IMPLEMENTATION OF GPS ENABLED SOS SMART SAFTEY HELMET

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ABSTRACT

Road traffic accidents and road traffic injuries are a major growing public problem that impacts on all sectors of society. According to WHO worldwide deaths from road accidents is two-thirds of the entire death rate. In this Paper to implement the overall rescue process fast,accurate and estimation of the severity of the accident represent a key point to help emergency services better .The sensor based smart helmet can easily estimate the severity level of accidents and place of incidents and sends the SOS signals via GPS to the nearby police stations and ambulance services. There is a buzzer to alert the surroundings. Incase if the accident is minor the victim can recover and putt off the buzzer beep with in the set time limit and hence no SOS signals are sent. If Incase the accident is major the victim falls unconscious, the buzzer beep time limit expires and the SOS signals are sent. As an added security feature ,Bluetooth call service is implemented in a secure way that the driver can attend the call only when either his vehicle is in neutral state (or)his speedometer touches zero mark.

Keywords - Bluetooth, GPS, Smartphone, SOS(Save Our Soul),smart safety helmets.

I. INTRODUCTION

Accidents were quite common and they take place in a rapid eye blink of time. Many methods and inventions came into place to avoid this road accidents to the possible maximum extent. European road transport commission reveals that in 2011, more than 30,000 people died on the roads of the European Union, i.e. the equivalent of a medium town.In India alone about 40% of Indian population die of road accidents every year. Smart safety helmets are the need of the hour. These helmets will provide the wireless communication between two helmets for intercommunication or it will navigate through GPS, mobile networks, Zigbee etc.It can also function with solar energy system which will recharge the battery so that it will be constantly applicable. That is why we call it “Smart Helmet”.In this undertaking, when the accident takes place the victim’s location is sent to the victims mobile SOS numbers and nearby police station and the ambulance services and the safety call feature so that the accidents can be minimized and controlled.

II. PROPOSED SYSTEM

In this proposed system, we are using PIC micro controller to develop this project . we are using MEMS sensor, vibration sensor, Bluetooth, these all sensors are inbuilt in our helmet and when an accident occurs our helmet which is containing vibration sensor will sense the vibration impact and the MEMS sensor will analyses the position of our body . if we have fallen down the MEMS sensor will analyze it and our cell phone Bluetooth which is already paired with the helmet's Bluetooth, receives the alert notification and via GPS it will intimate to the nearest ambulance service and hospital.

In the existing system, The motorcycle's engine will start only when the motorcycle's rider rides with his helmet. Also a led will flash in the helmet if the speed raises to 100KMPH.If the rider loses his helmet he can't access his motorcycle and also the speed control intimation is not quite good. To overcome these disadvantages we are coming up with the proposed system for upgrading the safety measure to the next level.

