

Canny Helmet: A Sustainable Protection for New Generation

M.Divya pushpalakshmi, R.Ramalakshmi, V.Ramachandran

Abstract: The thought of developing this project came from social responsibility towards the society. As we can see many accidents occurring around us in our day-to-day life. Usually people die due to lack of treatment in proper time. The reasons for this may be many such as late arrival of ambulance, no person at place of accident to give information to the ambulance. Therefore, this paper came up with idea of giving the information about accident as soon as possible and in time. Thus, the death rate due to bike accident can be minimized. Here the vibration sensors in the helmet that are connected to Arduino board that delivers an input when the rider crashes. Based upon the sensor value, the Arduino extract GPS (Global Positioning System) data and then GSM (Global System for Mobile communication) module automatically sends message to ambulance, police and family members with GPS location. Then the accidents caused due to over fall of light at nighttime can also be avoided here by helmet equipped with the feature, automatic change of night mode visor. In addition, the android mobile communication can be done via Bluetooth module in the helmet.

Keywords: vibration sensor, GSM, GPS, Arduino, Ldr sensor, helmet.

I. INTRODUCTION

In today's life, people are busy in their own work. To accomplish that work, most of the people prefer two wheelers. Thus, the number of two wheelers users are increasing now a day. In addition, most of the youngsters are interested in bike riding. This trend leads to bike accidents as per the data cited in the report, the country recorded at least four, 80,652 accidents in 2016, leading to 1, 50,785 deaths [2]. The number suggests that at least 413 people died every day in 1,317 road accidents. Especially in India, according to a survey there are around 698 accidents occurring due to bike crashes per year [3]. Thus, the death rate in road accidents are increasing. Majority of the accidents happens because of the lack of consciousness and there is no helping hands in and around the place to inform the incidents. Similar work has been done in various paths such as e-call functions and software monitoring [4]. Alerting techniques using smart safety of common people in other aspects [5]. To rectify this Problem GPS and GSM is interfaced within the Helmet to

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deliver a SMS with exact location. In addition, it is equipped with some smart features such as automatic change of night mode visor and Bluetooth attached with helmet.

II. STATISTICS OF ROAD ACCIDENTS

Psychiatric terms such as stress, sleeplessness, and depression are known to increase the possibilities of accidents in commercial facility [1]. According to the report compiled by the Transport Research Wing, the total number of road accidents in the country increased by 2.5% from 489,400 in 2014 to 501,423 in 2015[7]. The total number of persons killed in road accidents increased by 4.6% from 139,671 in 2014 to 146,133 in 2015[6]. Road accident injuries have also increased by 1.4% from 493,474 in 2014 to 500,279 in 2015[8]. The severity of road accidents, measured in terms of number of persons killed per 100 accident has increased from 28.5 in 2014 to 29.1 in 2015.

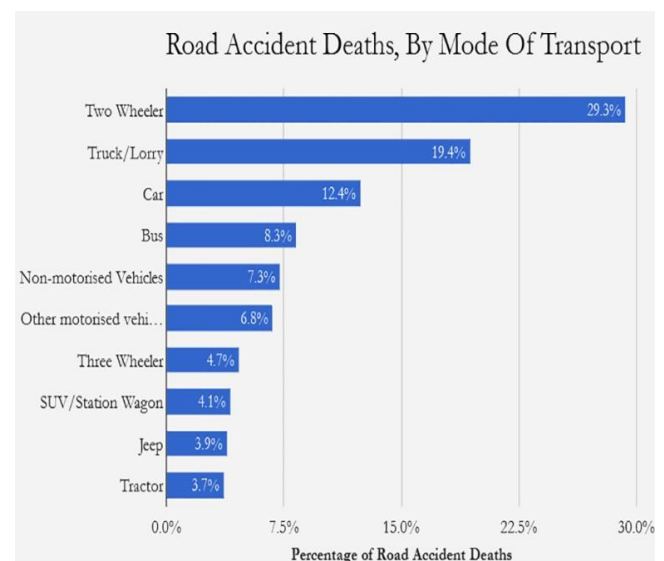


Fig. 1. Representation of two wheeler accident.

The number of road accidents caused by the two wheelers are increasing more than accidents caused by other vehicles. It accounts for 29.5%. [14]. According to the statement of road transport, this situation will grow up in future. In order to reduce that situation and to save the life of the people, this system is implemented.

Deaths On National And State Highways

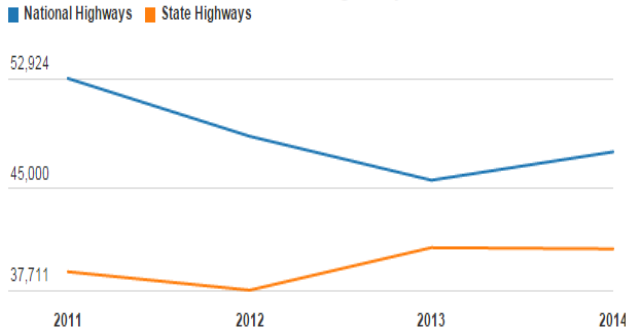


Fig. 2. Representation accident at highways.

