

Health care System in recycling plants and garbage waste disposal sites

John Colaco¹, Dr. R.B. Lohani²

¹Student & Department of Electronics & Telecommunications, Goa Engineering College, Goa, India

²Professor & Department of Electronics & Telecommunications, Goa Engineering College, Goa, India

Abstract - The recycling plants and waste disposal sites environment very hazardous to human health. The workers working in these environments face lot of hardship and suffocations. These workers get highly exposed to airborne microbial agents. The infectious diseases are also seen in garbage treatment plants and other waste disposal sites. These garbage emits various gases such as water vapour, carbon monoxide, methane which can easily increase stress level. Various diseases which are caused by garbage gases are such as Asthma, Cholera and other skin diseases. This can create a risk in their health and life. Hence a proper and regular care of their health is needed in order to save their health and life. Therefore, it is vital to monitor their several health parameters. These parameters include such as temperature, stress by using various sensors of biological nature and then transmitting their health parameters through wireless communication technology. This can be done by noticing their health abnormalities through alarming. This alarm can be generated when one of the parameters will exceed the limiting value and then sending this exceeded value wirelessly to receiving unit.

Key Words: Garbage waste, Sensor, temperature, Gas, Microcontroller, Raspberry pi

1. INTRODUCTION

Proper Disposal of garbage waste both wet and dry is important for the growth of the society/ country but health and safety humans working in garbage treatment plants is a prime concern because of unhealthy conditions. Due to the presence of various organic and toxic gases, the health is becoming inferior day by day. Health care means the monitoring which includes biological monitoring and medical examination of individuals for the purpose of identifying changes in health status due to occupational exposure to a hazard including hazardous gas, chemicals and disease. It is very important to monitor different parameters continuously and to take required action immediately to avoid any types of hazards related to human health. This can be achieved by detecting immediately any adverse changes in health by using various medical sensors and monitoring using wireless communication technology and will help to prevent and save the life of miners. temperature of underground coal mine. The system [5] is monitoring heart rate pulse of workers working at underground mine using pulse detection sensor but it is time consuming system. The proposed system will monitor health parameters such as fever, temperature heartbeat. This system is more efficient than in [5].

2. SYSTEM ARCHITECTURE

In this proposed system, there are two units one is transmitting Unit and other is receiving Unit. Both the units comprise of Raspberry pi as core microcontrollers. They are communicated via wireless technology. The sensors are interfaced to these microcontrollers. The transmitting unit have sensors to detect the biological parameters, LCD display to show the values of parameters and wireless technology to send the detected parameters and the receiving unit have computer to show the value of detected parameters and buzzer giving warning when the values of parameters will go beyond the limit and a wireless device.

At the transmitting section, the parameters such as temperature, poisonous gases are detected by the respective sensors. Now if any of the parameters received goes beyond the normal value of human, then a Buzzer will be activated giving warning to the receiving unit which will be placed in control room. In this control room, there will be medical a staff. The values of parameters will be displayed on the computer screen. In the control room, the XBee transceiver receives the information and communicate to the raspberry pi. The computer connected to the raspberry displays the information of workers working inside the garbage treatment plant in the control room. Also, the detected information can be sent via SMS to doctor in charge phone through GSM/GPRS modem. This will give fast, accurate and reliable help to workers.