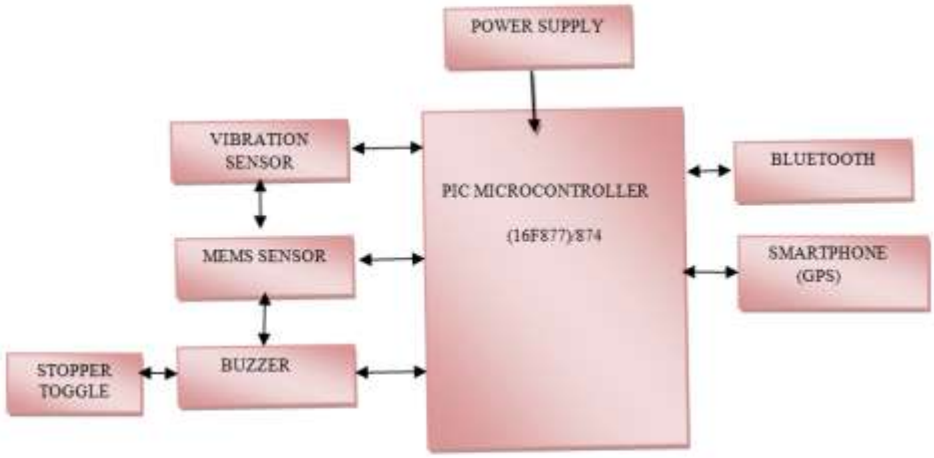


Figure 1 Block diagram of the Introduced System

2.1 Working of the Proposed System

The power supply will be provide from a 12v battery source. When the rider wearing the helmet falls down the buzzer provided in the helmet beeps for a limited period of time such that if the accident is minor the victim can recover and pull of the buzzer and hence unwanted discrepancy for emergency services is avoided. In case if the accident is major such that the victim falls unconscious the buzzer will transfer the information to the MEMS sensor which will analyse the three position axes of the body and the impact generated will be measured by the vibration sensor. All these values will be analysed by the micro controller. micro controller will be programmed in a such a way that the values generated by these sensors will be compared with the predefined values in the controller and the flag will be set such that it falls beyond normal values. These flag will be analysed by the android application that is running background in our mobile phone such that the application will intimate the details of the victim to the SOS numbers of the victim and to the ambulance services and police station.

2.2 PIC Microcontroller

PIC 16F877 is one of the most advanced micro controller from Microchip. This controller is widely used for experimental and modern applications because of its low price, wide range of applications, high quality and ease of availability. It is ideal for applications such as machine control applications, measurement devices, study purpose, and so on.

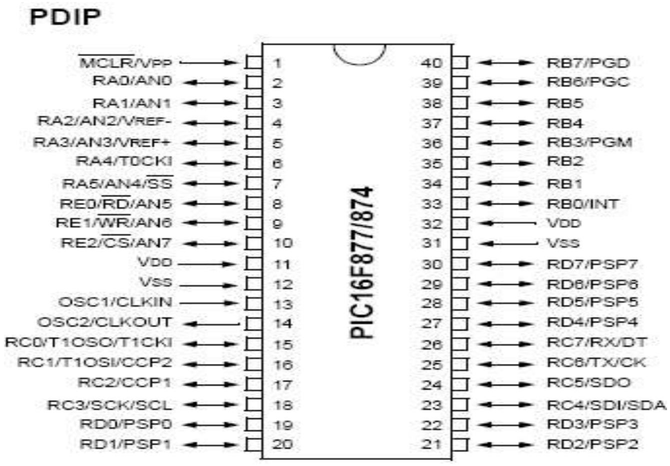


Figure 2 Pin Diagram of Picmicro controller

2.3 Key Feautures

- Maximum operating frequency is 20MHz.
- Flash program memory (14 bit words), 8KB.
- Data memory (bytes) is 368.
- EEPROM data memory (bytes) is 256.
- 5 input/output ports.
- 3 timers.
- 2 CCP modules.
- 2 serial communication ports (MSSP, USART).
- PSP parallel communication port
- 10bit A/D module (8 channels)

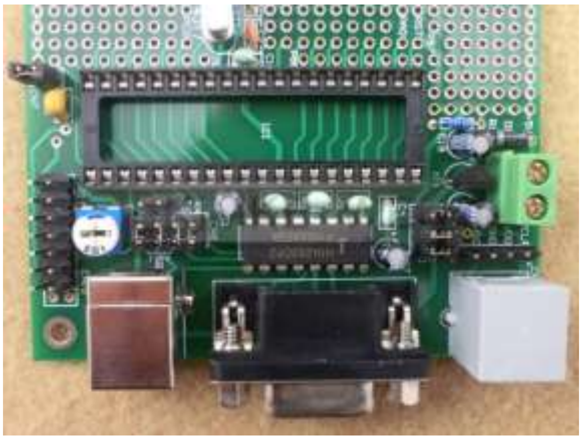


Figure 3 Pic Micro Controller.

