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Smart Helmet for Accident Avoidance

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Abstract— *From over the past decades the road accidents are increasing day by day in the country. Due to the fact, that the riders are not wearing the helmet and also the consumption of alcohol while riding the bike is another major cause which leads to the road accidents. This results in loss of human lives. In order to overcome these problems, this project work proposes a device called "SMART HELMET". The switch or touch sensor checks whether the person is wearing the helmet or not. The alcohol sensor which recognizes the alcoholic content in the riders breathe. If the person is not wearing the helmet and also consumes the alcohol, then the bike will not start. If there is no alcohol content present and helmet is used then only the bike will start. Here when the rider met with an accident, the sensor recognizes the condition of motorbike and reports the accident. Then the G.P.S in the bike unit will send the location of the accident place to the registered number or to the nearby hospitals. It will provide a safer travel for bikers and help them in case of emergency.*

Keywords—*Arduino Uno, NEO 6-M G.P.S, MPU 6050, RF Modules, Relay Module, DC Motor, G.S.M SIM 900A, Alcohol Sensor, MQ-3 Gas Sensor, Micro Switch*

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I. Introduction

In a highly populated and developing nations like India, which has a huge number of road accidents every year. The most effective means of road transport is through bike because of low cost and simplicity. But these Bikes are one of the most unsafe means of road transportation. The major road accidents that we come across is because of two-wheeler road accidents. The accidents mainly occur due to many reasons like drunk and driving, driving rashly, over speeding, leaving hands while driving for fun, etc.

Now-a-days wearing helmet is compulsory for bike riders, but the inconvenience which causes due to wearing of helmet make the rider to stop (or) avoid the usage of helmet and which finally leads to death of rider. In Many accidents the riders get injured mainly on the head. So, a helmet plays a very important role in saving the life of a rider. A design is proposed that synchronizes with the module present on helmet. if a rider is not wearing the helmet and wants to start a bike, it won't start. The rider must and should wear the helmet in order to start the bike. The MQ-3 alcohol sensor detects the alcohol content in the rider's breath. So, even though the rider consumes alcohol and wears the helmet, the bike won't start. So, the rider must wear the helmet and should not consume alcohol then only the bike will start.

Even though the police are continuously working day in and day out still two wheelers accidents are continuously increasing. This project aims on reducing accidents by making the rider drive carefully and safely. In case of an accident happens, the G.P.S and the G.S.M module sends messages with the location of rider to emergency contacts Ease of Use

II. Literature Survey

Several researchers have worked on this problem using various methods

Nataraja proposed a system that checks whether a helmet is worn or not by using an IR sensor. The project contains a helmet module and vehicle module which communicate via RF communication. The system is also capable of accident detection, signboard detection, and alcohol detection.

Shikha Gupta developed a smart helmet that was IOT enabled and was capable of performing alcohol detection and accident detection. The system is GSM and GPS enabled which sends messages in case of accidents. Features like live location tracking and a camera for recording in case of accidents are also present. The whole system is mounted on top of the helmet.

Vimal Jyothi Engineering College, Kannur, India, have shown the collision detection using an Arduino Uno; and the message is delivered using a Router and GSM modem. They mention "It consist of a GPS receiver, GSM modem, Arduino using ATMEGA 328 IC, vibration sensors, buzzer and a power supply system. The heart

of the system is the Arduino uno board, which controls all other blocks in this system." Further they also mention "it takes the value of latitude and longitude from the GPS receiver and transfer it to the pre-programmed mobile number via SMS through GSM modem. And it operates the audio alarm."

Archana had proposed a system which will not allow driver to start the engine without wearing the helmet. When rider wore the helmet, helmet will be locked and engine will be switched ON. This system also identifies the approaching vehicle's speed on both sides of the bike while riding by using ultrasonic sensor and alert the rider by generating vibrations in bike's handlebar.

