ASSISTANCE AND ACCIDENT DETECTION USING SMART HELMET - SKULLMATE

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Abstract- Even though there has been tremendous progress in recent years, the safety of motorcyclists on the road is still not guaranteed. One cause of the accident or death among motorcyclists is negligence in wearing helmets. However, creating awareness among riders and detecting the accidents immediately can reduce risks to a large extent. Our proposed model primarily focuses on an advanced helmet, which acts as an assistant to remind the rider to wear a helmet at the start of the journey, and to intimate to the victim's loved ones immediately in case of accidents.

Keywords- Helmet detection, accident detection, Arduino Uno, Accelerometer - MPU6050, Bluetooth module - HC05, RFID reader - MFRC522, Force sensing resistor.

I. INTRODUCTION

As we all know about every brand in the market for vehicles, especially that of motorcycles, it has facilities, advantages and sophistication of its own. Although progress is increasing, the safety of motorcyclists on the road is still not guaranteed.

One cause of the accident or death among motorcyclists is negligence in wearing helmets. Because the accident rate for motorcyclists is increasing from safety negligence helmet for Motorcyclist is proposed which is inspired by its security features for motorcycle riders.

Road accident is one of the major problems all over the world. A recent report says that the annual average rate of road accidents is estimated to be about 14, 00,000 of which about 10 percentage occur in India which has overtaken China. The annual statistics revealed by the World Health Organization (WHO) as shown in following figure in its Global status report on road safety says that around 1,46,000 people are killed on Indian roads due to rash driving, and less usage of helmets. To overcome this problem, a system called Accident Detection, using a smart Wireless Safety Helmet is introduced.

II. WORKING

There are two main parts in this project which are used for helmet detection as well as for accident fall detection :

(i) Helmet Detection:

As soon as the rider starts the bike, a buzzer starts ringing and the receiver section inside the bike checks whether the rider is wearing the helmet or not. Firstly, a code is embedded into an MFRC522 RFID reader connected to an Arduino UNO of the bike circuit which checks for RFID tag placed on the helmet and detects its distance from the bike. Secondly, there is a force resistor inside the helmet which is activated only when the force of the rider's head is detected upon it. When both these conditions are satisfied only, the buzzer stops buzzing and the rider is safe to start his ride.

(ii) Accident Fall Detection:

For the accident detection part, an algorithm is implemented for the accelerometer placed inside the circuit of the helmet which checks for three conditions. If there is an abrupt tilt in the angle of gyroscope of the helmet, and the z-axis of the accelerometer changes rapidly within a second, then an accident fall is said to be occurred and the Bluetooth module of the helmet circuit gets activated and gets connected to an app in the rider's mobile. The app is built using the MIT app inventer 2 platform. Immediately, the location of the accident is sent via rider's mobile app to the ambulance as well as to his family members. In case the user wants to know the location of the rider even while travelling, a cloud platform named Thingspeak IOT cloud platform" is used for updating the location of the rider continuously and can be accessed easily from anywhere. To achieve this, the block diagram is divided into:

(a) Block Diagram of Helmet Circuit:
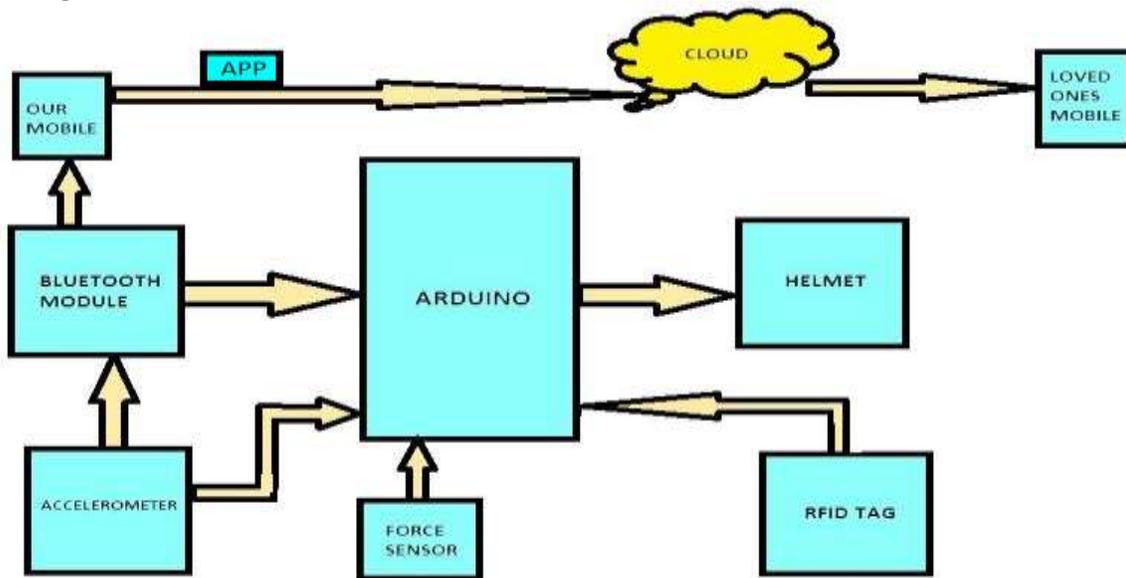
(b) Block Diagram of Bike Circuit:

