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Continuous Motorcycle Handle Control Monitoring System

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Abstract — This Continuous Motorcycle Handle Control Monitoring System is an innovative step which ensures public safety. These days there's an increase in accident rate and that to due to rash driving. The majority of these accidents are caused by youth and their careless driving. Even phone calling or receiving during driving is increasing the risk of people's lives. It is considered dangerous and many jurisdictions have made the act illegal, even though, the busy life, dependency over mobiles, leads to single hand driving which increases the risk of life. Another reason which includes careless driving is consuming alcohol which leads drowsiness and may lead to accidents. The main objective is to increase the driver's safety with low cost and minimum maintenance by minimizing the above problems which minimize the accidents to a remarkable level.

***Index Terms* — Rash driving, Handle control, Alcohol detection, Motor, Rider.**

I. INTRODUCTION

In this age of information and knowledge, the main purpose of innovation in technology, irrespective of the domain, has been in simplifying life on earth or making every day's work easier and faster. Both vehicles and mobile phones revolutionized the way of living of modern men. Vehicles which we use for transport purposes either for people or for cargo, popular vehicles like motorbikes and cars are used for individual transportation of a person, due to so and so and so we know that accidents occur in individual transport. According to the National Highway Traffic Safety Administration (NHTSA), more than three million people are injured each year in vehicle accidents across the country [11].

According to, National Crime Records Bureau, Ministry of Road Transport & Highway, Law commission of India, Global status report on road safety 2013, Over 1,37,000 people were killed in road accidents in 2013 alone, that is more than the number of people killed in all our wars put together. There is one death every four minutes due to a road accident in India. One serious road accident in the country occur every minute and 16 die on Indian roads every hour. 1214 road crashes occur every day in India. Two wheelers account for 25% of total road crash deaths in India [12].

In 2010, the federal government estimated that the number of deaths on motorcycles was about 30 times the number of deaths in cars, on a per miles travelled basis. No doubt that these deaths were a function of the number of head injuries, which are more common among motorcyclists than car drivers, which should be fairly obvious. It is estimated that about 37% of deaths could be prevented by wearing a helmet. About 67% of the brain injuries could be prevented as well.

A rider can get thrown off the bike, and suffer some injuries, but usually not death. However, when you get a massive vehicle colliding with a motorcycle rider, much or serious results occur[13]. The main causes of motor cycle crashes are drunken drivers and mobile phones which lead to single hand driving. So the system helps in taking extra precautions for safety of the driver and people around it.

According to NHTSA (February 2017), 94 percent of traffic crashes are related to human choices. GHSA continues to hear from state agencies that the three predominant factors contributing to traffic deaths are still belts, booze and speed. Additionally, driver distraction and our society's addiction to electronic devices is likely play ing a role in the increase in death rate [6].

The main reasons for these accidents are:

1)Rash or careless driving

2)Alcohol consumption

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II. FLOW CHART AND WORKING PRINCIPLE