a. Transmitting Unit

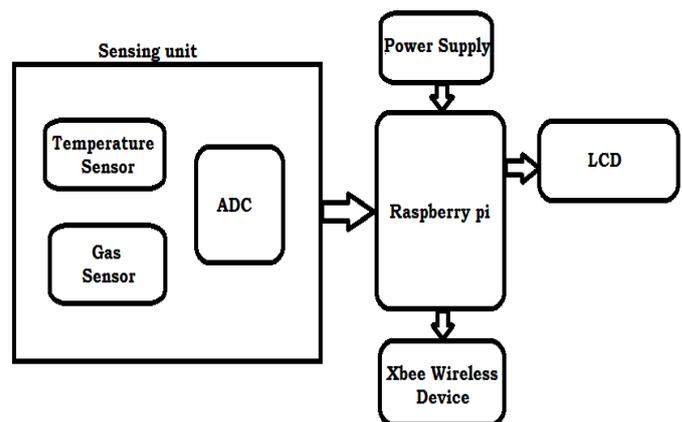


Fig-1: Block Diagram of Transmitting Unit

b. Receiving unit

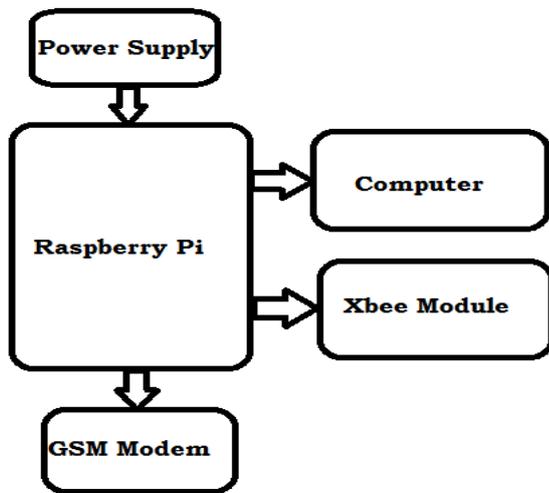


Fig-2: Block Diagram of Receiving Unit

3. HARDWARE DETAILS

3.1 Raspberry Pi

The main idea of Raspberry Pi was to get people educated, especially School children on programming and interfacing of basic hard ware. The structure of the Raspberry Pi makes it a machine on which one can learn computer concepts. It is a credit-card sized computer. It is manufactured and designed by the Raspberry Pi foundation in United Kingdom with an aim of teaching basic computer science to school children and all other persons having interest in computer hardware, programming. It has a BroadcomBCM2835 system on a chip (SoC), which comprises anARM1176JZF-S 700 MHz processor, Video Core IV GPU and was originally sent with256 megabytes of RAM, later upgraded (Model B & Model B+) to 512 MB. It does not contain a built-in hard disk or solid-state drive, but it has an SD card for booting and persistent storage, with the Model B+ using MicroSD. In the Raspberry the Broadcom SoC used is equivalent to a chip used in an old smartphone of Android or iPhone. Whereas it is operating at 700 MHz by default, which provides a real-class performance roughly equivalent to 0.041GFLOPS. It consumes 700mA or 3W or power. It is driven by a Micro USB charger or the GPIO header. The operating system can be loaded on the card using a card reader on any computer. This Raspberry Pi board have 2.54 mm (100 mil) 26-pin expansion header, marked as P1, organized in a 2x13 strip. They provide 8 GPIO pins plus access to I²C, SPI, UART), as well as +3.3 V, +5 V and GND supply lines. The Raspberry Pi primarily uses Linux kernel-based operating systems. The install manager for Raspberry Pi is NOOBS. The Oss included with NOOBS are Archlinux ARM, Pidora (Fedora Remix), Raspbian (recommended).

