SMART HELMET EMERGENCY ALERT SYSTEM

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ABSTRACT

Normally in our day to life we have many questions running in our mind, still we drive on those situations. People who drive motorcycles know that they are in danger but the importance of safety is not something to be ignored there. In 2016, Texas motorcycle crashes killed 463 motorcyclists, half of which were not wearing a helmet. A helmet not only protects your brain and your head but also protects your face. This smart helmet has the special idea which makes motorcycle driving safer than before. This is implemented using Router fixed in smart cities. This has the connection established between router and helmet. The working of this smart helmet uses sensors which are placed in different parts of the helmet. When the person who met with an accident, the helmet hit the ground and the sensors sensed the information and gave it to the microcontroller board. Then the controller sends the data using the Router that is interfaced to it. When the data exceeds the minimum stress limit, Router automatically sends a message to the nearest medical center that is already programmed where to be sent. Later on, for every 10 seconds of 15 minutes the direction, distance and tilt value of the helmet is monitored. By applying the binning and clustering methods, we can easily identify whether that person met an accident accurately and also minimize road accidents. In this Project we design a smart helmet with an emergency alert using machine learning.

Keyword - *Machine Learning, Helmet, Alert system, Clustering, Binning*

1. INTRODUCTION

In the research and development of growing crops under agriculture, AI has shown improvements in the yield of crops. AI also predicts the time is taken for fruits like tomato to get ripped thus it helps the efficiency of farmers. Most of the online shopping websites have the data that we searched so next time when we go there they will automatically display the suggestion related to our previous search [6]. Here, Google Analytics has the information of search and its analysis of what we need. Implementation of artificial in the online has a small bit of data behind every transaction and every link followed which personalizes the experience. Due to personalization results, we get the alert or popup message in what we are interested in and categories our demand and supply. Some of the tasks are very difficult for the human to perform but the robotic automation completes it. Implementing machine learning algorithms on and CRM platforms will help to analyze the uncover information on customer service. [5].

Road safety is a major issue nowadays. According to the world health rankings, road accidents caused an estimated 23.87 death rate in INDIA. Most of the accident occurs due to rash driving and not wearing a helmet this result in serious injuries. Many people don't realize the importance of wearing a helmet. During an accident, most of the impact is absorbed by the helmet rather than your head and brain. People are charged when they don't wear helmets, yet they completely ignore the significance of it and the value of life. We've found a way to make helmets compulsory who is riding a bike. A helmet not only protects your brain and your head but also protects your face [7]. The purpose of wearing a helmet is safety, this provides better than before. This is implemented using Router fixed in smart cities. This has the connection established between the router and helmet. The working of this smart helmet uses sensors that are placed in different parts of the helmet. When the person met with an accident, the helmet hit the ground and the sensors sensed the information and gave it to the microcontroller board. Then the controller sends the data using the Router that is interfaced with it. When the data attains the minimum limit, the Router automatically sends a message to the nearest medical center that is already programmed where to be sent. Later on, for every 10 seconds of 15 minutes the direction, distance, and tilt value of the helmet are monitored. By applying the binning and clustering methods, we can easily identify whether that person met an accident accurately

and also minimize road accidents. In this project, we design a smart helmet with an emergency alert using machine learning [8].

2. RELATED WORKS

The existing model of the smart helmet has wireless communication between the helmet and mobile phone. These types of helmets have sensors embedded in them which helps to detect the accident and sends the emergency alert to pre-fixed contact. Some other designs have control over the speed of the vehicle. The major components (such as sensors) which are required are placed in the helmet which monitors the vehicle's speed and instructs the rider to increase or decrease the speed of the vehicle [5]. This has the following disadvantages:

- The rider will not wear the helmet where the police are not present and in areas where are less traffic.
- Checking every person for the consumption of alcohol in India is not advisable.
- There is more difficulty in maintaining the traffic rules by traffic police.
- If the helmet is unfortunately the alert will be sent to the emergency number.

Advantages

- Providing the safety of riders and gives an alarm when any vehicle is nearer.
- The unwanted alert will not be sent as if the helmet is fallen, unfortunately.

2.1 Ultrasonic Sensor

An ultrasonic sensor is an electronic device that helps to calculate the distance of a goal or a target object by releasing ultrasonic sound waves through the sensor and finally converts the sound waves into an electrical signal. The waves will traverse faster than the sound waves.

It has two main components:

- Transmitter (it releases a sound using piezoelectric crystals)
- Receiver (it experiences a sound after it has traveled to and from the goal/target.

