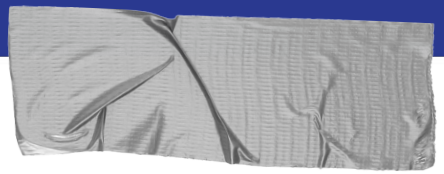
AVOCODU / AVCDU

Advanced Version Of COllision Detector Unit

Group 3



The Team

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- Chirag Vashist (B16094)
- Nikhil T R (B16066)
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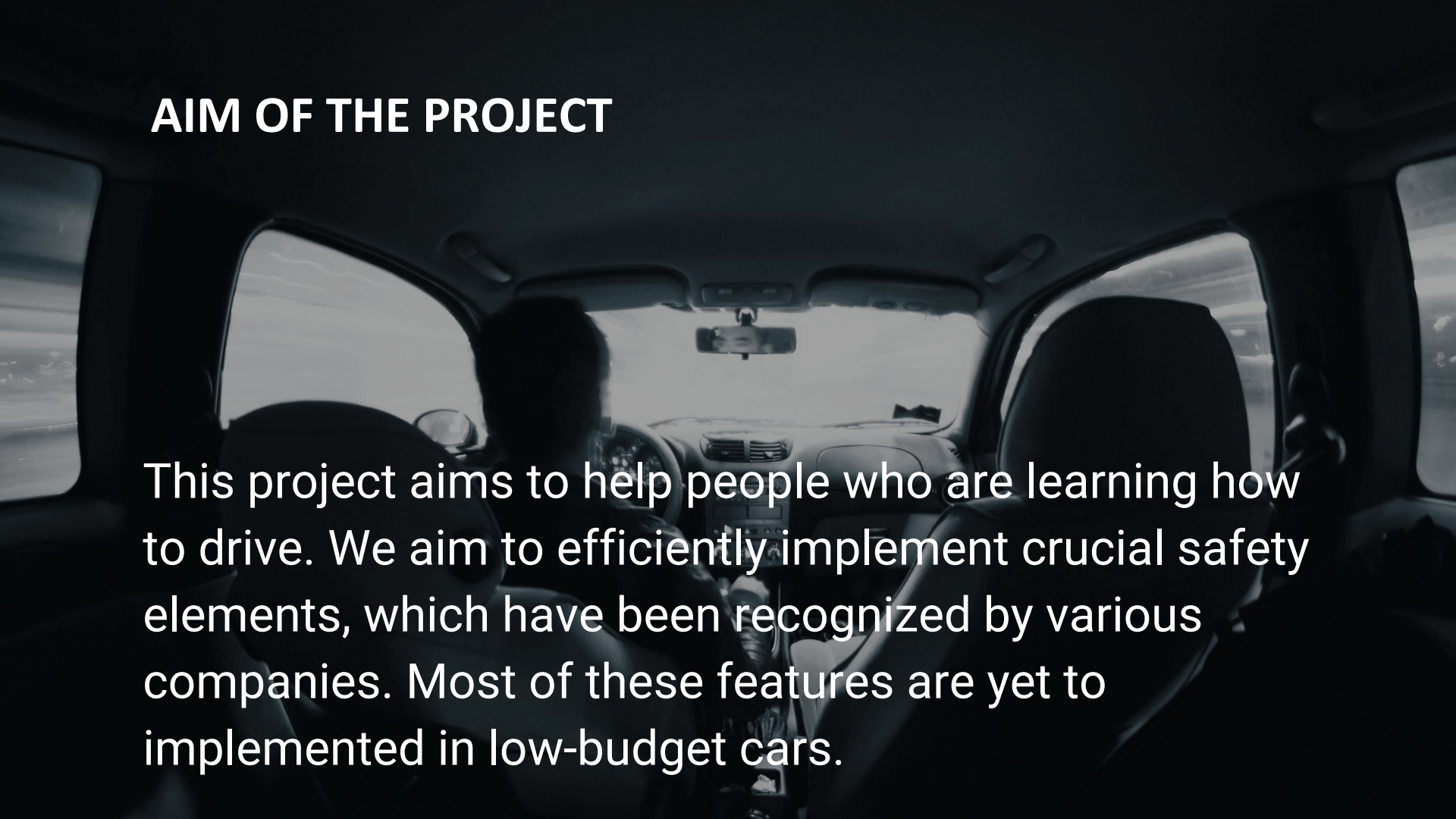
AIM OF THE PROJECT



This project aims to help people who are learning how to drive. We aim to efficiently implement crucial safety elements, which have been recognized by various companies. Most of these features are yet to implemented in low-budget cars.