The fall detection algorithm which is implemented in the Arduino program is as follows:

(1) if the parameter > threshold value of the parameter

    then

(2) if angle > threshold value of angle

(among 100 samples after satisfying the condition in Line 1)

    then

(3)   return fall detection

(4) return no fall detection

III. ADVANTAGES

1. Awareness is created among the riders about the necessity of wearing helmets.
2. Safety is ensured even in two wheelers and people need not fear risking their lives.
3. Detection of accidents in remote areas can be easy and medical services can be provided in short time.
4. The design of the system provides high reliability.
5. Precise location of the accident can be known for faster and genuine rescue operations.

IV. APPLICATIONS

1. It can be used in real time safety system. We can implement the whole circuit into small module later.
2. Less power consuming safety system.
3. This safety system technology can further be enhanced in mines where safety of workers is ensured.
4. Racers can employ this technology for their racing bikes which is extremely user-friendly and beneficial.

V. RESULTS

The project "Assistance and accident detection using smart helmet" best suits to accomplish following objectives:

- With the help of force sensor and RFID tag, driving without helmet can be avoided. As soon as there is any difference in the status, the alarm is raised and rider is immediately intimated to wear helmet correctly.
- The helmet is able to detect real accident falls with an accuracy of 90% using a robust algorithm.
- The location of the accident is sent within a few seconds to beloved one's phones along with a link of google maps.

Figure 1: Result illustration

When an accident occurs the data is immediately uploaded to the Thingspeak cloud whose illustration is as follows:

Figure 3: Latitude of accident location updated to Thingspeak cloud

To send the location to the family members, the mobile app gets activated and message about location is sent as follows:
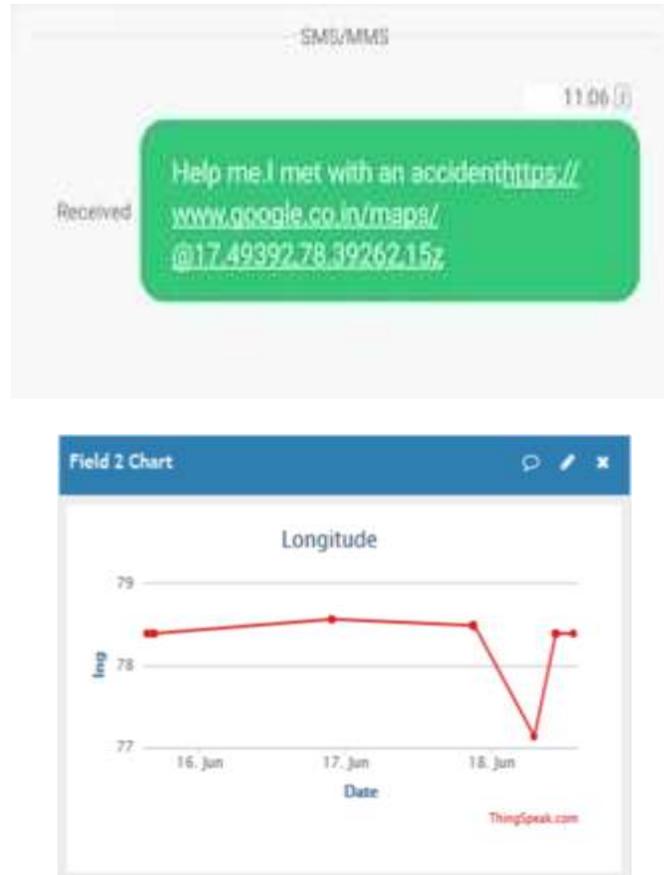

Figure 2: Longitude of accident location updated to Thingspeak cloud

VI. CONCLUSION

The developed system efficiently ensures the rider is wearing helmet throughout the ride and efficient accident detection. By implementing this system a safe two wheeler journey is possible which would decrease the head injuries during accidents and also reduce the accident rate due to driving bike after consuming alcohol. A helmet may not be a 100% foolproof but is definitely the first line of defense for the rider in case of an accident to prevent fatal brain injuries. The proposed approach makes it mandatory for the rider to use this protective guard in order to drive a two-wheeler vehicle and ensures the safety of the human brain and therefore reduces the risks of brain injuries and deaths in case of an accident. In future this intelligent system can be fabricated in a compact size so that it is globally acceptable to notify "No entry" and "No parking" areas. Government must enforce laws to install such system in every two wheeler. By implementing such mechanism in two-wheeler, deaths due to driving recklessly and other road fatalities can be minimized to large extent.

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