Smart Ignition by Auto-Silencing of Android Phones

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Abstract*—The purpose of the project is to restrict the usage of mobile phones while driving. The safety of co-passengers, pedestrians as well as co-vehicles lies in the hands of every driver on the road. Majority of the accidents are caused because of the driver's ignorance in wearing the seatbelts and the usage of mobile phones while on the road. Our project aims at making certain that the driver fastens his seatbelt and also the phone is brought into silent mode before he is all set to drive. This could be done using an Arduino controller with which an ESP8266 Wi-Fi Module has been interfaced, a seatbelt detector and a mobile android service running in the background of the driver's phone. The mobile is brought out of silent mode once the Wi-Fi is turned off.*

Keywords—*Arduino Board, ESP8266, PIC Microcontroller, GSM Module, Seat Belt Checker, Android Service.*

I. INTRODUCTION

According to WHO Global status report on road safety, Seatbelts protect passengers from injuries and fatalities. Seatbelts mean the difference between life and death while driving. People fail to wear seatbelts owing to discomfort or sometimes forget to wear them in a hurry. A study at the University of Sussex said "Hands-free phone uses by the drivers 'equally distracting' as that of handheld devices".

In India, during 2016, the number of accidents due to the usage of mobile phones by the driver was found to be 4976. Also, 2138 people have died and 4746 people have been injured. This proves to show that mobile phones have become an integral part of every individual. People are unaware of the ill consequences of their usage in inappropriate places. As a society, people have become multitaskers that they're willing to risk their personal safety as well as that of the others because they can't resist themselves from using mobile phones.

Our proposed model could be used in cars and is integrated with the ignition control system of the car. This ensures that the driver fastens his seatbelt and his mobile is in silent mode as these two requirements have to be met for the ignition of the car to be enabled.

A. Existing system

There are presently many applications to which aim to bring the mobile phone into the silent mode detecting its motion through the global positioning system and using accelerometer sensor. For using GPS, Internet access is necessary which is not always available in all mobile phones thereby failing to get the mobile into silent mode. One such application is Dash Droid which uses GPS to analyze speed and gets the mobile phone under silent mode. Also, this app allows one to use up to 6 applications which is a major cause of distraction to the driver.

Even in the iOS system, the same mechanism is used and the user is provided with an option to choose whether to enable the silent mode either automatically or manually. People tend to stick to the manual mode as they do not want to miss out on any calls which may lead to unfortunate events.

B. Proposed system

In our proposed system we use Arduino controller to whichESP8266 is interfaced. It incorporates the signals from the IR Sensor and android service JobScheduler(). A positive signal from the seatbelt detector is awaited which ensures that the seatbelt is fastened. Simultaneously the mobile phone is brought into the silent mode by using a JobScheduler() developed using an Android studio. This program uses the function AudioManager() to get the phone under silent mode. The call forward mode is also enabled with an option of forwarding while the call is unanswered programmatically. The hardware and software are interfaced using a port on the Arduino Board. During the silent mode if a call is received for more than 3 times from a certain caller the number is displayed in the LCD of the car automatically which is controlled by the PIC Microcontroller. This restricts the driver from using the mobile phones behind the wheels.

II. PRACTICAL IMPLEMENTATION

This mechanism requires Arduino Board, ESP8266 Wi-Fi Module, GSM Module, PIC Microcontroller, Engine Driver Unit L293D, LCD screen, IR sensor.

A. Arduino Board

In this project, we will be using Arduino UNO Board which has an ATmega328 controller. It has 14 digital input/output pins, 6 analog input pins, 16MHz crystal oscillator. To start its operation we will be connecting a USB cable to the computer.

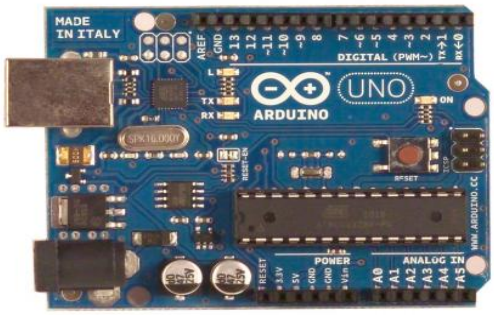

Fig1: Arduino Board

B. ESP8266 Wi-Fi Module

ESP8266 is a low-cost microchip which uses TCP/IP stack for communicating with devices. It is based on IEEE 802.11 b/g/n Wi-Fi. It is connected to the microcontroller from where it receives the signal. Here the ESP8266 will host the JobScheduler service() on the mobile.

