AN EXPERIMENTAL STUDY ON ADVANCED LANE CHANGING SIGNAL ASSIST TECHNOLOGY WITH SMART HELMET

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ABSTRACT

Nowadays accidents are an increasing concern all over the world. In present scenario accidents are happening due to the factors of improper implementation and usage of helmets while driving. Un-Prediction of other vehicle motions, utilizing low-quality helmets. All this carelessness and irresponsible activities play a dominant role in accidents that are leading to cause of death and disability. Helmets play a major role in protecting a human head injury in case of accidents. The purpose of this research is to create a smart and secure electronic helmet that plays a vital role in protecting human lives from accidents and this helmet help to send and monitor the information about the vehicle and also the person driving the vehicle. This research mainly focuses on indicating alerts to the driver about the surrounding vehicle movements while “changing the lane” and also helps to navigate the driver incorrect way for travelling. A high-speed motorist without a helmet has a very harmful impact that may lead to death. Helmings will mitigate injury and save a life. The goal of this project is to increase motorcycle driver safety. If the limits of their speed are breached and cars reach the surrounding vehicle struck, motorcyclists shall be warned. The new cloud-based communications helmet program would transmit messages to the receiver material of the network. Many countries are implementing regulations that require the driver to wear a helmet while riding his motorcycle. Most accidents are caused by reckless driving, drunk or mobile phone use, while traffic laws and rules are violated. Many people lose their lives due to late notification of accident due to that the people are not able to monitor the accident area's precise GPS coordinates. The significant explanation that people get hurt in the head if they don't carry a cask while pushing the wheel. The Force Sensing Resistor (FSR) is used for measuring the driver's head and motorcycle acceleration. Just when the driver humps the helmet is the engine ignited. A LED will flash in the helmet while some obstacles or critical risk. Thus this research helps the researches for implementing and adopting the helmets in various aspects of security and protection of humans in future studies.

KEYWORDS: Smart Helmet, Gyroscope, Lane Changing, Signal Indication, Secure and Protective Helmet & Internet of Things GPS Module.

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1. INTRODUCTION

The Project is mainly aimed at tracking, preventing and warning incidents [1]. This is achieved with the high-safety Smart Helmet device. Most accidents are the product of reckless travel, drunken driving, cell phones and road violations and laws. Often people are lost to their lives because of late accident reports that they were unable to trace the accident area's precise GPS location [2]. To solve these issues, we have initiated this research has been implemented. The main cause of head injuries to many while driving is due to helmet low qualities and also without wearing a helmet. The reason many riders don't wear a helmet is that they feel uncomfortable and suffocating while wearing it. In recent year's research have shown that wearing a helmet able to reduce the risk of a drastic brain

injury and loss of lives because during an accident because of fall or collision of vehicles, most of the influence power is taken by the helmet, instead of your head and brain [3]. Two-wheelers require to take extra care and precautions to protect the body. The most prime place to begin by protecting the brain. The brain and head are most endangered to injury in a motorcycle accident. A motorcyclist wearing helmets grow the chance of survival remarkably over non-helmet wearers. Helmets are considered as a device secure head protector that has been developed over the years. Most of the countries and administration need to use secure headgear while during a motorcycle or bike. Various countries forcing the rules wear a helmet while driving vehicle especially concerned to two wheeler's rider need to when driving on their motorcycle, Malaysia is an instance of that kind of country. There has been many a trail to institute federal regulations of necessity helmets. Helmets had embedded with an electronic circuit which has been used in any kind of workplaces [4-6]. In present research sensors and lane, changing plays major role actions like driving, riding, cycling, racing, a helmet with integrated sensors would provide maximum satisfaction and the chance to monitor the vehicle condition and surroundings condition simultaneously GPS receiver is generally isolated and unique, tiny chip (IC) when utilized in embedded applications. The chips are normally placed on aboard. When the chip is mechanized by voltage and receives the satellite signals, the chip emits a stream of NMEA (normally) encoded position data [8-9]. The current helmet also has features like GPS, GSM, alcohol detectors, airbags, camera, alarm and other facilities. therefore it has some downside, even though the helmet peaks in trend unexpectedly, the GSM can immediately send messages into emergency contacts, GPS displays only latitude and longitude but not visual locations [10]. The GPS is more convenient for drivers to contact immediately to the database contacts and alerting emergencies [11-12]. The primary objective of this research is to prevent accidents and to identify riders when they experience accidents.

1.1 Arduino In Safety System

Arduino is computer hardware, technology, venture, and developer community open-source that develops and produces one-board microcontrollers and microcontroller modules for creating electronic devices and objects in that control and senses the object in the physical world. Arduino board models use a range of micro and controller applications. The boards are supplied with sets of I / O pins that can be interfaced with specific extension boards (shields) and other circuit board [13].

1.2 Alcohol Detecting Sensors Embedded In Helmet

The sensor mounted in the mouth of the helmet interfaced with the IoT [14], The sensors senses whether the rider is intoxicated or not. Also allows the rider to begin the ignition when (BAC>0.03) the alcoholic level is disabled. If the rider is non-alcoholic, it is permitted to a safe drive.

