

# Design of Smart Helmet using Microcontroller

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**Abstract**— The main objective of this project is to build a safety system which is integrated with the integrated helmet and intelligent bike to reduce the probability of two-wheeler accidents and drunken drive cases. The push button checks if the person is wearing the helmet or not. Alcohol sensor detect the alcoholic content in riders' breath. If the rider is not wearing the helmet or if there is any alcohol content found in rider's breath, the bike remains off. The bike will start when the rider wears the helmet and if there is no alcoholic content present. When the rider crashes, helmet hits the ground, accelerometer detects the motion and tilts of helmet and reports the occurrence of an accident. It sends information of the corresponding location via message to family members of the rider and emergency contact number. In order to avoid the death and rash driving, drink and drive, this project would be useful for the people.

**Keywords**— Smart, microcontroller, accident prevention, safety or rider, Arduino, web-based.

## I. INTRODUCTION

As the technology developed the rate of mishap is also increase. The riders avoid wearing helmet without any specific reason. also, over speeding and drink and drive have come common issues. Due to the lack of experience or focus and violation of business rules, which leads to accidents. So, with the help of technology we made sure that business rules are followed, problems mentioned over are avoided and their goods are minimized. The idea of developing this work comes from our social responsibility towards society. In numerous accidents that do, there's a huge loss of life.

numerous people die on roads every time that do due to bike accidents. There are colorful reasons for accidents similar as not having acceptable capability to drive, imperfect two wheelers, gadarene driving, drink and drive, etc. But the main reason was the absence of helmet on the person which leads to immediate death due to brain damage. thus, it's important that there should be a installation to minimize the after goods of these accidents. still, the main thing of our work is to make it obligatory for the rider to wear a helmet during the lift, to help drink and drive script and over speeding or rash riding by motorcyclists and also give proper medical attention when met with accident by waking the concerned person which will give results to other major issues for accidents.

currently as IT diligence are setting a new peep in the request by bringing new technologies and products in the request. In this study, the stress situations in workers are also noticed to raise the bar high. Though there are numerous associations who give internal health related schemes for their workers but the issue is far from control. In this paper we try to go in the depth of this problem by trying to descry the stress patterns in

the working hand in the companies we'd like to apply image processing and machine literacy ways to assay stress patterns and to constrict down the factors that explosively determine the stress situations.

The idea of developing this work comes from our social responsibility towards society. In numerous accidents that do, there's a huge loss of life. Numerous people die on roads every time that do due to bike accidents. There are colorful reasons for accidents similar as not having acceptable capability to drive, imperfect two wheelers, gadarene driving, drink and drive, etc. But the main reason was the absence of helmet on the person which leads to immediate death due to brain damage. thus, it's important that there should be a installation to minimize the after goods of these accidents. still, the main thing of our work is to make it obligatory for the rider to wear a helmet during the lift, to help drink and drive script and over speeding or rash riding by motorcyclists and also give proper medical attention when met with accident by waking the concerned person which will give results to other major issues for accidents.

Moment we all talk about Internet of effects and how it's changing our lives. The Internet of effects is creating a new world, quantifiable and measurable world where people and businesses can manage their means in better informed ways, and can make further timely and more informed opinions about what they want or need to do. This new world brings in numerous practical advancements similar as convenience, health and safety in our lives.

In India there's one death every four twinkles due to road accidents. Out of total road accidents, 25% accounts for two wheeler accidents. According to recent study 98.6 % bikers who failed, didn't wear a helmet. Hence police department has made it obligatory to wear helmet while riding.

Riders face numerous problems on the go similar as unfit to take calls, unfit to see charts for navigation purposes etc. While having these helmets as a safety measure is a boon, we add further features to it to make it smart.

Smart Helmet is an innovative way of erecting a helmet with rearmost technologies. Did you ever feel the need to hear to music or perhaps shoot a SOS communication in case of exigency? To make the riders feel more comfortable, we designed a smart helmet.

This helmet is integrated with rearmost IOT technology through which it'll get connected to the authorized person when the rider meets with the accident the authorized person is notified with a SMS and position where the accident took place.

This design helps stoner's to indeed more wear helmet because of its features in addition to safety purposes.