The Modules

- Collision Detection Unit
- Lane Change Assist
- Parking Assistance Unit
- Alcohol Detection Unit
- GSM Communication
- Sound Alert System using Buzzer
- Gear Suggestion system
- Driving and Steering System
- Remote+Bluetooth Unit

Work Distribution

- Aditya : Chassis Building, Buzzer Alert System, Peripheral jobs
- Amrendra : Overseeing project, Gyroscope unit, integration of components
- Anant : Bluetooth communication, Remote, Peripheral Jobs, Chassis Building
- Chirag : Alcohol Detection Unit, GSM Communication System, Car Chassis Building, Documentation
- Nikhil T R : SONAR sensors, Remote, Algorithm for Steering,
- Sujetth : Algorithm development for Collision detection, Parking and Lane change assist

Collision Detection Assist

The aim of the collision detection assist is to alert the driver is case a collision is imminent. The algorithm primarily takes two things into consideration:
(i) Distance
(ii) Relative velocity

This algorithm accounts for 5 major cases:

(i) There are no surrounding vehicles. In this state, nothing happens.

(ii) There is at least one vehicle in the vicinity of the driver but the driver isn't approaching the vehicle at an alarming speed. No alerts are shown in this case.

(iii) There is at least one vehicle in the vicinity of the driver and the driver is approaching it at a very fast pace. In this case, a buzzer starts beeping.

(iv) The driver's vehicle is really close to a surrounding vehicle and there still exists a negative relative velocity between both the vehicles. In this case, the buzzer starts beeping and required action is taken if the driver doesn’t respond in time.

(v) The driver's vehicle is really close to a surrounding vehicle but the relative velocity is almost zero. In this case, nothing happens. Example : Traffic

Lane Change Assist

A lot of road accidents take place simply due to the negligence of the driver when he/she is trying to change lanes but doesn’t notice an approaching vehicle.
The lane change assist mainly takes into consideration the 6 sensors on the left and right sides of the car

Situation

The driver is trying to move towards the left lane but there is a car diagonally opposite to ours on the left side. Please consider the sonar at the bottom left corner. Now there are two cases:

(i) The distance isn't decreasing between both the cars. In this case, it is safe to turn (If there is a safe distance between the two cars).

(ii) The distance is decreasing - This means that the other car is already in a position where it is impossible for our car to turn. In this case, the buzzer starts beeping. If the driver doesn't respond quickly enough, the lane change assist will automatically apply mild brakes (given there is no vehicle directly behind ours) and prevent the collision.