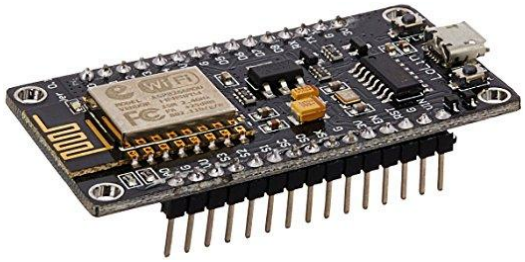

Fig2: ESP8266 Wi-Fi Module

C. SIM 900 Module

A GSM Module can be independently used as a mobile for making calls, sending and receiving messages. It has a SIM slot in which a network operator SIM is inserted. It can communicate with a controller through AT commands. It operates at Quad band 1900 MHz to send messages to the calls which are hanged up programmatically. It is compatible with any of the controllers.

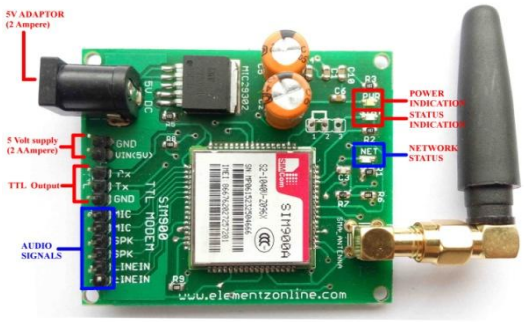

Fig3: SIM 900 Module

D. PIC Microcontroller

PIC Microcontroller is convenient to be used here.It has a total of 40 pins out of which 33 pins are allocated for input and output.It has a wide range of application like controlling remote sensors, security and safety devices. Here the PIC Microcontroller is programmed such that the LCD and GSM module is interfaced with it.

Fig4: PIC16F877A

E. Engine Driver Unit

To depict the ignition of car we use a DC motor which is controlled by the Raspberry Pi. The Engine driver unit act as a bridge between the processor and the DC motor. It is an H-Bridge motor control circuit which is formed using LM293D.The LM293D is a 16 pin IC. Each motor requires two wires from LM293D.

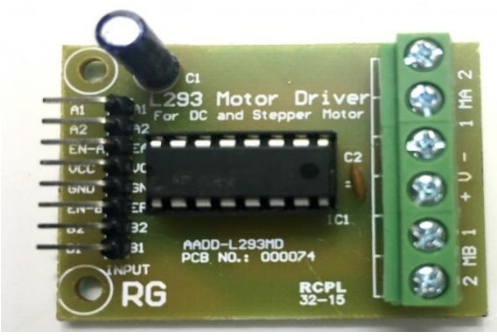

Fig5: L293D Engine Driver Unit

F. Seat Belt Checker

To ensure whether the seatbelt is worn by the driver or not seatbelt checker is used. It is made using IR sensor. It has two parts IRemitter and IR receptor. IR emitter consists of IR led and a series resistance which emits infrared light and is fixed to the end of the belt. The infrared receptor is placed at the other end that is where the belt is inserted and locked. The IR receiver is made of a photodiode. When the seatbelt is fastened photodiode will receive the infrared light and sends a positive signal to the processor. Only after the seat belt is fastened and mobile is brought into the silent mode using Wi-Fi connectivity, the ignition is enabled.

