International Journal of Science and Research (IJSR)
ISSN: 2319-7064
SJIF (2020): 7.803

Smart Car System

Shriya Chavan[1], Neerav Thakur[2], Mayuresh Pandit[3], Meet Sangoi[4], Neeta Chavan[5]

[1, 2, 3, 4]Student, Dept. of Electronics & Telecommunication Engineering, University of Mumbai Vivekanand Education Society's Institute of Technology, Mumbai-400074, Maharashtra, India
[1]*SChavan0118 [at]gmail.com*
[2]*neeravthakur99 [at]gmail.com*
[3]*panditmayuresh10 [at]gmail.com*
[4]*sangoimeet100 [at]gmail.com*
[5]*neeta.chavan [at]ves.ac.in*

Abstract: ***In recent years researchers are trying to develop the automobile industry more and more for safety, reliability, flexibility and entertainment by modern computing and electronics. Consumers are expecting their car to be voice controlled, auto driven and GPS assisted visual directions for driving. Distraction or taking drivers' eye off the road may cause devastating accidents. The Southern part of Asian countries has placed within 100 top accident happening countries in the world (WHO 2011). This paper presents the research work done in the field of automotive safety. This prototype is designed to avoid the diversion caused while controlling the various features available in cars. The heart of this project is the arduino controller. A prototype of a multi featured car system consists of various features like automatic wiper and headlight control, pothole detection and antitheft. Depending upon the rain intensity with the help of rain sensor, the speed of the wiper is varied in automatic wiper feature. The headlight system consists of turning the headlight on, off and provides the facility of automatic switching of headlight. In the pothole detection system along with the ultrasonic sensor, it provides the GPS coordinates to the respective authorities. In the Anti-theft system, while entering the car each user is asked for password. If correct then entering the car is permitted or else the owner is notified through SMS using GSM. The whole prototype works using a bluetooth module. This project focuses on improving human comfort in the existing system so that the driver can pay full attention in driving at all weather, even in all conditions***.

Keywords: Arduino Mega, Rain sensor, Light Dependent Resistor, Ultrasonic Sensor, GPS, GSM, Solar Panel

1. Introduction

The facilities in modern cars are for entertainment purposes and for overall enhancement in travelling experience but some features are the causes of accident. Therefore, designing a system where features will work automatically without human intervention is our motive. Features like handling the speed of the wiper, the intensity of the headlights especially during night time causes a lot of distractions to the driver and hence high intensity accidents occur. With increased intensity in traffic, it is not safe for drivers to get distracted when it

As we know, manual switching takes more time and attention than automatic switching. Therefore, designing a system where features will work automatically without human intervention is our motive. With drivers exposed to an ever increasing number of accidents, automatic rain-sensing wiper system, Headlight control system could be an even more appealing feature, as they work to minimize the time the driver must take his/her hands off the wheel. The pivotal concern is to render more attention to the driver on the road. No matter where you are in India, driving is a breath-holding, multi-mirror involving, potentially life threatening affair. Roads in India normally have Potholes so that the vehicle's speed can be controlled to avoid accidents. To address the above mentioned problems, a cost effective solution is needed that collects the information about the severity of potholes and humps and also helps drivers to drive safely. With the proposed system an attempt has been made to endorse drivers to ward off the accidents caused due to potholes.

2. Proposed System

The automobiles in recent times have made travelling from one place to another, be it long or short distance, easier and safer. One can travel in leisure in recent cars due to the availability of air conditioning, good mileage, availability of space to sit and sleep, etc. Even though these cars have multiple advantages, they lack some features that provide more safety. As in India there are many potholes so one must look for potholes on the road while driving .When travelling especially during night time, it is often difficult to locate potholes and speed breakers and hence fatal accidents may take place. To mend these potholes, the government bodies need their locations and sometimes the roads which are less busier, the potholes on them are ignored. Just like this, during the rainy season, when there is a new driver or a new car is bought, it is often difficult to locate where the wiper controls are. While trying to turn on the wiper or vary the speed of the wiper, the driver's attention is partially towards the road and this may again be a reason for accidents. Especially during night travelling, one cannot see the controls and hence has to be extremely careful on the road. To control the upper, dipper and fog lamp, it is difficult to locate the controls especially at night and since headlights during night time play an important role, the driver has to pay utmost attention to the road as well as turning on/off the lights.