III. Implementation

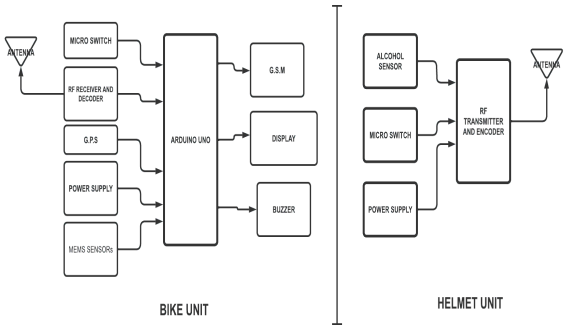

Fig. 1: Block Diagram

The block diagram of the Smart Helmet using is shown in above figure 2.1. It consists of two sections, those are Helmet section and Bike section. Here at first at the Bike section, the RF Receiver is in waiting state for a signal from Helmet section along with Arduino UNO, buzzer, led display, relay module, ignition lock and at Helmet section it consists of RF Transmitter, Alcohol sensor, Batteries and a micro switch

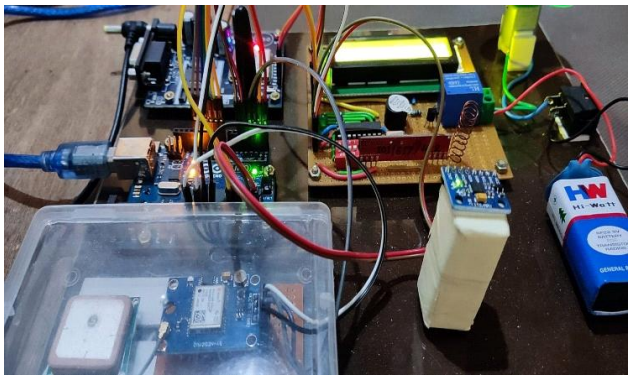

Fig. 2: Bike Circuit Unit

Here when the user wears the helmet in order to ride the bike, the alcohol sensor and micro switch will check whether the conditions to start a bike have met or not. Here the micro switch will detects/checks whether the use is wearing the helmet or not and alcohol sensor will detect whether the user is drunk or not. After collecting this data, it is sent to Bike unit by RF Transmitter.

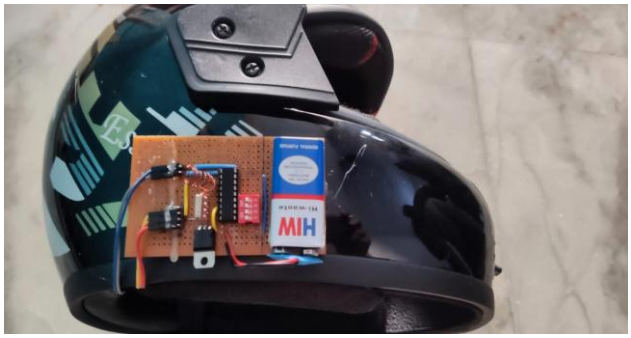

Fig. 3: Helmet Circuit Unit

In Bike section the data will be received by RF Receiver and it is connected to Arduino UNO board. Here it is programmed in such a way that this Microcontroller will checks whether the user is wearing helmet and whether the user has drunken an alcohol. If either the user didn't wear a helmet or he consumed an alcohol which exceeds the limit the Bike will not Start. If the user wears a helmet and doesn't consume alcohol the bike will start. During the driving of bike if the user accidently took off the helmet it take 2-5 sec delay to stop the bike.

IV. Result

Fig. 4: Starting the Bike Unit

The above message will display when the rider has started the bike.

Fig. 5: Message appears when helmet is not worn

The above message showed when the user didn't wear the helmet.

Fig. 6: Message appears when Alcohol is Detected

Here the message will be displayed on screen if the alcohol sensor detects the alcohol content in the rider's breath

Fig. 7: Ask information when any accident happened

If an accident has happened, the MEMS Sensors detects that asks the rider whether the rider is safe or not?

