

Smart Engine Management System

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Abstract—Cars are the most important means of transportation for our society. Without them, we can barely imagine our work, trips, daily activities etc. If not managed properly, they can cause millions of deaths, every year. Car accidents can take place due to speeding, drunken driving, reckless driving etc. *Most of these can be easily resolved by social awareness and management but the main factor that causes car accidents is human imperfection i.e. DISTRACTION.* This particular factor has a variety of reasons like driver's lack of concentration, alcohol consumption, etc. This factor cannot be removed but can be minimized with the help of technology. Nowadays, the mobile industries are growing rapidly throughout the world that pumps in the level of distraction at the highest peak.

Keywords— Distraction, Engine, ECU, CAN, Tactile sensor, capacitive sensor, Special heat based sensor.

I. INTRODUCTION

World Health Organization (WHO) in its first ever Global Status Report on Road Safety pointed to speeding, drunk driving, seat belts and driver carelessness as the main contributing factors. Approximately 1.3 million people die each year on the world's roads, and between 20 and 50 million sustain non-fatal injuries [8].

In India, road accidents claimed 1, 50,785 lives last year, according to the data shared by the MRTH (Ministry of Road Transport and Highways, India). In an annual publication, the ministry said a total of 4, 80,652 road accidents were reported in 2016. 9,583 accidents and 3,396 fatalities were attributed to speed breakers which average to a daily count of 1,317 accidents and 413 deaths, or an hourly count of 55 accidents and 17 deaths every hour [7].

Road safety can only be improved when we understand the causes and consequences of road accidents/collisions and work out remedial measures.

II. AIM

In order to avoid the accidents caused due to carelessness of the driver, various technologies and methods have been developed. This project is one of such initiatives in that area.

The aim of this project is to implement a 'Smart engine management system' that automatically detects the status of driver's hands on the steering wheel and takes action accordingly.

III. BASIC PRINCIPLE

In this project, the speed of the engine will be controlled in accordance with the status of driver's hands (i.e. whether they are on the steering wheel or not). We will be dealing with the sensors on the steering wheel, that'll input the status of the driver's hands' on the steering wheel. A microcontroller will be used for receiving the inputs and processing the data accordingly and the data will be sent as output to the ECU for further action. The ECU will carry out the required task i.e. controlling the speed of the engine.

Here are some particular things that we intend to do to make a car safe from road accidents:

- ▶ The speed control parameters written within an ECU [1] will be changed by an external microcontroller.
- ▶ The new changed parameters will correspond to the changed speed of the engine that is in accordance with the placement of driver's hands on the steering wheel.
- ▶ The parameters will keep on changing as long as the driver's hands' status [3] changes i.e. if the driver removes his/her hands, the car will slow down or vice versa.

IV. BLOCK DIAGRAM

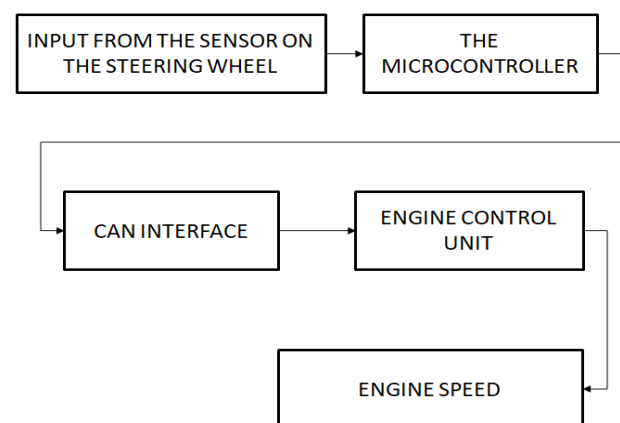


Fig 1. Block Diagram

- ▶ The above figure shows the connection between the inputs (i.e. the steering wheel) and the output (controlled engine speed).
- ▶ The input from the sensors that are mounted on the steering wheel is sent to the microcontroller.
- ▶ The microcontroller takes a decision based on the algorithm monitoring the sensors.
- ▶ The decision taken results in the generation of a map that is sent to the engine control unit (ECU), which will update its parameters' value [2].
- ▶ The communication is realized using CAN interface [1]; The ECU having received the required data will in turn control the speed of the engine.

V. INTENDED HARDWARE

The hardware that we intend to work on is listed as below:

1. PIC microcontroller(PIC18F45K80)
2. Tactile sensor^[4]
3. Capacitive sensor^[5]
4. Special heat based sensor^[6]
5. BOSCHEDC16C8

VI. INTENDED SOFTWARE

The software that we will use is:

1. MPLAB.
2. ECU remapping software.

VII. CONCLUSION

This project serves the sole purpose of reducing the number of road accidents occurring due to the distraction of driver.

1. In future, the project will handle other vehicle controlling parameters like engine temperature, alcohol consumption, drowsiness of driver, seat belt state, position of vehicle, speed of the vehicle, etc ^[9].
2. More parameters of vehicle like mileage, tier pressure, fuel level in vehicle, etc. will be monitored and controlled in future implementations ^[9].
3. The real time parameters which are necessary for the crash analysis will also be monitored for the insurance agencies, crime cases etc. to investigate on accident cases further ^[9].

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