

# An IoT Based Approach for Better Vision of Motorcycles with Automatic Headlamp Orientation

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**Abstract**— This paper designed to introduce the automatic headlight technology for the safety of motorcyclist by using easily available technologies to automate the control of headlamps and detection of an accident thereby making the Helmet Intelligent. The idea of using smart helmet is to recognize the accident and notify to concerned person, friend or either the control room to seek help for injured person. 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 Aurdino Board which is the brain of the Helmet. 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.

**Key words:** IoT, Automatic Headlamp Orientation

## I. INTRODUCTION

- Our society report on the road safety as millions of people die every year as a result of road accidents.
- According to the national organisations for youth, society, safety driving at night is a top cause of vehicle accidents due to failure of human eye to respond to switch between bright light and darkness.
- Major cause for accidents or death among motorcyclists is the improper usage of helmets and also this paper introduces a security system for the motorcyclist with the helmet usage and smart control of headlamps.

## II. COMPONENTS USED

The model has two parts, helmet and headlamps. The helmet consists of Arduino board, 3-axis accelerometer, Piezoelectric sensor, RF Transmitter, Portable battery, GSM Module. The headlamps consists RF Receiver, Servo motor.

### A. Arduino Board

The Arduino board is a microcontroller board based on the ATmega328p chip. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards and other circuits.



Fig. 1: Arduino Board

### B. 3-axis accelerometer

An Accelerometer is a device that measures proper acceleration. Proper acceleration, being the acceleration of a body in its own instantaneous coordinate axis (X,Y,Z).



Fig. 2: 3-Axis Accelerometer

### C. Piezoelectric Sensor

A Piezoelectric sensor 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.

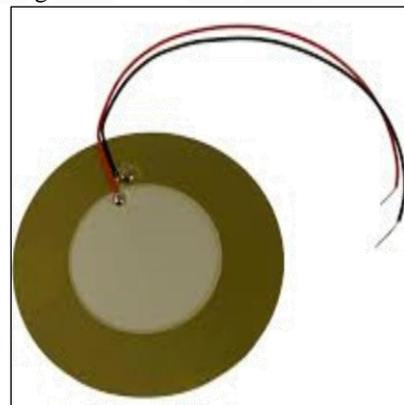


Fig. 3: Piezoelectric Sensor

### D. RF Transmitter

It provides a wireless communication between headlamps and helmet. This wireless communication may be accomplished through radio frequency. It uses a transmission frequency of 433 MHz.

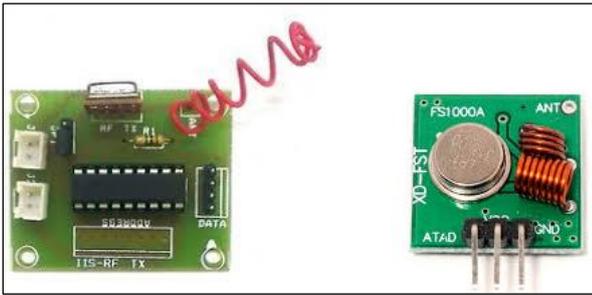


Fig. 4: RF Transmitter

### E. GSM Module

Global System for Mobile Communications. It basically provides a connection from the helmet. When an accident event is identified, this module sends an alert to the user's phone in the form of an SMS.

### F. RF Receiver

The signals sent by the RF Transmitter is received by the RF Receiver. The signals obtained from the transmitter converts the information carried by them into a useful form.

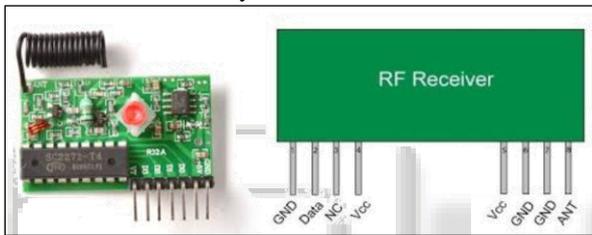


Fig. 5: RF Receiver

### G. Servo Motor

A Servo motor is a closed-loop servo mechanism that uses position feedback to control its motion and final position. It rotates based on the values received by the Arduino board.



