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Automatic Smart Helmet Using Iot

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Abstract – Now a days road accidents are increasing day by day because raiders are consuming alcohol and the death rate is increasing because of not using the helmet. The main target of the project is to design a smart helmet by using advanced features like alcohol discovery, accident identification, location tracking, fall detection, and wiping the rain drops on the helmet shield. This makes it not only a smart helmet but also a point of a smart bike. It's mandatory to wear the helmet, without which the ignition switch cannot turn ON. However, and sends a communication to the registered mobile number with their current position, If the raider is drunk the ignition gets automatically locked. In case an accident occurs, it will send a communication through GSM. The presence of smart helmet wiper will automatically start as soon as it senses the presence of rain drops on the rain drop sensor.

Keywords—GSM, RF Module, Wiper, Ignition.

I. INTRODUCTION

The study of developing this design comes to do some good towards the society. Day by day the two-wheeler accidents are increasing and leads to loss of many lives. According to the survey in India there are around 1,58,954 road accidents being due to bike crashes in 2020. The reasons may be multitudinous analogous as no proper driving knowledge, fast riding of bike, scrupulous and drive etc. Sometime the person injured, the accident may not be fault of rider, but end of the day it's both driver bear in the accidents who is going to hurts. Still, lack of treatment in proper time is another reason for deaths, if accidents are one issue. According to the survey in India 426 accidents occur per day, nearly half the injured people die due to lack of treatment in proper time. The many reasons for this to happen is that of late appearance of ambulance, no persons at place where the accident do to give information to the ambulance or parents.

The design work presents the smart helmet that ensures that rider start the bike without wearing it. This helmet uses simple string relief wireless switching on a bike. So that the motorcycle would not start without the key and the helmet. Also, whenever the automobile starts ignition the alcohol sensor calculates the content of the alcohol in his breath and automatically switch off the bike. To make driving further safe GSM and GPS are used. And by using rain sensor it's easy to travel during the rain and it senses when the rain will happen.

The alcohol sensor would be used to detect the presenceof alcohol in the blood, the project can detect whether the person is drunk or not. If found drunken then it won'tallow the bike to start, if the person does not put on the helmet in that case, the bike will not start. As the number of motorcyclists in our nation rises, so do the number of traffic accidents and fatalities the majority of these are the result of failure to wear a helmet. And drinking alcohol is one of the factors that led to this accident.

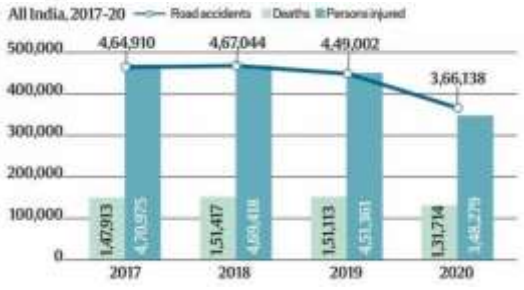


Figure 1- Accidents in India, 2017-2020.

II. LITERATURE SURVEY

Dr. Y Mohana Roopa etal.[1] designed a smart helmet in confluence with three major factors are Alcohol Sensor with GSM, and GPS. In a single helmet, all these factors are fixed together. So far, only the Alcohol Sensor and the Accident Switch have been integrated into a single system, in addition to the Alcohol Sensor, the Accident

Switch and GSM, and GPS be integrated into a single helmet. If the motorist has ingested alcohol, the system, will deliver an alarm communication when the person has consumed alcohol, Accident switches, also known as Bump switches, are used to shoot exigency SMS cautions to connections on the victim's phone as well as hospitals.

D.N. et suggested an IoT- grounded helmet that will be suitable to track the biker and relay GPS coordinates toa pre-defined number, precluding road accidents and detecting alcohol input. It may also identify a crash and shoot an announcement to a destined number as well as the nearest police station. The microcontroller, alcohol detector, piezoelectric detector, position detector IOT modem, RF transmitter, GPS receiver, power force, and solar panel are all part of this system [2].

