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Smart Bike System-Electronic Safety Apparatus for Two Wheelers

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Abstract: ***The blow when a motor cyclist involves in a soaring speed without wearing a helmet is very risky and can lead to casualty, even loss of life. Wearing a helmet can reduce the shock from the impact and thereby one or more lives could be saved. There are many countries around the world enforcing a guideline that requires the motorcycle's rider to wear a helmet while riding their motorcycle. This proposed work is to improve the safety of the motorcycle rider by ensuring that rider rides the motor cycle with helmet. A smart helmet is a type of protective head gear used by the rider which makes bike riding safer than before. Intelligent electronics safety apparatus for two wheeled vehicles relates to a helmet incorporating a vehicle control system to control the ignition and the riders along with helmet. The intelligent electronic safety apparatus comprises of a helmet with safety device, a sensor mounted in the seating arrangement and an authentication means wherein, above said device are connected with a main control unit mounted in the two wheeler. The main control unit is preferably a micro controller and the control unit is used to control the ignition system of the motor cycle. Its compulsory to wear helmet, without helmet ignition switch will not ignite.***

Keywords: Smarthelmet, motorcycle, safety apparatus

I. INTRODUCTION

Traffic accidents are increasing from day- to- day in our country. The highest percentage of death rate in India is due to two wheeler accidents. The major reason for fatal death is the carelessness of the rider. Technology has grown to a great extent where nothing is humanly impossible.

A helmet is a protective headgear used by the motor cycle rider. The main reason is to protect the rider from getting any head injury. Over speeding, without wearing a helmet is one of the major reasons for fatal accidents. Death risks are higher in the cases where the rider does not wear a helmet. In India, Maharashtra ranks first in road accidents due to over speeding and not wearing a helmet.

Almost 17.7% of the total accidents in India occur in Maharashtra. Tamil Nadu ranks second in our country with 13.8% of total two wheeler accidents. It is a proven fact that the once the speed of the motor cycles are increased so does the accident rate. The blow during the accident results in fatal casualty. The main objective of the proposed work is to build a smart and safety system which forces the bike riders to wear the helmet.

The safety system is created with the help of embedded technology using sensors and a microcontroller. Intelligent electronics safety apparatus for two wheeled vehicles relates to a helmet incorporating a vehicle control system to control the ignition and the riders along with helmet.

The intelligent electronic safety apparatus comprises of a helmet with safety device, a sensor mounted in the seating arrangement and an authentication means wherein, above said devices are connected with a main control unit mounted on the motorcycle. The main control unit is preferably a micro controller and the control unit is used to control the ignition system of the motor cycle. The control unit used is an ATMEGA328 along with force sensors .A RF transceiver module is used for signal transmission and reception.

II. EXISTING SYSTEM

The existing system aims at only accident detection and notification, theft prevention and also integrated systems that prevent from accidents. Various sensors and Wi-Fi enabled processors are used to build effective systems. The accident detection is done using the tri-axial accelerometer and the accident notification is done using the client- server model where the microcontroller acts as the client and the server is the web-based service. The accident detection system communicates the accelerometer and sends the values to the processor which continuously monitors for the inconsistent variations. When an accident occurs, the details are immediately sent to the emergency contacts by utilizing the data stored in a cloud-based service. The vehicle location is obtained by making use of the satellite based application -global positioning system. The current vehicle systems also provide a smart helmet that detects whether the rider is drunk and this technology has grown to an extent where the bike does not ignite without wearing the helmet.

III. PROPOSED SYSTEM

The proposed system aims in prevention of the bike from theft and also the lives of the rider/riders of the two- wheeler. It is an integrated system that provides safety to the rider as well as the vehicle. The two-wheeler does not ignite without wearing the helmet and removal of the parking device. It is an intelligent safety apparatus for two wheelers because this system detects the number of riders and forces the rider or riders to wear the helmet in order to ignite the vehicle. This system ensures that the rider has also removed the side stand before starting the vehicle. The helmets are encoded with the bike to prevent from theft.