It's a well-known fact that youthful generation prefers bikes and motorcycle over four-wheeler. The riders avoid wearing helmet without any specific reason. Also, over speeding and drink and drive have come common issues. Due to the lack of experience or focus and violation of business rules, leads to accidents. So, with the help of technology we made sure that business rules are followed, and the life of the rider is saved by notifying the authorized person with a SMS and position of the rider when he meets with an accident.

#### Problem Statement

As the bikers in our county are adding, the road mishaps are also adding day by day, due to which numerous deaths do, utmost of them are caused due to most common negligence of not wearing helmets, also numerous deaths do due to lack of prompt medical attention demanded by the injured person. The design aims at the security and safety of the bikers against road accidents.

#### LITERATURE SURVEY

- [1] Jennifer William - proposed system in which the intelligent helmet ensures the safety of the biker by making it necessary to wear the helmet and assure that rider hasn't consume any alcohol while driving the vehicle.
- [2] C. Prabha - introduced system which can be used as a crash or rollover detector of the vehicle and GPS location of the rider can be sent for immediate medical aid to prevent from further fatalities.
- [3] Immediately accident notification will be sends to the registered contact number using GSM through "acciassisto".

#### II. OBJECTIVE

- The main objective of this project is to make sure that the bike riders follow basic traffic rule so that we can avoid most of the accidents.
- To alert rider's family and friends in the cases of any accident occurrence.
- To make sure that the rider get any need medical attention to prevent some serious fatalities.
- To save human lives in general and prevent any misfortunes in accidents.

#### METHODOLOGY CARRIED OUT

The system won't allow the rider to start the vehicle, if the rider isn't wearing the helmet. It detects the consumption of alcohol, if the rider has consumed alcohol, the bike machine won't start. The system cautions the rider when the speed exceeds the limited value. When met with an accident it detects it and gives the announcement to the registered contact with a position and picture information. Helmet section consists of drive button, alcohol detector, accelerometer, micro regulator, RF transmitter. When the rider has worn the helmet, the drive button is pressed. Alcohol detector measures the presence of alcohol in rider's breath. Accelerometer measures tipping of the helmet. The affair of these factors will act as input for microcontroller

which is on the helmet. The microcontroller processes the data and sends it to the bike section using RF transmitter. RF receiver receives the data and the data is transmitted to the microcontroller, Microcontroller makes the decision according to the affair of the helmet section. There are two conditions to start bike ignition Push button should be pressed when a rider wears the helmet, Rider shouldn't be alcoholic. When the affair of the helmet section matches these two conditions, also the bike ignition will start. When an accelerometer measures the tilting of helmet with respect to ground as zero, it means that an accident has passed. incontinently Capture accident equals and notified the separate person through the SMS with position. also they can give the immediate medical demand and they can also inform about the incident to the police station.

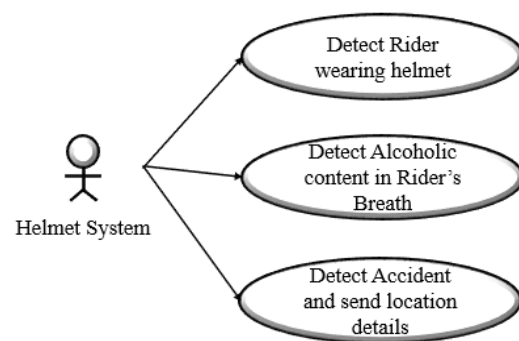


Fig 1. Use case diagram

#### A. Specifications, Cost and others

SL No	Components	Cost(rs), number
1	Arudino Uno	3500 * 2
2	Helmet	1000
3	Push button	400 * 2
4	Li-Ion Battery	12V 7AH
5	RF transmitter & receiver	3000
6	Alcohol sensor	800
7	Tilt sensor	600
8	ESP01	1000*2
9	Ignition	200
10	GSM	1000
11	ThingSpeak	500
12	Relays	7 Amp, 12V DC, 250V AC

**PUSH BUTTON:** Push button determines whether the rider wears the helmet or not. Push button is fixed inside the helmet. If the rider wears the helmet the push button is pressed and determines that rider wears the helmet. If the push button is not pressed then the rider is not wearing the helmet. Push button status is sent from RF transmitter of helmet side to RF receiver of bike side. If the push button is not pressed it determines helmet is not wearied by the rider and the ignition is made off with the help of relay.