M.A. Rahman etal. suggest a smart helmet model for accident discovery and prevent. For accident prevent, IR detectors, gas detectors, and cargo detectors are used. Any accident is detected using a 3- axis accelerometer [3]. The Arduino platform is used to interpret detector data and give a communication system between detectors and mobile apps. The mobile operation is linked to a central monitoring system, allowing authorities to keep track of each stoner's accident history. When an accident occurs, the position of the accident is transferred to the monitoring database, which also sends the position to the nearest hospital and police station. The accident discovery system is largely accurate, and it records, detects, and reports incidents in real-time. The rider might use the driving data to more his or her driving. This approach encourages motorcycle riders to wear helmets. A motorbike journey would be more protected and safer with the smart helmet.

The frame of the Connect smart helmet is described by Chandran et al. An intertwined network of detectors, a Wi- Fi enabled CPU, and pall calculating technologies are used to produce the smart helmet for accident discovery and warning. The helmet is intended to identify an accident and incontinently notify straits connections. The danger of an accident is quantified using a 3- axis accelerometer that continuously monitors the motorist's head exposure and helmet position [4]. When the threshold limit is exceeded, an automatic textbook communication is transferred to the danger figures with the motorist's position. The textbook dispatches are transferred out at regular intervals to make it easy for the motorist's connections to find him. Thus, a smart helmet for accident discovery is constructed using universal connectivity.

The two- wheeler safety system, which includes a smart helmet and an intelligent bike, is reliable and intends to help in the settlement, discovery, and reporting of accidents, thus lowering the liability of drunk driving cases. It also has several advantages over previous systems. R, Tejashwini etal. proposed approach emphasizes the significance of precluding accidents and ensures an advanced position of safety in two- wheelers. The maturity of accidents currently is caused by motorcycles. The inflexibility of these accidents is anger by the lack of a helmet or the consumption of alcoholic potables [5]. By applying this system, a safe two-wheelerlift may be achieved, reducing the number of head injuries caused by accidents caused by the lack of a helmet, as well as the number of accidents caused by enraptured driving. In the event of an accident, a GSM modem will shoot a communication to the specified figures have been programmed using a microcontroller.

R. Vashisth etal. introduced the smart helmet. The helmet unit includes an alcohol detector, a helmet on discovery circuit, a fog detector, a GSM module, an TV, a microcontroller ATMega328- PU, an accelerometer for accident discovery, and an RF module. The detectors in the helmet produce the analogy affair. This signal is routed to a comparator, which serves as an ADC. The affair signals of the comparator and detector cinch are decoded as double signals and transferred via the RF transmitter. The RF Module [6] includes a transmitter with a range of 5 measures. It's used to shoot control signals to the bike module for perpetration. It's used to shoot control signals to the bike module so that they can be enforced. ALCHO- LOCK is a function that's used to avoid drunk driving incidents. Accidents are honoured by an accelerometer, which is increased by the addition of a GSM module in the circuit, which is meant to automatically hit one communication to one particular contact and one responsible authority indicating that the existent has been in an accident, as well as a fog detectorto ameliorate visibility in the event of fog or gauze.

III. HARDWARE REQUIREMENT

The hardware elements needed to construct IoT based smart helmet are listed below:

Arduino Uno: Arduino is the open-source platform used for constructing the electronic systems. Arduino consists of both hardware and firmware, and this firmware is usedto write the code and upload into the physical board through the string. Arduino has different kinds of boards but the UNO is one of the most popular boards in the Arduino family.

Figure 1- Arduino Uno

RF transmitter: RF transmitter operates on Radio frequency. It is placed in circuit mounted on Helmet. The RF transmitter operates at a frequency of 434 MHz's. An RF transmitter receives data from Encoder

IC and transmits it wirelessly. RF Transmitter receives periodical data and transmits it wirelessly through antenna connected at pin 4.