IV. WORKING

The system is mainly aimed at the protection of the rider as well as the pillion rider. It consists of two setups, one on the bike and the other on the helmet. It uses two helmets in order to reduce the accident rate due to two wheelers. Both the helmets contain the same components and connections. It consists of ATMEGA 328 controllers connected to the force sensitive sensors and a RF transceiver module. The force sensor is placed on the seat and it is used to measure the person's weight. The other is kept in the helmet, to measure the axis of the helmet. The setup on the bike consists of an ATMEGA 328P connected to a RF transceiver device and a LCD display. The commands are sent and received using the RF transceivers and the status of the bike is displayed in the LCD. The given condition to this setup is that the bike starts only if the rider/riders wear the helmet. Thus if this condition is satisfied, the bike ignites else the bike does not ignite.

A. Experimental Setup

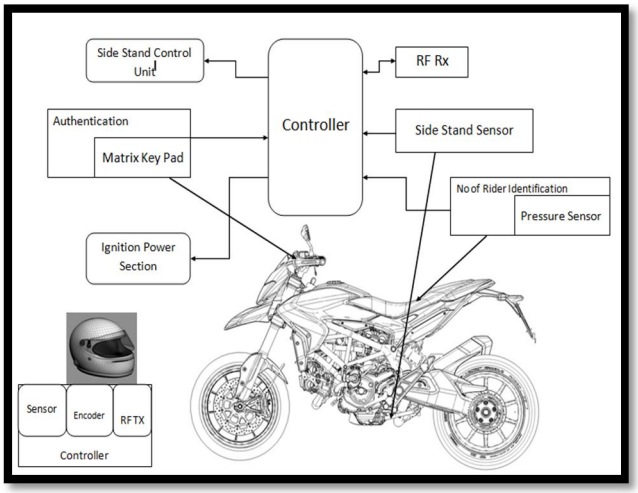

Fig: 4.1[a]- BLOCK DIAGRAM

V. TECHNICAL STUDIES

A. Arduino UNO

Arduino Uno (Fig 5.1[a]) is a microcontroller board based on Atmega328P (Fig5.1 [b]).It has 14 digital I/O pins and 6 analog ports. Out of 14 digital I/O pins 6 provide pulse width modulation output. Its operating voltage is 5v.it supports serial communication which works on the serial peripheral interface protocol. It is one of the best boards to start with electronics and coding.

Fig: 5.1[a] Arduino Uno

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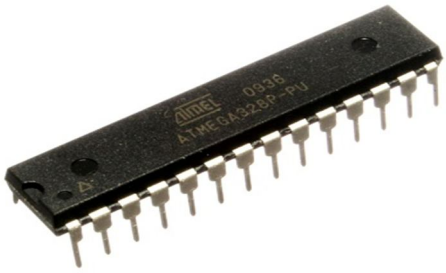

Fig 5.1 [b] ATMEGA 328P chip

B. Arduino NANO

Arduino Nano (Fig5.2) is a microcontroller based on Atmega328.it is a function module which is very small with lots of advantages. Its operating voltage is 5V.Arduino Nano is very special as it is compatible with breadboard. It does not have a dc jack so a mini USB pin is used to supply power to the board.It has some features that are more complete than Arduino Uno.

Fig: 5.2 Arduino Nano

C. Force Sensor

A force-sensing resistor as shown in Fig:5.3.[a] is a type of resistor which is used to measure the amount of force or pressure applied on it. It is also known as "force-sensitive resistor" commonly referred as FSR. It is used to analyze the relative change in force or applied load, rate of change of force, contact/touch. The value of resistance depends on the force applied.FSR consist of a conductive polymer which changes resistance in a predictable manner depending on the application of force. The value of resistance can be measured using a multi meter. The layout of an FSR is shown in the fig 5.3[b].