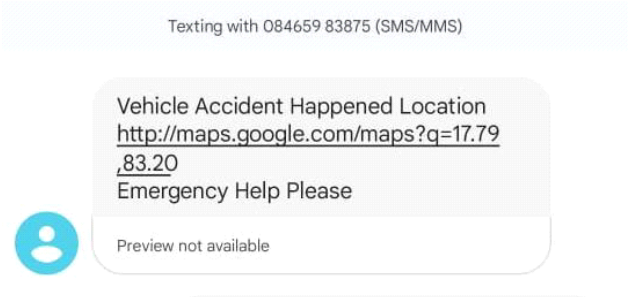

Fig. 8: Information sent to Emergency Contacts

If the rider is safe, he can press the RESET button and the system won't send any message. If the user is badly hurt the SOS signal will be sent to the emergency contacts along with nearby hospitals and ambulances indicating that particular rider has gotten into accident and he needs their help he is in that particular location sending google maps link along side

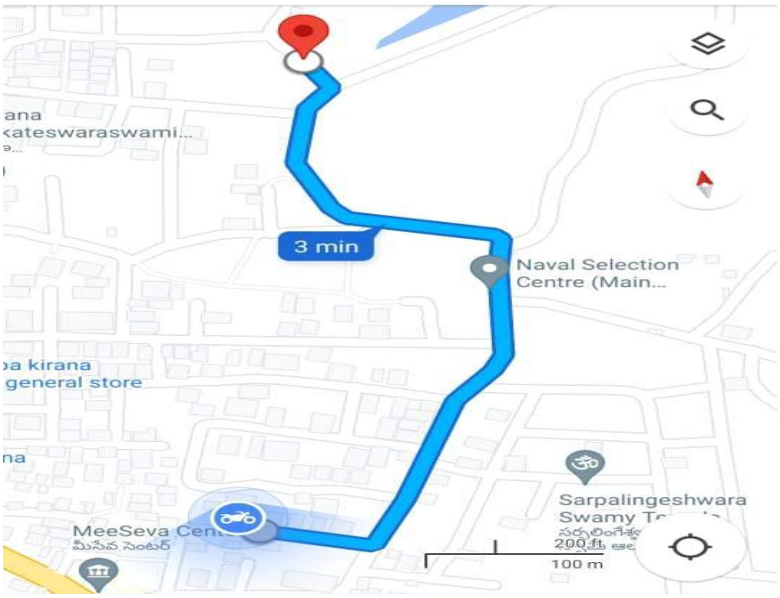

Fig. 9: Direction Pointing toward Accident location

As soon as that contacted person press that link it will display that particular location where the accident has happened.

V. Conclusion

The government has to initiate by making compulsory Helmet and no Drink and Drive. According to analysis only 10% of the bike riders follow these rules and many a times these rules are violated. The previously developed helmets detect only the presence of helmet and the alcohol in driver's breath. The proposed system provides a "Smart Helmet" which detects the alcohol consumed by the rider and whether the rider has worn the helmet or not and also the accident detection by using the GPS and GSM modules.

We have introduced an advanced sensors, techniques and radio frequency wireless communications to make this system a noble one. This valuable smart system pays attention for the efficient checking of wearing the helmet and driving under the influence of alcohol and also providing the message and live location to the registered mobile number when the accident happens. By implementing this smart system, we can safeguard the life of a rider by wearing helmet and eliminate the possibility of driver driving under the influence of alcohol which makes the journey very safe. Hopefully the proposed system will provide the rider's safety and restrict driving under the influence of alcohol.

VI. Future Scope

In the next version of the prototype, the size of the circuit can still be reduced and also planning further reduction of power consumption. Artificial intelligence can also be used by checking the exact position of the helmet and on the head Solar plates can be used instead of some batteries for the power supply. If the bike module won't respond, then the bike will not start. In that case, the bypass mechanism can be provided with the password to open the pipe. The accidental message and the location can be sent to the nearby hospitals. Here blue-tooth modules can also be used instead of RF modules. The power of the battery can be still enhanced by installing a higher capacity for a longer duration.

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