Figure 1: Sms-Alerting System Drunk & Drive.

1.3 GSM and Clouds On Helmet

If an incident happens in elevated pressure, the pressure sensor detects the pressure point; when it becomes greater than that amount, the device (GSM) intimates alerts and the system vibrates as it is known that the incident is happening. [15]. For the person as soon as possible to reach the hospital. It preserves the data in the cloud and keeps records. When the accident happens on several locations, the cloud gathers data from the GPS and GSM controller and then from the internet, which transmits messages to the ambulances, the police, the community and the local hospitals. To get the patient to the hospital as soon as possible. It stores data in the cloud and keeps records. So the government may display the accident area database and declare this region a vulnerable zone.

1.4 GPS Module On Smart Helmet

GPS only displays latitude and longitude with a precision of the accident zone. The GPS Mapping shares an exact zone of the accident that gives a clear view of saving the man. GPS controls the exact location of the crash. GPS sends information to cloud-based services, where the image is shot with a 360 ° camcorder and accessed by a protection algorithm where the data are available only to emergency contacts. In Google map, a program was developed to indicate and display GPS navigation [16-17]. In Google map, a program was developed to indicate and display GPS navigation.

1.5 Force Resistor Sensing (FSR)

Sensing of force resistance (FSR) shown in the fig. structure. Force Resistance Sensing (FSR) 1 (a) must be installed inside the helmet as a tactile sensor to determine if the wearer is wearing his helmet. It consists of a low-resistance and increased pressure system for Polymer Thick Film (PTF) on the active surface[18].

2.0 INTERNET OF THINGS

The "Internet of Things" (IoT) is a network of virtual devices, automobiles, home appliances and other objects that have been built into computers, software, sensors, actuators and networking to communicate and exchange information. The IoT enables objects to be remotely sensed and managed through existing network infrastructures, creating opportunities to incorporate physically the environment more directly into computer systems and leading to increased performance, precision, and economic value as well as a reduced human response. The IoT platform is expanded with sensors and actuators and is an indicator of a broader variety of cyber-physical networks, including innovations like smart grids, electric power plants, smart houses, smart infrastructure and smart communities. These systems collect useful data from various existing technologies and then autonomously move data between other devices. The sensor is an instrument, a device, or a subsystem that aims to detect and send information to other electronics, often a software processor, for events or changes in their environment.

2.1 IoT Based Smart Helmet

The intelligent helmet is an innovative method of designing a helmet with the current trends using IoT technology for safety purposes. At present various countries have made it mandatory for riders and pillions to wear a helmet. Only if the driver removes the helmet and buckles the seat belt will the motorcycle alert the signal and the engine gets turned off. The risk of collisions will be minimized. If the driver is intoxicated, the alcohol detector will sense the alcohol level and prevent the rider from starting the car. SOS notifications will be sent to the person chosen by the user in the event of an emergency through IoT Applications.

i) Sensors

A sensor is quite easy as light and complex as a device with other electronics. For everyday objects such as touch-controlled controls, elevator buttons and lights, sensors are used, which damp or brighten when touching the unit.

ii) Proposed System:

The core element of the system is the Arduino board that manages and regulates all features carried out by the other devices. The element instructions are provided in the Arduino programming language.

Arduino is a physical programmable circuit board and a software module or IDE that operates on a device and which we use to write down and upload software code to the physical board. This model consists of the following components,

- MPU-6050 3-Axis Accelerometer and Gyro Sensor senses and tracks the co-ordinate system-based values and sends a signal on the monitor.
- The MQ3 Gas Sensor has high alcohol sensitivity to detect the concentration and sends a signal to stop the vehicle. Digital and analogue outputs in this unit.

iii) Pressure Sensor

Piezo electrical detector is used by the electrical charge to calculate variable changes including stress, temperature, acceleration and force of the dynamic motions.

iv) Smart Alerting System

According to Suhaib Muhammad [21] The utilization of cloud computing renders numerous benefits, When the rider wears a helmet and buckles it, the pressurized sensor sense and alarms to precautions of proper fit of a helmet. When a driver encounters an accident, SOS message will be sent. The software Ios, Sensors, Wi-fi and Cloud can be used. The Android app analyses the information and performs specific actions to the individual concerned over the cloud as shown in figure 1 & figure 2.

Figure 2: Sms-Alerting System During Accident Occurrence.

v) Acceleration

Acceleration can be stationary, like inertia, and dynamic acceleration can be rapid movement or vibration. Arduino is an open-source, software-and hardware-based electronics system. Boards of Arduino can read the input-a sensor signal, a hand on a key, message-and convert it into an output-by switching on a vehicle, turned on an LED or posting it digitally. This model fitted with the camera mounted on a helmet through which the incidences can be captured or stored in the data

storage device.

vi) Outcomes on Embedded API in Helmet

To demonstrate the impact, we used the Google Map API as mentioned in the fig.3. Drivers can be cautious when driving the Google street view [17] from the camera is a snapshot of the road condition. On google road view there is a purple sign to signify the limit breaker. Such results reveal that our approach works with the best results.