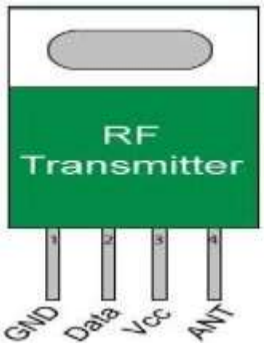


Figure 2 - RF transmitter

GPS: GPS means Global positioning system and it was invented by Ivan A. GPS is a combination of satellites and receiving devices that are used to determine the location of anything on Earth. GPS receivers provide latitude, longitude, and altitude in order to find the location. GPS works through a technique called trilateration which is Used to calculate the location, velocity, and elevation. The GPS consists of 24 earth-orbiting satellites, in 6 orbital planes.

GSM: The Global System for Mobile Communications (GSM) is a principle developed by ETSI. GSM is a digital mobile network that is widely used by mobile phone users throughout the world. A sim has to be fitted into the sim card harborage in modem and can be operated using a mobile device, it can shoot and admit dispatches from registered figures.

Figure 3 – GSM

RF Encoder: This module uses HT12E encoder IC. HT12E is an encoder integrated circuit of 2(12) series of encoders. They are paired with 2(12) series of decoders for use in remote control system operations. It's substantially used in uniting RF and infrared circuits.

Figure 4 - RF encoder

RF receiver: Radiofrequency receiver is an electronic device, used to communicate between two electronic bias which are connected wirelessly. The transmission takes place through the radio swells which are of the form of electromagnetic radiation. The helmet module affair data will be entered by the vehicle module(receiver) and the process will take place by wireless technology.

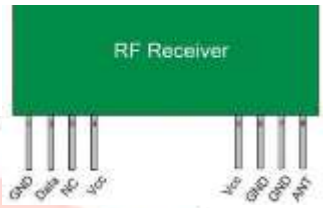


Figure 5 - RF transmitter

Pressure Sensor: An IoT pressure detector is any device that senses pressure and converts it into an electric signal. The position of voltage given out by the detector depends on the position of pressure applied. These detectors enable IoT systems that cover systems and bias that are pressure propelled.

Figure 6 – Pressure sensor

Alcohol Sensor: The alcohol detector is technically concern to as a MQ3 detector which detects ethanol in the air. When a drunk person breathes near the alcohol detector it detects the ethanol in his breathe and provides an affair grounded on alcohol attention.

Figure 7 – Alcohol sensor

Tilt Sensor: Tilt sensors are bias that produce an electrical signal that varies with an angular movement. These detectors are used to measure pitch and cock within a limited range of stir. occasionally, these sensors are appertained to as inclinometers because the detectors just induce a signal but inclinometers induce both readout and a signal.

Figure 8 – Tilt Sensor

Rain drop Sensor: Raindrop Sensor is a tool used for seeing rain. It has two modules, a rain board that detects the rain and a control module, which compares the analog value, and converts it to a digital value. The droplet detectors can be used in the machine sector to control the windshield wipers automatically, in the agriculture sector to sense rain and it's also used in home robotization systems.

Figure 9 – Rain drop Sensor

Servo Motor: Servo motors or "servos", as they are known, are electronic devices and rotary or linear actuators that rotate and push parts of a machine with precision. Servos are mainly used on angular or linear position and for specific velocity, and acceleration.

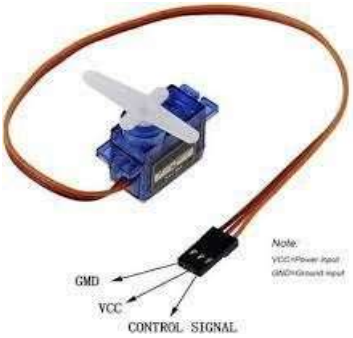


Figure 10 – Servo Motor

LCD display: LCD stands for liquid Crystal display that it uses liquid chargers for operation. It's veritably popular and astronomically used in electronic systems as they're used for displaying information like detectors data from the design. Liquid chargers don't emit light directly but rather use a backlight or glass to produce images in color or snap.

