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Smart Helmet & Intelligent Bike System

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Abstract - ***A smart helmet is a type of protective headgear used by the rider which makes bike driving safer than before. The main purpose of this smart helmet to provide safety for rider . This implement by using advance feature like alcohol detection, accident identification, location tracking, use as a hands free device, solar powered, fall detection. This makes not only smart helmet but also feature of smart bike. Its compulsory to wear helmet, without helmet ignition switch cannot ON. A RF Module as wireless link which able to communicate between transmitter and receiver. If rider getting drunk it gets automatically ignition switch is locked, and send message automatically to their register number with their current location. So when accident occurs, it will send message by GSM to register numbers with their current location by GPS module. It can use to receive call while driving. The distinctive utility of project is fall detection, if the bike rider fall from bike it will send message automatically.***

Key Words: Biker's safety, Accident detection and alert system, Smart helmet, Alcohol detection,

1. INTRODUCTION

In recent times helmets have been made compulsory in Maharashtra State. Traffic accidents in India have increased year by year. As per Section129 of Motor Vehicles Act, 1988 makes it required for every single riding a two-wheeler to wear protective headgear following to standards of the BIS (Bureau of Indian Standards).In India drunken drive case is a criminal offence of The Motor Vehicle act 1939. Which states that the bike rider will get punish. In existence bike rider easily get escaped from law.

These are the three main issues which motivates us for developing this project. The first step is to identify the helmet is wear or not. If helmet is wear then ignition will start otherwise it will remains off till helmet is not wear. For these we use FSR sensor. The second step is alcohol detection. Alcohol sensor is use as breath analyzer which detect the presence of alcohol in rider breathe if it is exceeds permissible range ignition cannot start. It will send the message to register number.

MQ-3 sensor is used for these. When these two conditions are satisfied then ignition will start. The third main issue is accident and late medical help. If the rider met accident with him he cannot receive medical help instantly, its big reason for deaths. Around every second people die due to late medical help or the accident place is unmanned. In fall detection, we place accelerometer at the bike unit. Due to these mechanism we detect the accident occurs or not.

The aim of this project is to make a protection system in a helmet for a good safety of bike rider. The smart helmet that we made is fixed with sensors which act as to detect wear helmet or not. There are two different microcontroller is used in this project. Each unit has used a separate microcontroller, for bike unit we use Arduino Lilypad and for helmet unit we use ARM7 lpc2148. Signal transmission between the helmet unit and bike unit is using a RF concept.

2. TECHNICAL STUDIES

2.1 Force Sensing Resistor (FSR)

Force Sensing Resister is placed at inside the helmet where the actual human touch is sensed. It determines by helmet unit that whether helmet is worn or not. If this condition will satisfy or not satisfied then it sends the signal to bike unit. Force Sensing Resistors, or FSRs, are strong polymer thick film (PTF) devices that resistance is inversely proportional to force applied to the face of the sensor. This sensor is used as human touch control in various applications. Such as medical systems, automotive electronics and in robotics and industrial applications. The force vs. resistance characteristic shown in Fig. 1 (b) provides a general idea of Force sensing resister typical response behavior. For convenience, the force vs. resistance data is plotted on a semi-log format. Force sensing resister is two-wire sensor with a resistance that changes on applied force. The resistor RM is selected to maximize the required force sensitivity range and to limit current. Here we use 10 kΩ of measuring resister. The output voltage is described by mathematical equation:

$$Vout = \frac{RmV +}{(Rm + Rfsr)}$$

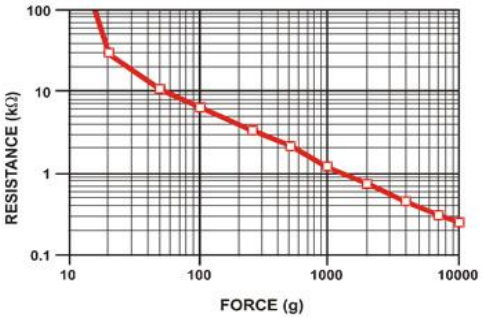


Fig -1: Resistance vs. Force.

