iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 6 **Issue:** IV **Month of publication:** April 2018

DOI: http://doi.org/10.22214/ijraset.2018.4244

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 6 Issue IV, April 2018- Available at www.ijraset.com

An Automated Approach to Headlamp Positioning and Accident Recognition

Ms. Kavitha K K[1], Deepak Bhat[2]
[1]*Asst. Professor,* [2]*Undergraduate Student, Department of Information Science and Engineering, New Horizon College of Engineering, Marathahalli, Bangalore, Karnataka, India*

Abstract: ***The Objective of this paper is to significantly increase the safety of motorcyclists by using easily available technologies to automate the control of headlamps and detection of an accident thereby making the Helmet Intelligent. It has been made mandatory by a lot of countries to wear a helmet while riding including India. The number of two wheelers is drastically increasing by every passing day. And yet, the safety provided has a long way to go. The proposed idea is achieved by using an Accelerometer, Piezoelectric Sensor, RF Transmitter and Receiver, Servo Motor attached to the Headlamp and GSM Module. All of these equipments are connected to an Arduino Board which is the brain of the Helmet. Headlamps are automatically positioned as required which is calculated by the amount of Rider's Facial movement. The values from the Accelerometer and the Sensor are used to detect an accident, and if yes, alerts are sent to prioritized contacts through the GSM module.***
Keywords: Smart helmets, Headlamps, Accelerometer, RF transmitter, RF receiver, Servo motor, Internet of Things, GSM

I. INTRODUCTION

The Global Statistics on Road Accidents as reported by the WHO (World Health Organization) states that 1.25 million fatalities occur every year. Out of which 22 percent take place in India. Over 137000 people were killed in road accidents in 2013 alone, which is more than the number of people killed in all our wars put together. An Accident resulting in death on a motorcycle is 16 times more than all the other vehicles. According to a study around 40 percent of fatalities happen at night and 72 percent of death occur an hour after an accident because of not receiving medical aid and due to failure of notifying the emergency medical assistance. This paper provides a system which makes use of sensors, GSM Module and a rotatable headlamp which are interconnected through an Arduino Board to provide a safer and smarter helmet for the user. This idea is an application of IOT (Internet of Things), where various objects and components are interconnected and exchange real-time data. Thus it provides a smarter system which can be remotely managed, monitored for better data analytics. In case of detection of an accident, notifications are sent to ambulance services and prioritized contacts through the GSM Module.

II. PROPOSED SYSTEM

To achieve the objective we make use of a 3-Axis Accelerometer which is basically an electromechanical device used to measure acceleration forces in three perpendicular axes. The return values for each coordinate are varying voltage levels. When these values pass a threshold, switches in the RF Transmitter is made high by bypassing the high signal from the Arduino board controlling the switches.

These signals are then received at the RF Receiver which is connected to two servo motors to which the Headlamps are attached. The headlamp is precisely positioned from the values thus received. A Buzzer is used to alert the user if he falls asleep which is calculated by abrupt changes in accelerometer values.

The Helmet is also equipped with a Piezoelectric Sensor to detect an accident. If the pressure value received is above a threshold and simultaneously there are abrupt changes in values from the accelerometer, the system goes to an Accident alert Event. It first sends an alert to the user's smart phone and if there is no response, further notifications are sent to an Ambulance service and priority contacts.