III. CANNY HELMET

Helmet acts as a basic protection device for two-wheeler rider. It is developed with a GPS and GSM module, night mode visor, and Bluetooth. If someone unfortunately met with an accident then the location of that particular place will be sent to his or her relations as well as to nearby police station in the form of longitude and latitude values. In addition, the night mode visor change can reduce the bike crashes at nighttime. This helmet enable the person to communicate through android via the Bluetooth attached within the helmet.

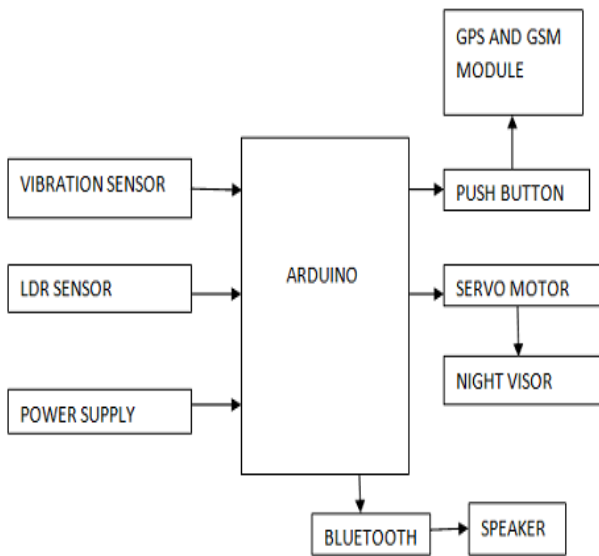


Fig. 3. Block diagram of canny helmet.

IV. PRINCIPLE OF OPERATIONS

This canny helmet has an accident detection and technology developed feature. I.e. the accident detection system use a vibration sensor GPS and GSM module. The vibration sensor is used as input device to detect a vibration and the GPS and GSM delivers a message to the given numbers when it receives the vibration value from the sensor. Moreover, the technology-developed feature is an automatic change of night mode visor. This feature consist of LDR sensor to sense the light intensity and servomotor is attached over the visor to lift up the visor. Based upon the light intensity, the visor can be lifted up and down .Here the Arduino acts as processing unit which fetches a input from the sensor and feeds the processed data to the output device to implement this systems.

V. HARDWARE DESCRIPTION ARDUINO

For processing the sensor values, every system needs a processing unit. So here, Adriano is used as processing unit. It is an open source. It can fetch the input the input data and feed the processed data to the output devices. It uses an ATMEGA328 microcontroller, digital pins, analogue pins, power supply and ground pin.



Fig. 4. Arduino Nano

A. VIBRATION SENSOR

This sensor is used to detect vibration in biker’s helmet. Vibration Sensor outputs a logic HIGH when vibration was detected. We can use any of Arduino pins to read the data. Its operating voltage is 5v.it consist of three pins. The purpose of pin is Vcc for receiving power, one is for ground connection, and another pin for transmitting and receiving a data .A wide dynamic range (0.001Hz~1000MHz) guarantees an excellent measuring performance [12][17]. In addition, the value can be adjusted its sensitivity by adjusting the on-board potentiometer with a screw. It is an effective sensor to detect the vibration.



Fig. 5. vibration sensor

B. GPS AND GSM MODULE SIM808

The Global Positioning System (GPS) is a satellite-based navigation system, which is used to detect the location where the accident will be taken place [16]. It detects the Longitude and Latitude values of particular place and sends it to GSM module. It works in all weather conditions. It is a well-designed device, which consist of GPS antenna to search for a location .This, is in interfaced with GSM module. GSM abbreviates as Global System for Mobile communication. It is used to establish connection between a computer and GSM system [20]. It includes standard interfaces like RS232, USB, etc. The power supply circuit is also built in the module that can be activated by using a suitable adaptor. It operates on 3.3v to 4vIt [11]. Consist of supply, ground, transmission and reception pin. It is used to send messages through the SIM. Message receiving SIM number was already initialized in the coding of GSM module. Thus, it sends the message about the accidents with exact location.



Fig. 6. GPS and GSM moduleSIM808

C. SIM

SIM abbreviates as Subscriber Identity Module. It is a small chip placed inside GSM module [10]. It is used to send the location to the relatives of victim and nearby police station where the accident has occurred. Nowadays, SIM is an easily available thing .so usage of GSM with SIM within the helmet is feasible and safe.

D. PUSH BUTTON

The push button is three-pin device that gives an output as high when it is pressed. It consist of two states like a switch such as high and low i.e. on and off [18]. Here it is used as intermediate device in between the Arduino and GSM and GPS module.