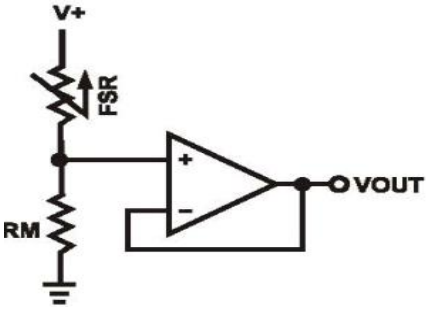


Fig -2: Circuit diagrams of FSR

2.2 MQ-3 Alcohol Sensor

MQ-3 gas sensor is right for identifying the alcohol content from breath. It can be positioned just front of the face. The sensor is responds to various gases. It determines by helmet unit that weather the rider is drunk or not. MQ-3 sensor has potentiometer to adjusting different concentration of gasses. We calibrate the detector for 0.4mg/L of Alcohol concentration in air and use value of resistance is 200 KΩ. MQ-3 has supports for both analog and digital. MQ-3 has a 4 pin namely GND, VCC, Aout, Dout. Here we use digital output of this sensor which is gives output in terms of high or low. It decided by our helmet unit weather rider is drunk.

2.3 Accelerometer ADLX345

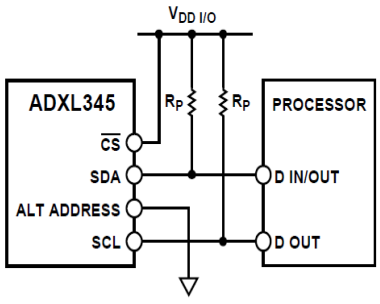


Fig -3: Interfacing diagram of Accelerometer

The ADXL345 is tinny, tri axial accelerometer with resolution of 13 bit. The output of accelerometer is digital and use 16 bit 2's complement data. It is access to connect via Serial Peripheral Interface (SPI 3-4 wire) or I2C interface. ADLX 345 is used for both measurement of static and dynamic acceleration. In this project we use accelerometer measures the static acceleration of gravity. Free-fall sensing notices if the bike is falling. And Bike unit take decision that accident is occurs or not. In this project we interfaced ADXL345 by using I2C digital interface technique. The CS connected to high to VDD I/O, the ADXL345 is requiring 2-wire connection. The minimal operational voltage of this device cannot greater than VDD I/O that is 0.3 V. For the proper working condition, we use two external pull up resister. The value of pull up resister is 3.3 kilo ohm.

2.4 RF Communication circuit

Helmet unit and Bike unit are connected by wireless link of RF. RF communication circuit contains encoder and decoder circuit. Encoder is on helmet side which is using to convert parallel data into serial data. The encoder is capable of encoding massage which contains of 12N data bits and N address bits. Each address/data can stay set to with two logical states. The oscillator frequency is selected by Rosc. We choose oscillator frequency is 3 kHz, with Rosc of 1M ohms. Minimum transmission of data is 4 words. Decoder is on bike side, it used to decode serial data. It converts this serial data in to parallel. The decoders are capable to receive data that are spread by an encoder and understand it. The first bits period use as addresses and last 12N bits as our desired data, where N is stands for address number. In this decoder circuit oscillator frequency is 50 times greater than fOSCE (encoder oscillator frequency). fOSCD is 150 kHz, which is select by value of Rosc. Rosc is 1k ohms.

3. CONSTRUCTION

We already mentioned that we divide a project in two units namely helmet and bike. In helmet unit, the force sensing resister is placed on inside upper part of the helmet where actually head was touched with sensor surface. And alcohol sensor is placed on in front of rider's mouth. It can sense easily. Solar panels are mounted on upper side of helmet which is in direct sunlight. And the battery and regular circuits was fixed inside the helmet. Secondary controller and RF transmitter circuit was also placed on inside the helmet, antenna are located outside the helmet.

