Smart helmet and intelligent bike system using RF technology

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Abstract: Now a day's most of the countries are enforcing their citizen to wear helmet while riding bike and not to ride bike when the person is under the influence of alcohol, but still rules are being violated. In order to overcome this problem, "Accident Detection, Theft and Drive Protection using Intelligent Wireless Safety Helmet" is developed. It consists of an intelligent system embedded into the helmet and the vehicle. Helmet unit ensures that rider is wearing helmet and not under influence of alcohol throughout the ride. It communicates with vehicle unit to switch off ignition system of bike if above condition is not met. Vehicle unit checks and intimates accident through geometric coordinates via SMS. By using geometric coordinates, location of the injured rider can be traced using simple GPS tracking application. Also, this system provides theft protection as helmet is also essential along with key to start bike.

1. INTRODUCTION

An embedded system is a special-purpose system in which the computer is completely encapsulated by or dedicated to the device or system it controls. Unlike a general-purpose computer, such as a personal computer, an embedded system performs one or a few predefined tasks, usually with very specific requirements. Since the system is dedicated to specific tasks, design engineers can optimize it, reducing the size and cost of the product. Embedded systems are often mass-produced, benefiting from economies of scale. Personal digital assistants (PDAs) or handheld computers are generally considered embedded devices because of the nature of their hardware design, even though they are more expandable in software terms. This line of definition continues to blur as devices expand. With the introduction of the OQO Model 2 with the Windows XP operating system and ports such as a USB port — both features usually belong to "general purpose computers", — the line of nomenclature blurs even more.

Embedded systems plays major role in electronics varies from portable devices to large stationary installations like digital watches and MP3 players, traffic lights, factory controllers, or the systems controlling nuclear power plants. In terms of complexity embedded systems can range from very simple with a single microcontroller chip, to very complex with multiple units, peripherals and networks mounted inside a large chassis or enclosure.
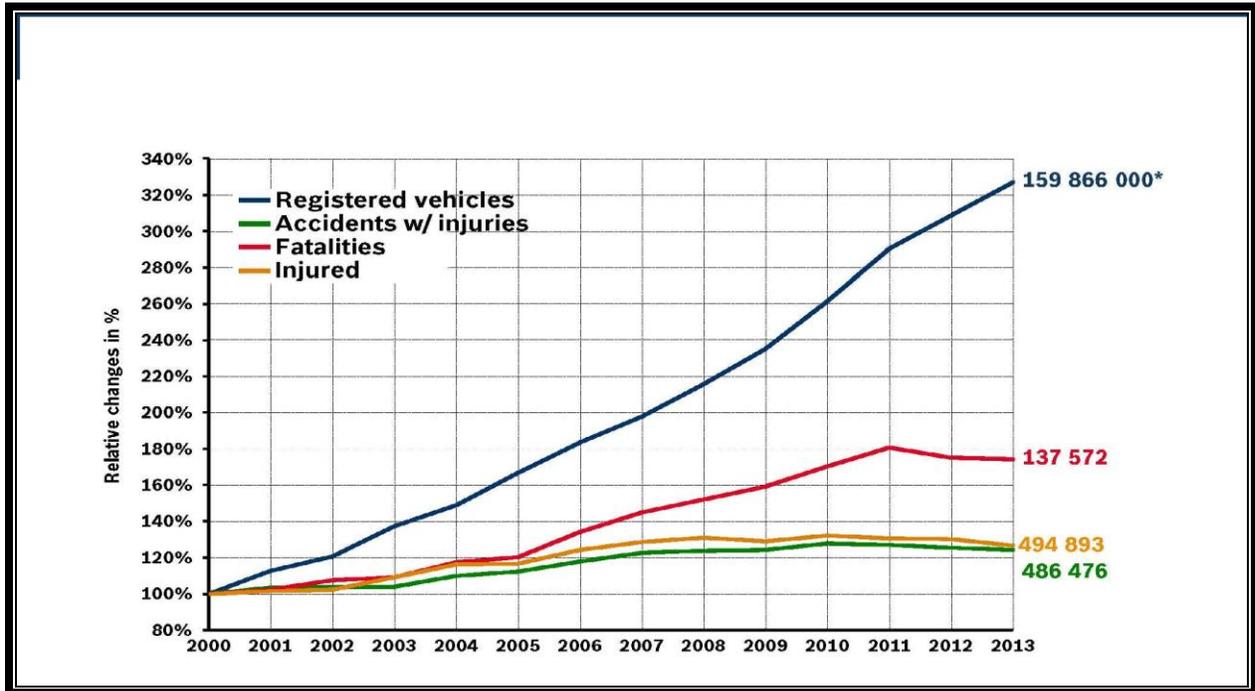
2.   STATISTICS

