www.ioirp.com

International Journal of Innovative Research in Technology, Science & Engineering (IJIRTSE)
ISSN: 2395-5619, Volume – 4, Issue – 1. March 2018

SMART HELMET FOR PREVENTING THE INDUSTRIAL ACCIDENTS

Dr.K.Sivasubramaniyan[1]
Assistant Professor,
Department of ECE.
S.Santhosh Murali[2], K.Shalini[2], S.Shanmuga Priya[2], P.Vijay[2]
K.S.Rangasamy College of Technology,
Tiruchengode, Tamilnadu.
E-mail:priyassjk@gmail.com.

Abstract:

An accident is an unfortunate incident that happens unexpectedly and resulting in damage or injury. In the modern society, even though the technologies are improved so well, the numbers of accidents are not reduced. The proposed project called "Smart Helmet for Preventing the Industrial Accidents" will try to reduce the number of accidents happening in industries. This project is mostly based on the sensor which constantly senses the environmental parameters such as high temperature and poisonous gases continuously. The measured values are passed to the controller unit. If the controller finds any deviation, it will give an alarming signal to the workers inside the industry. If any accident occurs due to negligence of alarming signal or unexpected happenings, the location of such accidents will be intimated to the emergency care unit, nearby hospitals etc. Thus the number of accident happening inside the industry can be reduced as well save the human life by quickly responding to the accidents.

Keywords: *Internet of Things, Arduino UNO, ultrasonic sensor, GSM/GPRS &GSM SIM908 Module and Potentiometer.*

I. INTRODUCTION

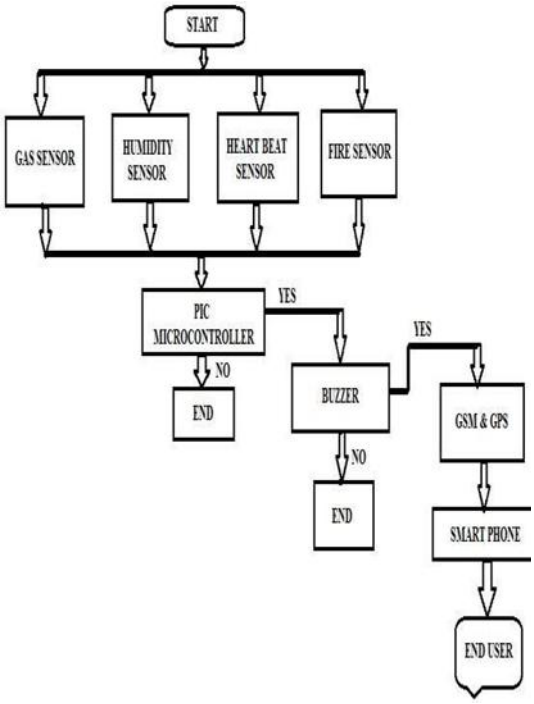
Present industry is increasingly shifting towards automation. In the industry, safety and security is a first aspect. To avoid any type of unwanted conditions a smart helmet is designed to monitor different parameters such as temperature, increasing humidity level, heartbeat, fire and hazardous gases continuously using sensors such as gas sensor, humidity sensor, temperature sensor, fire sensor and infrared sensor to take necessary conditions and gives an alert using buzzer. Automatic accidents detection system is used to recognize the location of the accident. Thus accident detection system using GSM and GPS has gained attention. This system automatically informs accidents to the pre-programmed numbers. When accident occurs, this system sends short message to mobile number via GSM modem. Message will give longitude and latitude values. From these values, location of accidents can be determined.

II. PROBLEM DEFINITION

An industrial accident is a sudden and unanticipated event that can result in injuries, fatalities, property damage and lost production time. Mishaps in the workplace are fairly frequent despite federal laws to protect worker safety. Ignoring safety procedures and using poor judgment are among factors that put workers at greater risk, resulting in serious job-related injury or illness. Thus our proposed system gives a solution to this problem for industrial workers with the help of sensors and GSM and GPS module.

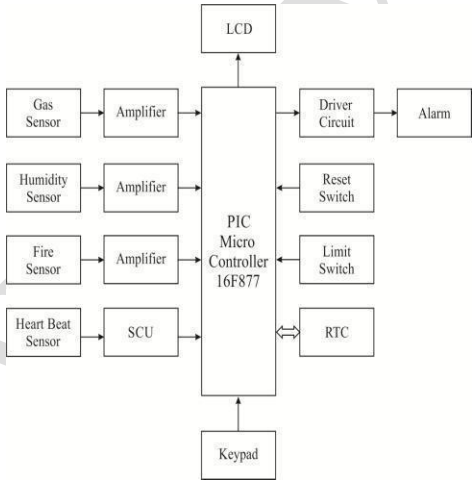
III. PROPOSED SYSTEM

The working of the system is unpretentious. In this system, as shown in the block diagram above, it consists of four important sensors namely Humidity sensor, Fire sensor, Heartbeat sensor, Gas sensor. Gas sensor (MQ-3) which could be used to detect liquefied petroleum gas with different concentrations, it is less expensive and suitable for different applications



1.1 The Flowchart of Smart Helmet

Initially, the sensors sense the signal of the atmospheric conditions. Humidity sensor (HS1101LF) which the absorption of water vapor in air can affect human comfort as well as many manufacturing processes in industries. In Heartbeat sensor, Heart rate is a term used to describe the frequency of the cardiac cycle. It is considered one of the four vital signs. Usually it Block diagram of Smart Helmet is calculated as the number of contractions(heart beats) of the heart in one minute and expressed as "beats per second" (bps). Fire sensor which



sense the fire and then sent the signa to the microcontroller. Then the signals which are sensed by the sensors are send to the Microcontroller which is known as the heart of the embedded systems.Human beings have the power of withstand up to some limits (limit means human acceptable signal), if the limits are exceeded immediately the buzzer will alert the worker mentioning that the limit is beyond that normal level. After the buzzer alert, Global Positioning System (GPS) will find the location of the worker and it sent the accurate location to the microcontroller. The worker's details are preprogrammed in the microcontroller. The details are person's mobile numbers, e-mail id, home addresses etc. Finally, the injured worker's location is sent to Company Management and worker's relatives. By implementing the Global System for Mobile Communication technology into the smart helmet we can alert our family members and nearby hospital about the accident or any misshapen. This System will track the worker's position via SMS or alert warning to the Company managers. By alerting the worker from the dangerous situation, we can save a valuable human's life.

IV. HARDWARE UNITS

POWER SUPPLY

The ac voltage, typically 220V RMS, is connected to a transformer, which steps that ac voltage down to the level of the desired de output. A diode rectifier then provides a full-wave rectified voltage that is initially filtered by a simple capacitor filter to produce a dc voltage. This resulting dc voltage usually has some ripple or ac voltage variation.

A regulator circuit removes the ripples and also remains the same dc value even if the input dc voltage varies, or the load connected to the output dc voltage changes. This voltage regulation is usually obtained using one of the popular voltage regulator IC units.

MICROCONTROLLER

PIC (usually pronounced as "pick") is a family of microcontrollers made by Microchip Technology, derived from the PIC165 originally developed by General Instrument's Microelectronics Division. The name PIC initially referred to Peripheral Interface Controller. The first parts of the family were available in 1976 by 2013 the company had shipped more than twelve billion individual parts, used in a wide variety of embedded systems. Early models of PIC had read-only memory (ROM) or field-programmable EPROM for program storage, some with provision for erasing memory. All current models use flash memory for program storage, and newer models allow the PIC to reprogram itself. Program memory and data memory are separated.

Data memory is 8-bit, 16-bit, and, in latest models, 32-bit wide. Program instructions vary in bit-count by family of PIC, and may be 12, 14, 16, or 24 bits long. The instruction set also varies by model, with more powerful chips adding instructions for digital signal processing functions.

The hardware capabilities of PIC devices range from 6-pin SMD, 8-pin DIP chips up to 144-pin SMD chips, with discrete I/O pins, ADC and DAC modules, and communications ports such as UART, I2C, CAN, and even USB. Low-power and high-speed variations exist for many types. The manufacturer supplies computer software for development known as MPLAB X, assemblers and C/C++ compilers, and programmer/debugger hardware under the MPLAB and PIC Kit seriesThird party and some open- source tools are also available. Some parts have in-circuit programming capability; low-cost development programmers are available as well as high-production programmers. PIC devices are popular with both industrial developers and hobbyists due to their low cost, wide availability, large user base, extensive collection of application notes, and availability of low cost or free development tools, serial programming, and re-programmable Flash-memory capability.

GAS DETECTOR

The gas sensor is the special sensor which designed for sense the gas leakage. In the gas sensor the supply voltage is given to input terminal. The gas sensor output terminals are connected to non-inverting input terminal of the comparator.

HUMIDITY DETECTOR

Humidity is the amount of water vapor in an air sample. There are three different ways to measure humidity: absolute humidity, relative humidity, and specific humidity. Relative humidity is the most frequently encountered measurement of humidity because it is regularly used in weather forecasts.

FIRE DETECTOR:

The flame sensor is connected with resistor. This connection formed the voltage divider network which is connected with inverting input terminal of the comparator. The reference voltage is given to non-inverting input terminal. The comparator is constructed with LM 741 operational amplifier.

HEART BEAT PULSE DETECTION:

Heart rate is a term used to describe the frequency of the cardiac cycle. It is considered one of the four vital signs. Usually it is calculated as the number of contractions (heart beats) of the heart in one minute and expressed as "beats per second" (bps).

GPS TECHNOLOGY

GPS or Global Positioning System is a network of orbiting satellites that send precise details of their position in space back to earth. The signal are obtained by GPS receivers, such as navigation devices and are used to calculate the exact position.

GSM TECHNOLOGY

GSM (Global System for Mobile communication) is a digital mobile telephony system that is widely used in Europe and other parts of the world. GSM uses a variation of time division multiple access (TDMA) and I the most widely used of the three digital wireless telephony technologies (TDMA, GSM and CDMA).

ALARM CIRCUIT:

The circuit is designed to control the buzzer. The buzzer ON and OFF is controlled by the pair of switching transistors (BC 547) . The buzzer is connected in the Q2 transistor collector terminal

V. SOFTWARE DESCRIPTION

A) MP LAB

MPLAB IDE is an integrated development environment that provides development engineers with the flexibility to develop and debug firmware for various Microchip devices.

MPLAB IDE is a Windows-based Integrated Development Environment for the Microchip Technology Incorporated PIC microcontroller (MCU) and dsPIC digital signal controller (DSC) families.

B) MPLAB SIMULATOR

MPLAB SIM is a discrete-event simulator for the PIC microcontroller (MCU) families. It is integrated into MPLAB IDE

integrated development environment. The MPLAB SIM debugging tool is designed to model operation of microchip. Technology's PIC microcontroller to assist users in debugging software for these devices.

C) IC PROG

The PRO MATE II is a Microchip microcontroller device programmer. Through interchangeable programming socket modules, PRO MATE II enables you to quickly and easily program the entire line of Microchip PICmicro microcontroller devices and many of the Microchip memory parts.

PRO MATE II may be used with MPLAB IDE running under supported Windows OS's (see Read me for PRO MATE II.txt for support list), with the command-line controller PROCMD or as a stand-alone programmer

D) COMPILER-HIGH TECH C

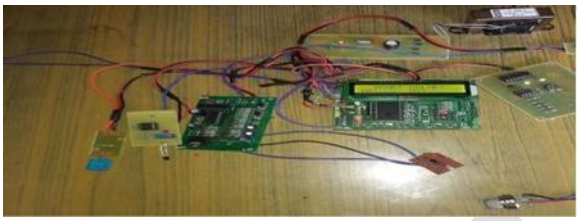
A program written in the high level language called C; which will be converted into PIC micro MCU machine code by a compiler. Machine code is suitable for use by a PIC micro MCU or Microchip development system product like MPLAB IDE.

E) PIC START PLUS PROGRAMMER:

The PIC start plus development system from microchip technology provides the product development engineer with a highly flexible low cost microcontroller design tool set for all microchip PIC micro devices. The pic start plus development system includes PIC start plus development programmer and MPLAB IDE.

The PIC start plus programmer gives the product developer ability to program user software in to any of the supported microcontrollers. The PIC start plus software running under MPLAB provides for full interactive control over the programmer.

OUTPUT:



Output of Smart Helmet

CONCLUSION

The values from heartbeat, gas, fire and humidity sensors are monitored and measured. If the value exceeds more than or equal to the threshold range, the buzzer will alarm. Around the environmental conditions, in the case of spark, moisture content and hazardous gases were present in the atmosphere; the sensors sensed the particular thing according to the sensor. The sensed values are given to the controller unit. The sensed values are compared with reference value if the values are above the threshold range, the buzzer alarmed. The Smart Helmet system is combined to a GSM and GPS module to report the information of the accidents occurs.

FUTURE WORK:

The GSM and GPS module will be replaced with the IoT technology to intimate the accident occurring zone

REFERENCES

[1] Pranjal Hazarika (2016) "Implementation of Smart Safety Helmet for Coal Mine Workers", Proceedings of IEEEInternational Conference on Power Electronics, Intelligent Control and Energy Systems (ICPEICES).

[2] Shabina.S (2014) "Smart Helmet Using RF and WSN Technology For Underground Mines Safety", Proceedings of International Conference on Intelligent Computing Applications.

[3] MohodKhairulAfiqRali (2013) "Smart Helmet with Sensors for Accident Prevention", Proceedings of International Conference on Electrical, Electronics and System Engineering.

[4] C.J.Behr, A.Kumar (2016) "A Smart Helmet for Air Quality and Hazardous Event Detection for the Mining Industry", Proceeding of IEEE International Conference on Industrial Technology(ICIT).

[5] Deepak Punetha, Vartika Mehta (2014) "Smart and Intelligent GSM and GPS based Automatic

Tracking and Alert System", Proceedings of International Conference on Advances in, Communications and Information (ICACCI).

[6] Bhuvani. R (2014) "Life Saving Alert for Wearing Helmets Using Security Tokens", Proceedings of International Conference on Smart Structures & Systems (ICSSS).

[7] Ping Li (2014) "A Smart Safety Helmet using IMU and EEG sensors for worker fatigue detection ", Proceedings of IEEE International Symposium on Robotic and Sensors Environments (ROSE).

[8] Boris Pokric (2014) "Environmental Monitoring using Low-cost Sensors for Detecting Gases, Particulate Matter and Meteorological Parameters", Proceedings of Eighth International Conference on Innovative Mobile and Internet Services in Ubiquitous Computing.

[9] Wilhelm von Rosenberg (2015) "Smart Helmet: Monitoring Brain, Cardiac and Respiratory Activity", Proceedings of 37th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC).

[10] S. Molina (2011) "Detection of Gases and Collapses in Underground Mines using WSN", Proceedings of IEEE International Conference on Industrial Technology.