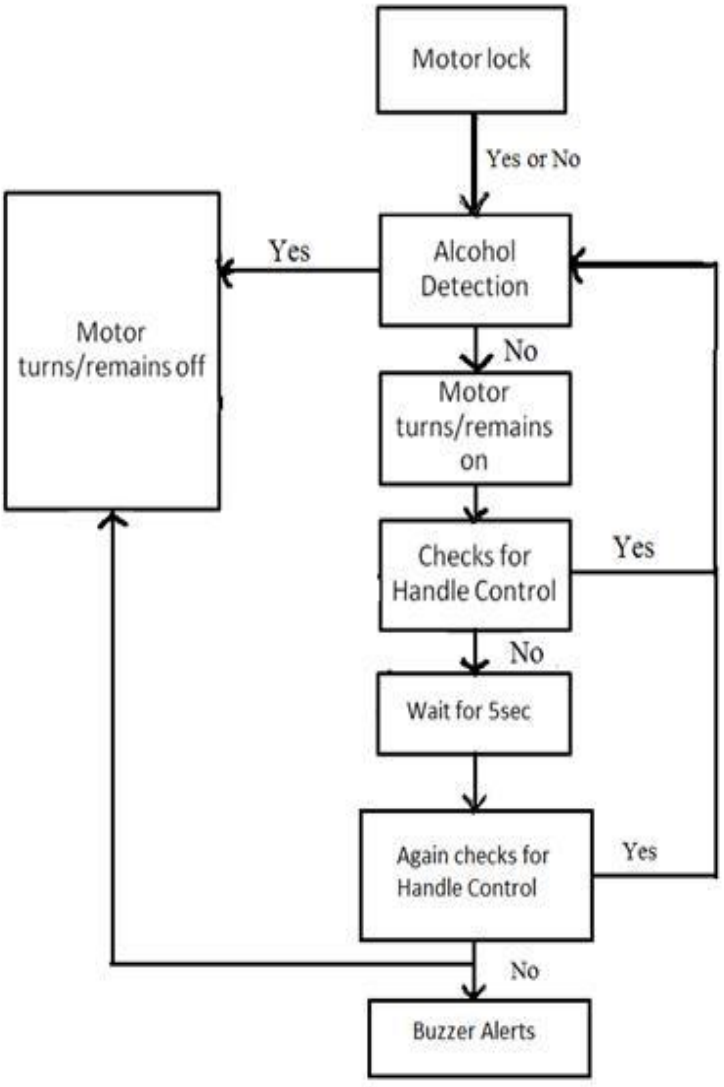

Fig.1. Flow Chart

To design the Smart Vehicle Prototype, two major blocks required are the transmitter and receiver blocks. The transmitter block is the PCB containing the entire transmitter part kept on the helmet, where as receiver block is the PCB contains the receiver part kept on the bike and a few other components like LCD and touch sensor related to handle control are placed separately as per requirement. The step-by-step procedure of our project can be explained by the flowchart shown in fig.1.

Initially, though the motor is ON or OFF, the alcohol presence is checked. If the condition is not satisfied, the motor remains OFF, if already is in OFF position, else turns the motor OFF. Now, if the condition is satisfied, then the motor turns ON, if it is OFF position or continues to be in ON position, if it's already ON. Now, the next condition, i.e., handle control is checked only when the motor is ON. Here, in this condition, the way the rider holds the handle is checked, whether he's holding the handle properly or not is checked. If the condition is not satisfied, then a delay of 5 seconds is initially provided. Even then the handle is not held properly, and then the motor is turned OFF.

If even this condition is satisfied then, all the two conditions are continuously checked, throughout the drive.

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III. BLOCK DIAGRAM

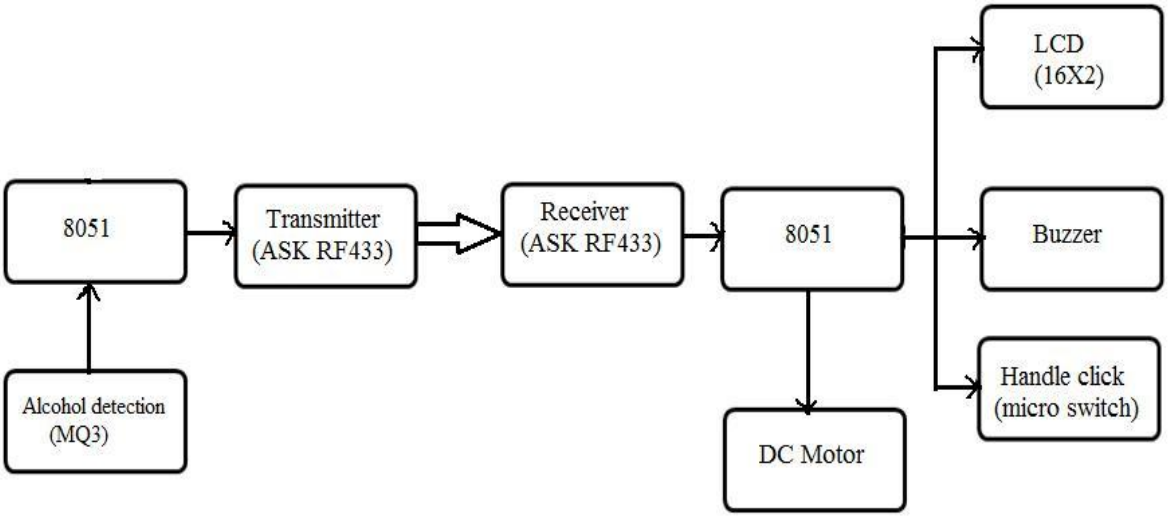

Fig.2. Block diagram

IV. WORKING MECHANISM

The existing system does not have the features which prevents the rider who drives rashly and puts public safety at stake. Our system consists of a basic transmitter and a receiver, where the transmitter is placed in the helmet and receiver is placed in the motorcycle. These basic blocks are explained as follows:

i. **Alcohol Detection:** The next condition to be checked is presence of alcohol content in the rider. The motor starts only after this condition is passed. This alcohol content is detected using MQ3 alcohol sensor.