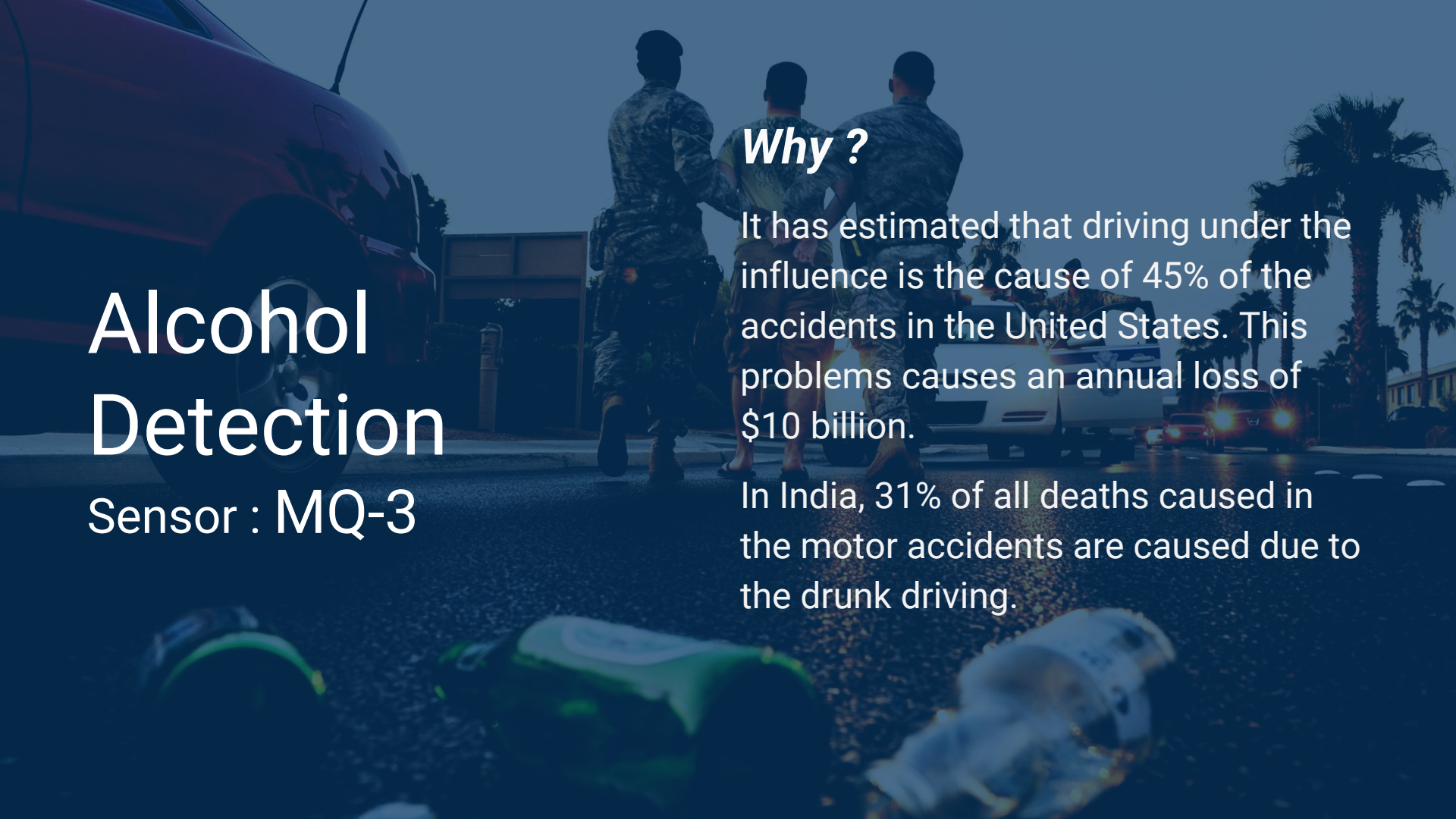
Parking Assist

The parking assist makes the job easier for the driver by providing information about distances to the user.

The parking is assist differs from the collision detection assist in the following ways:

(i) The threshold distances for alerting the user are different.

(ii) When the car stops moving, the distances on all four sides are measured and if there is an object which is considerably close but not too close to the car, then a single letter appears on the 7 segment (F - Front, B - Back, L - Left, R - Right) to tell the user which side he/she could move the car to park it more perfectly.



Alcohol Detection

Sensor : MQ-3

Why ?

It has estimated that driving under the influence is the cause of 45% of the accidents in the United States. This problems causes an annual loss of $10 billion.

In India, 31% of all deaths caused in the motor accidents are caused due to the drunk driving.

1. MQ3 sensor needs a pre-heating of around 30 minutes. When the alcohol molecules come in contact with Tin Oxide, they convert to acid. The conductivity increases as a result and thus we get an accurate value.
2. Needs around 30 seconds to return to the normal value.

This can be installed in the car on the dashboard or on the either side of car. When the alcohol levels cross the given threshold, the sensor will kill the ignition and a message will be sent to the driver's guardian/relative, informing them about the situation.

NOTE :

Listerine has 30% alcohol concentration. Thus by making a 25% solution of Listerine, we can emulate alcoholic beverages.

NOTE :

Legal values of blood alcohol level is 0.05, Most alcoholic beverages have alcohol content of around 10%. This is around 280 reading on MQ-3 sensor.

GSM Unit

Using SIMCOM 800 unit's AT+CMGS function. This function is SMS standard function.

Feature 1: In case of high alcohol content , the unit will send a warning message to the driver's guardian.

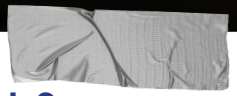
Feature 2: In case of accident or collision, the driver's guardian will again be informed.

Almost all cars have an inbuilt communication system. This system can be easily integrated.

Gear Suggestion System

One of the biggest problem that new driving learners face is to what gear to use at what time ?