While doing so, serious tragedy can occur. To avoid this, the headlights can be controlled automatically without the need of driver's mindfulness. This can be done with the help of light sensors for day and night time. As security is a prime concern in vehicles so in traditional cars the security is not adequate as a concern. There have been multiple cases

especially in India where cars are stolen. This happens because the owner has no idea that his/her car is trying to be stolen. So this system provides great security. Additionally, during long distance travelling, the battery of the car may reduce suddenly and will cause a disturbance in the journey. Hence, to have a peaceful journey, Solar panels can be used which will help the car to work during daytime and simultaneously charge the battery which will help the car to work during night. Hence, the car also becomes environmentally friendly.

3. Literature Survey

Rajarathnam.DRP [1] proposed a system using Rain Detecting Sensor, LDR Module, Arduino, Motor Driver, DC Motor, Headlight and Battery. When rain is automatically detected by a rain sensor, the wiper which is connected to the dc motor start moving from 0 to 180 degrees.. Depending on the light which is falling on LDR accordingly its resistance will change. When high intensity light is falling on the LDR Module its resistance will decrease accordingly the intensity of the headlight will be controlled with the help of LDR Module. Mr. Sandip S. Jadhav [2] proposed some major reasons behind designing this project. This system uses different components such as Arduino, LED, LDR, Resistors and Humidity Sensor. When light falls on the LDR, if the intensity is low, there is more resistance to the flow of current and when resistance is low hence more current passes through it. Automatic Fog lamps are also implemented. The advantage observed in this project was that automatic conversion of bright light to dim light according to light intensity of opposite vehicles is also possible. But as humidity sensors and LDRs are used if any of the module stops working the feature of fog lamp and automatic transition of dim to bright light will noT work A.H.M Fazle Elahi and Mohammad Safiur Rehman [3] proposed a control system which contains a water sensor, dust sensor, light sensor, relay switches, wiper motor, servo motor and Arduino microcontroller. When even a small amount of raindrop falls, the water sensor attached with the windscreen gives signal to the microcontroller and acts as it has been programmed and the wiper moves. Here a dust sensor is also attached which responds after getting a certain amount of dust in the windscreen and opens up the spray pump to spill water in the windscreen and turns the wiper ON. When sunlight falls on the light sensor, the servo motor turns on when light intensity gets higher and transfers the rotation to the flap of the sun visor. Even though all features are present, it is expensive as the cost of the overall system is high because other components are also required along with rain sensors. Ruchi Bagul [4] proposed a system for automatic detection of potholes using ultrasonic sensors, The GPS receiver will be used to capture the location coordinates of the potholes and the same will be conveyed to registered mobile SIM via GSM modem. The sent messages will include information about the depth and height of the pothole and hump respectively and also its location coordinates. Since ultrasonic sensors are used, the potholes will be detected when the vehicle is above or very near to it.

V.N. RAJ SUDHARSHAN [5] has implemented a method for pothole detection and hump recognition. So for this they have used LiDAR sensors to identify the potholes and humps and also to calculate their distance from the vehicles, height of the humps or depth of the potholes respectively. The circuit will be installed at the front or on top of the vehicle. This method is very helpful but LIDAR Usage Limited usage in nighttime/cloudy weather and operating altitude is only 500-2000m. Quite an expensive technology. Rajeshwari Madli [6] proposed a method of pothole detection methods. Ultrasonic sensors(HC-SR04) are used to identify the potholes and humps and also to measure their depth and height, respectively. It captures the geographical location coordinates of the potholes and humps using a global positioning system receiver. The sensed-data includes pothole depth, height of hump, and geographic location, which is stored in the database. Server module receives information from the microcontroller module, processes and stores it in the database. Pathan Amir khan Ayyub khan has proposed a method of pothole detection and alert system [7]. It consists of three methods. Ultrasonic based method that uses the sensor and calculates information of potholes. Vision based method that uses cameras to detect potholes. The camera captures the images in real time. These images are applied to image processing algorithms like edge detection. This requires a lot of processing time and power. Maintenance is high because use of delicate parts like lenses and processing is also complex.