G. Working

When the central locking button is pressed, the car gets unlocked and supply of 3.3V is applied to the Arduino board. The Wi-Fi module gets switched on which will run the Android service in the mobile phone will get the mobile under the silent mode. The service code for forwarding the call when unanswered runs in the background. The call is forwarded to the GSM Module. Now, Arduino controllerwaits for the signal from the seatbelt checker. When fastened, a wired signal is sent to the Arduino's GPIO pin. A positive signal is sent by the processor to L239D pin enabling the ignition of the car. While driving when a call is received, an auto-reply message is sent through the GSM module using AT commands for telling that the caller that driver is driving. In case of emergency, if a call is received from the same number for more than three times, the number is displayed on LCD screen with a buzzer. Once the driver switches off the car, the phone is disconnected from Wi-Fi network. The application stops working when the phone switches to normal mode from silent mode. In another way, we have also tried Service Handler() to detect the incoming call number and send SMS to the caller.

III. DIAGRAMS

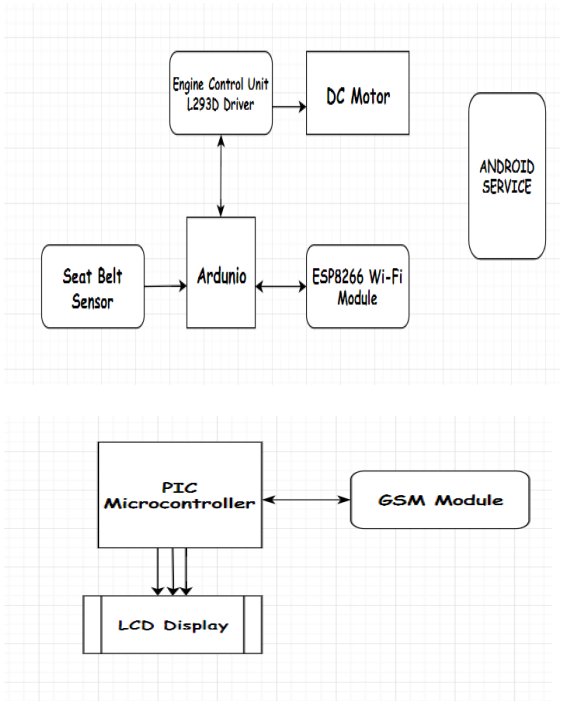

Fig6: Block Diagram

IV. RELATED WORKS

1. **Automatic disabling of cell phones at prohibited areas**
   Handoff mechanism is used in this paper. Here we should add external hardware circuit inside the mobile phone which is simulated using MATLAB Simulink Toolbox. Use of hardware circuit inside the mobile phone is practically difficult.

2. **Automatic Enabling and Disabling of Mobile Phones in Restricted Areas**
   This paper focuses on disabling the mobile phones only in restricted areas.This brings all the phones connected to the Wi-Fi under airplane mode. This is proposed in public places like temples, petrol bunks.

3. **Authenticated access control for vehicle ignition system by smartcard and fingerprint technology**
   In this paper, they have used magnetic sensors as seatbelt detectors. When they come in contact with loudspeakers and microphones they cause bends in magnetic lines which creates a problem of the sensor is switching on. Thus sending incorrect signals.

4. Seat Belt Safety Features Using Sensors to Protect Occupant

The principle used in this paper is a microcontroller which is placed under every seat. The controller gets information from various sensors like load sensor, touch sensor, and reluctance sensor. This information is passed to wheel sensor and then locking mechanism is enabled. The main disadvantage is placing microcontroller under every seat is quite costly.

V. CONCLUSION

A destination is a reward for safe driving, through our proposed system we ensure that driver reaches his destination with utmost safety. This system focuses not only on the safety of the moving vehicle but also those on the road. In present-day applications, the choice to set the mobile to silent mode lies in the hands of a driver. The motion sensors are used in mobile to get the phone to silent mode. They even come into action while the person is traveling in a train or engaged in some other activity like running. This is a disadvantage as mobile is brought into the silent mode at wrong times. Sometimes it also detects the motion using rate of change of WIFI connectivity in the surroundings which may always not be available. So, through our proposed model we ensure that mobile is brought into the silent mode automatically well before the ignition of the car. Our system also requires that the driver fastens his seatbelt before he hits the road. According to recent IOT study, by 2025 cars will be connected to each other using Wi-Fi. So, we have incorporated the concept of Wi-Fi. Thereby, our proposed system ensures the driver's his own and everyone's safety on road.

VI. REFERENCES

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