**RF TRANSMITTER & RECEIVER:** The RF transmitter is ideal for remote control applications where low cost and longer range is required. The transmitter operates from a 1.5-12V supply, making it ideal for battery-powered applications. The transmitter employs a SAW-stabilized oscillator, ensuring accurate frequency control for best range performance. Output power and harmonic emissions are easy to control, making FCC and ETSI compliance easy. The manufacturing-friendly SIP style package and low-cost make the RF transmitter suitable for high volume applications.



Fig. 2. RF transmitter and receiver

**ALCOHOL SENSOR:** Traffic police often use breath analyzer to check the blood alcohol content. The most important part of this analyzer is Alcohol sensor MQ3 or similar. Sensitive material of MQ-3 gas sensor is SnO<sub>2</sub>, which with lower conductivity in clean air. When the target alcohol gas exists, the sensor's conductivity gets higher along with the gas concentration rising. Users can convert the change of conductivity to correspond output signal of gas concentration through a simple circuit.



Fig. 3. Alcohol sensor

**ARUDINO:** Arduino is an open-source prototyping platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing. The Arduino Software (IDE) runs on Windows, Macintosh OSX, and Linux operating systems. Most microcontroller systems are limited to Windows. The Arduino software is published as open source tools, available for extension by experienced programmers. The language can be expanded through C++ libraries, and people wanting to understand the technical details can make the leap from Arduino to the AVR C programming language on which it's based.



Fig. 4. Arudino Uno

**WIFI MODULE:** The ESP8266 Wi-Fi Module is a self-contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your Wi-Fi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. It can connect traditional serial device and MCU controlled device with wi-fi network to realize control and management. The module has an Ethernet port. It can realize mutual data transmission among wi-fi, serial and Ethernet. It works by implementing the 802.11 set of protocols, helped by a radio module. The Arduino Uno Wi-Fi is an Arduino Uno with an integrated Wi-Fi module. The board is based on the ATmega328P with an ESP8266 Wi-Fi Module integrated.



Fig. 5. Wifi module

**THINGSPEAK:** ThingSpeak is an open data platform for the Internet of Things. Your device or application can communicate with ThingSpeak using a RESTful API, and you can either keep your data private, or make it public. In addition, use ThingSpeak to analyze and act on your data. ThingSpeak is an IoT analytics platform service that allows you to aggregate, visualize and analyze live data streams in the cloud. ThingSpeak provides instant visualizations of data posted by your devices to ThingSpeak.

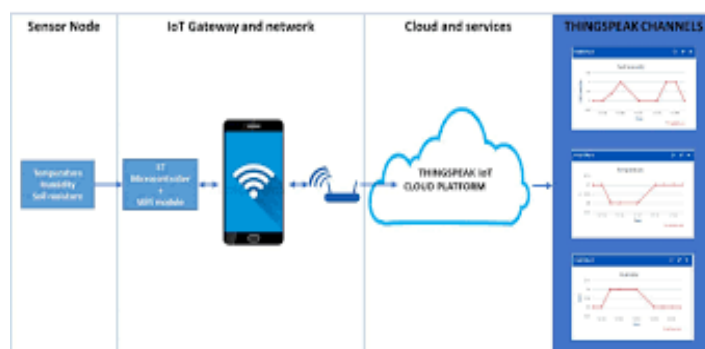


Fig 6. Thing Speak



**BIKE IGNITION:** The job of the ignition system is to supply a spark at the correct time within the cylinder. The spark must be sufficiently strong enough to jump a gap at the spark plug electrodes. The simplest form of spark ignition is that using a magneto. The engine spins a magnet inside a coil, or, in the earlier designs, a coil inside a fixed magnet, and also operates a contact breaker, interrupting the current and causing the voltage to be increased sufficiently to jump a small gap. If the rider is alcoholic and not wearing the helmet then the bike ignition does not start, if the rider meets with an accident then the bike engine automatically turns off.