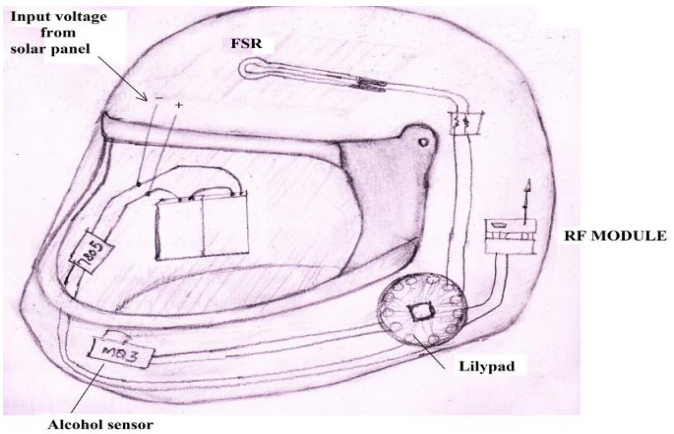


Fig-4: Construction of helmet unit

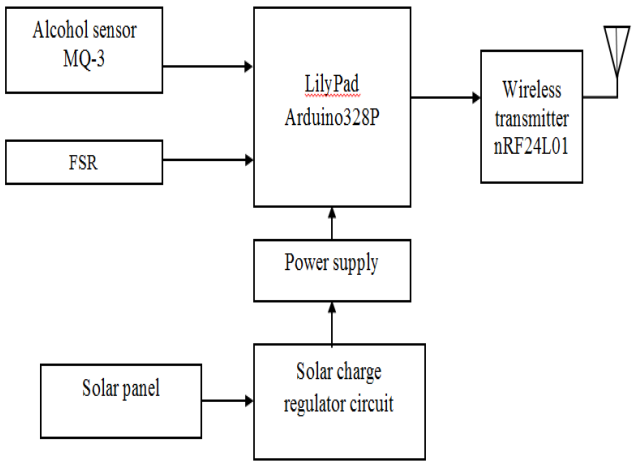


Fig -5: Helmet unit

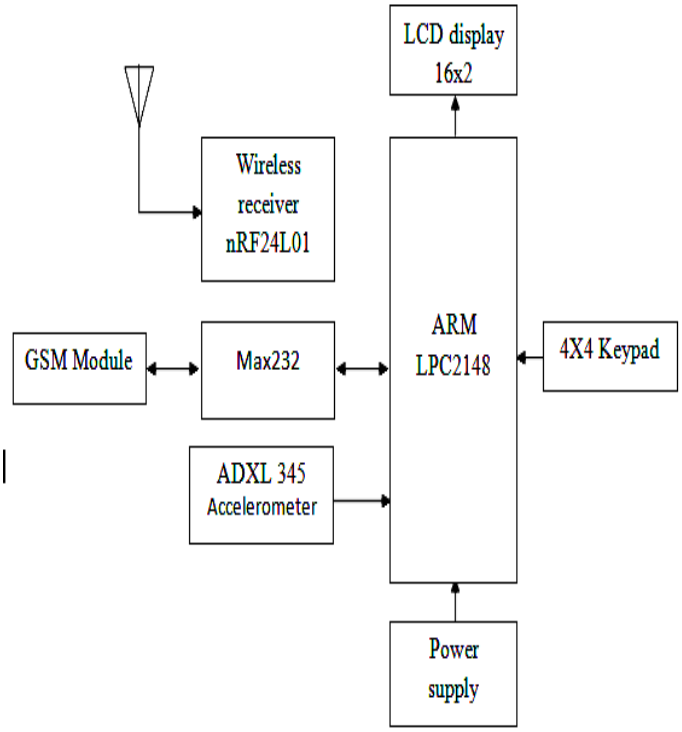
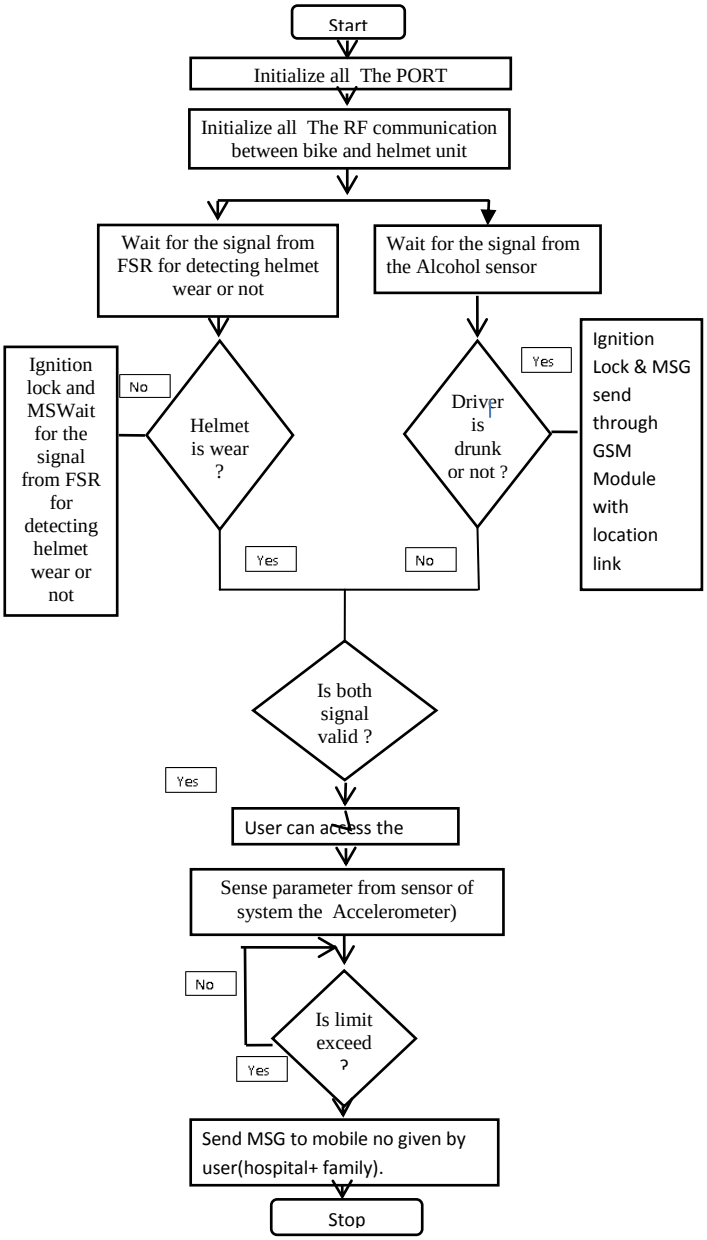