Fig. 6: Servo Motor

## III. THESIS

The working process of this system (figure:1) makes use of a 3-axis accelerometer which measures the acceleration forces made by the head, to the change in direction of head in 3 different axis. The values obtained by the device are sent to the Arduino board. This Arduino board is used for controlling the switches that are sent by the accelerometer. The switches are set to certain limited range in each direction and if the output values from accelerometer matches the range then

specific switches in the RF transmitter is made high by bypassing the high signals from Arduino board. The transmitted signals are then received by RF receiver connected to servo motors which is attached to headlamps. These motors make the headlamp move up, down, right, left based on the values received from accelerometer.

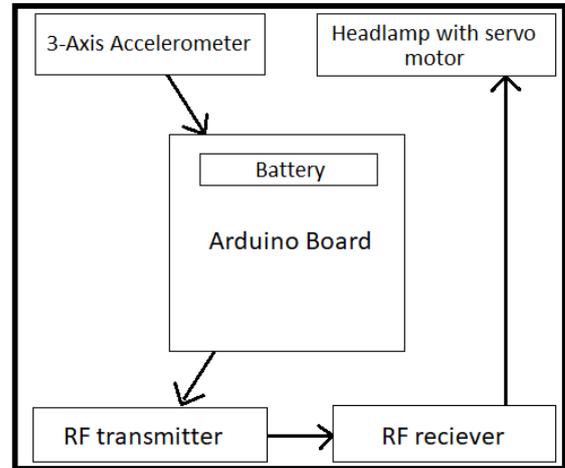


Fig. 1:

The helmet is also equipped with a piezoelectric sensor to detect an accident. The pressure values obtained from the accelerometer are sent to Arduino board. If both values get sudden changes from the accelerometer and piezoelectric sensor receives above the threshold condition, which results in accident event being triggered. The GSM module is used for mobile communication. It provides a connection within the helmet and sends an accident alert to phone.

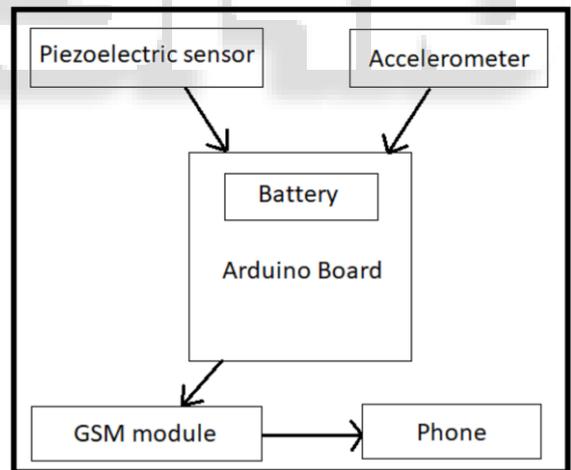


Fig. 2:

## IV. PROS AND CONS

### A. Pros

- Without moving the handle of the vehicle to change the direction of the beam of light, as it can be easily done by changing the direction of head.
- It is used to reduce the glare in the night that is when we see a high beam light in the opposite side.
- Accident notification system: this system makes use of accelerometer value and GPS to send information to cloud based notification system.

### B. Cons

- By usage of all the components, makes the helmet heavier.
- Implementation /Integration of all the components on the helmet can make the helmet a bit more expensive.
- Special focus need to be given on designing the helmet such that it is made waterproof and heat resistance.

### V. FUTURE WORK

- As a future extension of the work the smart helmet could be used for air quality and hazardous event detection for the mining industry.
- It can also be equipped to detect alcohol content in the breath of motorist in order to keep a check on drunk and driving cases.
- Mobile smart helmet for brain stroke early detection through neural network based signals analysis.
- AutoVeCoN: Automatic vehicle collision notification and intelligent police deployment system for radio flying squad and traffic department.

### VI. CONCLUSION

The overall outcome of this paper was to provide safety of motorcyclist on the roads. This paper provides an idea of Automatic Autonomous Headlight Technology which helps the motorcyclist to respond between bright light and darkness.

Apart from the headlight technology, the paper also speaks about the accident recognition with the help of piezoelectric sensor and accelerometer connected to arduino board and makes provisions, alerts through the use of GSM module system.

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