To calculate the distance between an object and the sensor, the sensor measures the time taken between the emissions of sound by the transmitter to its contact with a receiver

The formula to calculate the distance between sensor and object is,

$$D = \frac{1}{2} T \times C \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots.\text{equation (1)}$$

D-Distance between sensor and object

T-time

C-speed of a sound (i.e.343 m/s)

2.2 Tilt Sensor

The second output is a tilt sensor. This device produces an electrical signal that differs from an angular movement. it is used to measure a slope and a tilt within a limited range of motion.in some cases, it is referred to as inclinometers because the normal sensor generates the only signal, but inclinometers generate both signals and readouts. This sensor consists of rolling balls with a conductive plate above a rolling ball. When the sensor gets or connects to power the rolling ball falls to the bottom of the sensor to produce or form an electrical connection. at the same time when the sensor is tilted the rolling ball doesn't fall to the bottom so current cannot flow the two end terminals of a sensor [7].

2.3 Alcohol Sensor - MQ3

The alcohol sensor is a semiconductor sensor and, it costs very low. These sensors can detect the presence of alcohol content or alcohol gases at a concentration from 0.05 mg/L to 10mg/L. The materials used for this sensor is SnO_2 which has conductivity lower in clean air. When the content or concentration of alcohol gases is increasing then the conductivity of SnO_2 also increases. It has a high sensitivity to alcohol and has better resistance to disturbances due to vapor, gasoline, and smoke. This sensor or module provides both digital and analog outputs.MQ3 alcohol sensors can be easy links with microcontrollers. It is suitable for detecting alcohol content or concentration on your breath, like your breathalyzer. It has a fast response time and has a high sensitivity. This sensor provides an analog resistive output based on alcohol content.
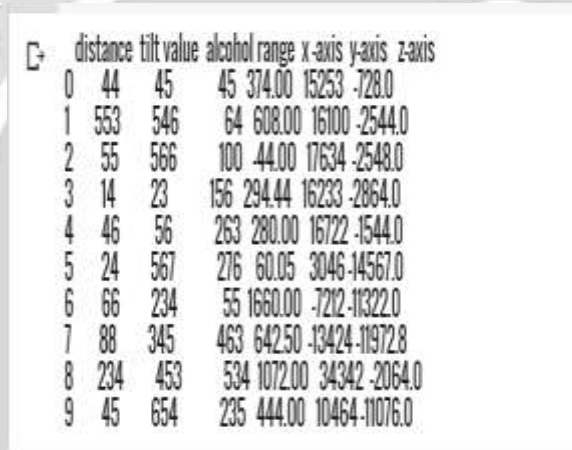
2.4 Gyroscope Sensor

A gyroscope sensor is a device that can measure and maintain the orientation and angular velocity of an object. These are more advanced than accelerometers. These can measure the tilt and lateral orientation of the object whereas an accelerometer can only measure the linear motion. Gyroscope sensors are also called Angular Rate Sensor or Angular Velocity Sensors. These sensors are installed in applications where the orientation of the object is difficult to sense by humans. Measured in degrees per second, angular velocity is the change in the rotational angle of the object per unit of time [8].

3. PROPOSED SYSTEM

Here machine learning plays the major role in the detection of accident. This also checks the rider has consumed alcohol or not. And the distance sensor will give alarm when the other vehicles reach near to us. The sensor values are monitored for every 10 seconds, and then they are grouped under binning and clustering method. When there is no danger the values of sensor will be constant. If the person met with the accident at that time values at sensor reaches the minimum stress level then will microcontroller board sends this information to router and the router will send the an alert with its location as there is an emergency. All the hospitals are provided with portal, at the time of emergency an alert will be displayed in the portal. If the hospital doesn't respond within 15 seconds then it will be sent to next nearest medical center that will be pre-defined where to be sent. If the helmet falls downs with huge force and there is possibility of sending the alert to rectify this issue we made a button if it is pressed in 10 seconds within after fallen or unfortunately hit somewhere there no alert will be sent.

3.1 Data set Description

- The below given is the values that are given as output of the sensor
- The first column give the distance (i.e. the distance from the nearest object from the helmet)

	distance	tilt value	alcohol range	x-axis	y-axis	z-axis
0	44	45	45	374.00	15253	-728.0
1	553	546	64	608.00	16100	-2544.0
2	55	566	100	44.00	17634	-2548.0
3	14	23	156	294.44	16233	-2864.0
4	46	56	263	280.00	16722	-1544.0
5	24	567	276	60.05	3046	-14567.0
6	66	234	55	1660.00	-7212	-11322.0
7	88	345	463	642.50	-13424	-11972.8
8	234	453	534	1072.00	34342	-2064.0
9	45	654	235	444.00	10464	-11076.0

Fig- 1: Dataset Description

```
dst and tilt
0   True
1   False
2   True
3   True
dtype: bool
tilt and acl
0   True
1   False
2   False
3   True
dtype: bool
[]
```

Fig-2: Finalized value for emergency alert

The alert will be sent where the conditions are true. Binning is a way to group a number of more or less continuous values into a smaller number of "bins". In our data set we obtain values from the senor for every second. Here every five second once the data are binned and then it is analyzed.

4. CONCLUSIONS

The developed analysis will help to save the rider when any accident happened. When the accident happened at night times there may be no one to intimate. It provides automatic alert thus saving the riders life. It also detects the alcohol consumption.

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