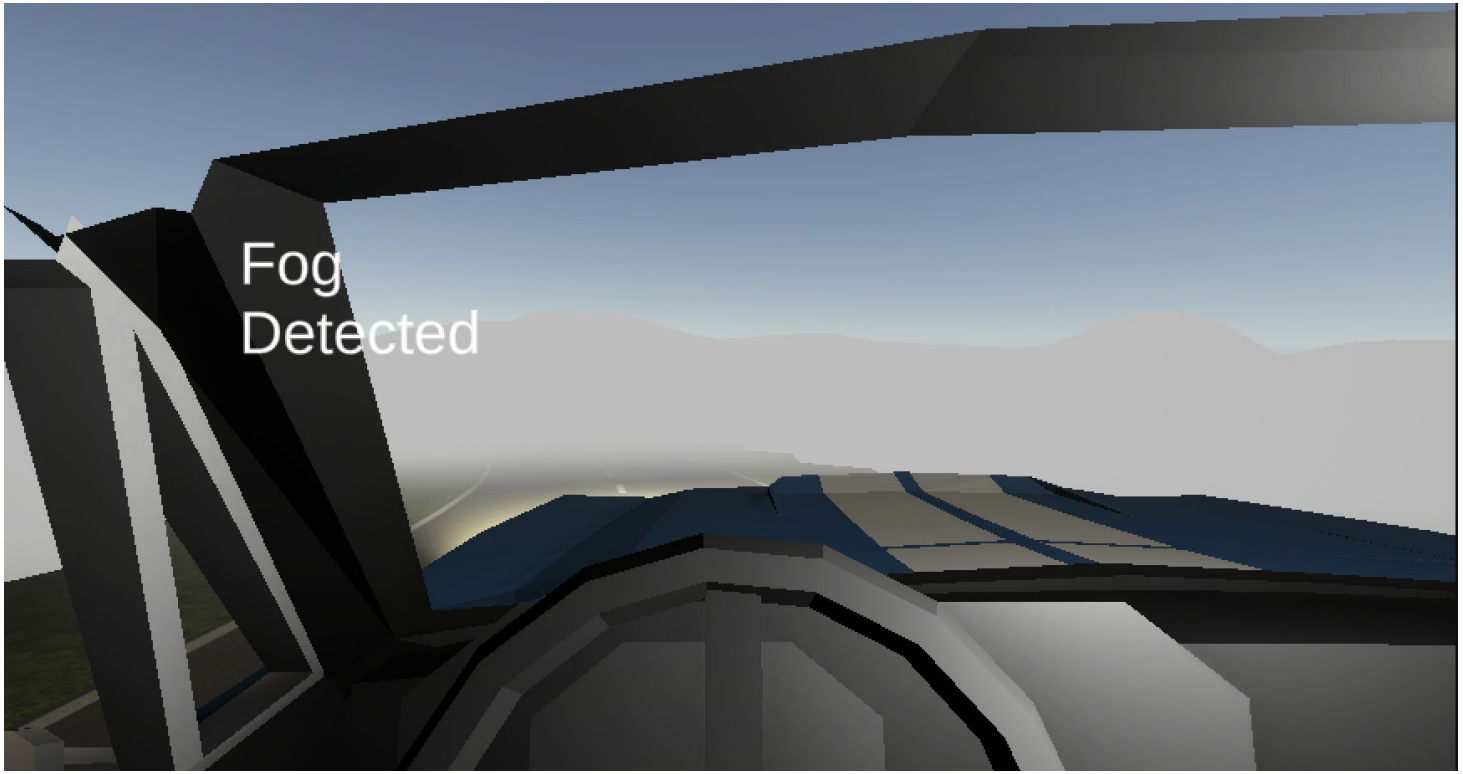
Scenario 4

- ADB system when failure detected



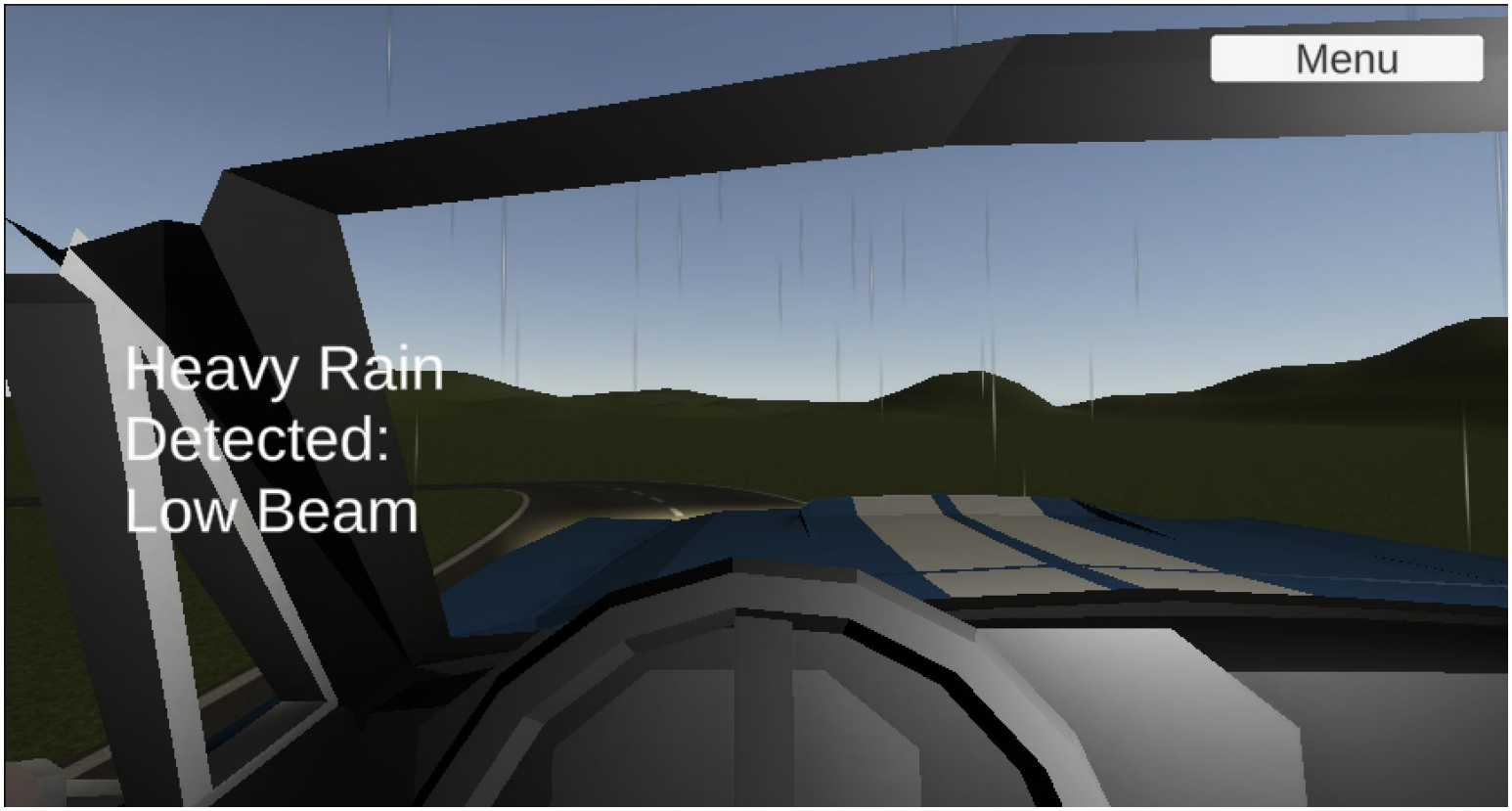
Scenario 5

- ADB system when fog detected