We have used a simple MPU-6050 inertial measurement unit to suggest gears to them based on the inclination in case they can't figure them out. As soon as the inclination changes, we display the suggested gear on a seven segment display, so they can check if they've put their car into the correct gear or if they still haven't done it, then the gear that should put their vehicle in.



MPU-6050

This is one of the best and yet the cheapest 6 axis inertia measurement units. This combines the power of a 3-axis gyroscope as well as a 3-axis accelerometer.

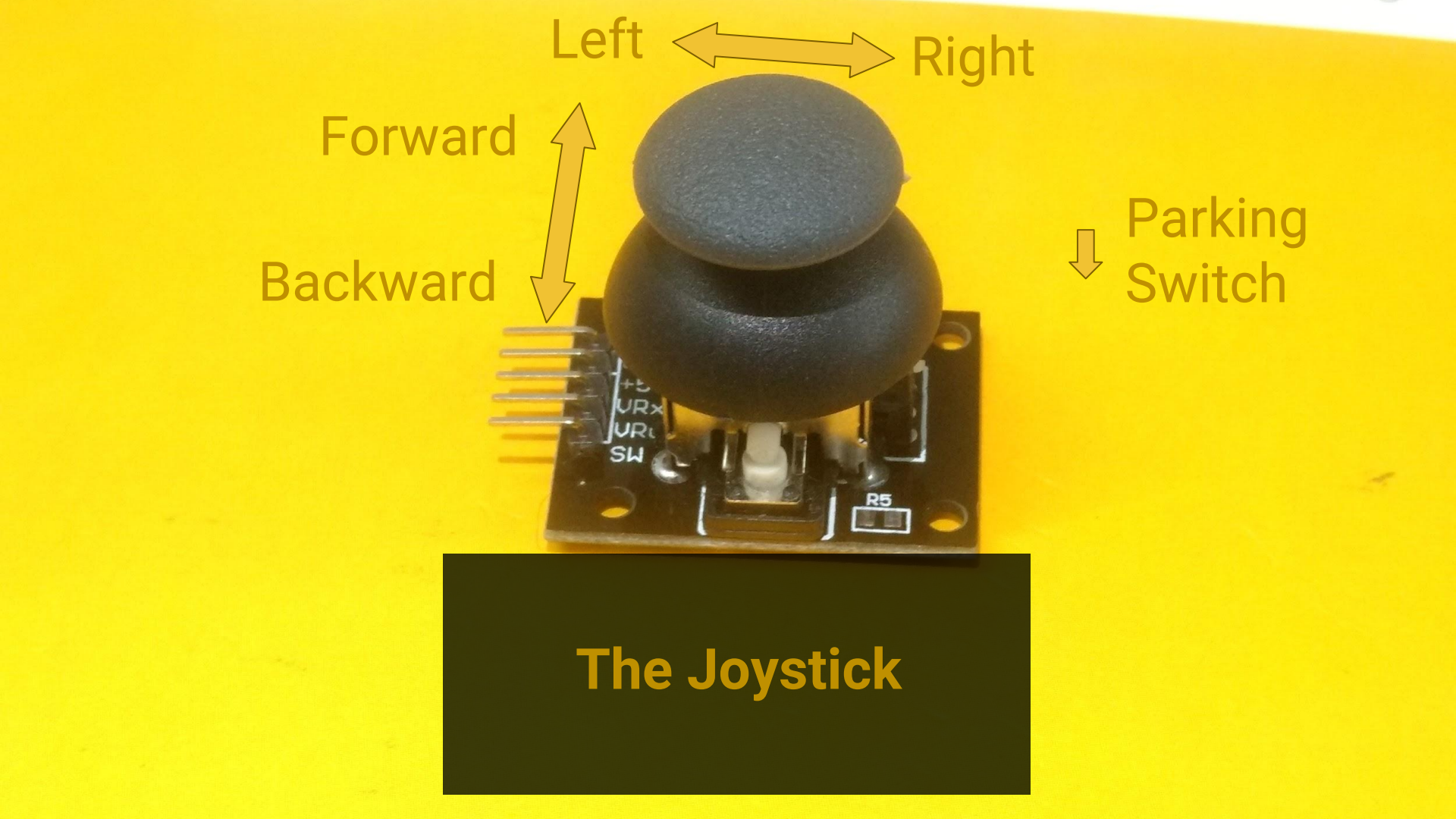
Buzzer Alert System

Why do we need a buzzer alert system?