2.4 Vibration Sensor

Vibration sensors are utilized in a number of applications to measure acceleration and/or vibrational activity. Vibration sensors can be utilized to determine whether the machinery is operating properly. Vibration sensors can be useful for monitoring the condition of rotating machinery, where overheating or excessive vibration could indicate excessive loading, inadequate lubrication, or bearing wear. Such sensors are also utilized in geophysical applications and applications requiring accelerometers. Vibration sensors are used as knock sensors in internal combustion engines. In order to assure that an engine is operating under optimum conditions, it is necessary to accurately monitor its actual operating state. One device known to be highly useful for this purpose is the engine vibration sensor. Vibration or shock sensors are commonly used in alarm systems to activate an alarm whenever the devices to which they are attached are touched, moved, or otherwise vibrated. For example, vibration sensors are commonly placed in windows of buildings to sense glass breakage and in car alarm systems to detect vehicle tampering.

Commercial vibration sensors use a piezoelectric ceramic strain transducer attached to a metallic proof mass in order to respond to an externally imposed acceleration. Piezoelectric vibration sensors used for detecting vibration from various vibration sources are generally classified into two large types, resonant type and nonresonent type. A capacitive vibration sensor or an accelerometer is formed from a capacitor one plate of which is a proof mass, with the other plate fixed to a substrate. Vibrations are typically measured using analog vibration sensing elements, such as analog accelerometers, positioned on machinery at strategic locations.

Fig 4 Vibration Sensor.

Fig 5 Piezo Electric Vibration Sensor.

2.5 Max 232

The MAX232 is an integrated circuit that converts signals from an RS-232 serial port to signals suitable for use in TTL compatible digital logic circuits. The MAX232 is a dual driver/receiver and typically converts the RX, TX, CTS and RTS signals. The drivers provide RS-232 voltage level outputs (approx. ± 7.5 V) from a single + 5 V supply via on-chip charge pumps and external capacitors. This makes it useful for implementing RS-232 in devices that otherwise do not need any voltages outside the 0 V to + 5 V range, as power supply design does not need to be made more complicated just for driving the RS-232 in this case.

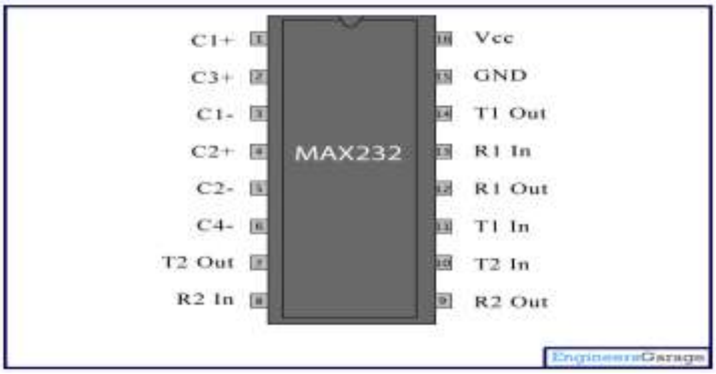
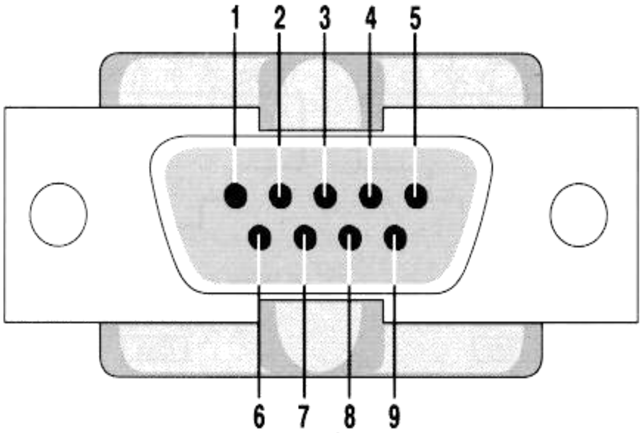


Fig 6 Pin Diagramof Max232

The receivers reduce RS-232 inputs (which may be as high as ± 25 V), to standard 5 V TTL levels. These receivers have a typical threshold of 1.3 V, and a typical hysteresis of 0.5 V.The later MAX232A is backwards compatible with the original MAX232 but may operate at higher baud rates and can use smaller external capacitors – 0.1 μF in place of the 1.0 μF capacitors used with theoriginal device.