Fig -6: Bike Unit

The bike unit is mounted on actual bike. Accelerometer was fixed on bike, for the fall detection. Our main controller is positioning in to storage case of bike. And decoder circuit is placed on in handle of bike. We also stick a keyboard on the petrol tank. So we can easily type the password.

4. FLOWCHART AND REPRESENTATION

The first step of project is it initializes all the port and next step is Accident Detection using accelerometer if No accident then it will goes to third step. Third step is listening to RF Module Continuously for Data and Interprets Data using if conditions. Fourth step is check weather helmet is ware or not. If Helmet not wore then display Message “Please wear the helmet”. Next step is check the condition of drunk if rider is drunk display message "You are Drunk" and then send the message to stored no. with Location. And ask for the password if password is correct then start bike. The sixth step, if accident detected, stop everything and send message with location



5. ADVANTAGES, APPLICATION AND FUTURE SCOPE

5.1 Advantages:

- Detection of accident in remote area can be easily detected and medical services provided in short time.
- Simply avoiding drunken drive by using alcohol detector. it will reduces the probability of accident
- Operates on solar as well as battery supply.

- If helmet was stolen then we can start the bike by the password

5.2 Application:

- It can be used in real time safety system.
- We can implement the whole circuit into small module later.
- Less power consuming safety system.
- This safety system technology can further be enhanced in car and also by replacing the helmet with seat belt.

5.3 Future Scope:

- We can implement various bioelectric sensors on the helmet to measure various activity.
- We can use small camera for the recording the drivers activity.
- It can be used for passing message from the one vehicle to another vehicle by using wireless transmitter.
- We have used solar panel for helmet power supply by using same power supply we can charge our mobile.

6. RESULT

6.1 IF RF module not in range or helmet RF module is not switch on

6.2 If rider is not ware helmet, then it displays the message of "No Helmet Pls Wear it".

6.3 If alcohol concentration present in human breath then it display the message on LCD And it sends the SMS to register no. with their current location.

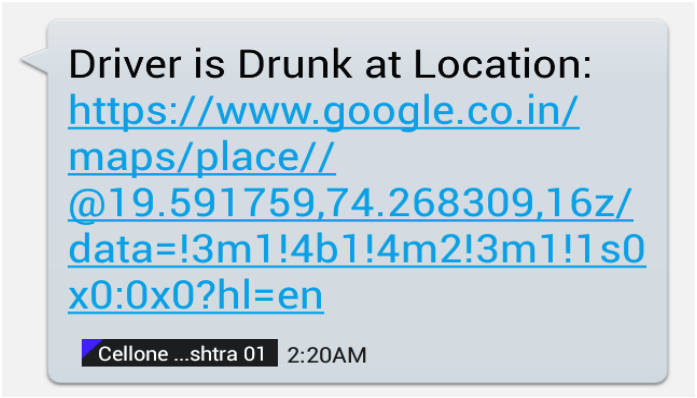
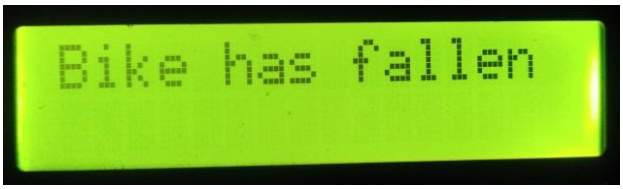


Fig-7: Alert messgae on mobile for drunk Driver

6.4 If accident occurred, then bike is fallen. It display the message on LCD. And it sends the SMS to register no. with their current geographical location.