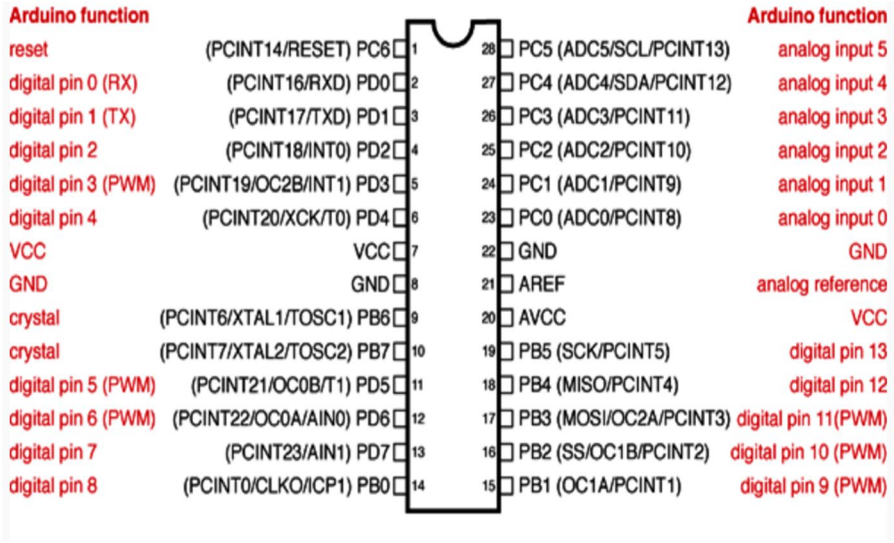
III. COMPONENTS USED

The System mainly consists of two parts, helmet and the headlamp. The helmet is equipped with an Arduino Board, 3-Axis Accelerometer, RF transmitter, RF Receiver, Piezoelectric Sensor, GSM Module, Buzzer, Portable Battery to power the circuit and a Servo Motor to which the Headlamps are attached.

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 6 Issue IV, April 2018- Available at www.ijraset.com

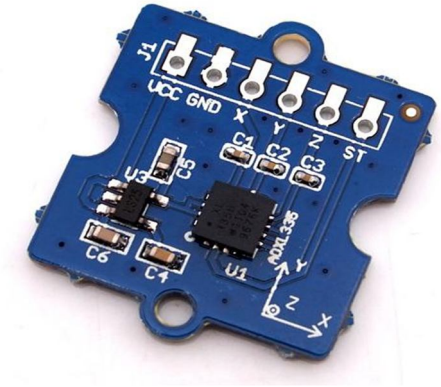
A. Arduino Board

It consists of an Atmel ATmega328 microcontroller where all the programming is done. This forms the brain of the system.



B. 3-Axis Accelerometer

A Tri-axis Accelerometer is placed at the top of the helmet. According to the change in direction of the head, different coordinate (3-axis) values are passed by this device due to dynamic change in acceleration forces of the coordinates, whose values are then sent to Analog read pins of the Arduino Board.



C. Rf Transmitter

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 6 Issue IV, April 2018- Available at www.ijraset.com

The RF transmitter is a small electronic device used to establish a wireless communication between the helmet and the headlamp by transmitting radio signals. It uses a transmission frequency of 433 MHz. Different ranges are set for the coordinate values (x,y,z) in each direction and if the output acceleration force values from the accelerometer are present in between these ranges, then specific switches in the RF transmitter are made high by bypassing the high Arduino output signals.

D. Piezoelectric Sensor

It is a device that uses the piezoelectric effect to measure changes in pressure, acceleration, temperature, strain, or force by converting them to an electrical charge. An electrical potential appears from the crystal in the sensor when it is subject to mechanical stress. This voltage value is transmitted to the Arduino Board which calculates the occurrence of an accident using other variables.

E. Buzzer

The buzzer is basically an electrical device that makes a buzzing noise and is used for signaling. The system is programmed to turn on the buzzer when abrupt changes in values from accelerometer are detected which means that the rider is not in a position to drive the motorcycle. For example, when the rider falls asleep or dozes off, the accelerometer passes abrupt values and makes the buzzer go high. So it can also act as a sleep detector and alarm. The Buzzer can also be made to signal the rider in case the helmet is not buckled properly.

F. Portable Battery

The system makes use of Ambrane P-1000 Portable battery to power the Arduino. This battery uses lithium ion cells. It has a capacity of 10400 mAh, output voltage of 5v and a maximum current of 2A.

G. GSM Module

Global System for Mobile Communications (GSM) uses three time division multiplexing which are TDMA, GSM and CDMA. This module is implemented to provide a cellular connection from the helmet. When an Accident event is triggered this module sends an alert to the user's phone in the form of an SMS. If the user fails to respond alerts are further sent to Ambulance services and prioritized contacts.

H. Rf reciever

The signals transmitted from the RF transmitter are received by the RF receiver and is sent to the Arduino board. According to the signal received, the two servo motors are operated to move the head lamp up, down, straight, left and right as required and programmed.