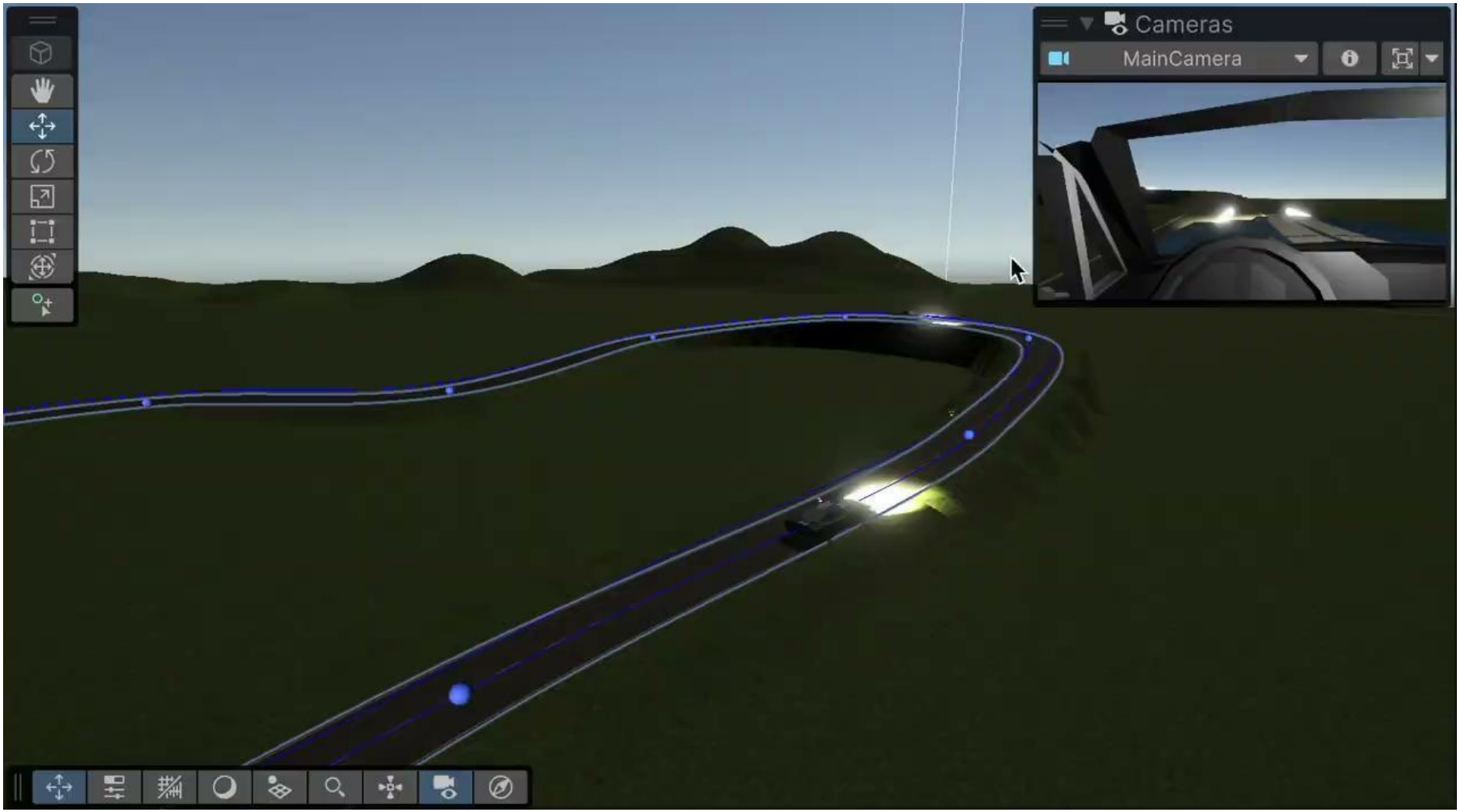


Scenario 6

- ADB system when heavy rain detected



Part III: Demonstration



Acknowledgements

- We gratefully acknowledge and appreciate the participation of our customer, Mr. Jacob Rhodes from Flex-N-Gate
- Thank you to Professor Cheng, Kira, and Sol for teaching us this semester