Design and development of Smart helmet

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Abstract

Smart helmet provides safety to the driver by making an intelligent helmet with sensors and AI. Rider gets a warning when he is prone to accident and thus safety of rider is increased. Multiple sensors such as force sensor, breathalyzer, vibration sensor and GSM module. Making a smart helmet contributes to the overall digitization and can ultimately be useful in making the bike smart. GSM module is used to send SMS to SOS contact when the rider has met an accident. Accident is detected using various parameters from sensors and making a prediction based on algorithms. Accuracy of prediction model will keep on increasing with increase in data collected and making analysis using random forest algorithm. The current accuracy of the predictive model is 70 percent.

Keywords- *Alcohol Breathalyzer, Accelerome- ter, RF module, GSM, Vibration sensor.*

INTRODUCTION

With advancement of technology in all sectors, we are moving towards a digitized use of all devices. Cars have already integrated with technology and it is necessary to make bike riding secure. Collection of data has significant impact in making in making the device smart. Real challenge for smart object is making a real time prediction. This is made possible by using microchips and microprocessors. Various signals are recorded and a prediction is made. At the same time the data is sent to predictive model in database. In the periodic time, the data collected is reanalyzed and predictive model keeps on increasing. [1]

This is made possible by using various AI models. Analyzed data provides the threshold values to the sensor and a fast prediction is made. Thus, increasing the security of the bike.

The major component of this project is the artificial intelligence predictive model. This model works on both analyzing the user and giving a warning to the user when it is prone to accident. When the critical condition is encountered by the rider a message and a call is sent to the given SOS contact. This can be used todetermine the location and call the ambulance.

For detection of fall, force sensor is placed which determines impact. Apart from this accelerometer is used along with vibration to determine the probability of accident. Alcohol sensor is used to detect if driver is drunk or not as drunk driving contributes to large part of accident. If the driver isfound drunk a warning is issued.

It is evident from the analysis of data that even after digitization over the years, ambulance still fails to reach the accident in over 60 percent cases. It is improved drastically when the SOS contact will receive the information about the accident of rider. When the driver is driving after being drunk its SOS contact will receive information and can contact the user. This project works on making a secure device to be used alongwith helmet and can improve the security of driver significantly.

I. Technologies used

A. Force sensing resistor

The force sensing resister is placed in the area where the probability of impact is highest. [2] The FSR can be used to detectthe intensity of the impact as it is one of the more important factors in determiningthe severity of an accident.
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B. MQ3 alcohol sensor

MQ-3 gas sensor is used for detecting the presence of alcohol content in the rider's breath. It can be placed just behind the mouth guard of the helmet.[3] The sensor works on the concept of heat sensitivity. Initially the sensor needs to be warmed up for specified amount of time to achieve maximum accuracy.

C. Accelerometer

[4] The ADXL345 is a tiny, tri-axial accelerometer with resolution of 13 bit.
It produces a digital output and uses a 16 bit 2's complement data. It can be connected using an I2C interface. The main aim of using accelerometer in smart headgear is to determine the sudden change in riders' acceleration that may be indicative of an accident. ADXL345 is used for both measurement of static and dynamic acceleration. This data along withFSR's and vibration sensor's reading is taken as parameter for accident predictive model.

D. Vibration sensor

Digital vibration sensor is a digital Plug and Play sensor block.[5] The vibration sensor is small compact module which is place inside the helmet.

The main aim of adding vibration is to improve the accuracy of the predictive model which is done by taking the amount of vibration as a quantifiable value in the parameter.

Conclusion

Helmet is an essential part of the bike thatprovides some safety in the case of accident.

However there hasn't been much advancement to the helmet. The goal is to create a smart headgear which not only safeguards the rider but also help in preventing the accident in future.

Machine learning has been integrated into the system which in turn enrich the data supply. It was aimed at bringing the real time data from the Iot model for real time analysis. This feature is integrated with headgear without hampering its normal functionalities.

REFERENCES

[1] Israel Campero-Jurado, Sergio Márquez- Sánchez, Juan Quintanar-Gómez, Sara Rodríguez and Juan M. Corchado, Smart Helmet
5.0 for Industrial Internet of Things Using Artificial Intelligence, 27 October 2020

[2] A. S. Sadun a, J. Jalani b, J.A. Sukor,Force Sensing Resistor (FSR): A Brief Overview and the Low Cost Sensor for Active Compliance Control,July 2016

[3] N. Manjunathan, P. Rajesh, A. Suresh, Drunk and Drive Detection Using Iot,5 March, 2019

[4] Davey T. W. FONG, Joe C. Y. WONG, Alan
H. F. LAM, Raymond H.W. LAM and Wen J. LI, A Wireless Motion Sensing System Using ADXL MEMS Accelerometers for Sports Science Applications, June 15-19.2004

[5] Aiyin Guo,A Vibration Sensor DesignResearch,4 April 2014