GOALS		
Project	**Content**	**Deadline**
2	**1. Functionality** **Problem 1:** Integration of Simulation and Real-World Vehicle Response Autonomous Navigation in Simulation: The vehicle must successfully traverse the entire map within the simulation environment using pathfinding algorithms such as Dijkstra, Greedy Search, etc. Parallel Synchronization: Synchronize real-world control with the simulation to display live data, including: IMU Data: Real-world Yaw angle. Velocity: Real-world speed via encoders. Coordinates: GPS-based positioning within the simulated environment. **Problem 2:** Object and Lane Detection (Video Processing) First-Person View (FPV): Display the camera feed via the embedded computer's monitor. Computer Vision: Detect traffic signs and lane markings from a pre-recorded or live video stream. **2. Technology Stack** **Problem 1:** Simulation & Hardware Integration Simulation Environment (Ubuntu): Implement full map traversal logic. Develop simulation-to-hardware control interfaces. Hardware Components: Positioning/Inertial: GPS, IMU (Inertial Measurement Unit). Feedback: Encoders, Light Sensors. Processing: an Computer that can run ROS1 Noetic, Nucleo F4. Actuators: Servo motors, DC Motors. **Problem 2:** Computer Vision (Inherited from Problem 1) Hardware: Raspberry Pi 5. Optics: Raspberry Pi Camera Module V3. Output: Dedicated display monitor for real-time camera feed. **3. Performance Requirements** Processing Speed: Camera frame acquisition and detection algorithm throughput must maintain > 25 FPS. Velocity Accuracy: Speed measurement error must be < 5%. Sensor Sampling Rates: Encoders: 50 Hz, IMU: 50 Hz, GPS: 10 Hz	**4/2**