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Smart Helmet for Motorcycles

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Abstract: *Our India, the world's second-most populous nation, has a sizable young population. Today's youth like riding bikes, and due to fashion, they often choose not to wear helmets. Due to them, the number of fatal bike accidents is rising daily. Even triple riding causes a lot of fatalities. Head injuries are a major cause of fatalities and can be avoided by using a helmet. A helmet is a type of head protection equipment that prevents head injuries. The helmet primarily helps the skull protect the brain. Various sensors are used to build the smart helmet. The study also sheds light on how the smart helmet system has changed through time and how it functions now utilising cutting-edge technologies like the Internet of Things. Also, this paper discusses the intelligent helmet technology that warns the rider of approaching large vehicles or buses in order to prevent crashes.*

I. INTRODUCTION

Two things are the most crucial elements in every part of the lives. They are safety and security. In many incidents when people are killed or suffer serious injuries nowadays, two-wheeler traffic accidents are to blame. In addition, a serious problem that needs everyone's attention because India reports one fatality every few minutes. Since it is difficult to provide prompt first aid in the event of an accident, the individual may die as a result of the delayed medicine. According to the World Health Organization (WHO), helmet use can save 40% of deaths and 70% of injuries.

Sensors play a crucial role in all smart applications. It recognises any physical or chemical change, and after analysing the data gathered, sensors automate the software or equipment to make it intelligent. IoT incorporates a variety of sensors, devices, and nodes that can interact with one another without human involvement[3]. Alcohol sensors are used to determine whether a cyclist has consumed alcohol.

A rider's helmet can be examined using an infrared sensor. It determines whether the user is donning a helmet or not. The motor bike will not start if the rider is drunken and not wearing a helmet. The bike will start only if helmet is worn and no signs of alcohol usage. Back distance can be monitored using ultrasonic sensor.

II. METHODOLOGY

There are 2 sections. They are :

A. Helmet Section

The receiver is put in a specific bike, and the transmitter is put in the helmet portion. As a result, two modules are able to communicate without a wire connection. The switch within the helmet activated when a bike rider dons it. Because it will be positioned in a helmet in such a way that it is able to readily detect the riders breath and the alcohol sensor that will be located in the helmet detects the alcoholic gas when the rider is breathing. The threshold value will change and the bike won't start because the ignition is OFF if the alcohol sensor determines that the rider is very drunk.

A microcontroller that is built within the helmet will take its input from the output of these components. Then, via an RF transmitter, the helmet's microcontroller's processed data is transmitted to the bike module.

B. Bike Section

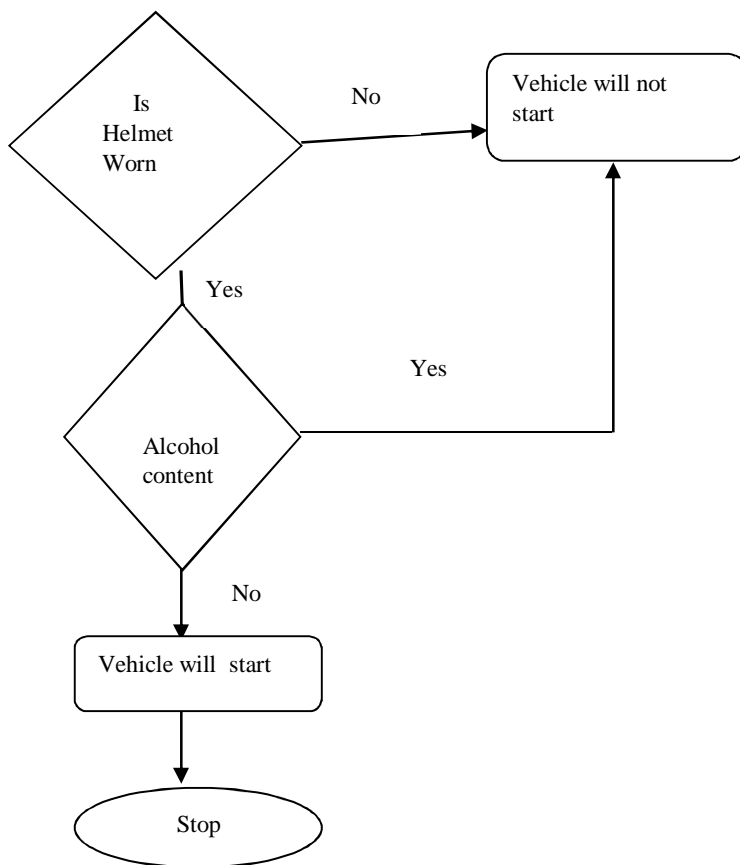
The bike module's RF receiver gathers data from the helmet and transfers it to the microcontroller. The microcontroller will then analyse all of the helmet's data before deciding whether or not to start the bike.

Two requirements must be met in order to start a bike's ignition:

- 1) Since the helmet has a switch that, when pressed, initiates the ignition, the rider is required to wear the helmet.
- 2) Alcohol shouldn't have been ingested by the cyclist.

The output of the helmet data must meet the aforementioned two requirements for the bike to start; otherwise, the bike won't start.

Work flow:



III. RESULTS & DISCUSSION

| Sl. No. | Author | Methodology | Limitations |
|---------|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|
| 1 | Jesudoss et.al[1] | uses wired sensors that are connected to the PIC. It makes use of sensors including gas sensors, load sensors, vibration sensors, IR sensors. | High precision and accuracy. |
| 2 | Mehata et.al [2] | Make sure that workers are properly detected if they fall at work. | Ensure effective worker fall detection in the workplace. |
| 3 | Divyasudha et.al[3] | The components of the system include a microcontroller, location sensor, a sensor that detects alcohol, a piezoelectric sensor, an RF transmitter, an IOT modem, a GPS receiver, a power source, and a solar panel. | Less cost |

| | | | |
|---|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| 4 | Manish et.al [4] | There are two sections, the helmet unit and the two-wheeler section, which use the accelerometer module, GPS module, speed sensor, microcontroller unit, and helmet sensor switch. | Utilizing an accelerometer module, the vehicle's tilt angle is also monitored. This enables us to determine whether or not the has fallen. |
| 5 | Shoeb et.al [5] | Accelerometer and GSM module were connected using a microcontroller. Using cloud infrastructures, the accident's notice and report are delivered. | In the event that a car is stolen, the system can serve as a remote immobiliser. |

IV. CONCLUSION

With the development of science and technology, each person's existence has become increasingly significant. In order to offer security and fit all necessary facilities in a small space, smart helmets are employed. The suggested smart helmet design would provide all types of helmets with modern, cost-effective technologies to help avoid traffic accidents. Smart Helmet is an intelligent device that will make biking safer. For the protection of motorcycle riders, smart helmets are the only option given the state of the roads, the high accident rate, the prevalence of traffic offences, and the weak regulatory framework. It is essential to wear a helmet when operating a motorbike because, in the event of an accident, it can prevent the rider from suffering serious brain injuries. Thus, this is where the precise IR sensor will be used. It will make sure that in order to start a bike, a rider must put on the helmet. Today, it's crucial to take into account the issue of drunk driving. Because bike accidents are more likely to be caused by drunk driving than automobile accidents.

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