Movement Of The Head Lamp

DIRECTION OF HEAD LAMP	VALUES OF THE ACCELEROMETER		
	X	Y	Z
Straight	326-342	340-352	Any value
Up	326-342	<340	Any value
Down	326-342	>352	Any value
Left	>335	335-359	Any value
Right	<330	335-359	Any value
Sleep detection	Any value	Any value	<399

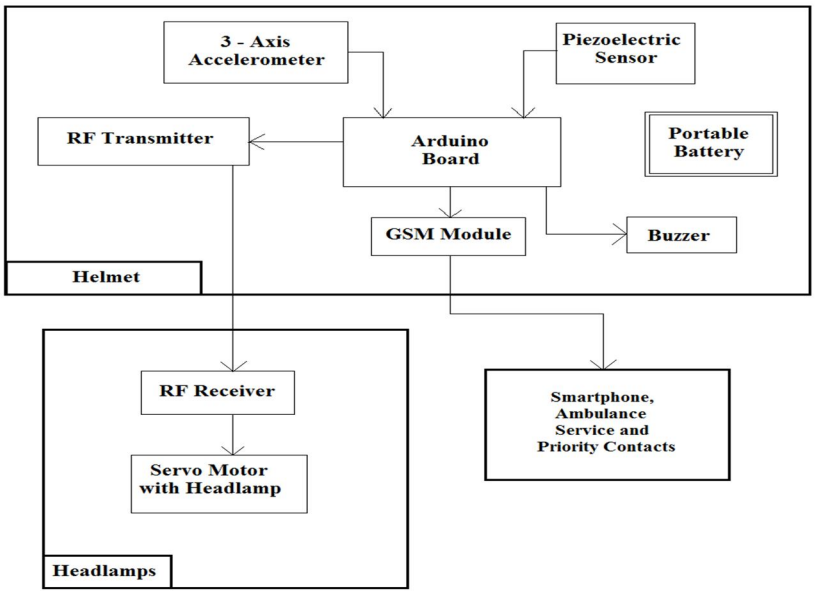
As the above given table implies, the headlamps are angled in respective positions when the Accelerometer records these values. The position of the headlamps varies for different values of the three perpendicular axes. The values in the Z-Axis can be any value as it refers to the angle pointing from the ground to the sky. The change of value in this axis basically means a difference in the height of the rider or acceleration forces with respect to gravity.

I. Servo Motor

The headlamp has two servo motors to position the lamp facing up, down, left and right. The servo motor can rotate from 0-180 degree. It rotates based on the value shown received by the Arduino Board as shown in the previous table.

IV. ARCHITECTURE MODEL

The below given model represent the interconnections between the various components of the system.



A. Some of the Advantages And Enhancements That Can further be Implemented on The System Are

It significantly reduces the glare at night, when the vehicles on the opposite side are using high beam.

1) A Breathalyser can be installed on the system which automatically detects consumption of alcohol by the rider.
2) Solar lamps can be used on the helmet to power the other components.
3) Augmented Reality Visors can be used which can help the rider with a lot of information on the go.
4) A Bluetooth module on the system can be used for using Navigation and Call features remotely.
5) A GPS Module on the helmet can be implemented to track the location where an Accident has occurred.

V. RELATED WORK

The previous study towards improvising the safety of riders through smart helmets was designed by Chandra D. Allen on December 6, 1996. There are three design areas addressed in his design: sensors, signal processing, antennas and transceivers. The helmet comes with a complementary Hall Effect sensor, which is attached to the motorcycle frame near the front wheel. Two magnets with opposite polarities are placed onto the spokes of the wheel, which is used to do a speed comparison, if the rider over speeds a pre-recorded warning is given to the rider. In case of an accident the helmet uses the accelerometer to detect the impact and a call is made to the local police station. There's also an ongoing research by the Skully Team focusing on attaching a rear view camera in the helmet to provide a clear rear view vision to the rider through a LCD display.