	Vision Based	Vibration Based	Ultrasonic Based
Sensor used	Camera	Accelerometer	Ultrasonic Sensor
Response time	High	Low	High
Sensing time	While approaching the pothole	While going through the pothole	While going through the pothole
Processing	Complex image processing algorithms	Readings are directly used	Readings can be used directly
Maintenance	High because of delicate parts like lens	Low	Low
Characterization of pothole	Based on the size	Based on the vibrations	Based on sound reflection

Figure 3.1: Comparison of Methodologies used in Pothole Detection

Nikhil Satish [8] proposed a system that uses a password to access the vehicle. If the password entered by the driver is correct then the circuit is built-up to the engine ignition system. If the password goes wrong the ignition will not

occur. When the key is inserted in the key hole the IR sensor detects the key and sends a signal to the microcontroller which then asks the user to enter the password. As price of Anti-theft is high so system is complex Samir Rana [9] proposed a system comes for the security of our vehicles.The setup consists of a mix of software and hardware, the user will find various options on the application interface to control the various functions of the vehicle and to lock the accelerator, gear and brake pedals of the vehicle, to ensure it's security. There are alot of disadvantages in this system too. We are using an internet connection so internet range should be good. As in ghat's there is no proper availability of internet so this can act as a disadvantage. Pritpal Singh, Tanjot Sethi, Bibhuti Bhusan Biswal, and Sujit Kumar Pattanayak [11] proposed a system for Security, especially theft security of vehicle, The system contains GPS module, GSM modem, Infrared sensors, DTMF decoder IC MT8870DE, 8051 microcontroller, relay switch, vibration sensor, and high voltage mesh. The preventive measures like engine ignition cutoff, fuel supply cutoff, electric shock system (installed on steering wheel) and are installed in the vehicle which is controlled using user or owner GSM mobile. The owner can lock or unlock his/her vehicle with the help of SMS.

4. Physical Components

4.1.1 Rain Sensor - FC 37

Raindrop Sensor is a tool used for sensing rain. It consists of two modules, a rain board that detects the rain and a control module, which compares the analog value, and converts it to a digital value.

4.1.2 Ultrasonic Sensor

HC-SR04 is an ultrasonic ranging module that provides 2 cm to 400 cm non-contact measurement function. The ranging
accuracy can reach up to 3mm and the effective angle is < 15°. It can be powered from a 5V power supply.

4.1.3 Solar Panels

Solar panels work by absorbing sunlight with photovoltaic (PV) cells, usually after being placed on the roof of a house. Each PV cell is basically a sandwich made up of two slices of semiconducting material such as silicon. When light interacts with a silicon cell, it prompts electrons to be set in motion which initiate a flow of electric current known as the 'photovoltaic effect'.

4.1.4 Light Dependent Resistors (LDR's)

The Light Dependent Resistor (LDR) is just another special type of Resistor and hence has no polarity. Meaning they can be connected in any direction. They are breadboard friendly and can be easily used on a perf board also.

4.1.5 Resistors

A **resistor** is passive two-terminal electrical component that implements electrical resistance as a circuit element. In electronic circuits, resistors are used to reduce current flow, adjust signal levels, to divide voltages, bias active elements, and terminate transmission lines, among other uses.

4.1.6 Power Light Emitting Diodes (LED's)

A light-emitting diode (LED) is a two-lead semiconductor light source. It is a p–n junction diode that emits light when activated. When a suitable current is applied to the leads, electrons are able to recombine with electron holes within the device, releasing energy in the form of photons.

4.1.7 GSM

GSM (Global System for Mobile Communication) is used to transmit mobile data as well as voice services. GSM is an open and digital cellular technology used for transmitting mobile voice and data services operating at the 850MHz, 900MHz, 1800MHz, and 1900MHz frequency bands. It requires 12V of power supply.In this system GSM is used in the application of pothole detection and antitheft

4.1.8 GPS

Global positioning system (GPS) is a space-based satellite route framework that gives area and time data in all climate conditions, anyplace on or close to the earth where there is an unhampered observable pathway to four or more GPS satellites. It has a input voltage of 2.7 ~ 6 and it will help us in tracking the exact location of the vehicle to prevent theft.GPS receiver can only receive the vehicle location information from satellite whereas in pothole detection GPS will help us to plotting the location of potholes and it will be send to government bodies.

4.1.9 Key Switch

A **key switch** (sometimes called a lock switch to distinguish it from a keyswitch) is a switch that can be activated only by the use of a key. They are usually used in situations where access needs to be restricted to the switch's functions. In this System it is used for antitheft

5. Methodology

For the automatic wiper system we will use the Rain Sensor module .For Arduino input is rain sensor and output is stepper motor. As the rain increases, the resistance of the rain sensor decreases resulting in the decrease of voltage and vice versa. The range from 187-360 means heavy rain, range from 363 to 600 means mild rain and greater than 600 means no rain.