Fig. 7. Bike ignition

**RELAY:** A relay is an electrically operated switch. It consists of a set of input terminals for a single or multiple control signals, and a set of operating contact terminals. The switch may have any number of contacts in multiple contact forms, such as make contacts, break contacts, or combinations thereof. A relay is a simple electromechanical switch made up of an electromagnet and a set of contacts. Relays are found hidden in all sorts of devices. In fact, some of the first computers ever built used relays to implement Boolean gates. A relay can be defined as a switch. Switches are generally used to close or open the circuit manually. Relay is also a switch that connects or disconnects two circuits. But instead of manual operation a relay is applied with electrical signal, which in turn connects or disconnects another circuit.



Fig. 8. Relay switch

### III. IMPLEMENTATION AND FINAL OUTCOME

#### A. Final Outcome

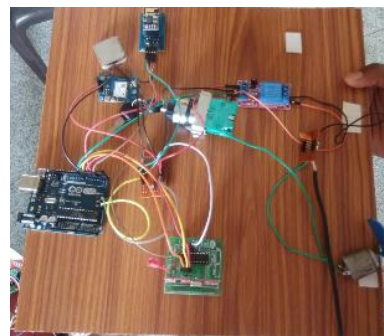


Fig. 9. Helmet and bike section of smart helmet model

#### IV. WORKING OF THE SMART HELMET

This smart helmet has two sections i.e. Helmet section and bike section. In helmet section we have 3 input devices that are attached to it which are push button, alcohol sensor and tilt sensor. Alcohol sensor is used to detect either the rider is drunk or not and push button is mounted on the top inner part of the helmet that is used to detect either rider is wearing helmet or not. When the rider is not drunk and he is wearing the helmet then only the bike will start otherwise ignition of the bike won't start in the first place. All these information are being transmitted between bike section and helmet section using 2 radio frequency transmitters, one on each side.

If in any cases of accidents the tilt sensor is used in correspondent with helmet as well as bike section to deter the occurrence of accident. When the accident will happen then with the help of GPS we can record the GPS location of the place where accident has happened. Then with the help of Wi-Fi module mounted on the bike section we can send information like GPS location, condition off bike, rider health condition to the cloud. From there we can use all those information to seek for the immediate needed medical attention in any cases of accidents and minimize the risk of fatalities to the riders.

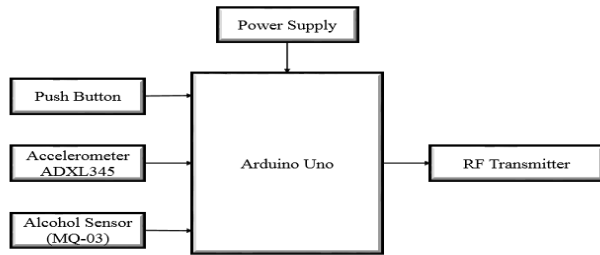


Fig 10. Helmet section block diagram

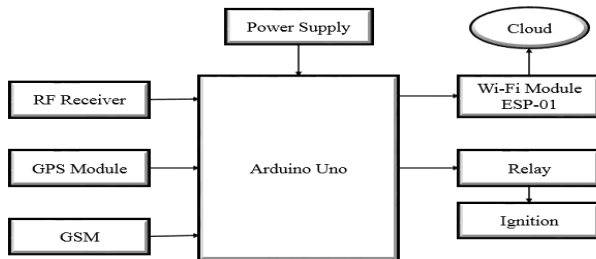


Fig 11. Bike section block diagram

## V. CONCLUSION

The proposed system can be used to prevent the accidents from happening. Alcohol sensor is used to check alcohol consumption level of rider, to find out either rider is in his conscious or not to ride the bike. Without wearing helmet, ignition of the bike won't take place. Design aspect of the help has be considered to maintain/improve comfort and impact resistance of the helmet. In any misfortune cases, system ensure the safety of rider by informing rider's friends and family to seek the immediate medical help by sharing the geological location and health condition of the rider.

In future this intelligent system can be fabricated in a compact size so that it is globally acceptable to notify No entry and No parking areas. Government must enforce laws

to install such system in every two-wheeler. By implementing such mechanism in two-wheeler, deaths due to driving under influence of alcohol and other road fatalities can be minimized to large extent.

The fingerprint authorization can be used that prevents vehicle theft and provides security. We can implement various bioelectric sensors on the helmet to measure various activities of the rider. This model can be equipped with a camera mounted to the helmet where entire video will be recorded and it will be stored in the data storage of the helmet.

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