Smart Helmet Safety System for Bike using NodeMCU for Accident Avoidance

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Abstract— With the increasing number of two-wheeled vehicles, the frequency of accidents is on the rise. Major causes for Accidents are either the rider not wearing a helmet, or he has consumed alcohol and the accident is not reported on time. The person could not be saved because delayed in admittance to a hospital. In this proposed system we proposed a system that can detect an accident, detect the person is wearing a helmet or not and rider is over-consumed alcohol. For this purpose, we use NodeMCU as a Microcontroller and some on board sensors- pressure sensor, MQ-7 sensor, Sensor, Infrared Sensor, and panic button. If the Accident has occurred then the location of the accident is tracked by geolocation API and sends the alert message to the friends with the location of the accident. If a person is not wearing a helmet or over-consumed alcohol then the bike will not be started by stopping the ignition engine of Bike. This system will provide safety to bike rider all the time.

Keywords: NodeMCU, IR Sensor, MQ-7 Sensor, Pressure Sensor

I. INTRODUCTION

The idea of building up this undertaking comes to benefit a few things towards the general public. Step by step the bike mishaps are expanding and prompts loss of numerous lives. Accord to a review of India around 698 mishaps are happening because of bicycle crashes every year. The reasons might be numerous, for example, no legitimate driving information, no wellness of the bicycle, the quick riding of the bicycle, smashed and drive and so forth. Sometimes the individual harmed, the mishap may not be straightforwardly liable for the mishap, it might be a flaw of rider, yet day's end it's both the drivers engaged with the mishaps who will endure. If mishaps are one issue, the absence of treatment in legitimate time is another explanation behind passings. As per the study, India 698 mishaps happen every year, almost a large portion of the harmed individuals bite the dust because of the absence of treatment inappropriate time. The numerous explanations behind this, for example, late appearance of the rescue vehicle, no people at the place where the mishap strike offer data to the emergency vehicle or guardians. This is a circumstance we watch our everyday life, an idea of discovering some answer to resolve this issue think of this thought of giving the data about mishap as quickly as time permits and in TIME. Because after untouched issues a great deal, if everything is done in time, in any event, we can spare a large portion of the lives that are lost because of bicycle mishaps. Considering three main considerations for maintaining a strategic distance from the mishap causes, for example, I. Make wearing the cap necessary. II. Evade alcoholic and drive. III. On the off chance that an individual met with a mishap, nobody is there to support him. Leaving or disregarding the individual he may bite the dust. In such circumstances, educating to emergency vehicle or relatives through versatile to protect him for a degree. The possibility of this work is to give data about the rider wearing the cap or not, regardless of whether the rider intoxicated or not and furthermore, he met with a mishap it gives a data about area where he is met with a mishap through GSM module to versatile numbers relatives, so I have picked GSM innovation to give the data by sending SMS, utilizing GSM module which has SIM card space to put the SIM and send SMS. Sending SMS alone can't support the driver, on the off chance that we send and an SMS saying that mishap had happened where the emergency vehicle will come without knowing the area of the mishap. So to follow out the area where precisely mishap happen utilizing GPS module, and provides for microcontroller, at that point it sends the SMS which contains the scope and longitude of a region to relatives versatile numbers For this we use GPS module to separate the area of the mishap, the GPS information will contain the scope and longitude esteems utilizing which we can locate the exact situation of the mishap place.

II. LITERATURE SURVEY

The purpose of this literature review is to investigate the topic of IoT Based Bike Analyzer: Delivery Boys Safety Mechanism. The following section explores different references that discuss various topics related to our project.

[1] Implementation Of Smart Helmet Deekshitha K J and Pushpalatha S, 2017 In this paper an IoT product called Smart Helmet is proposed, which comprises two units, the motor unit, and helmet unit. It consists of different sensors and transmitter circuitry. The transmitter side microcontroller contains three sensors which are alcohol sensor, vibrate sensor and IR sensor. The receiver side microcontroller comprises an LCD, GSM module, RF recipient, Receive antenna, DC motor, drive L293D and GPS module.

[2] Accidental Identification and Navigation System In Helmet A.Ajay, G.Vishnu, V.Kishoreswaminathan, V.Vishwanth, K.Srinivasan, and S. Jeevanantham, 2017 A system for intelligent helmet has been proposed. This system detects the occurrence of an accident and makes provisions to sound an alert through the use of a GPS and GSM system. This system aims to provide a low-cost intelligent system mainly focusing on the importance of human life.