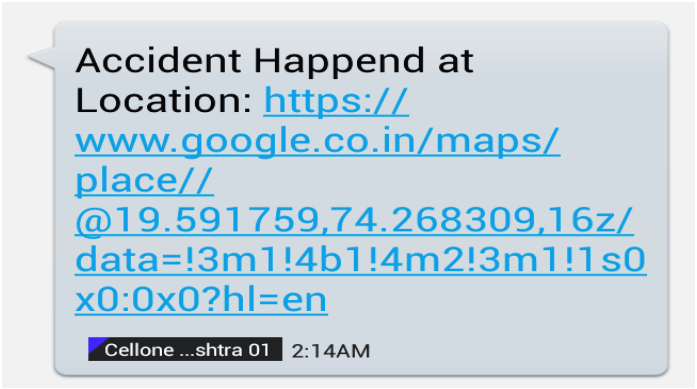


Fig-7: Alert messgae on mobile for Accident

7. CONCLUSION

The outcomes of the project have showed that the bike ignition will start if the helmet is worn. So, it will automatically decrease the effect from accident and it can avoid bike from being stolen. Arduino lilypad is good in controlling all the system and the sensors. Executing the wireless system which Radio Frequency Module to send signal from helmet unit to the bike unit. Due to this wireless connection is better than wired link.

REFERENCES

[1]. Safety measures for "Two wheelers by Smart Helmet and Four wheelers by Vehicular Communication" Manjesh N 1, Prof. Sudarshan raju C H 2 M Tech, ECE-DSCE, JNTUA, Hindupur Email: manjesh405@gmail.com HOD & Asst. Prof. BIT-IT, Hindupur International Journal

of Engineering Research and Applications (IJERA) ISSN: 2248-9622 NATIONAL CONFERENCE on Developments, Advances & Trends in Engineering Sciences (NCDATES-09th & 10th January 2015)

[2]. Smart Helmet with Sensors for Accident Prevention Mohd Khairul Afiq Mohd Rasli, Nina Korlina Madzhi, Juliana Johari Faculty of Electrical Engineering University Tecnology MARA40450 Shah Alam Selangor, MALAYSIAjulia893@salam.uitm.edu.my)

[3]. A Solar Powered Smart Helmet With Multifeatures Mr.P.Dileep Kumar1, Dr.G.N.Kodanda Ramaiah2 Mr.A.Subramanyam3, Mrs.M.Dharani4 International Journal of Engineering Inventions e-ISSN: 2278-7461, p-ISSN: 2319-6491 Volume 4, Issue 10 [June 2015] PP: 06-11)

[4]. A Smart Safety Helmet using IMU and EEG sensors for worker fatigue detection Ping Li, Ramy Meziane, Martin J.-D. Otis, Hassan Ezzaidi, REPARTI Center, University of Quebec at Chicoutimi Chicoutimi, Canada Email: Martin_Otis@uqac.ca Philippe Cardou REPARTI Center, Laval University Quebec, Canada Email: pcardou@gmc.ulaval.ca)

[5]. ISSN 2319 – 2518 www.ijeetc.comVol. 4, No. 2, April 2015© 2015 IJEETC.

[6]. Sudarsan K and Kumaraguru Diderot P (2014), "Helmet for Road Hazard Warning with Wireless Bike Authentication and Traffic Adaptive Mp3 Playback", International Journal of Science and Research (IJSR), Vol. 3, No. 3, ISSN (Online): 2319-7064.

[7]. Vijay J, Saritha B, Priyadharshini B,Deepeka S and Laxmi R (2011), "Drunken Drive Protection System", International Journal of Scientific & Engineering Research, Vol. 2, No. 12, ISSN: 2229-5518.

[8]. Harish Chandra Mohanta, Rajat Kumar Mahapatra and Jyotirmayee Muduli(2014)", Anti-Theft Mechanism System with Accidental Avoidance and Cabin Safety System for Automobiles", International Refereed Journal of Engineering and Science (IRJES), Vol. 3, No. 4, pp. 56-62.