Smart Helmet to Avoid Road Kills (SHARK)

[1]Ashwinkumar T. Limbanee, [2]Angraj G. Kad, [3]Swapnil N. Jagtap, [4]Komal S. Lonari,
[5]Prof. Shiv Sutar

[1,2,3,4] Computer Engineering Students, MIT College of Engineering Pune
[5]Assistant Professor, MIT College of Engineering Pune

Abstract: **Smart helmets as a subsequent step to human safety, is one of the great challenges in the area of active safety for two wheelers. Two wheeler road accident is on the rise from past few years. According to report of National Crime Records Bureau (NCRB) year 2014, the total annual deaths had crossed 4.51 lakhs. Through our project we aim to mitigate the probability of the deaths caused in two wheeler accidents.**

In this project, we proposed a WSN based solution which restricts the driver to wear helmet while riding a two wheeler. Unlike the current solutions i.e. the expensive smart helmets that use high level Artificial Intelligence and also rely on heavy infrastructure. In our vehicular safety solution there is only a tiny low cost sensor that is deployed, which will be used to detect the presence of helmet on the rider's head.

The communication between the sensors and vehicle will be achieved using Bluetooth / WIFI connectivity and through a micro controller (programmable device) such as Arduino Uno. For pairing the helmet, authentication will be done using RFID tags. It can also serve as an alternative solution for unsophisticated vehicles that are not equipped with on board computers and cannot take advantage of the current Intelligent Transportation System and Services. To illustrate the basic idea of our system, our main focus is to ensure that the driver has a helmet ON, to start vehicle.

Keywords: **Arduino mini, Bluetooth, NFC, Pressure Sensor, Receiver RX, Relay, Switch, Transmitter TX, ZigBee.**

I.   INTRODUCTION

Now a day's people become least conscious about their life. As people do not wear helmet while driving bike, although it is compulsory. Government is also working on this, and tries to insist people to use helmet while driving. Like recently Government introduced policy "No Helmet No Petrol". But unfortunately it did not work. Large number of accident reports in cities as well as on highways lead to deaths of many people due to head injury.

For encouraging people to wear Helmet industries try to add smart device to the helmet. Those devices were configured as one helmet to one device (no cross connection). Smart Helmets (AI) are also available in foreign market.eg. SKULLY AR-1 but they are very expensive and large size. [4]

The thought of developing this paper comes from social responsibility towards the society. We are going to discuss about device which can be implemented and used efficiently. This device will also have cross connection facility; any helmet can be connected to any bike with wireless technology. Also we are try to consider product cost as important constrain, so that it will be affordable to common person.

II.   TECHNICAL STUDIES

A.   Arduino Pro Mini:

Arduino can be used to develop interactive objects, taking inputs from a variety of switches or sensors, and controlling a variety of lights, motors, and other physical outputs. Arduino projects can be stand-alone, or they can communicate with software running on your computer. The Arduino Mini is a small microcontroller board originally based on the ATmega168, but now supplied with the 328.intended for use on breadboards and when space is at a premium. It has

14 digital input/output pins (of which 6 can be used as PWM outputs), 8 analog inputs, and a 16 MHz crystal oscillator. It can be programmed with the USB serial adaptor or other USB or RS232 to TTL serial adapter. [6]
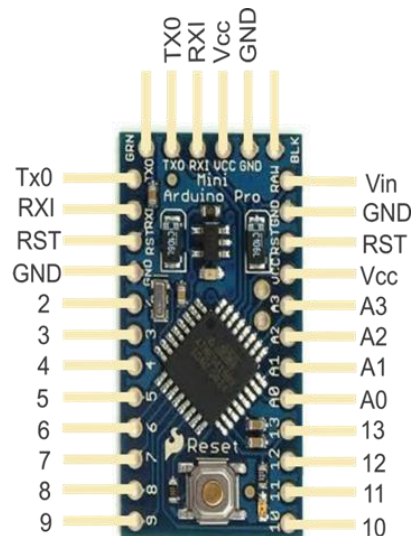
B. Bluetooth:

HC-05 module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. Serial port Bluetooth module is fully qualified Bluetooth V2.0+EDR (Enhanced Data Rate) 3Mbps Modulation with complete 2.4GHz radio transceiver and baseband. [2]

This module is used to connect helmet device to two wheelers device.

We need to do some module level coding into Bluetooth in order to connect any helmet device to the two wheeler device.

C. Force Sensing Resistor:

FSR is a device used to measure force or pressure acting on a body [1]. It consist of variable resistance whose value changes from nearly infinite to 3000 ohm. And thus we can calculate the pressure applied on an object.

In our SHARK device, we have used FSR to check whether the user has worn the helmet or not using pressure applied by the head of the person on the helmet in upward direction.

D. Limit Switch:

Switch is a very basic device in electrical field. It is used either to complete or break the connection or circuit.