[3] An IoT based Smart Helmet for Accident Detection and Notification Prem Kumar M, Rajesh Bagrecha, 2017 The objective of this project is to develop a smart helmet is to provide a means and apparatus for detecting and reporting accidents. Sensors, Wi-Fi enabled processors, and cloud computing infrastructures are utilized for building the system. The accident detection system communicates the accelerometer values to the processor which continuously monitors for erratic variations. When an accident occurs, the related details are sent to the emergency contacts by utilizing

a cloud-based service. The vehicle location is obtained by making use of the global positioning system.

[4] IoT BASED SMART HELMET SYSTEM USING RASPBERRY Pi-3 Vinith.G and Dr. K.thangarajan, 2017 Shrewd System for Helmet Detection utilizing Raspberry Pi guarantees cap ownership by a motorcyclist consistently by catching a depiction of the rider's head protector utilizing Pi Camera and affirming object location by cascading technique. The primary thought behind the venture is to diminish street fatalities among motorcyclists. An intelligent LED will caution the rider if the protective cap is not recognized after which the rider needs to guarantee the ownership of a cap or else the System will show a notice message which will win the rider a strike if it is overlooked. An automated e-mail alert generation system is also developed in a reporting module of the proposed system.

[5] Faiz Smart Helmet Faizan Manzoor, Shah Asif Bashir, Aaqib Manzoor, Zain Ashraf Wani, Shahid Mohi Ud Din, 2017 The smart helmet includes the integrated electronic system which uses some of the basic components in the world of electronics. The microcontroller coordinates with the GPS, GSM, WIFI and the sensors. The vibration sensor, pressure sensor, and the accelerometer sensor trigger after a certain value which can cause damage to the motorcycle rider. Once the sensors are triggered above the certain value, the GPS coordinates along with time will send a message to the family members and the server via the WIFI component and GSM.

[6] IMPLEMENTATION AND ANALYSIS OF SMART HELMET Rashmi Vashisth, Sanchit Gupta, Aditya Jain, Sarthak Gupta, Sahil, Prashant Rana, 2017 In this project radio frequency module is responsible for the wireless communication between the helmet and the bike circuit. The Piezoelectric buzzer is used to detect speeding and this feature is extended by limiting the speed of the user. The ALCO-LOCK function is used to prevent drink and drive scenarios Accelerometer detects accidents, and a fog sensor for increasing visibility in case of fog or smog is also used. Another feature known as E-HELMET allows for automatic deduction of the required amount from the user's virtual wallet wirelessly preventing the rider to stop and pay for it.

[7] Intelligent Transportation System for Accident Prevention and Detection Dr.D.Selvathi, P.Pavithra, T.Preethi, 2017 This paper provides an intelligent system for two-wheelers accident prevention and detection for 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. The relay does not ON the engine if these two conditions are not satisfied. The microcontroller controls the function of the relay and thus the ignition. The system also enables detection of an accident at any place and reports about the accident to predefined numbers with the GSM module. The Microcontroller continuously records all the parameters of the automobile for the prevention and detection of an accident.

[8] Mission On! Innovations in Bike Systems to Provide a Safe Ride Based on IOT Archana.D, Boomija.G, Manisha.J, Kalaiselvi.V.K.G, 2017 Our system aims in providing a safe bike ride by the use of the sensor that helps the rider know the approaching vehicles and generate vibrations in the bike's handlebar. When a person starts to ride the bike, the person has to plug in the bike key and the bike coordinate system starts. It is operated through a wireless control system. Most of the time people never mind wearing a helmet. Therefore the helmet is fixed with sensors to detect if the person is wearing the helmet or not. After the person has worn it, the helmet will automatically lock and the bike's engine starts.

III. INTERNET OF THINGS

The Internet of Things (IoT) is an arrangement of interrelated registering gadgets, mechanical and advanced machines, articles, creatures or individuals that are furnished with special identifiers (UIDs) and the capacity to move information over a system without expecting human-to-human or human-to-PC connection.

