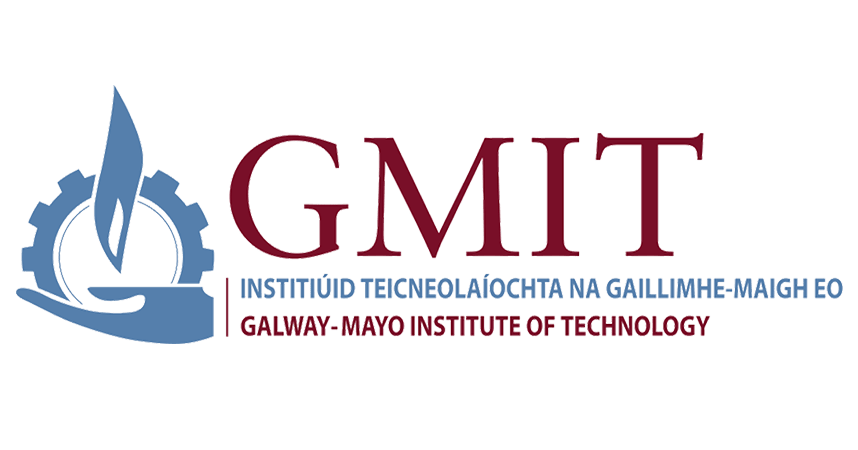
SELF-DRIVING CAR

Project Proposal

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# Project Description

Self-Driving Car (S-Car) is a vehicle that can drive between destinations, avoid objects and take decisions without a human operator. Self-driving cars are a great improvement in the automotive world as they help us to save our environment by eliminating CO2 and use renewable energy. It can help to reduce accidents that are caused by drunk drivers and drivers that use their phones while driving, also it provides high comfort and safety to the driver.

The S-Car will use two boards ESP32 and Raspberry pi.

**ESP32**

* Control the servo and DC motors
* Distance calculation for ultrasonic sensors
* Receive data from driver’s phone using Bluetooth
* Send and read Raspberry pi requests
* Send and read all app requests
* GSM module to link the car to the internet
* C++ will be the coding language for ESP32

**Raspberry pi**

* Get data from two cameras, one camera to analyse the road and the second camera to analyse the driver’s face
* Temperature sensor value
* Calculate heartbeat sensor value
* The code for the Raspberry pi will be written in Python
* The two boards will be communicating with each other by using a cable (serial communication)

## Main Features

1. Parking assist: The car will be able to park itself, using ultrasonic sensors and cameras.
2. Mobile app: It allows the main driver to add/remove other drivers, display the car status, set a pickup point and control the car via Bluetooth. All data will be stored and encrypted on a database in the cloud. I will be creating the app using Android studio and Java as the coding language.
3. Driving: The car will be able to drive using computer vision, it will be able to detect the lanes on the road using raspberry pi camera and OpenCV.
4. Machine learning: The S-Car will be capable of making decisions in real time to avoid accidents.
5. Calendar sync: The car will sync with the driver’s phone calendar to its database, then the car will turn on before the event to control the temperature inside the car and get the event destination.

## Additional Feature

1. Stroke and heart attack detection: This feature will be able to detect if the driver is having a heart attack or a stroke by using a heart rate sensor, temperature sensor and a camera to analyse the status of the driver’s face.
2. Keyless: The keyless feature will allow the driver to unlock/lock or start the car by using an NFC reader, the reader will collect values from the driver’s phone, if the values are correct the car will unlock or start.

The first challenge in my project is to integrate machine learning to the car, as this requires very strong coding skills and mathematic skills.

The second challenge is to learn python coding language, as I will be using it with the Raspberry pi to analyse the road and driver’s face.

The third challenge is the Stroke and Heart attack detection, as this requires analysing the status of the drivers face, measure the driver’s heartbeat and temperature, it also needs to locate the nearest hospital for the driver using Google maps AI. (Additional Feature)

# Timeline

|  |  |
| --- | --- |
| **November** | S-Car app fully working.  Integrate GSM module with ESP32  Integrate ultrasonic sensors with ESP32 |
| **December** | Integrate DC motor and servo motor with ESP32  Car will be controlled from driver’s phone via Bluetooth.  Car will connect to database to get data. |
| **January** | Parking assist fully working with camera and ultrasonic sensors.  Prepare for demonstration. |
| **February** | Integrate machine learning to the car.  Lane detection.  Calendar sync fully working. |
| **March** | Integrate machine learning to the car.  Car will drive using camera and ultrasonic sensors.  Poster, report and video |
| **April** | Heart attack and stroke detection. (Additional feature)  NFC reader fully working. (Additional feature)  Test all the components.  Prepare for the final demonstration and presentation. |

# Hardware Used

|  |  |
| --- | --- |
| * ESP32 board * Raspberry pi board * 2 x Raspberry pi cameras * Infrared Temperature sensor * GSM module * DC motor * Heartbeat sensor | * 4 x Ultrasonic sensors * NFC reader * Servo motor * 12V battery * External storage |

# Architecture Diagram