ii. **Handle detection:** This handle control is checked, only after successfully turning the motor ON and is checked by using a touch sensor. Using this handle control detection, we can assure that the rider is holding the properly while driving.

iii. **Transmitter block:** In this block, the result of helmet detection and alcohol detection is managed by the microcontroller 8051 and accordingly, it acts depending upon the instructions given via program. Then the final result is transmitted to the receiver by the transmitter through wireless transmission.

iv. **Receiver block:** In this block, the result of the first two conditions is received by the receiver which is transmitted from the helmet by the transmitter inside the helmet. Depending upon the received data the 8051 microcontroller takes decisions, whether to start the motor or not. It even controls LCD, handle control and buzzer to alert the rider when any uncertainties are observed.

V. HARDWARE DESCRIPTION

8051 Microcontroller

8051 microcontroller is an 8-bit microcontroller. It is built with 40 pins DIP (dual inline package), 4kb of ROM storage and 128 bytes of RAM storage, two 16-bit timers. It consists of are four parallel 8-bit ports, which are programmable as well as addressable as per the requirement. An on -chip crystal oscillator is integrated in the microcontroller having crystal frequency of 12 MHz. Architecture of 8051 consists of two buses i.e., for program memory and data memory. It has an 8 bit processing unit and 8 bit accumulator. It also includes 8 bit B register as main processing blocks. It also has some other 8 bit and 16 bit registers.

Alcohol Gas Sensor (MQ3)

An Alcohol Gas Sensor is used to detect alcohol concentration in a person's breath. For this purpose, we have chosen MQ3 of MQ series sensors. It is a low cost semiconductor sensor which can detect the presence of

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alcohol gases at concentrations from 0.05 mg/L to 10 mg/L. The sensitive material used for this sensor is SnO_2, whose conductivity is lower in clean air. Its conductivity increases as the concentration of alcohol gases increases. It has high sensitivity to alcohol, fast response time and has a good resistance to disturbances due to smoke, vapour and gasoline. MQ3 alcohol sensor can be easily interfaced with the microcontroller, we are using. This sensor provides an analog resistive output based on alcohol concentration. The drive circuit is very simple; all it needs is one resistor.

LCD

LCD (Liquid Crystal Display) screen is an electronic display module and has a wide range of applications. A 16x2 LCD is a very basic module and is very commonly used in various devices and circuits. The reasons being: LCDs are economical, easily programmable, have no limitation of special and even custom characters (unlike in 7 segments), animations and so on. It means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has 2 registers namely, Command and Data. The command register stores the command instructions given to the LCD. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD [7].

DC Motor

An electric motor is an electric machine that converts electric energy into mechanical energy. In normal motoring mode, most electric motors operate through the interaction between an electric motor's magnetic field and winding currents to generate force within the motor.

Transmitter and Receiver (ASK RF 433MHz Module)

The RF module, as the name suggests, operates at Radio Frequency. The corresponding frequency range varies between 30 kHz & 300 GHz. In this RF system, the digital data is represented as variations in the amplitude of carrier wave. This kind of modulation is known as Amplitude Shift Keying (ASK). Transmission through RF is better than IR (infrared) because of many reasons. Firstly, signals through RF can travel through larger distances making it suitable for long range applications. Also, while IR mostly operates in line-of-sight mode, RF signals can travel even when there is an obstruction between transmitter & receiver. RF transmission is stronger and reliable than IR transmission. RF communication uses a specific frequency unlike IR signals which are affected by other IR emitting sources [9].

Touch sensor

A touch sensor detects touch or near proximity without relying on physical contact. Touch sensors are making their way into many applications like mobile phones, remote controls, and control panels, etc. Present day touch sensors can replace mechanical buttons and switches. Touch sensors with simple rotational sliders, touch pads and rotary wheels offer significant advantages for more intuitive user interfaces. Touch sensors are more convenient and more reliable to use without moving parts. The use of touch sensors provides great freedom to the system designer and help in reducing the overall cost of the system. The overall look of the system can be more appealing and contemporary [14].

Buzzer

A buzzer is an electrical device that makes a buzzing noise (here we use to alert) and is used as an audio signalling device. There are different types of buzzers which consist of electrical buzzer, mechanical buzzer, piezo buzzer and so on. It is used for Novelty uses, Judging panels, educational purposes, game show lock out device, electrical alarms, etc.