The meaning of the Internet of Things has developed because of the combination of numerous innovations, constant investigation, AI, item sensors, and installed frameworks. Customary fields of installed frameworks, remote sensor systems, control frameworks, robotization (counting home and building mechanization), and others all add to empowering the Internet of Things. In the purchaser showcase, IoT innovation is generally synonymous with items relating to the idea of the "brilliant home", covering gadgets and machines, (for example, lighting installations, indoor regulators, home security frameworks and cameras, and other home apparatuses) that help at least one normal environments, and can be controlled by means of gadgets related with that biological system, for example, cell phones and keen speakers.

There are various genuine worries about risks in the development of IoT, particularly in the zones of protection and security; and therefore the industry and legislative moves to start to address these. Encompassing knowledge and self-ruling control are not part of the first idea of the Internet of things. Encompassing insight and self-ruling control doesn't require Internet structures, either. Notwithstanding, there is a move in look into (by organizations, for example, Intel) to incorporate the ideas of the IoT and self-ruling control, with introductory results towards this bearing considering objects as the main impetus for self-ruling IoT. A promising methodology in this setting is profound fortification realizing where the vast majority of IoT frameworks give a dynamic and intuitive condition. Preparing a specialist (i.e., IoT gadget) to carry on insightfully in such a situation can't be tended to by ordinary AI calculations, for example, regulated learning. By support the learning approach, a learning operator can detect the earth's state (e.g., detecting home temperature), perform activities (e.g., turn HVAC on or off) and learn through the augmenting amassed rewards it gets in the long haul.

IoT knowledge can be offered at three levels: IoT gadgets, Edge/Fog hubs, and Cloud registering. The requirement for astute control and choice at each level relies upon the time affectability of the IoT application. For instance, a self-ruling vehicle's camera needs to make ongoing snag discovery to maintain a strategic distance from a mishap. This quick basic leadership would not be conceivable through moving information from the vehicle to cloud occurrences and return the expectations to the vehicle.

Rather, all the activity ought to be performed locally in the vehicle. Coordinating propelled AI calculations including profound learning into IoT gadgets is a functioning exploration region to make shrewd articles nearer to the real world. Also, it is conceivable to get the most incentive out of IoT organizations through investigating IoT information, removing concealed data, and anticipating control choices. A wide assortment of AI procedures have been utilized in IoT space extending from customary strategies, for example, relapse, bolster vector machine, and arbitrary backwoods to cutting edge ones, for example, convolutional neural systems, LSTM, and variational autoencoder.

IV. OBJECTIVES OF THE SYSTEM

Smart Helmet is an imaginative method for structuring a head protector for security reason utilizing the most recent and inclining innovation, IoT. Today various nations have made it required to wear head protectors for both rider and pillion rider. Bike motor will turn over just when the rider wears the head protector and clasps the belt of the cap. This will lessen the effect of mishaps. On the off chance that if the rider is flushed, the liquor sensor identifies the liquor substance and prevents the rider from beginning the vehicle. If there should be an occurrence of crisis, the SOS message will be sent to the concerned individual chosen by the client through the cloud framework.

V. SYSTEM ARCHITECTURE

The fundamental objective of the task is structuring a keen head protector for mishap shirking and liquor recognition. The sensors check if the individual is wearing the head protector or not and perceives the alcoholic substance in the rider's breath. If the individual isn't wearing the head protector and on the off chance that he expends liquor, the bicycle won't begin. If there is no indication of alcoholic substance present and cap is utilized, at that point, just the bicycle will begin. Right when the rider met with a mishap, the sensor perceives the state of the motorbike and reports the mishap. At that point, the GPS in the bicycle will send the area of the mishap spot to the primary server of the close-by emergency clinics.
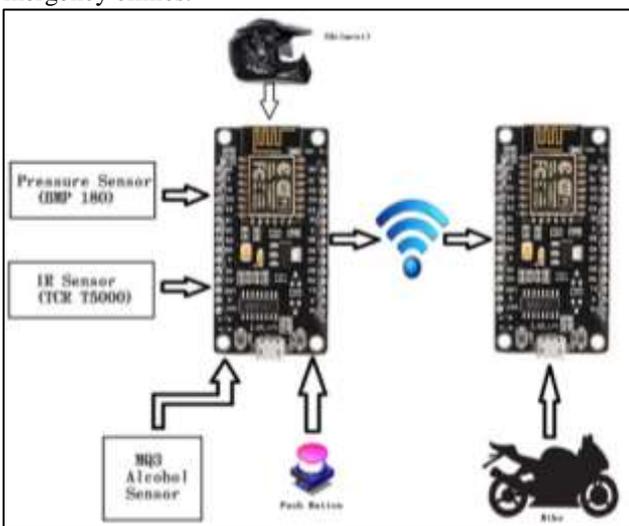