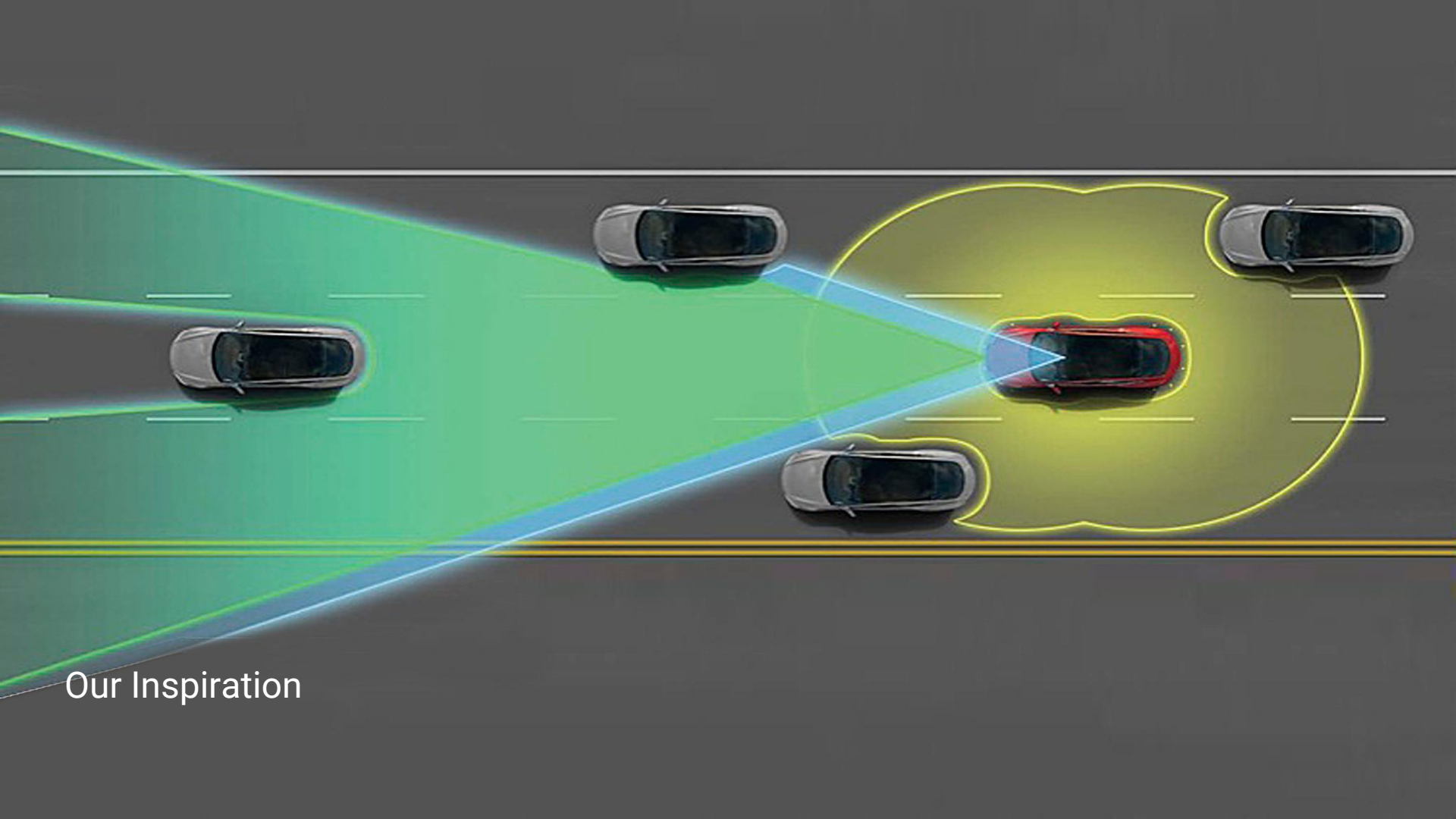
“According to the National Sleep Foundation 2005 Sleep in America poll, 60% of adult drivers about 168 million people say they have driven a vehicle while feeling drowsy in the past year, and more than one-third, (37% or 103 million people), have actually fallen asleep at the wheel! In fact, of those who have nodded off, 13% say they have done so at least once a month. Four percent approximately eleven million drivers admit they have had an accident or near accident because they dozed off or were too tired to drive”.
[http://drowsydriving.org/about/facts-and-stats/]

There is no test to determine sleepiness as there is for intoxication, i.e. like a Breathalyzer. A buzzer alert system can alert the sleepy or distracted driver of incoming vehicles, objects and can prevent accidents upto a good extent.