Two LDRs are used, LDR1 represents upper and LDR2 represents deeper. When a high intense beam falls on LDR1, the total circuit gets closed and that time LED1 is turned off. Other cases when it is dark, then the total circuit gets open and that time LED1 (UPPER) is turned on.

At the same time when light from the opposite vehicle falls on LDR2, then LED1 will turn off and LED2 (DEEPER) will turn on.

Ultrasonic Sensor module transmitter and receiver, where ECO is input and TRIGGER is output.

When the distance between the ultrasonic sensor is greater than 50cm then POTHOLE is detected. After detecting a pothole its location will be saved by the GPS module. Then, the BMC bodies will be notified immediately. Key switch will detect when the key is entered into the keyhole.

The controller will ask the driver to enter the password. If the password is right, enter the car. If the password is wrong, access denied and owner notified.

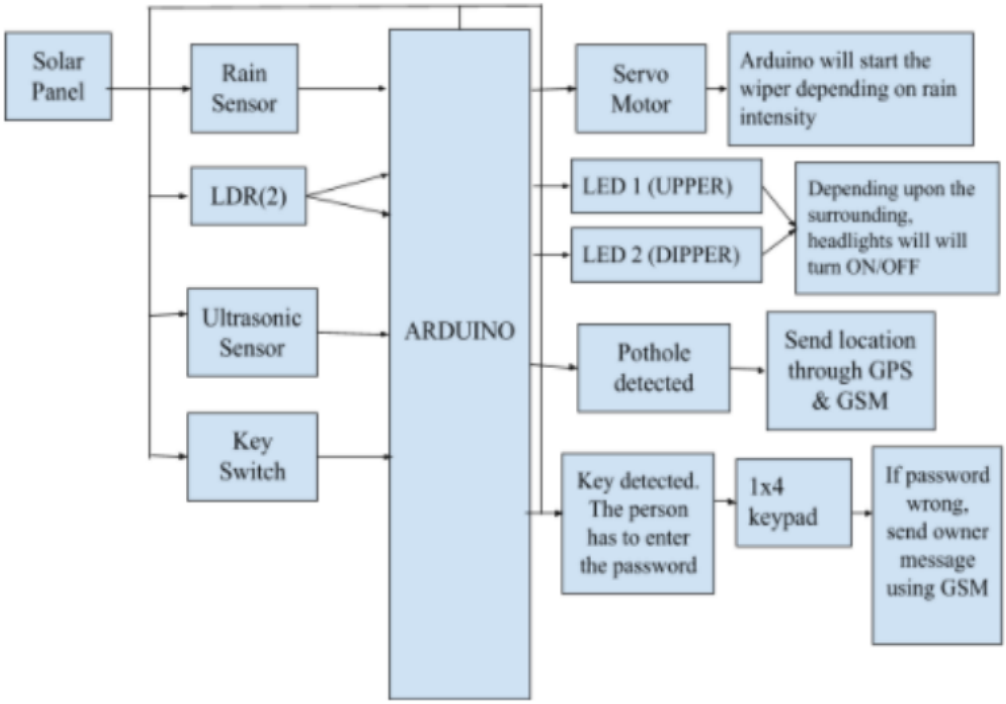

Figure 5.1: Block Diagram

6. Results

We used Proteus Professional 8.0 version for Software Simulation

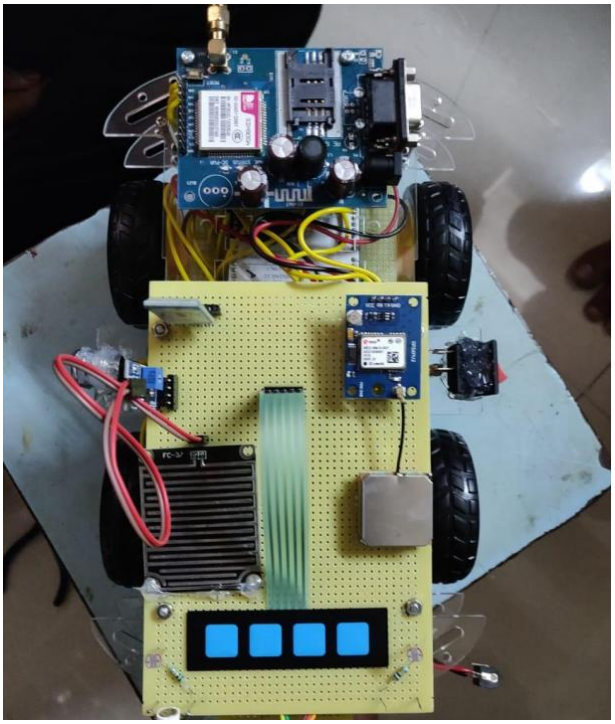

Figure 6.1: Prototype

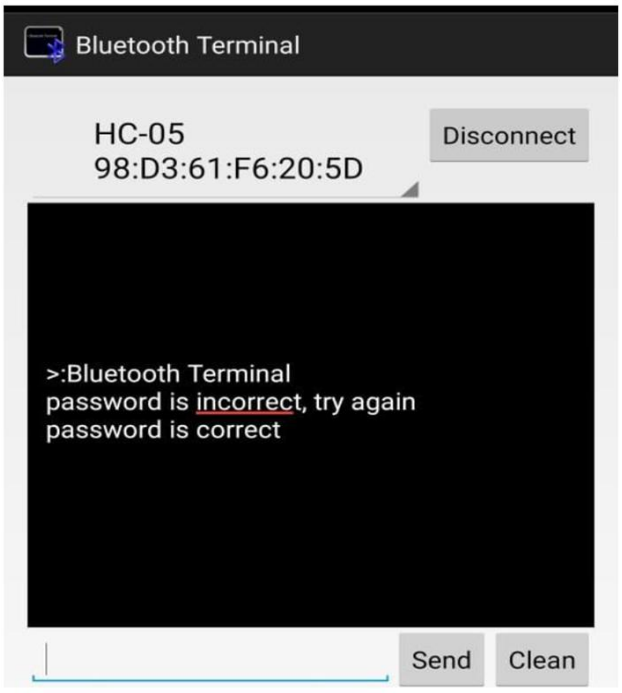

Figure 6.2: Screenshot of Bluetooth Terminal

References

[1] Rajarathnam.Drp, Vibinstalin. , Dinesh.S, Vijaya Kumar, Vijay,Venkatesan,*"Automatic Rain Sensing Wiper And Headlight Control In The Vehicle*",Vol-5 Issue-2 2019

[2] Mr. Sandip S. Jadhav,Prof. Ansar A. Mulla,"*A Multi Featured Automatic Head Light Systems Prototype For*

Automotive Safety', International Journal Of Engineering Research And Technology. Issn 0974-3154 Volume 10, Number 1 (2017).