3.2 Temperature Sensor

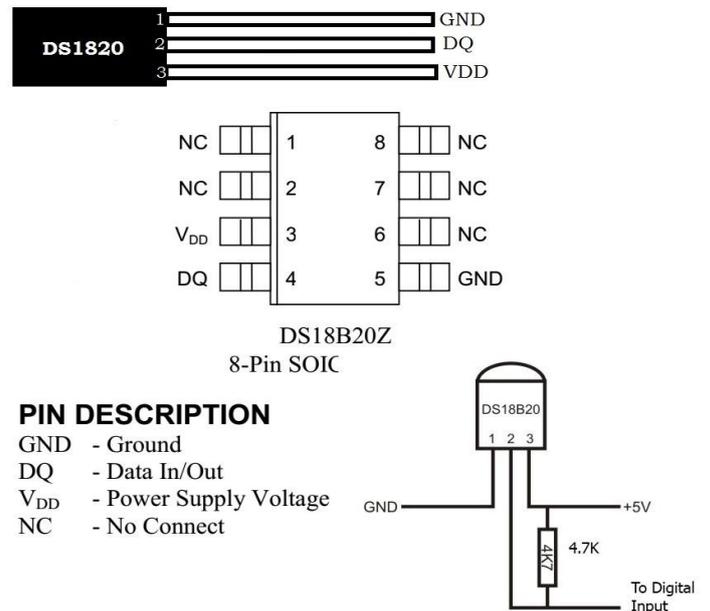


Fig -3: Structural Diagram of Temperature sensor

The DS18B20 is an Digital Thermometer that provides 9 to 12-bit (configurable) temperature readings which display the temperature of the device. Information is sent through over a 1-Wire interface, so that only one wire (and ground) needs to be connected from a central microprocessor to a DS18B20. Power for reading, writing, and performing temperature conversions can get from the data line without a need for an external power source. The core functionality of the DS18B20 is its direct-to-digital temperature sensor.

The DS18B20 consists of four data components: 1) 64-bit lasered ROM, 2) temperature sensor, 3) non-volatile temperature alarm triggers TH and TL, and 4) a configuration register. By storing the energy on an internal capacitor during periods of time when the signal line is high, the device derives its power from the 1-Wire communication line and continuing to operating off power source during the low times of the 1-Wire line until it returns high to refill the parasite (capacitor) supply. Other choice is that the DS18B20 may also be powered from an external 3 volts - 5.5-volt supply. One control function orders the DS18B20 to perform a temperature measurement. Hence the sufficient power must be provided over the DQ line when a temperature conversion is taking place in order for the DS18B20 to be able to perform accurate temperature conversions.

3.3 Gas Sensors

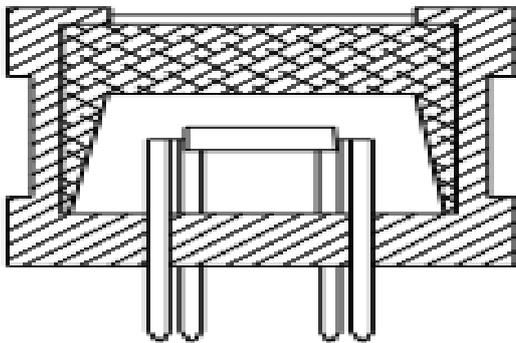


Fig -4: Structure of Gas Sensor

Detecting the poisonous gases such as methane and carbon monoxide is very important for the workers working in garbage and waste treatment plant. For detection of methane and carbon monoxide which are the major toxic gases in garbage and waste treatment plant, MQ-214 gas sensor for methane detection and MQ-7 for Carbon - Monoxide detection is used. The sensor shown in figure is a structure of MQ-7 gas sensor which consist of Tin Dioxide (SnO₂) sensitive layer, micro AL₂O₃ ceramic tube. The measuring electrode and heater are fixed into a coating made by plastic and stainless-steel net. The heater provides necessary work conditions for work of sensitive components. The enclosed MQ-7 have 6 pins 2 are used for providing heating current and 4 of them are used to fetch signals.