In our SHARK project we can use switch as an alternative to FSR. [5] That is the circuit will be completed when the user wears the helmet & he/she will be able to drive the two wheelers.

E. ZigBee:

ZigBee is an IEEE 802.15.4-based specification for a suite of high-level communication protocols used to create personal area networks with small, low-power digital radios.

It consumes very low power & its range is between 10-100 m.

We can use ZigBee as an alternative to Bluetooth module. [2] Although, it is expensive than Bluetooth it is hardware re-configurable. Its range is high & is reliable.
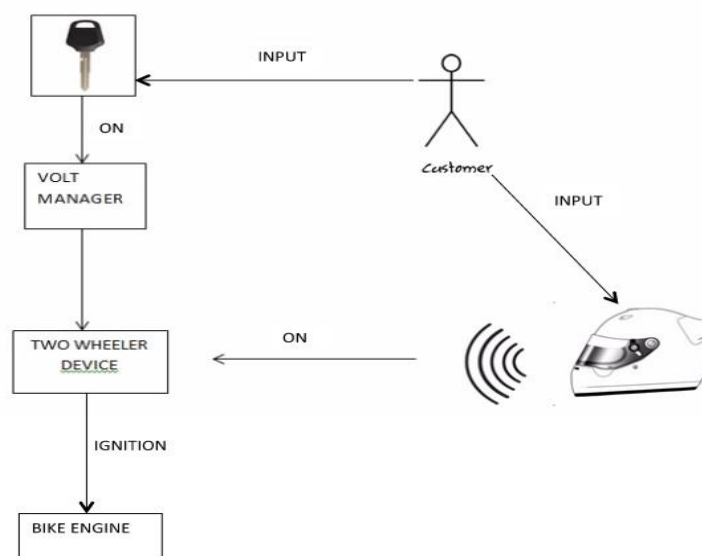
III.   OVERALL DESIGN

Figure 1: SHARK Architecture

Working:

As shown in the above figure, the SHARK system/hardware will receive two inputs, one from the hardware installed in the helmet, when helmet is worn & another when the key is ON, in the two wheeler. When the SHARK system receives both the inputs then & only then the engine will be ignited otherwise user will not be able to start the bike.

Input from the helmet device to the two-wheeler device will be transferred through wireless technology (Bluetooth/ ZigBee). And any helmet with SHARK device installed into it can input to any two wheeler device.

After the validation of both the input, user will be able to start the bike using kick start or self-start. And thus SHARK system is implemented in accordance to human safety measures.

IV.   FUTURE SCOPE

We can add a buzzer in the helmet or we can make LED flash when the speed exceeds the limit. We can extend it to notify the dangerous turns, bridges by installing zone indicators in such areas. We can add Alcohol detection sensor, if driver is drunk then the bike will not start.

Implementation of GSM technology:

By implementing this technology into the SHARK project we can alert our family members & nearby hospital about any accident or misshapen. This system will track our position using GPS and alert concerning people via SMS or alert warning. [3]

Implementation of GPS technology:

GPS technology is well known in our world. We use it in our day to day life for navigation. We can extend our project by displaying the navigation system on the portion of wind shutter screen of our helmet. By doing so rider will not have to use other devise & can concentrate on the road. [3]

V.   CONCLUSION

SHARK project is the future of two-wheelers safety measure device. SHARK device, not only impose law on people to wear Helmet but also encourages them to wear helmet by providing additional tech facilities like GPS, GSM, night vision. During the first phase of this project, connection between SHARK devices & security measures will be implemented. After that other tech facilities will be incorporated as per advancement feasibility.

REFERENCES

[1] Mohd Khairul Afiq Mohd Rasli, Nina Korlina Madzhi, Juliana Johari,” Smart Helmet with Sensors for Accident Prevention”, International Conference on Electrical, Electronics and System Engineering, pp 21-26, 2013.

[2] Jin-Shyan Lee, Yu-Wei Su, Chung-Chou Shen,"A Comparative Study of Wireless Protocols:Bluetooth, UWB, ZigBee, and Wi-Fi",The 33rd Annual Conference of the IEEE Industrial Electronics Society (IECON), IEEE, pp 46-51, Nov-2007.

[3] Lakshmi Devi P, Bindushree R, Deekshitha N M, Jeevan M, Likhith M P,"Helmet Using GSM and GPS Technology for Accident Detection and Reporting System", International Journal on Recent and Innovation Trends in Computing and Communication, pp 18-21, May-2016.

[4] SKULLYAR-1: https://blog.skully.com/?_ga=1.25621 4923.1662713579.14760 9181 [online].

[5] Limit Switch: https://www.youtube.com/watch?v=VdgfY3-uzk4 [online].

[6] Arduino Pro Mini: https://www.arduino.cc/en/Main/ArduinoBoardMini [online].