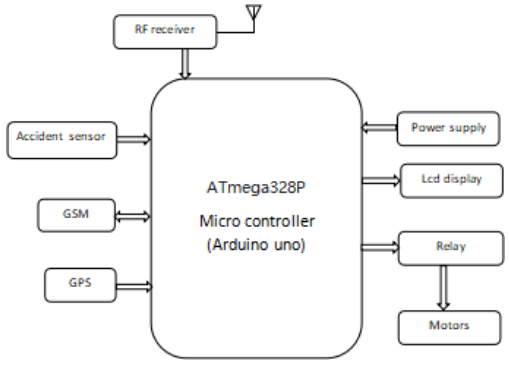
Figure 11 – LCD display

Power Supply: A power force is what's used to give electric power to the boards and generally can be a battery, USB string, AC addition or a regulated power source device. Arduino boards can operate satisfactorily on power that's available from the USB harborage. It provides 5V DC voltage and can be sourced from the harborage from a PC, wall socket appendage or movable power bank.

BLOCK DIAGRAM:

Block illustration correspond of two units Helmet unit and Vehicle unit. Helmet unit correspond of RF encoder, RF transmitter, pressure sensor, Alcohol sensor. Vehicle unit correspond of RF receiver, Tilt sensor, GSM, GPS, Rain drop detector, Motor motorists, LCD display, Servo motor, Power force. The whole system is controlled by Arduino Uno unit. Different functions are controlled by using detectors. The Arduino UNO is placed in the Vehicle unit. The inputs from different detectors are given to Arduino unit and which is analyzed by the Arduino and given to the Vehicle unit by RF transmission. The power force is given to the Vehicle unit.

VEHICLE SECTION:



HELMET SECTION:

WORKING PRINCIPLE:

Motorcycle safety related to different features of the vehicle similar as outfit model, design of the vehicle, and as well as driver skill is special for motorcycle riders has towards the motorbikes. Our design Automatic smart helmet using IoT has two sections one is the helmet section and the vehicle section. Helmet section contains a Pressure Sensor, Alcohol sensor, RF encoder, and RF transmitter. Before starting the bike, the rider should put on the helmet and he/she should make sure they have not consumed alcohol. When the rider put on the helmet the Pressure Sensor inside the helmet will be pressed so by that it is linked whether the rider had his helmet on or not and the alcohol detector in the helmet section will examine the presence of alcohol in the rider's breath. And these two inputs are given to the RF encoder like an Encoder which is a combinational circuit and performs the operation of taking the outside of 2n input lines and producing affair lines and these inputs are given to the RF encoder and transmitted through the RF transmitter in the helmet section to the RF receiver in the vehicle section. Indeed, though there's a key to start the bike but still the rider has to tone- start the bike and that can be done by the motor of the bike when the rider has not whisked up the helmet or consumed alcohol also the Arduino in the vehicle section won't allow the bike to start. If in case the rider met with an accident also by using GPS position is transferred to the registered mobile number. we use GSM to shoot the communication to the registered mobile number. Droplet detector senses the drops and with help of a wiper, the water drops will be wiped off.

CONCLUSION:

The designed Smart helmet ensures the safety of the rider by making it necessary to wear helmet, and also ensures that the rider has not consumed alcohol further than the admissible limit. If any of these high safety rules are violated, the proposed system will help the biker from starting the bike. The system also helps in effective running of the fate of accidents by transferring a SMS with the position of the biker to the police station. This ensures that the victims get proper and prompt medical attention, if he she met with an accident. Two-wheeler riding in stormy season becomes accessible with the use of a Smart Helmet Wiper. It works automatically by seeing the intensity of rain and can be manually terminated with a switch.

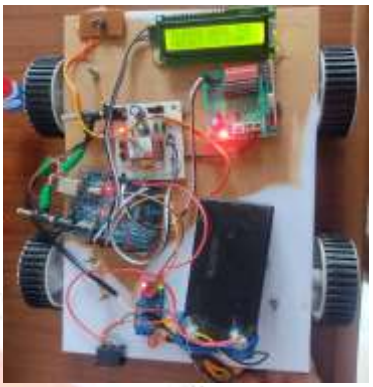


Figure 12 – Please were the helmet to start.