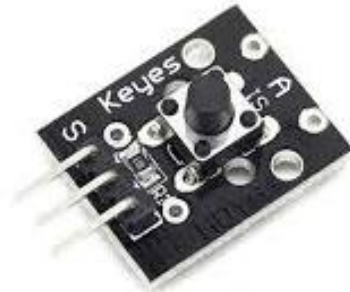


Fig. 7. Push button

E. LDR SENSOR:

The LDR sensor is a type of sensor used to find the light intensity. This acts as an input device to detect whether it is a day or night based upon the brightness. It passes an input over the Arduino when it gets the light intensity [15]. It may be high or low. Here LDR sensor input can enable the visor to move up and down.

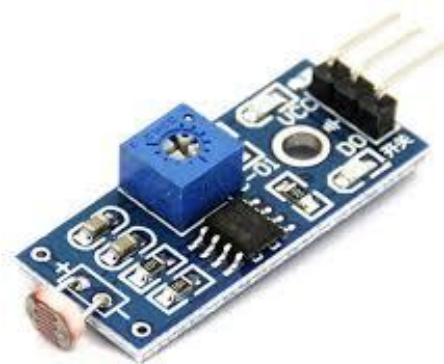


Fig. 8. LDR sensor

F. SERVO MOTOR

A servomotor is a rotary actuator or linear actuator that allows for precise control of angular or linear position. It consists of suitable motor coupled to a sensor for position feedback. It can rotate with particular angle [19]. The force exposed by the servo motor is enough to implement the automatic change of night mode visor. The rotation of this helps to move the visor up and down based upon the light intensity value delivered by ldr sensor.



Fig. 9. Servo motor

G. POWER SUPPLY/POWER ADAPTER

Power supply is the source of electrical power. An electrical battery is a power source which can be charged, discharged into a load, and recharged many times, as opposed to a disposable or primary battery, which is supplied fully charged and discarded after use. It is composed of one or more electrochemical cells. Here, 5V power supply is being used to give power over the devices. Current will flow in the circuit in the form of direct current (DC).

VI. METHODOLOGY AND WORKING PROCESS

In this project, multiple features are added in order to rectify the lacking of treatment to the people who met with an accident and to develop the existing helmet with some smart features. So vibration sensor, Arduino, GPS and GSM module are integrated for the purpose of detecting and informing about the accidents. Here the vibration sensor sends a logic HIGH at time of sensing vibration and the Arduino passed a fetched input over the GPS and GSM. Module with SIM for sending a message about the detected accident. According to the statement of road transport of India, The main reason for the death in accidents are no person at accident spot to inform about an accident, no treatment at necessary time. This helmet with hi-tech system can rectify these problems. Push button is also introduced to rectify the problem of transformation of message when the helmet falls non-accidentally. Then the servomotor attached with the visor can implement the automatic change of visor. In this implementation, ldr sensor sense and judge whether it is day or night. According to the data of LDR, Servomotor is rotated and expel a force to move a visor. The mobile communication can be done via Bluetooth module with speaker.

VII. FLOW DIAGRAM FOR ACCIDENT DETECTION SYSTEM IN CANNY HELMET

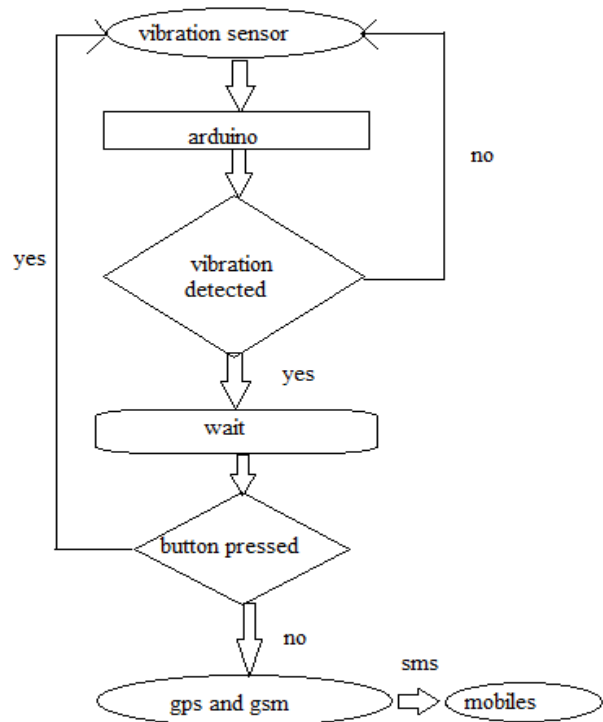


Fig.10. Flow diagram

VIII. RESULT

This module was completed to detect the accident system using push button, GSM and GPS, vibration sensor. Automation of visor was implemented by servomotor as a pull up force. These technologies can be served as awareness to the ambulance and family members by sending the SMS with exact location in accidental condition. These can be reduced the death of people in road accidents. The outcomes of this paper are can be shown by above image.



Fig.11. Image of real time implementation

IX. CONCLUSIONS

This helmet can reduce number of road accidents that takes place every day. It ensures the safety of the biker as well as sends the victim's location to family members and nearby police station. In addition, death rate can drastically be reduced by this project. Moreover, it consist of some extra-ordinary feature as visor and Bluetooth attached system. These ideas can develop this project more feasible and it will be suitable for all the bikers.

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