Fig. 1: System Architecture

A. *Hardware Modules:*

1) IR Sensor This IR intelligent sensor Module utilized TCRT5000 IR Sensor to distinguish shading and separation. This sensor module comprises an IR transmitter and an IR recipient. IR Transmitter persistently discharges IR signal which is then reflected by a snag and is then identified by the IR recipient. TCRT5000 Infrared Reflective Sensor Module is regularly utilized in line following robots, object arranging Robots since this module can detect if a surface is white or dark. The estimating separation goes from 1mm to 8mm, and the main issue is about 2.5mm. There is additionally an on-board potentiometer to modify the affectability. The infrared diode will transmit the infrared ceaselessly when the module is fueled ON, when the discharged infrared light has not been reflected or the quality isn't sufficiently large, the beneficiary diode will in the off state and yield stick for example DO will be LOW.

2) NodeMCU: - NodeMCU is an IoT Module dependent on ESP8266 Wi-Fi Module. NodeMCU utilizes Lua Scripting language and is an open-source Internet of Things (IoT) stage. This module has CH340g USB to TTL IC. Highlights of Node-MCU IoT Module
   1) Open-source IoT Platform
   2) Easily Programmable
   3) Low expense and Simple to Implement
   4) WI-FI empowered

3) Weight Sensor The BMP180 is the new computerized barometric weight sensor of Bosch Sensor Tec, with an extremely elite, which empowers applications in cutting edge cell phones, for example, advanced cells, tablet PCs and sports gadgets. It pursues the BMP085 and brings numerous upgrades, similar to the littler size and the extension of computerized interfaces. The ultra-low-power utilization down to 3 A makes the BMP180 the pioneer in control putting something aside for your cell phones. BMP180 is additionally recognized by its truly steady conduct (execution) concerning the independency of the stockpile voltage. BMP180 is the best ease detecting answer for estimating barometric weight and temperature. Since pressure changes with the height, you can likewise utilize it as an altimeter! The sensor is fastened onto a PCB with a 3.3V controller, I2C level shifter and draw up resistors on the I2C pins. The BMP180 is the up and coming age of sensors from Bosch and replaces the BMP085. Fortunately, it is indistinguishable from the BMP085 as far as firmware/programming/interfacing.

4) MQ-3 liquor sensor This is a simple to utilize minimal effort semiconductor Gas sensor Module with simple and advanced yield. This module utilizes the MQ3 Alcohol gas sensor as a liquor gas detecting component. It requires no outer parts simply plug in Vcc and ground pins and you are all set. For Digital yield, the edge worth can be effectively set by an on-board potentiometer. Utilizing this module you can without much of a stretch interface MQ3 Alcohol sensor to any Microcontroller, Arduino or even Raspberry Pi. Since this Gas Sensor module is delicate to liquor it very well may be utilized

in Breathalyzer. MQ3 Sensor additionally has a little affectability to Benzine.

5) Push-button It is going to use as a frenzy button at that development when the rider faces the mishap condition. If the rider is that much all right to push the catch independent from anyone else or somebody close by to him can squeeze that catch to support the rider.

VI. CONCLUSION

There are numerous mishap ID cases. In our work, the precision and exactness are high, which shows that our proposed framework is exact in evading mishaps by utilizing the brilliant helmet which is consist of compelling different sensors to identify high liquor utilization. The correlation of the parameters for mishap discovery shows the significance of the utilization of the helmet. A smart protective cap is a successful answer to some issues. Wearing the protective cap and being calm are important conditions for the bicycle to begin, diminishing the conceivable outcomes of mishaps. Regardless of whether an individual takes alert in some cases, mishaps do happen. Here our motor cut off component decreases the odds of fatalities fundamentally. The keen head protector goes about as a virtual police officer holding the drivers under wraps and making streets more secure.

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