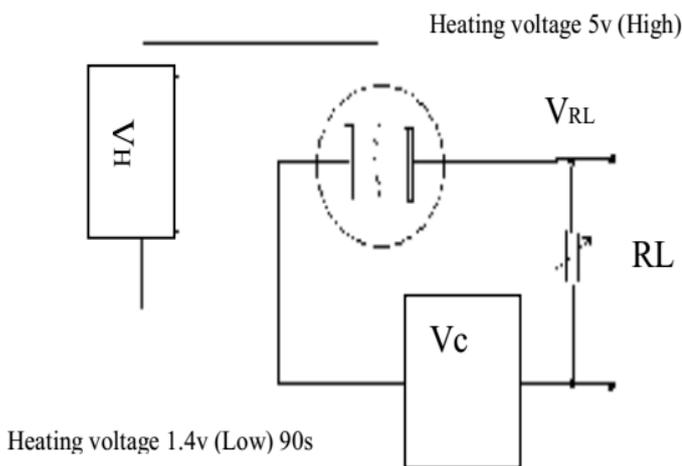


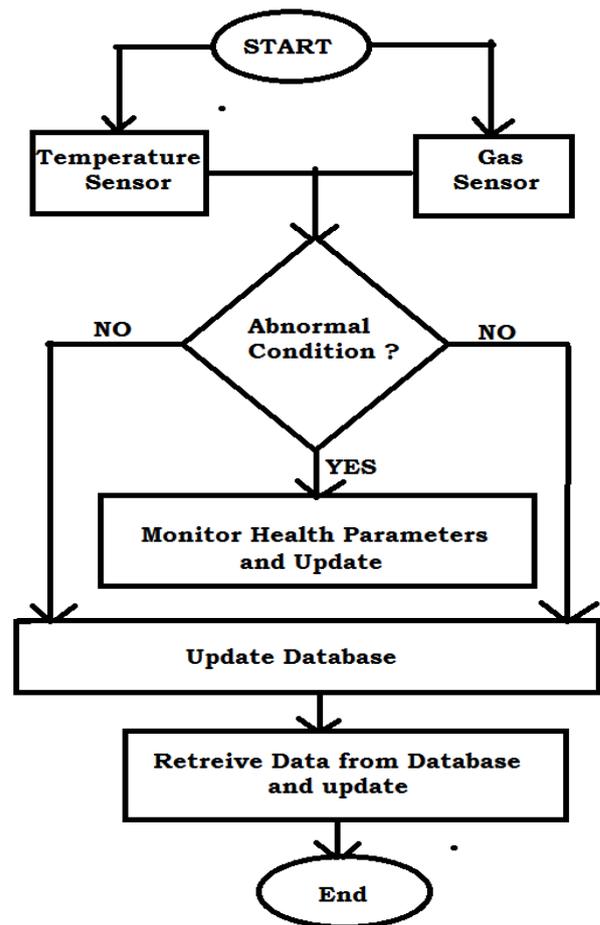
Fig -5: Measuring Circuit Diagram of MQ-7

Above Fig -5 shows standard measuring circuit diagram of MQ-7 sensitive components having 2 parts. One part is heating circuit that is having time control function (the high voltage and the low voltage work circularly). The second part is the signal output circuit, it can precisely respond changes of surface resistance of the sensor.

3.4 GSM MODEM

In this system GSM modem is used for communicating with the mobile phone in which messages will to be sent and this phone will be doctor mobile. The concerned doctor will receive all the information of health parameters.

4. FLOWCHART



5. CONCLUSIONS

This is to conclude that proposed health care system will give staff working in Garbage treatment plant a real-time their health status so that they can take good care of themselves. Also this system has capability to course real-time signals generated from Medical sensors and transmit the measured signal to the medical center's server for necessary treatment.

REFERENCES

- [1] Kalyani Ghute¹, Gayatri Thakare², Mayuri Wahane³, Akshay Holey⁴, Prof.Mayuri.M.Soni "IOT BASED Smart Garbage Monitoring and Air Pollution Control System" IJAREIE , Vol. 5, Issue 3, March 2017

- [2] Chetan T. Kasundra, Prof. A. S. Shirsat, "Raspberry-Pi Based Health Monitoring System" IJAREIE, Vol.4, Issue 8, August 2015.
- [3] William Walker, A. L. Praveen Aroul, Dinesh Bhatia, "Mobile Health Monitoring Systems", 31st Annual International Conference of the IEEE EMBS, Minneapolis, Minnesota, USA, September 2-6, 2009, 978-1-4244-3296-7/09/25.00 © 2009 IEEE, pp: (5199-5202).
- [4] Gao R, Zhou H, Su G, "A wireless sensor network environment monitoring system based on TinyOS". 2011 International Conference on Electronics and Optoelectronics (ICEOE 2011); 2011.
- [5] Abhishek Pal, Sachin Kumar, Dept. of Electronics & Telecommunication Amity university luknow, "Health Monitoring Device for Underground Coal Miners" (IJCTEE) Volume 3, Issue 3, June 2013 VOL 3, ISSUE 07.
- [6] MQ-2GasSensor and DS18B20 Datasheet,
- [7] Raspberry Pi Datasheet