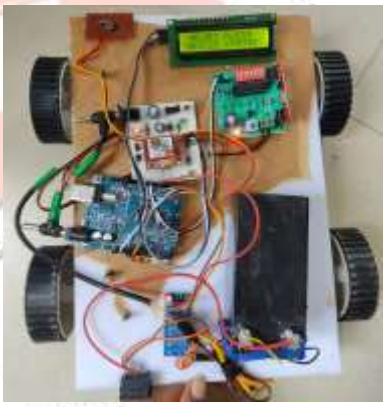


Figure 13 – Helmet placed vehicle started.

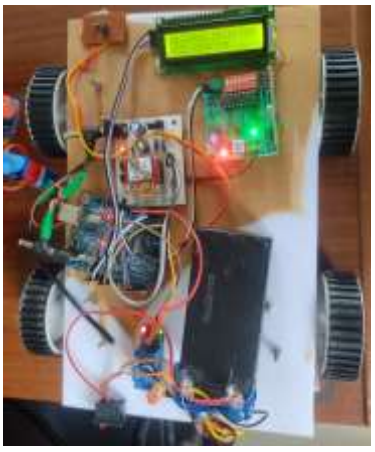


Figure 14 – Alcohol detected SMS sending.

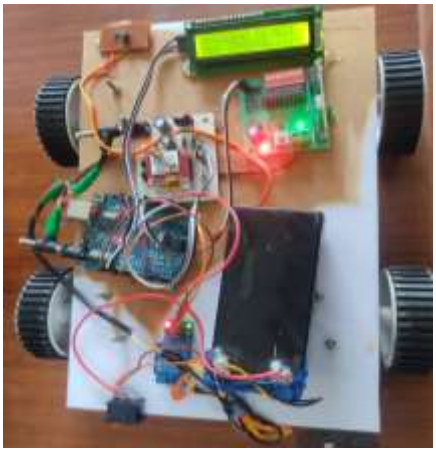


Figure 15 – Accident detected SMS sending.

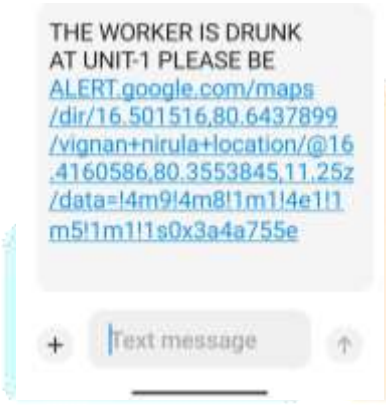


Figure 16 – Message sent when alcohol is detected.

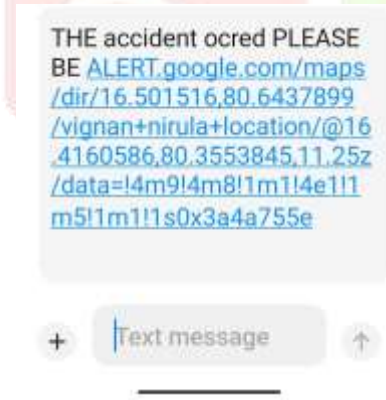


Figure 17 – Message sent when accident is detected.

FUTURE SCOPE:

On the helmet, different bio electric sensors can be installed to track a variety of activities and display the rider's statistics. Voice commands can be used to operate the fundamental bike features. Now, without taking any additional security precautions or special steps, the rider may leave the helmet on the two-wheeler while parking. On two-wheeler, we can use solar power to charge mobile devices and electric automobiles. Artificial intelligence can be used to create self-driving motorcycles in the future, keeping the rider safe and preventing accidents. The use of Nano Technology for designing this circuit can reduce the size of the circuit which will make it easier to be installed on a helmet. Low cost yet more powerful batteries can be used to reduce the overall cost of this system.

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