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IOT Based Smart Helmet System

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Abstract: ***In Today's era, due to growth in population and growing number of vehicles on the road, risk of accidents is high. Thousands of our individuals lose their lives in vehicle accidents and severe vehicle crashes. With the rapid development and surprising growth of transport networks like two-wheeler vehicles, safety on the roads and security on the bike has emerged as an ultimate priority for us. It has lengthened the rate of accidents, which leads to several damages with loss of lives. A helmet is a form of protecting equipment worn to keep safe the skull/head from injuries. The helmet helps in protecting the brain from severe injuries. A smart helmet can detect and alert the driver also save lives of rider and makes two-wheeler driving more safer from previously. This paper proposes a system of smart helmet to avoid the accident and casualty. The main purpose of this smart helmet is to provide safety for rider. This is implemented by using microcontroller chips. This makes not only smart helmet but also feature of smart bike. Its compulsory to wear helmet, without helmet ignition switch cannot on. When the drive will drunken alcohol the helmet will be detected and automatically cut off the ignition.***

Keywords: Smart Helmet, Alcohol Detection, Wearing Helmet Detection, IOT.

I. INTRODUCTION

India is the one of the densely most populated country. This exponential raise in the population and due to the recent pandemic many people did not prefer to use public transport to go to their work and to travel. This increases the sales of motor cycles rapidly compared to 2019, the sales has been doubled in 2022. This increase the traffic among the Indian roads and increase in the number of road accidents According to 2019 report 42% of road accidents occur in India are because of motorcycles. There are several causes for road accidents in India the major causes for road accident are given below. Drunken Driving Consumption of alcohol to celebrate any instance is very common. But when it is mixed with driving it turns enjoyment to misery. Alcohol can reduce concentration of riding. It decreases reaction time of a rider body. Hands and legs take more time to react. It suppress vision due to dizziness. Alcohol dampens fear and incite humans to take risks. All these factors while driving cause accidents.

Most of the motor cycle riders doesn't wear helmet while driving the motor cycle. Many studies have shown that helmets and other safety gears to reduce the impact of the road accident to a great extend but many people did not wear even though it is made into law.

II. LITERATURE REVIEW

Smart Helmet with Sensor in two wheeler provides an intelligent system for accident prevention and detection of human life safety. The prevention part involves, Smart Helmet, which automatically checks whether the person is wearing the helmet and has non-alcoholic breath while driving [1]. This system efficiently checks the wearing of helmet and drunken driving. By implementing this system a safe two wheeler journey is possible which would decrease the head injuries during accidents and also reduce the accidents due to drunken driving. An intelligent system has been embedded in the helmet itself [2].

This has given an approach Arduino NANO and Arduino Mega-2560 are microcontrollers which control the entire components of the system. Two 2.4 GHZ nRF24L01 for communication between sender and receiver. MQ-3 alcohol sensor is used which can detect whether the bike rider is consumed alcohol or not. If the bike rider is alcoholic, then the MQ3 sensor detects it and turn off engine. A Sharp IR sensor detects the head of the rider within the specified range. The Bike rider's engine will start only when the rider will buckle the helmet. GPS & GSM Technology is used for tracking the location of the bike rider and sending text message to the family members of the Bike rider when an accident occurs [3].

Smart helmet system has two units, the helmet unit (HU) and a motorbike unit (MU). Both the parts linked

radio frequency (RF). The helmet has the sensors to detect the pulse of the human, the alcohol content in breath of the rider, and the intensity of vibration. The pulse sensor is used to detect helmet worn or not. The GPS and GSM module are used to share location and to send message. Accelerometer used for detecting accident. The sensor on bike helps to ensure that the rider is in perfect riding position, if accident detected send message to emergency contact. A LIDAR sensor used to detect vehicles approaching behind. Force-sensitive resistors are used to detect perfect riding position [4]. The embodiment of a smart helmet, having an alcohol detection sensor to diagnose if the rider wears a helmet or is drunk. The expert system processes the information about bike speed, engine temperature, distance with the nearby vehicle, and location tracking. In the case of an accident, the system immediately sends an SMS, including GPS location to the emergency contacts. The proposed Expert System which analyzes IoT cloud data and gives a possible solution to identified problems [5]. Keesari Shravya has proposed a system to identify Whether the rider worn the helmet or not. If the rider worn The helmet then ignition will start the engine otherwise it Remains off. For this, Force Sensing Sensor sensor is used. The second step is alcohol detection. Alcohol sensor is Used to detect the presence of alcohol in rider's breath and if It detect ignition cannot start[6]. H.C. Impana has given a method method proposed using Microcontroller RF transmitter and other sensors is cost Effective but we find the system proposed using Raspberry Pi module, Pi camera, Pressure Sensor, GPS system which Uses image processing algorithms is most useful since the Image processing is included so that we can easily detect Helmet from the rider[7].

