

A Survey on Smart Helmet-A helmet for personal protection and Vehicle Security using IOT

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Abstract : Road accidents and vehicle theft are a major concern in our country. Majority of the deaths have happened due to road accidents that are caused due to negligence of not wearing helmet and drink and drive. Road accidents may lead to severe injuries due to lack of medical treatment immediately. This inspires us to think about making a system which ensures safety of the rider by mandating to wearing of helmet, detect drink and drive, provide immediate medical attention when met with an accident by notifying the guardian and the nearby hospitals with the location details. A system that also prevents vehicle theft through GPS tracking and face recognition which gives access to authorized persons only to start the ignition of the vehicle.

IndexTerms – Accidents, Smart Helmet, IOT , Vehicle Theft, Face Recognition, Tracking.

I. INTRODUCTION

Two Wheelers are a fundamental part of personal transport in India. But, it also involves a lot of accidents and successive loss of lives. Yearly, thousands of youth are in severe conditions due to accidents, and many have injuries that stays lifelong. By Stats, two wheeler deaths contribute for large number of all deaths due to accidents. In a survey done by the health department, it revealed that most of the two wheeler riders that died were not wearing helmet. Along with this, drunken driving is a major factor of accidents. Another problem with two wheelers is that it can be stolen easily. A system that helps to prevent a combination of these problems is necessary for today's society. A system helping in preventing vehicle theft by ensuring authentication of driving through face recognition system which authenticates user being an authorized person. Then linking that to get access to the ignition system is a good idea. Also tracking the vehicle location using GPS Technology would increase the security of the vehicle. To solve accident problems, there are important conditions that must be checked by our system before the vehicle starts. Primarily, most important condition is that we should check whether the rider is wearing the helmet or not. It must be detected using the touch sensors, fit inside the the helmet. Secondly to check is if the rider has consumed liquor. This can be done by checking his breath by using alcohol sensors or the analog gas sensors. Third if a person meets with an accident, the accelerometer must detect the accident and inform the nearest hospital and guardian or family members. We are making this survey for implementing this smart helmet system using face recognition, GPS tracking, helmet detection, alcohol detection and other important features which gives efficient and reliable system than the normal system.

II. LITERATURE SURVEY

In this survey we are discussing various smart helmets with various approaches and methodologies.

Akshatha et.al[1] proposed a mechanism, where sensors such as IR sensor, accelerometer and gas sensor, GSM modem are used. Alcohol sensor is used to check the quantity of alcohol he or she has consumed by checking their breath. The Sensors are interfaced with the PIC microcontroller. The alcohol sensor will detect if he or she has consumed alcohol and it will show on the LED screen. If an accident occurs the accelerometer sense the accident and send information through GPS to the hospital. IR sensor is used to confirm whether the rider is wearing helmet or not. In this system exactness and accuracy are high and ambulance is booked automatically based on location. This system is cost efficient and effective and also used in any type of vehicle.

Shabrin et.al[2] proposed a system consisting Raspberry pi module, Pi camera, pressured sensor, inbuilt Wi-Fi, DC Motor, relay and GPS system. Ignition will start only if it has permission from the raspberry pi controller. There will be standard symbol on the helmet. Raspberry Pi camera is placed on the bike. For image detection Open CV is used. Raspberry Pi will get activated once the user starts the system. Then the camera will get activated and it will start to detect standard symbols. Relay will be closed if it detects a standard symbol and DC motor will start working. If it doesn't detect then DC motor won't start and relay will be open. This system is cost effective and provide better security to the biker.

Navya Sri K et.al[3] proposed a mechanism, where sensors such as Contact sensor, accelerometer and gas sensor, GPS module, GSM modem are used. To check whether the rider is wearing the helmet or not Contact sensor is used. It is an open sensitive circuit which acts accordingly to user actions. The circuit will be closed when the rider wears helmet due to current passage in the body. This confirms that the rider is wearing helmet. Accident is detected by accelerometer. If an accident occurs the accelerometer sense the accident and send information through GPS to the hospital. GPS module is a device that is capable of receiving information from the GPS satellite and then to calculate the device's geographical position. The gas sensor or alcohol sensor was used to check the alcohol percentage in the person's breath. They claim to have high accuracy with automatic ambulance booking based on location.