2.6 Rs-232

Communication as defined in the RS232 standard is an asynchronous serial communication method. The word serial means, that the information is sent one bit at a time. Asynchronous tells us that the information is not sent in predefined time slots. Data transfer can start at any given time and it is the task of the receiver to detect when a message starts and ends. Asynchronous communication has some advantages and disadvantages which are both discussed in the next paragraph.



Pin	Signal	Pin	Signal
1	Data Carrier Detect	6	Data Set Ready
2	Received Data	7	Request to Send
3	Transmitted Data	8	Clear to Send
4	Data Terminal Ready	9	Ring Indicator
5	Signal Ground		

Fig 7 RS232

2.7 Bluetooth Device

Bluetooth is a frequency hopping wireless communications technology. As shown below in the scrolling spectrogram display, the Bluetooth device (the red/yellow energy squares) hops across the full 2.4 GHz Wi-Fi frequency band. This is easily seen in the scrolling spectrogram display, but more difficult to see in spectrum analyzer displays (top chart) which show only frequency and amplitude information but limited time-domain information.

Radio Frequency Characteristics:

Frequency Range: 2402-2480 MHz

Transmit Power: 2.2dBm

Modulation: GFSK, FHSS

Number of Communication Channels Supported: 79

Width of Communication Channel: 1 MHz

Features: Pulsed, low-power

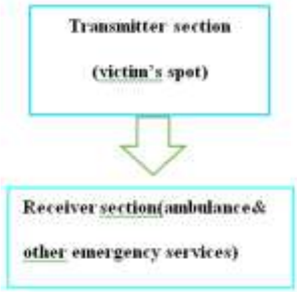
2.8 Different Connectivity Methods & Characteristics

TABLE 1

ZigBee	802.11 (Wi-Fi)	Bluetooth	IR Wireless
20, 40, and 250 Kbits/s	11 & 54 Mbits/sec	1 Mbits/s	20-40 Kbits/s115 Kbits/s4 & 16 Mbits/s
10-100 meters	50-100 meters	10 meters	<10 meters (line of sight)
Ad-hoc, peer to peer, star, or mesh	Point to hub	Ad-hoc, very small networks	Point to point
868 MHz (Europe) 900-928 MHz (NA), 2.4 GHz (worldwide)	2.4 and 5 GHz	2.4 GHz	800-900 nm
Very low (low power is a design goal)	High	Medium	Low
Devices can join an existing network in under 30ms	Device connection requires 3-5 seconds	Device connection requires up to 10 seconds	-
Industrial control and monitoring, sensor networks, building automation, home control and automation, toys, games	Wireless LAN connectivity, broadband Internet access	Wireless connectivity between devices such as phones, PDA, laptops, headsets	Remote controls, PC, PDA, phone, laptop links

III. MATERIALS AND METHODS

This system involves three modules. They are the transmitter section and the receiver section.The introduced system is simple,low-cost and can be easily implemented in our daily life.The transmitter section is the accidental spot from where the signal controlling unit controls the flow of the signal to the receiver. The system consists of a smart phone, smart safety helmet



(In built with all the necessary sensors and other necessary components for its working)

IV. CONCLUSION

This paper has concluded designing, developing and building a simple smart safety helmet using a Smartphone using microcontroller and sensors .The entire system has been built and the tests has been carried out successfully.The system developed is expected to continue to prevent accidents and for the safety of the motorbike rider. It is estimated that the system is able to overcome the problem of navigational issues in present scenario and many more advancements can be done with the same system for the road safety of the humankind.

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