Fig:5.3[a]Force Sensing Resistor

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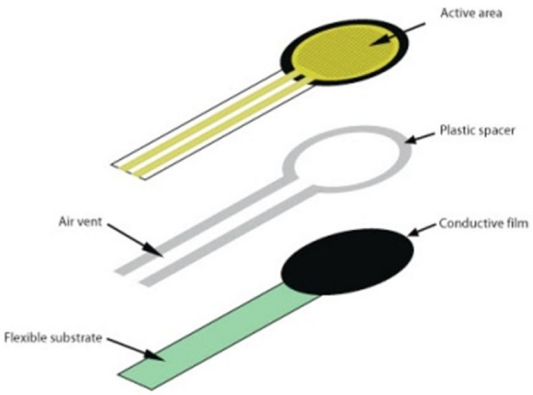

Fig: 5.3[b] Layout Diagram

D. Matrix Keypad

The 4*4 matrix keypad is used as an input. It consists of a set of buttons arranged on a block or pad. It is used for a variety of applications. The keypad consists of alpha numeric keys which are used for encoding data according to the application. The keypad is shown in Fig 5.4[a] and its interface with Arduino board is shown in Fig: 5.4.[b].

Fig 5.4[a] Matrix Keypad

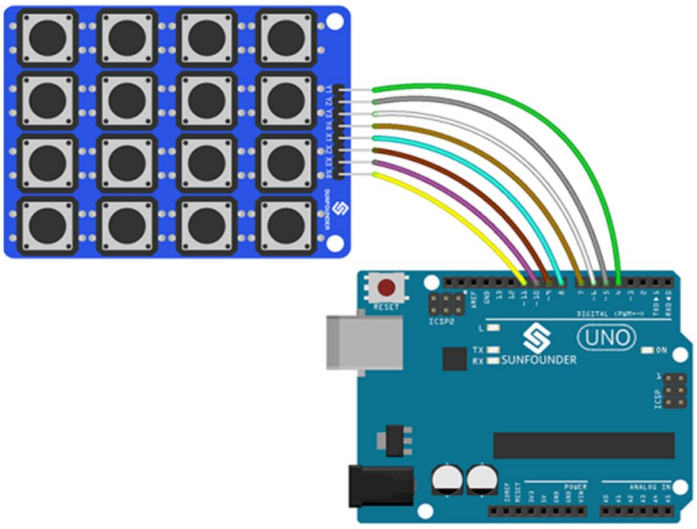

Fig: 5.4[b] Interface Diagram

E. RF Module

The RF module operates at the radio frequency. Its frequency range caries from30khz to300Ghz.The RF module comprises of an RF transmitter and RF receiver as shown in the Fig 5.5. The transmitter and receiver pair operates at a frequency of 434 MHz An RF transmitter receives serial data and transmits it wirelessly through RF through its antenna connected at pin4.the transmission happens at the speed of 1 kbps-10kbps.the transmitted knowledge is received by associate degree rf receiver operative at an equivalent frequency as that of the transmitter

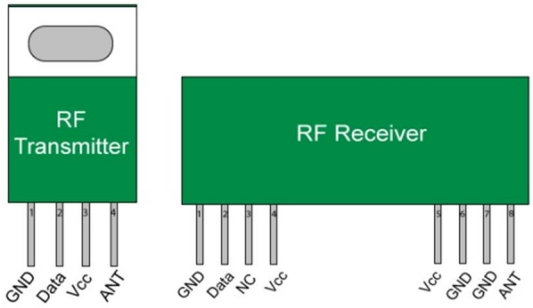

Fig: 5.5 RF Transceiver

VI. CONCLUSION

The proposed work is aimed at reducing the accident rate in our country. The existing systems do not provide the solution in reducing the risks of casualty. Even though stringent rules are available enforcing a guideline to wear the helmets many don't pay any attention to it. The bike ignites only if the rider wears the helmet and also detects the presence of a pillion rider, thus forcing both the riders to wear the helmets. This will be effective if the automobile manufacturers use this system while modeling their vehicles so that the casualty rate due to two wheeler accidents could be reduced to a great extent.