Tahasin attar et.al [4] proposed a system, where they have taken vehicle theft as their main priority. Their system is based on 4 wheelers. They propose a novel security system based on wireless communication and a low-cost Bluetooth module. They use GSM for sending messages and the user can control the ignition of the vehicle. They have deployed a keypad password which enables opening of vehicle door as well as seatbelt. The vehicle doesn't start if the driver isn't wearing seatbelt. A window intruder can be detected by IR sensor which sends and the Bluetooth module with help of alarm system will send an alert signal to the user's phone. If the vehicle is being towed then the limit switch will get pressed automatically and it sends a command to controller which sends to dashboard through Bluetooth module and the dashboard will send this information to user through SMS with GPS location with an continuous alert beep sound. This system provides high security for the vehicle. The response time here is also less. The system is also realistic. It is also easy to handle. The chances for detection of theft is more as the user will be notified about the status of the vehicle. One of the concerns of this system is that they use microcontrollers whose storage space is quite less. It also isn't fast enough. Lagging issues might occur. This system also requires more power. This system mainly concentrates on security of the vehicle and less on security of the driver.

Montaser N Ramden et.al [5] proposed a system where Vehicle theft is the main focus in this system. An anti-theft system is implemented using GPS and GSM module. Here the location is fetched with the help of google earth. The location is sent via SMS through GMS networks to a GSM modem. The location is more accurate with Kalman Filter. In case of a theft attempt the user can block the gas feeding line and make sure the vehicle doesn't move. The system gives a lot of advantages with high security. The user may wish to not to start the vehicle if he isn't using it. The system is very simple to adapt. There are also a few drawbacks in this system, it will require more and continuous power supply as it uses external software like google earth, MS Excel, KML, etc. Its efficiency may vary on the sufficiency of the communication network. They have used microcontrollers which has less memory and isn't too fast

K Hari Babu et.al [6] proposed a system consisting a transmitter at the helmet and the receiver at the bike. A switch is used to make sure that the helmet is placed on the head. If the switch is in ON state, then the helmet is placed properly. In the helmet the gas sensor is placed close to mouth of the rider to detect alcohol in his breath. A gas sensor is used to detect alcohol in the rider's breath. If any of the two conditions have been violated, then the engine will not go to ON state. If the rider meets with an accident and if helmet crashes, then the controller board is intimated by the sensors, then controller board will get GPS location data with its module in it. If data exceeds minimum stress limit then GSM module automatically sends message to ambulance or family members. This paper provides strong safety measures for the rider. Accident identification is an important feature added here. They do not concentrate on the issue of vehicle theft.

Jesudoos A et.al [7] proposed a technique, where sensors such as vibration sensor, gas sensor and IR sensor, MEMs are used. The gas sensor is used to detect the amount of liquor consumed by checking the breath of a person wearing the helmet. MEMS sensor is used to control the bar of the vehicle. Accidents are detected using vibration sensor. Load checker checks the load of the vehicle. The Sensors are interfaced with the PIC microcontroller. The gas sensor will detect the amount of alcohol consumed by the user and display it on the LED display. If an accident occurs, the vibration sensor sense the accident and send information through GPS to the nearby hospital. To check whether the rider is wearing the helmet or not IR sensor is used. In this system exactness and accuracy are high and ambulance is booked automatically based on location but this system requires internet to intimate the owner. Rakshith KB et.al [8] proposed a system consisting of two sections i.e., helmet section and bike section. The helmet section has alcohol gas sensor to check if a person is drunk and it also contain IR sensor to check whether the rider is wearing helmet or not. LCD display to display the information. The Bike section consists of vibration sensors, GSM network and GPS module. The vibration sensor is used alert in case of an accident. This system is cost effective and provides better security to the user but if driver wears mask the amount of breath exhaled by the user will not be enough for the sensor to trigger the action. It can be told as a drawback.

Nagalaskhmi T et.al [9] proposed a system mainly focuses on theft and accident control. This project is designed to establish communication between the owner and the vehicle over wireless technology, their proposed system is based on raspberry Pi based Embedded System which is used for vehicle monitoring, tracking and controlling over internet which can be accessed through mobile or computer. Along with raspberry pi the embedded system consists Arduino which serves as slave controller attached to raspberry pi which serves as master controller. The commands sent by the user using mobile or computer is received by raspberry pi through internet, this message is sent to Arduino that carries the suitable actions like switching on or switching off the engine. GPS helps to track the vehicle always and will give information to Gmail as cloud. Location is sent in a spreadsheet to the required guardian in case the vehicle stops moving that is if the motor doesn't move. If the alcoholic content is detected, then the Arduino sends the message to stop running the motor. Immediately it updates the cloud over the internet and also to the owner of the vehicle over GSM. This proposed system provides high security by continues tracking of the vehicle location and alerting the owner about the vehicle location and also about the alcohol content. However, this system requires internet to intimate the which may not be available everywhere as it is limited to local area network. Due to more controllers, this system consumes more power and the complexity in assembling this system more.