[3] A.H.M Fazle Elahi, Mohammad Shafiur Rahman, "*Intelligent Windshield For Automotive Vehicles*", International Conference On Computer & Information Technology (Iccit) At: Dhaka, Bangladesh Volume: 17th, December 2014.

[4] Ruchi Bagul, Tejvi Trivedi, Rajda Vinchu, Kavita Bani,"*Automatic Potholes Detection And Alert System With Speed Reduction Feature To Aid Drivers."* Feb

[5] 2020,International Research Journal Of Engineering And Technology,Volume: 07 Issue: 02 | Feb 2020.

[6] V.N. Raj Sudharshan, S. Ramesh, S. Thamodharan,M. Uthavanatha Sarath Santhar , M. Kamalakannan,"*Pothole And Hump Recognition Using Lidar Sensor*",International Research Journal Of Engineering And Technology, Volume: 06 Issue: 03 | Mar 2019.

[7] Rajeshwari Madli, Santosh Hebbar, Praveenraj Pattar, And Varaprasad Golla,"*Automatic Detection And Notification Of Potholes And Humps On Roads To Aid Drivers*",Ieee Sensors Journal, Vol. 15, No. 8, August 2015.

[8] Pathan Amir Khan Ayyub Khan,*"IOT Based Pothole Detection & Alert System*", International Journal For Innovative Research In Multidisciplinary Field Issn: 2455-0620, Volume - 4, Issue - 4, Apr – 2018.

[9] Anjan T L Nikhil Satish, Abhinandan Kumar, Abhinav Narayan, Kiran S M,"A*nti-theft Security System For Vehicles*", International Research Journal Of Engineering And Technology,Volume: 05 Issue: 05 | May-2018.

[10] Samir Rana, Ritu Mewari,Lata Nautiyal,"*Anti-theft Security System For Vehicles*", International Journal Of Engineering & Technology, 2018

[11] Pritpal Singh, Tanjot Sethi, Bibhuti Bhusan Biswal, And Sujit Kumar Pattanayak,*"A Smart Anti-theft System For Vehicle Security*", International Journal Of Materials, Mechanics And Manufacturing, Vol. 3, No. 4, November 2015.