VII. FUTURE WORK

This system can be implemented in real time and thereby accidents can be avoided to a greater extent thereby preventing human lives.

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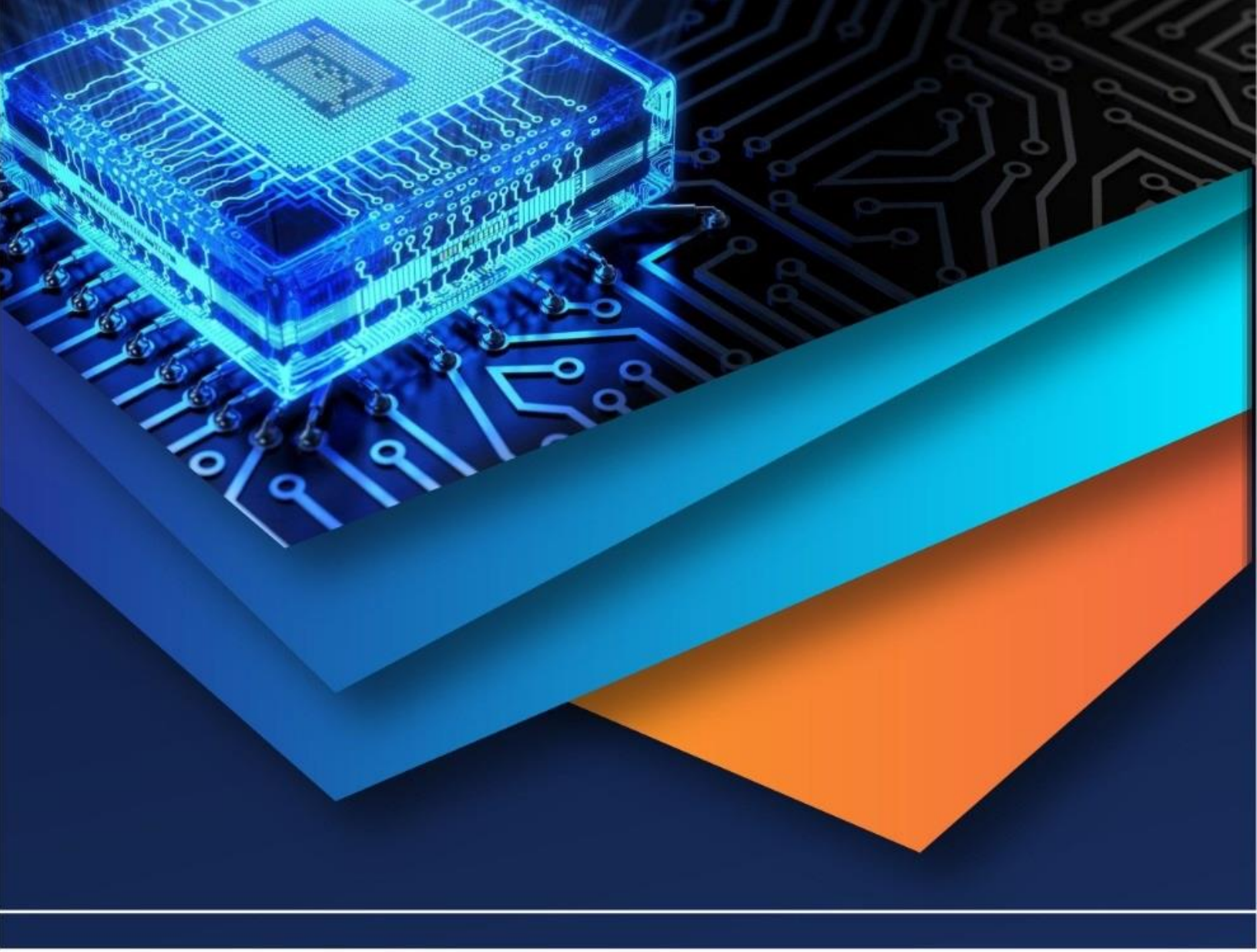

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