VI. SOFTWARE DESCRIPTION

Keil

Keil compiler is a software used where the machine language code his written and compiled. After compilation, the machine source code is converted into hex code which is to be dumped into microcontroller for further processing. Keil compiler also supports c language code. For our project, we have used assembly language for compilation. The basic transmitter and receiver programs are written using Keil software.

Proteus

Proteus is software for microprocessor simulation, schematic capture and printed circuit board (PCB) design. Proteus provides a unique combination of flexibility, performance and accuracy. Its modular structure s

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implifies customization and independent replacement of individual parts of the simulator, this promotes modules for particular architectures and multiple implementations that provide a variety of performance and accuracy combinations.

Proteus simulations obtained

The figure3 shows the one out of the various simulation results obtained while using Proteus software. This figure shows the condition, where the LCD instructs the rider to hold the handle properly. This is the image taken before the delay and so the motor is still ON. Now, even after the delay if the rider doesn't holds the handle properly, then the motor is turned OFF and even buzzer alerts, and that's the next case.

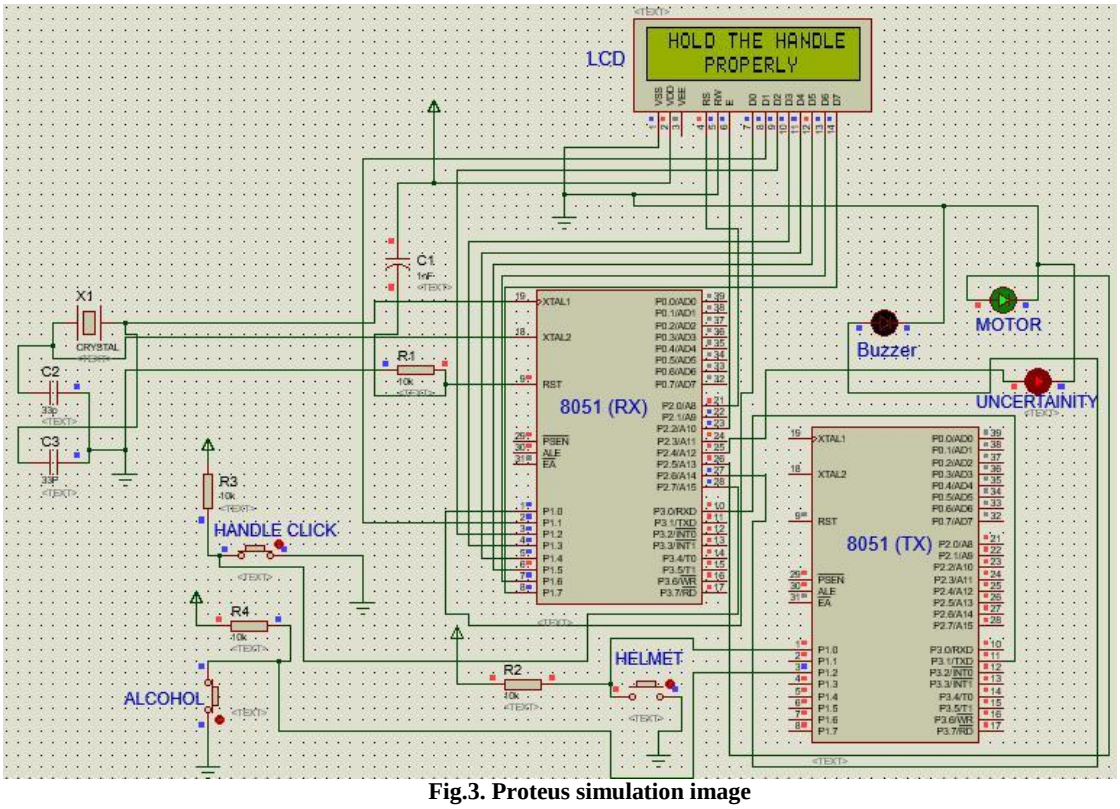

Fig.3. Proteus simulation image

EAGLE

Eagle is a PCB CAD program for designing and laying out printed circuit board (PCB) designs. EAGLE works in two stages: Schematic capture and PCB design. In the first, the circuit connectivity is designed using the standard component symbols with which we are all familiar. In the second stage, the components are positioned on the printed circuit board and then traces between connected components are laid out.