Figure 3: Google Street Visible through SMART Helmet Monitor System.

vii) Detecting Bumps, And Other Obstacles

Suhaib Muhammad [18] established a model how to detect the obstacle and deal with the conflicts, The traffic crash cannot be wiped away, but the state of the path towards the car's driver can be illustrated. In this report, to ensure a safe drive by implementing IoT, we propose a design that connects that device with another device to help prevent road accidents. Using real-time deployment capabilities in the Android software, design outputs (longitude, latitude and speed, acceleration information for vehicles) are collected in this situation. The design consists of two computer technology. The primary motivation is to provide an in-house traffic control network in real-time, ensuring safe, accident-free and fast driving.

viii) Impacts of Velocity of a Vehicle Over Time

The frequency of the vehicle is defined through the approached design and research as compared below in Table.1. Using IoT and accelerometer sensors. The drastic variance on the velocity of the vehicle overtime period can be observed. This condition suggests that in these places there are potholes and speed-breakers / bumps.

Table 1: A Comparison Study on Existing and Advanced SMART Helmet

Existing Smart Helmets Features.	Lane Changing signal Assist Helmet Features.
Inbuilt cooling fan to keep the heat away from the tight space on the Head.	1) We have Lane changing Alert System which assists the driver of an upcoming vehicle from the back.

Inbuilt Bluetooth system to connect devices wirelessly.	2) We have Alcohol Detection Sensor which Does not allow the Connected bike to start so that drink and drive can be avoided.
Accident alert system to send the signal to the selected phone numbers.	3) We have Ultrasonic sensor to sense that the rear vehicle has maintained a safe distance or else it can be alarmed.
Cell phone charging with the solar power to avoid charge running out.	4) We use LED's and buzzer for better alarm detection during the night time as well as during the heavy noise or crowded places.
Acceleration and Gyroscopic Sensor for Stability and Impact Alert.	5) Additional to all above we also have the normal smart helmet features like location tracking and alarming, acceleration and gyroscopic sensors etc.

3. EXPERIMENTAL SETUP

In this paper, the proposed Advanced SMART HELMET for Daily Applications of Motor-Drivers and The best safety assured helmet has been developed using IoT, Arduino programming. This helmet incorporated with advanced safety alerting technology, Drunk & Drive, i.e., less safety higher allocation of alerting technology has been followed up in the helmet. This helmet had designed with monitoring, the gyroscope of balancing, alcohol detecting, distance detecting, helmet lock connecting and disconnecting and other specifications with advanced technology had been implemented. The proposed technology represented in schematic representation below fig.4. This research brings advanced technology to all people to afford and drive safety lives.

Figure 4: A Flow Chart: IoT-Based Detecting Technology Schematic Representation.

ii) Complied Result

Figure 5: An Aurdino Program Compiling.

iii) Working Model

Figure 6: Proposed Working Model.

4. DISCUSSIONS

- The Purpose of this above research is to increase the Biker road safety as well as provides him with the assist and control of different driving parameters using simple Sensors, Microcontroller (Adriano Uno), Jumper Wires, Programming's etc.
- This Research can be further Updated in future with many other IoT based Technologies making the Two-Wheeler Driving more Safer and Easier till then we need to focus on minimising the accidents on the roads and how to overcome from it.
- Finally, with the Overall research with our working model it can be concluded that this Smart Assist Helmet will be very useful, Cheap and easy to use as compare to other normal helmets present in the market.
- Regardless of the denominator is used (residents, registration of motorbikes and motorbike crashes), States that have complete helmet laws were generally at lower rates of death— associated with accidents than states that have no such legislation, even when stratified by area.
- However, the total motorcycle mortality among law groups was similar.
- The Registers or crashes have the fivefold-to-six-fold risk of head injury to motorcyclists who died in crashes compared to people who died with other motorcycles and other accident statistics.
- Thus, This Research had considered all these above-mentioned problems and proposed a Modern and Smart Helmet for the safety of every individual.

5. CONCLUSIONS

The foregoing conclusions are focused on: in this new field study, many scholars have taken careful note of the above inquiries and have explained the foregoing: The following:

The intelligent cask is a sophisticated and versatile product which can be built and run at low cost which does not undermine the safety mechanism. It also offers several effective advantages over established crash monitoring and alert networks which rely heavily on data information from cellular devices of drivers. Our proposed design would warn users and safely avoid injuries, intoxicated or travel through pace. In particular, it will integrate a cost-effective camera costing a few bucks with a safety device such as the helmet and incorporate the image processor with its innovative algorithm. In this paper, a new approach is presented in the form of an intelligent helmet that incorporates video processing to improvise the protection of motorcyclists. The paper provides a new algorithm for detecting vehicles from the rear end, the side edge of the bike as well as a methodology for warning the driver of their distance. Further protection, particularly while the driver turns and also avoiding false alarms due to stationary vehicles was also taken care.

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