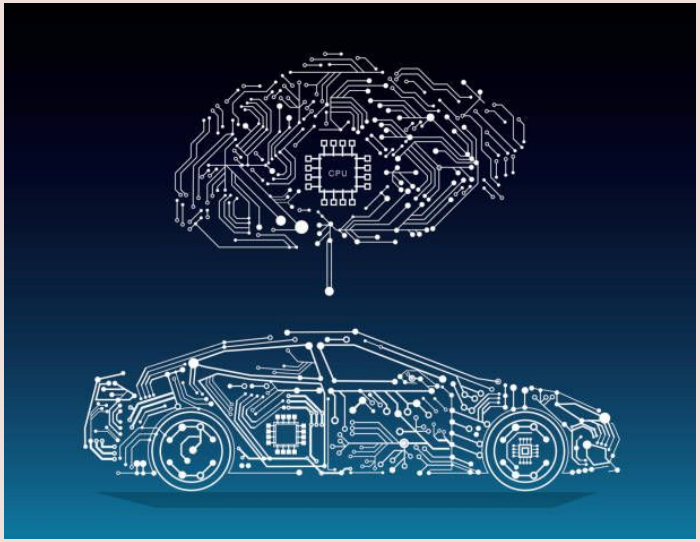
IOT Hug The Lanes



Team Name: Vehicular Vision

Team members (Group 5): Annabelle Crescenzo, Paige DiGirolamo, Skye Jorgensen, Kailey Totland

The Project

- The Goal
  - Our goal is to design a new software for self-driving cars that will surpass the efficiency and safety of current models, specifically a level-three autonomous vehicle that combines autonomous features with the skills of human drivers .
- The Use
  - The software has self-driving features in addition to features that ease the driver's experience. One way the software does this is by maintaining a data log that can be used that tracks environment variables and system variables. This data log is uploaded to the Cloud with Wifi connection and can be viewed by a technician to troubleshoot mechanical problems after a successful FireWall Authentication login.
- The Value
  - The vehicle has a mission critical real-time embedded system, which makes decisions in real time and may cause catastrophic real life consequences if it fails. It is of utmost importance to make self-driving vehicles that prioritize safety over aesthetic.

The Capabilities

- User Login
  - Must have proper username and password to be able to access the software of the car. This prevents any malicious people from accessing the car and harming the passengers.
- Blindspot Warning
  - When the driver turns on either turn signal, the car calls checkBlindSpot(). This will see if there is anything in the blindspot on the side indicated by the turn signal. If there is, a warning goes off on the display, alarming the driver and protecting them from a collision.
- Traction Control
  - The car constantly calls traction() which checks if the speed of each tire is relatively the same. If they are not, then they are adjusted to all be equal. This protects the driver.
- Detect an Object
  - If an object is in front of the car, the car will slow down to avoid collision.
- Lane Departure
  - When the car is above 40 mph, it constantly has signals that check the distance from the edge of the car to either lane line. If the distances are uneven, then the car readjusts itself, protecting the driving from leaving the lane and causing an accident.
- Windshield Wipers and Headlights
  - These activate when the driver's view is obstructed by darkness or rain/snow

Demo

- An added safety measure is extensive testing of our software. We want to ensure that our product and the functions we develop work efficiently and are reliable.
- We have scenario based testing and validation testing. In each test case we provide snippets of code that update the variables of the car and call the functions we want to test, and then check if the output matches what we would expect.
- We check if the display updates correctly and if the values of the variables are correct.

The Software Development Process

- Spiral Model
  - Adaptable and a continuous process, so it can be applied to our product as it is modified over time
  - Communication, Planning, Modeling, Construction
  - This was all completed for Phase 1
- Deciding the features during Communication and Planning
  - Many of the features that we thought of for our vehicle found ways to improve human reaction
  - Most of the accidents that occur are often due to human error
    - Object detection
    - Blind Spot Protection
- Planning the Scenarios / Use cases for Modeling
  - Went through the scenarios that provide the environment that triggers these reactions
- Coding it during the Construction Phase
  - We can see that the vehicle responds correctly to these scenarios through a series of test cases that show the conditions
- Future Possibile Safety
  - Incorporating weather patterns and conditions to inform drivers of future safe driving conditions
    - Planning long trips
  - Fully self-driving to completely eliminate distracted driving

Challenges, Excellences, and Next Steps

- Challenges
  - Determining which software architecture was best suited for our project
    - Struggled to fully understand each architecture in detail
  - Deciding which functional requirements to model
    - Multiple ideas for all 10 requirements, so it was difficult to focus on only five
- Excellences
  - Good understanding of the requirements and use cases that we implemented
  - Able to create functional test cases to successfully showcase our project
  - Good communication between teammates allowed for efficient and organized documentation
  - Learned about agile methods for future projects
- Next Steps (Phase 2+)
  - Stricter deadlines to decrease the time
  - More check-ins to increase communication to speed up completion time
  - Less time spent on development decreases the necessary costs

Thank you for listening!