Maresh R. Pawar et.al [10] proposed a system mainly focuses on designing and development of anti-theft embedded system that uses biometric authentication to access the vehicle. Key component of the system is raspberry pi. The system has camera, vibration sensor and other sensors. They have used 5MP camera having maximum resolution of "2592 x1944", the camera acts as like a transducer and it will take image, this image will be provided to processor for further operation. The vibration sensor detects the vibrations and makes output pin voltage low, directly connected by wire to the controlling unit. The controlling unit is the actual brain of the proposed system, all the inputs are collected as well as processed by this unit and related required action is also taken

by it by means of actuating the output devices. Vehicle control is the internal part of vehicle which is key components of the vehicle ignition system it will be handled by the controlling unit. The operating system installed in this system is raspberry Pi Operating System or raspbian OS. In this system they have used LBPH face recognition. In this system when the drivers face is recognized the engine starts otherwise the photo of the driver is sent to owner's phone or computer. If an accident occurs the information is sent to the registered person. The owner can park his vehicle without thinking of vehicle robbery or misuse of it, because any unknown person who will try to access vehicle will get captured in camera. Car owner can easily see these images on mobile or on computer. It is cost efficient and less complex. The system doesn't provide drivers surveillance. It provides less information and with more investment and many features can be added. The rider can remove the helmet only after the bike is stopped since sensor will lock the helmet automatically. This improves rider's security.

III. COMPARISON

Here we subtly discuss and compare the previously surveyed paper. We also give the methodology and contribution they had.

Table Provides the comparison of the survey on Smart helmet using IOT.

Authors	Methodology	Contribution
Akshatha et.al[1]	Uses Sensors that are interfaced with PIC through the wires. Sensors such as gas sensor, load sensor, vibration sensor, IR sensor and mems sensors are used.	Helps in accident avoidance and alcohol detection.
Shabrin et.al[2]	Consists of Raspberry pi module, Pi camera, Pressure Sensor, GPS system and uses image processing algorithms.	Helps in detecting any issue with rider.
Navya Sri K et.al[3]	Consists of vibration sensor, Contact sensor, gas sensor GSM module, GPS module.	Gives high location accuracy.
Tahesin attar et.al [4]	Uses Limit switch, Bluetooth module, GSM , Microcontroller, and IR sensor module is used to detect the intruder	Provides the high security and also track the vehicle location
Montaser N Ramden et.al [5]	Uses GSM modem, GPS receiver, control relay, current sensor and microcontroller	System can function as remote immobilizer in case if vehicle is stolen.
K Hari Babu et.al [6]	Consists of vibration sensor, Contact sensor, gas sensor GSM module, GPS module.	The helmet detection might not work properly,
Jesudoos A et.al [7]	Uses Sensors that are interfaced with PIC through the wires. Sensors such as gas sensor, load sensor, vibration sensor, IR sensor and mems sensors are used..	System might hang as it needs to process large data
Rakshith KB et.al [8]	Uses MQ3 sensors, Microcontroller unit, DC motor, Heartbeat Sensor, Blinking sensor, Ethanol detector to detect the ethanol in air	This system brings innovation to the existing technology in the vehicles, reduces the rate of accidents taking place
Nagalaskhmi T et.al [9]	This system consists of two controllers Pi and Arduino, Distance Sensors, Motors, Alcohol sensor, vibrating sensor, GPS module, GSM module.	Helps in reducing accidents and controlling thefts
Mahesh R. Pawar et.al [10]	This system consists raspberry pi, high resolution camera, vibration sensor and open source software	Has a strong control unit.

IV. APPLICATIONS OF SMART HELMET

We can use smart helmets in real life as it is a necessity for us. The Smart helmet must be used as the main factor to start the vehicle. It can be used to prevent driving with alcohol content in the body, It also provides security as it tracks the location of the vehicle. A camera module also multiplies the safety factor of the vehicle. Hospital Intimation is a great way to stop deaths due to accidents.

V. CONCLUSION

Our survey demonstrates a Smart helmet for accident avoidance, rider safety and vehicle theft. If the helmet is designed with accelerometer, touch sensor, alcohol sensor, GPS module, camera etc., and is cost effective, user friendly then it will be best for the society. To avoid drunk and drive, use of alcohol sensor or gas sensor to detect the consumption of the alcohol and once alcohol is detected the vehicle automatically must stop. This is a decent solution for the everyday problem. A system intimating the nearest hospital in case of an accident with tracking of vehicle using GPS location of the vehicle which also gives security.

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