III. PROPOSED SOLUTION

The first issue concentrates to prevent not wearing helmet and detect the rider is drunken drive these factors are the main reason for the accident cause. If the helmet is not worn properly the ignition of the bike is blocked and will not start and when the helmet is worn by the rider it will also check for alcohol condition if the rider consumed any alcohol, it will detect and the ignition will automatically stop for this module IR sensor and MQ-3 sensors are used. The IR sensor is fitted inside the helmet so it can detect the rider head. This eliminates the case of the rider keep the helmet on the top of bike fuel tank. The MQ-3 gas sensor is fitted in front of the rider mouth of the helmet detects the alcohol and set the value. If it is HIGH means the alcohol is detected and bike ignition will stop. A Radio Frequency (RF) Module is used for wireless communication between helmet unit as transmitter and bike unit as receiver. The system is consist of two units are Bike Unit and Helmet Unit in which the helmet unit contains Arduino UNO, IR Sensor for detection of rider head, MQ-3 sensor for alcohol Detection, and NRF24L01 transmitter and receiver to Establish wireless communication between helmet unit and Bike unit.

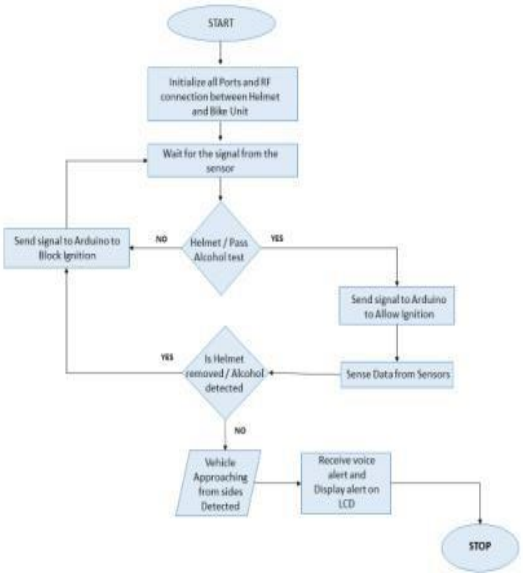

Fig-1: Flow chart for Helmet Unit

In Helmet unit the system initialize all ports and establish connection between RF transmitters to receiver. The system checks the condition whether the helmet is worn properly and check consumption of alcohol. If the above condition satisfy then the RF sends signal to Bike unit to start the ignition otherwise the engine won't start it shows alert.

1V. METHODOLOGY

The methodology of the proposed IoT based Smart Helmet system contains two interconnected units that is separated using wireless communication between the Helmet Unit microcontroller ESP8266 act as transmitter and the Bike Unit (ESP8266 microchip) act as receiver. NRF24L01 Transmitter & Receiver

Module is used to establish these two wireless connection. Smart helmet system is planned and implemented in such a way that the two-wheeler will not ignite until the rider wear worn the helmet properly using IR sensor and pass an alcohol test by MQ-3 sensor which will help to solve the problem of drink and drive.

4.1 HELMET DETECTION

To check whether the rider wear the helmet properly or not. By the IR – Infrared Sensor placed inside the helmet in position located in-front of the rider head it confirms the helmet worn properly. It eliminates the rider to keep the helmet on the top of fuel tank of the bike. This sensor detects the head of the rider between 5 cm and 30 cm away. IR sensor sends the signal to check whether rider consumed alcohol or not by MQ-3 Gas sensor. The gas sensor continuously checking the alcohol values, the condition in checked the alcohol value by varying in values. Alcohol gas value is different from normal gas. If the rider worn the helmet properly but consumed alcohol means its lock the engine ignition. Both the condition needs to satisfy in order to ignite the bike engine. When the bike ignition lock is opened the RF receiver will wait for the signal from the helmet unit. When the rider wears the helmet and not consumed alcohol the transmitter will send the signal to the receiver so that bike can be started. If the bike rider doesn't wear the helmet properly the ignition won't get start.

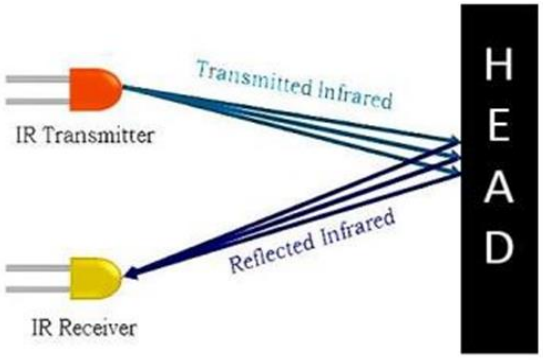

Fig-2: IR Sensor

V. RESULTS AND DISCUSSION

The safety protective helmet assures bike rider prosperity and moreover do whatever it may take to decrease mishap causality in the event that any highlighted are disregarded, the system can't permit the rider for get going the motorcycle. Smart helmet is a constructive solution to many difficult situations. This methodology detects if one is wearing a helmet or not and consumption of alcohol. An IOT-based Smart Helmet system and Statement is explained in this paper.

V1.CONCLUSION

Ultimately, the System is focused on the safety of riders, by obligatory use of safety equipment. Additionally, it provides certainty of non-consumption of alcohol throughout ride. The ignition system prevent rider to start a bike when rider violate any of security rules. This system overcomes many condition faced in previous system. The project's findings revealed that if a helmet is worn, the bike's ignition will start. As a result, the impact of an accident will be reduced automatically, and the bike will be less likely to be stolen.

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