The Bluetooth Communication unit



The Joystick



Our Inspiration

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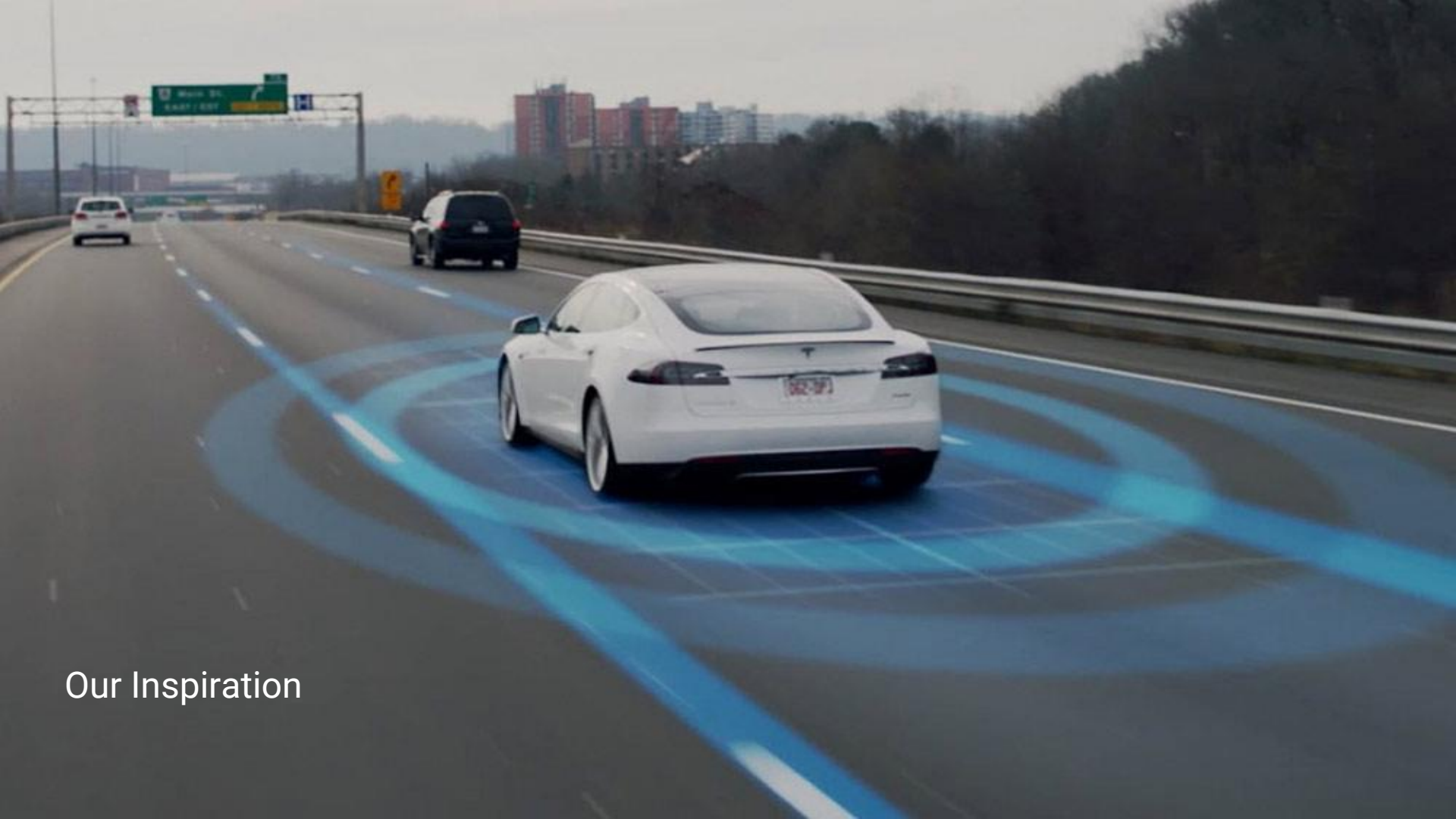

Our Inspiration


THANK
YOU