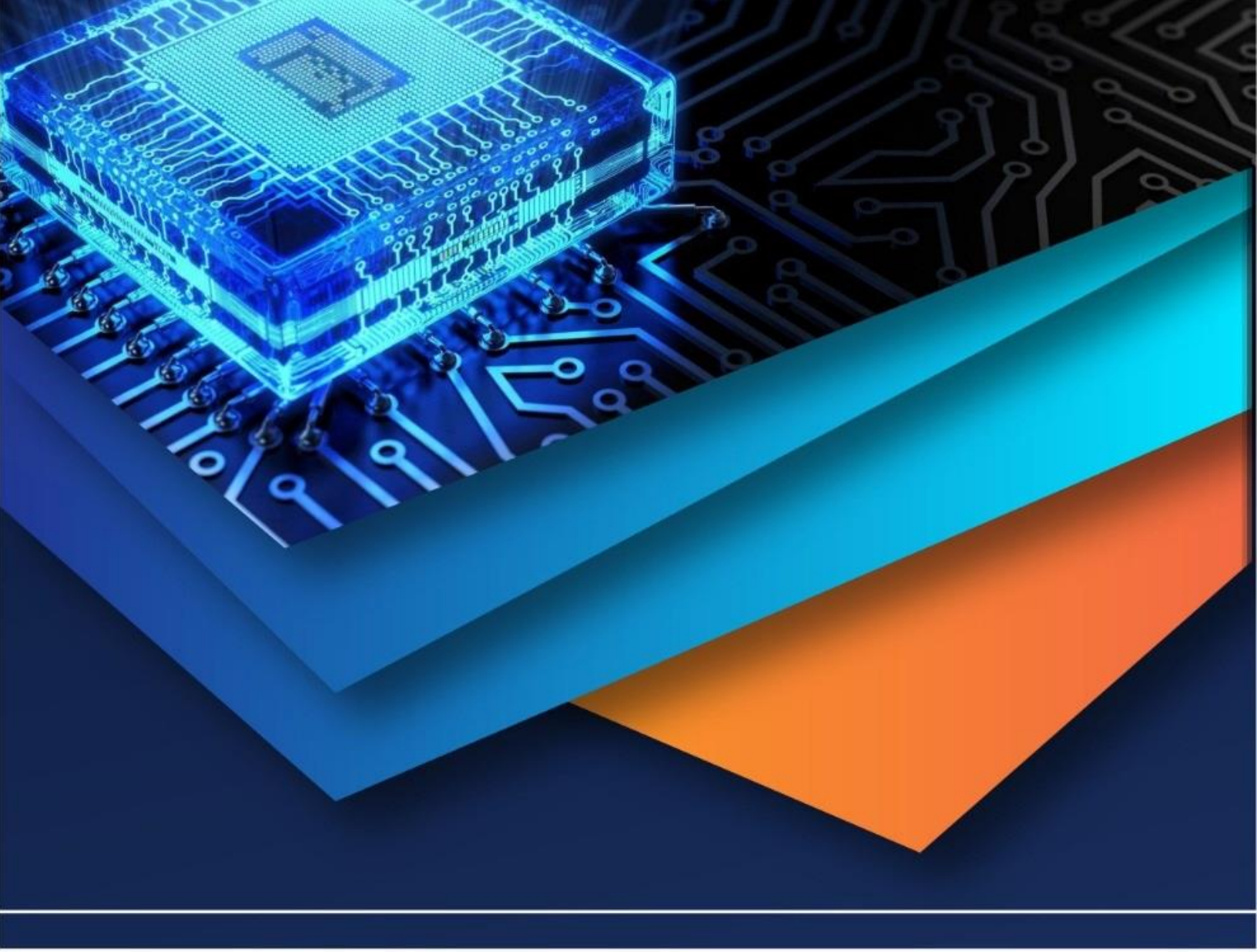
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 6 Issue IV, April 2018- Available at www.ijraset.com

VI. CONCLUSION

The Main Objective of this system was to provide better safety for motorcyclists by making use of cost-effective technologies available. The rate of development in technological sector and automobile safety are significantly higher than the progress being made in the safety features for motorcyclists. The Smart control of headlamps where the user can change the focus of the beam without having to turn the handlebar can prove to be effective while riding at night. Accident Detection and Notification property of this system further increases the response rate of emergency medical aid. The Helmet can be programmed such that the vehicle does not turn on when the rider has not buckled up his helmet. It can also detect fatigue and sleepiness of the user and alert them on the occurrence of the event. Thus, the development of this system marks a new step in the importance of road safety for motorcyclists thereby encouraging them to use the helmet at all times.

REFERENCES

[1] A.Ajay, G.Vishnu, V.Vishwanath, K.Srinivasan, S.Jeevanantham, “Accidental Identification and Navigation System in Helmet”, 2017 International Conference on Nextgen Electronic Technologies.
[2] Sreenithy Chandran, Sneha Chandrasekar, Edna Elizabeth N, “Konnect: An Internet of Things (IOT) based Smart Helmet for Accident Detection and Notification”
[3] Muthiah M, Aswin Natesh V, Sathiendran R K, “Smart Helmets for Automatic Control of Headlamps”, 2015 International Conference on Smart Sensors and Systems(IC-SSS)
[4] https://en.wikipedia.org/wiki/Motorcycle_safety
[5] https://www.arduino.cc/en/Tutorial/ADXL3xx.
[6] https://en.wikipedia.org/wiki/List_of_countries_by_traffic-related_death_rate
[7] http://en.wikipedia.org/wiki/Servomoto
[8] World Health Organization, “Global Status report on road safety 2015”, 2015.
[9] World Health Organization, “Road Traffic Deaths”.



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY