



**INTERNATIONAL JOURNAL OF ENGINEERING SCIENCES & RESEARCH
TECHNOLOGY**

**SAFEGUARD OF WORKERS EXPOSED TO PHYSICAL AGENTS IN
CONSTRUCTION SITES USING WSN**

Mrs.G.Bhavani*, S.Shamiya, P.Santha, P.Sivaranjini

* Assistant professor, GKM college of Engineering and technology, Chennai

UG student, GKM college of Engineering and technology, Chennai

UG student, GKM college of Engineering and technology, Chennai

UG student, GKM college of Engineering and technology, Chennai

ABSTRACT

Our aim is to develop a system for the protection of workers employed in the building sector, exposed to critical physical agents, typical of their working scenario. The network uses GSM technology in which the distance covered by the device is unlimited. The concept has been specifically developed to measure two different kinds of exposure Ultraviolet rays and dust. It deals with the subsequent realization of the wearable devices suitable to monitor working environment of workers in critical areas. The device is now designed in development boards which can be integrated as a wearable component. In our project the data will be sensed continuously, then status of the workers will be received in the mobile phone through the GSM then the buzzer will produce the alert. From the given details the rescue process will take place.

KEYWORDS: Wireless Sensor Networks, GSM, sensors, Ultra violet rays.

INTRODUCTION

WSN is the one of booming technology in many applications. In the application includes home applications, traffic control, logistic, industrial automation and management. It is efficient in many situation where cables can be replaced using sensors in mobility. Constructions in cities are developing more rapidly. So there is an negligence in protecting the construction workers. It becomes one of the major problem nowadays . The people are potentially at risk to the exposure of many radiations.

Construction workers are the largest group of service providers in city. Almost 43% of urban poor are employed in building and construction industry. These poor have deplorable working conditions and working roles, which severally impact their life style, Health and Growth potential. Health problem lead to considerable productivity loss at work among workers at construction sites. The aged people at construction site face several problem such as drowsiness, Hypertension, Asthma.

To prevent all these problems faced by workers in construction site. We proposed a project to measure heart rate, temperature, environment gas, UV rays by

using different sensors. The data related to all workers are transmitted to mobile phones by GSM technology.

SYSTEM DESIGN

Block Diagram mainly consists of Solar Panel which acts as UV Sensor, Heart Beat Sensor, Gas Sensor and Temperature Sensor. In this project, different types of sensors are used. The solar panel which we used here will absorb the UV rays , the heart beat sensor will sense the heart beat rate of the workers, the temperature sensor sense the temperature from the environment, the gas sensor absorbs the CO2 gas which emitted from cement. These signals were transmitted parallel to Analog to Digital Converter for continuous conversion mode by tying EOC output to START input. In this mode an external START pulse should be applied whenever power is switched ON. The digital signal from ADC is given to the input of microcontroller and the serial output from microcontroller is displayed in the LCD.

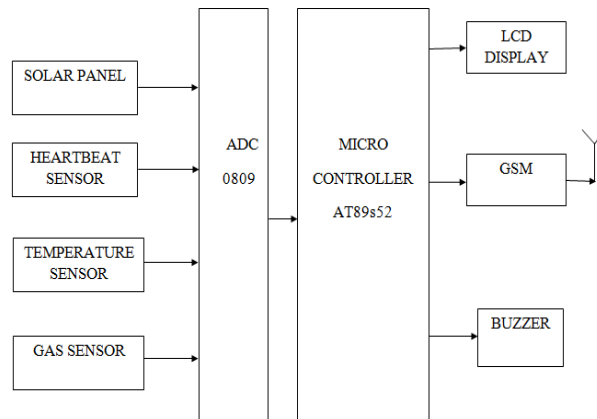


Fig 1.block diagram

The ranges of different sensors are displayed on the LCD screen. If it exceeds the specified range described in the program, the buzzer will intimate by beep sound. Simultaneously the alert message will be received in mobile through GSM

SYSTEM COMPONENTS DESCRIPTION

SOLAR PANEL: This panel acts an UV sensor which is actually used for measuring ultraviolet rays that affects the outdoor workers those who work sunlight for the whole day. This is connected to ADC and is also interconnected with other three sensors. The solar panel consists of solar cells usually coated with anti-reflective material so that they absorb the maximum amount of radiation as possible and it will provide the exact value of the UV rays absorbed by the body of workers.

HEART BEAT SENSOR: This is used to sense heart rate of workers in order to identify their health and body condition whether they are normal or abnormal. It is used to measure the alteration in blood volume at finger tip with each heart beat. The sensor unit consists of infrared light emitting diode and a photodiode in which IR LED transmits an infrared light into the fingertip and the photodiode senses the portion of the light that is reflected back. The reflected light is converted into a pulse. The pulses can be later counted by microcontroller to determine heart rate.

TEMPERATURE SENSOR: This sensor is used to monitoring the temperature of the environment in the construction sites. If the temperature gets increased the workers in the site is treated as abnormal. It gives the input to the ADC. The LM35 thus has an advantage over linear temperature sensors calibrated in Kelvin, as the user is not required to subtract a large constant

voltage from its output to obtain convenient Centigrade scaling.

GAS SENSOR: This sensor measure and indicate the concentration of carbon dioxide gas in cement. If the sensor is reading near the maximum values, it will check whether it causes danger to the person or not. It will be reported immediately through alert. They are manufactured as portable or stationary (fixed) units and work by signifying high levels of gases through a series of audible or visible indicators, such as alarms, lights or a combination of signals.

0809 ADC: The ADC used here is Successive Approximation Type ADC 0809. It consists of a successive approximation register which counts all the LSB and MSB values. This is used to convert the given analog signal to digital one with all its given data. The special feature of ADC, it can be easily interfaced with all micro controllers and it does not required any full scale and no zero adjustment. The resolution of this type of ADC is 8bits and its conversion time is under micro seconds. It needs only single power supply.

AT89S52 MICROCONTROLLER: This uses AT89S52 because of the maximum speed execution of instruction per cycle is 0.5. The three ports of the microcontroller is used for further operation. Port P0 and P2 also used to provide low byte and high byte addresses respectively, when connected to an external memory. Port 3 has multiplexed pins for special functions like serial communications, hardware interrupts, timer inputs and read/write operation from external memory. AT89S52 has an inbuilt UART for serial communication. It can be programmed to operate at different baud rates. Including two timers & hardware interrupts, it has a total of six interrupts.

GSM: This technology is specially used for larger coverage area of the work place. Here it is actually needed to provide the details of the labourers to the mobile phone. Like a GSM mobile phone, a GSM modem requires a SIM card from a wireless carrier in order to operate. It helps in sending SMS messages to mobile phones.

LCD DISPLAY: The 16x2 LCD display is used in the project to display all the four sensor values. A 16*2 LCD means it can be display 16 characters per line and there 2such lines. In this LCD each character is displayed in 5*7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the

LCD. The data is used to display the value of the character in the LCD.

BUZZER: The buzzer is required to create an alert sound when the ranges of sensors are crossing the certain limit of values that is specified.

ALGORITHM

1. Switch on power supply for the circuit to operate.
2. It will start to sense the working unit based on UV rays, Heartbeat, Temperature, gas produced by the different sensors.
3. To convert the Analog to Digital signal by using ADC to provide the signal to microcontroller.
4. To embed the software coding into the micro controller using embedded c.
5. The output of the microcontroller is displayed in LCD screen.
6. The data of the workers are transmitted to mobile phone by using GSM when they are at risk position.

RESULT

The output of the system is given in three different ways. The major output if the system is given as a message on the mobile phone of the controlling person using GSM technology. In addition to that the system produces an alarm when the message is received. The LCD is connected as shown in fig.2. The LCD will display the received values from the four sensors such as gas, temperature, uv rays intensity, heartbeat of the working person. It is shown in fig.3. When any of these values goes beyond the threshold value, an automatic message is transmitted through GSM, which is shown in fig.4. This will trigger the alarm.



Fig- 2 circuit output



Fig- 3 LCD Output



Fig- 4 Mobile Phone Output

CONCLUSION AND FUTURE SCOPE

Real time monitoring may have an important role as a strategy to provide effective and cost efficient safeguard measure for workers exposed to physical agents in construction sites. This wireless sensor network has potential for offering a wide range of benefits to workers, site engineers and society through continuous monitoring feature, early detection of abnormalities with high reliability and security. This instrument also has the flexibility which helps to reduce the possible health hazards range from short term effects such as sunburn and eye damage to chronic effects such as skin cancer and melanoma or cataracts and thereby reducing death rate. With the

help of the system the labours can finish the work earlier before the assigned time of the work. This instrument can also be integrated with higher level equipment and used in various applications and it can be fabricated into a micro chip so as wear in hand or helmet. In future it can be introduced in the market for sales as an inexpensive product. Implementation of another sensor namely vibration sensor for sensing the device which is about to fall and give vibration so that the workers are aware that it is always with them.

REFERENCES

1. Abderrahim, E.Garcia, R.Diez and C.Balaguer, "A Mechatronics Security System for the Construction Site", Automation in Construction, Volume 14, No.4, 460-466,2005.
2. Agnieszka Wolska, "Occupational Exposure to Solar Ultraviolet Radiation of Polish Outdoor Workers: Risk Estimation Method and Criterion", International Journal of Occupational Safety and Ergonomics, Volume 19, No. 1,107-116, 2013.
3. A.Giretti, A.Carbonari, B.Naticcchia, M.DeGrassi, "Advance Real Time Safety management system for construction sites", The 25th International journal on Automation and Robotics in construction, 2008.
4. C.Parks, K.Conrad, and G.Cooper, "Occupational exposure to crystalline silica and auto-immune disease", Environmental Health Perspectives, October 1999.
5. DevendraGurjar, Md Iftekhar Alam, Prof B BTiwari, Prof G N Panday, " Wireless sensor network : an emerging in healthcare", IOSR Journal of computer Engineering, Volume 4, PP 43-48, 2012.