Transmitter and Receiver PCBs

The images 1and 2 of the figure4 shows the transmitter and receiver PCBs of the hardware model.

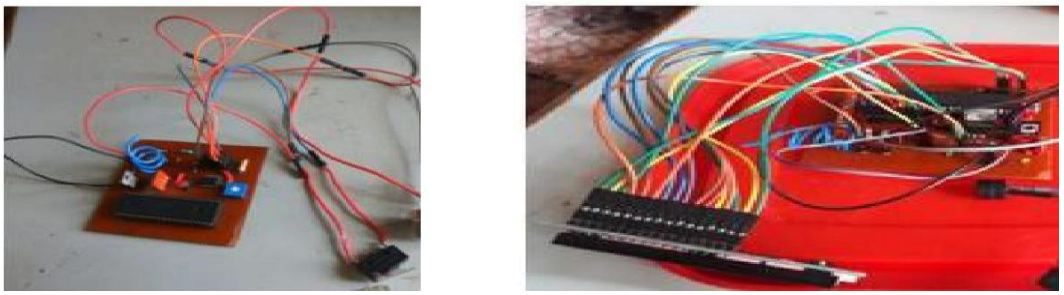

Fig.4. Transmitter and Receiver PCBs

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Transmitter PCB has transmitter and alcohol sensor & receiver PCB has receiver, LCD, buzzer, motor and touch switch for handle control.

VII. EXPERIMENTAL RESULTS

Figure 5 shows the snapshots of developed model and result obtained.

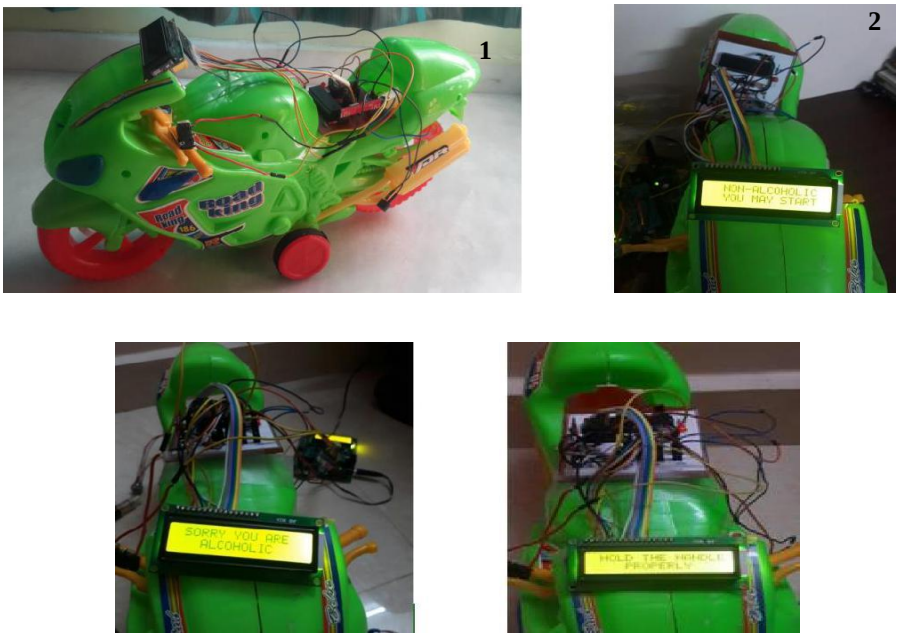

Fig.5. Hardware Model

The image 1 is how the model looks and image2 shows the result of first case, i.e., when every condition is satisfied and allowing the motorcycle to start. The image 3 shows the condition when handle not held properly, even after the alert via uncertainty LED which results in turning OFF of motor. The image 4 indicates the last condition where it indicates that the rider is alcoholic and results in turning motor OFF.

VIII. CONCLUSION

As the name itself suggests it's a smart vehicle, which is mainly focused on public safety. With it 's smart add-on features i.e. alcohol detection and handle control, it will definitely be an innovative idea for the safety of both riders and the people whom they come across. As our prototype continuously monitors these features, careless driving can be reduced and prevents drivers to drive after alcohol consumption thereby regulating accidents.

IX. FUTURE SCOPE

Though our prototype performs satisfactorily, a lot of work needs to be done before making the product commercially viable. A lot of testing needs to be done before making such a product a reality. Also for this model, we can even add features like anti-braking system using ultra sound mechanism ad a few other features make this model a lot better.

X. ACKNOWLEDGEMENT

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