Figure 1: Statistics Report graph

A Report on Road Accidents in India 2016, published by Transport Research wing under Ministry of Road Transport & Highways, Government of India, has revealed that more people died on roads accidents in India last year, as compared to the number of deaths in 2015. The data has further revealed that the states of Uttar Pradesh and Tamil Nadu have accounted for maximum number of deaths this year. As per the data cited in the report, the country recorded at least 4,80,652 accidents in 2016, leading to 1,50,785 deaths. The number suggests that at least 413 people died everyday in 1,317 road accidents. Further breaking down the statistics, the data reveals that at least 17 deaths occurred in road accidents in 55 accidents every hour in the given time period. Comparing the new recordings with data from previous year shows that in spite of recording fewer accidents in 2016, more deaths have occurred this year as in 2015. In 2015, 1,46,133 people had died in 5,01,423 accidents. The accident severity, which is measured as the number of persons killed per 100 accidents, was recorded at 29.1 in 2015 which is lower than 31.4 in 2016.
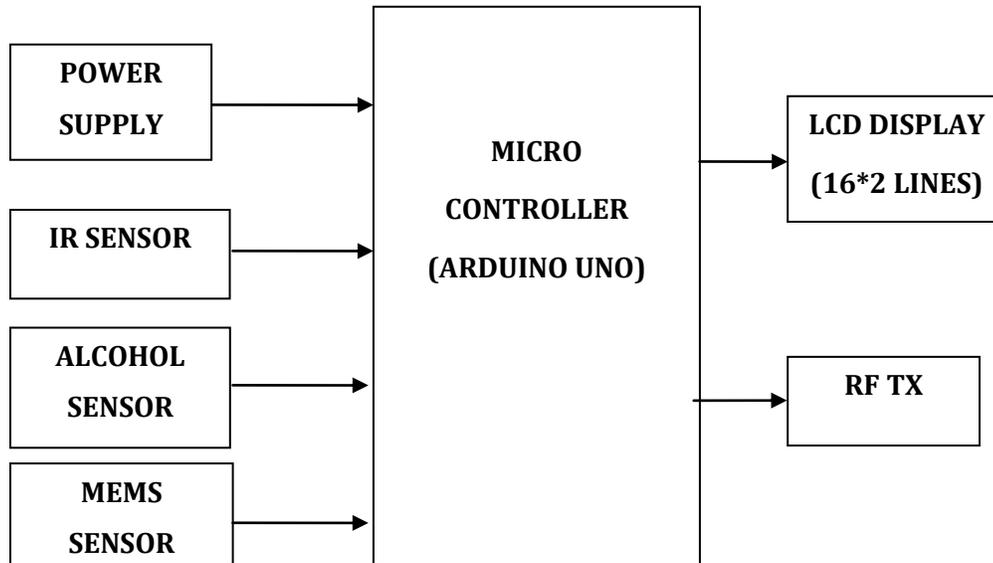
3. PRAPOSED METHODOLOGY

HELMET SECTION:

Figure 2.1: Block diagram of smart helmet

As shown in Figure 2.1, the Infrared sensor senses the wearing of helmet by blocking the receiving rays and the gas/alcohol sensors senses the alcohol in the breath. If the quantity of alcohol is less than the permissible limit and rider is wearing helmet then the required criteria is met and the signal is sent from the helmet unit to the vehicle unit through RF transmitter.
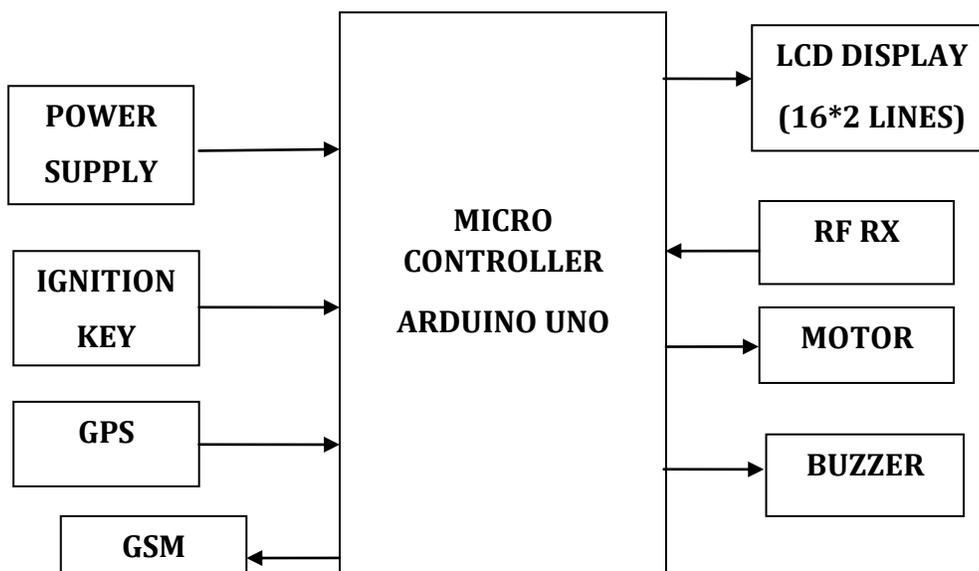
BIKE SECTION:

Figure 2.2: Block diagram of Bike system

Vehicle unit starts ignition system of bike. In case accident occurs then the MEM sensor present in the vehicle unit senses change of frequency caused due to impact of accident and it turns off ignition key in order to turn-off vehicle. Figure 2.2 explains if rider is conscious or in case of false accident detection, rider can turn off ignition key to avoid unnecessary message to relatives else, GSM module will send message with geometric coordinates using GPS module.

4. RESULT

4.1 Status of rider wearing helmet:

With the help of Infrared sensor, driving without helmet can be avoided. As the photo diode is receiving the rays the output is low that indicates helmet is not weared. If photo diode doesn't receive any rays output is high and indicates helmet is weared.

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4.2 Blood Alcohol Content (BAC) Test:

Illegal consumption of alcohol during driving is 0.08 mg/L as per the government act but for demonstration purpose, It is programmed to the threshold limit 0.04 mg/L. Threshold can be adjusted using potentiometer.

If sensitivity of MQ-5 is more than 0.04 mg/L of alcohol in breath then ZigBee of Helmet unit will communicate with vehicle unit and show " alcohol detected " as shown in Figure thereafter ignition system get switched OFF.
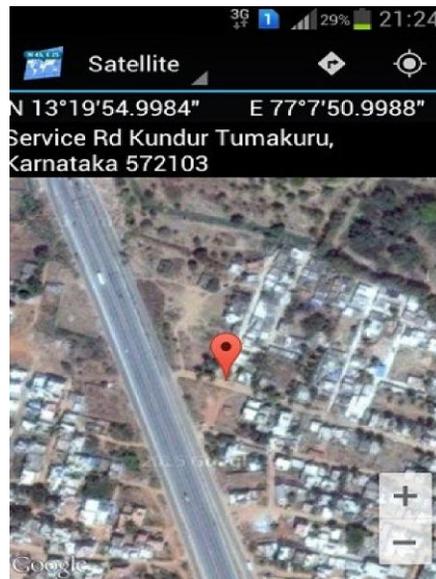

4.3 Accident Detection:

A range of frequency generated depending upon vibration produced due to accident or ob- stacle. If frequency is greater than threshold value then vehicle unit shows accident detected as shown.

4.4 Accident location:

Once, vehicle unit shows "Accident Detected" then GSM sends location of accident with the help of GPS. It sends latitude and longitude continuously to saved SIM numbers as shown in above figure till Ignition system is turned OFF.

5. CONCLUSION

The developed system efficiently ensures the Rider is wearing helmet throughout the ride, should not be under influence of alcohol and if any accident detection & theft prevention will be informed. By implementing this system a safe two wheeler journey is possible which would decrease the head injuries during accidents and also reduce the accident rate due to driving bike after consuming alcohol.

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