International Journal on Future Revolution in Computer Science & Communication Engineering
Volume: 3 Issue: 9
ISSN: 2454-4248
168 – 171

A New Sensor Based Communication for Environmental Monitoring

T. M. L. Mounika
M.Tech student
Department of ECE
UCEK (A), JNTUK
Kakinada, India
togaru.mm@gmail.com

K. Padma Priya
Professor
Department of ECE
UCEK (A), JNTUK
Kakinada, India
kesaripadmapriya@gmail.com

Abstract - This paper presents the development of a new sensor based communication for environmental monitoring at far off locations. In this proposed system the parameters of sensors are sent to any device having internet by using wireless LAN based on IEEE 802.11b/g standards. The parameters are also sent to mobile phones using GSM. This system includes embedded systems, sensor networks, coordination and management processes and services to capture physical data and to act on the physical environment, all integrated under a intelligent decision system. The system eliminates large amount of solutions, provides the data where network coverage exists.

Keywords: *Wireless LAN, Sensors, GSM, Internet of Things (IoT), IEEE 802.11b/g standards*.

*****

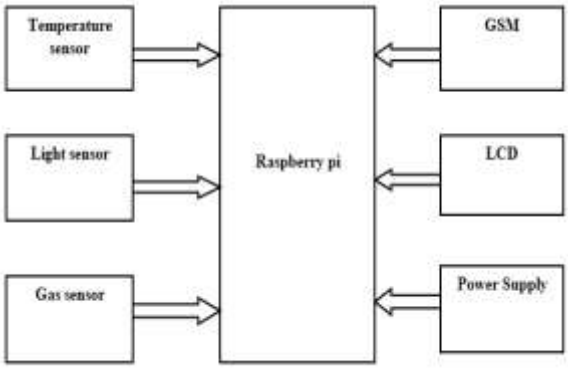
I. INTRODUCTION

As increase in pollution we need to monitor environmental conditions continuously. Few conditions cannot be identified by human, so there is need of electronic system to monitor those conditions. Indoor air quality represents an important factor affecting the comfort, health, and safety of building occupants [1], [2]. The usage of ambient sensors can lead to more energy efficient buildings [3]. A new system called Cyber Physical System (CPS) is developed to monitor environmental conditions. This system includes embedded systems, sensor networks, coordination and management processes and services to capture physical data and to act on the physical environment, all integrated under a intelligent decision system [4],[5],[6]. Cyber Physical System is a combination of cyber components and physical components. The Cyber components are network, computational unit and human computer interface and the Physical components are sensors, actuators and computer system. The physical processes are controlled and monitored by computers and networks with feedback loop. Cyber Physical System helps to enrich the interactions between the virtual and physical worlds [7]. By combining these processes cyber physical system becomes more advantageous. It provides safety and fast access.

The communication between system's components is performed using Wireless LAN based on IEEE 802.11 b/g standards. Cyber Physical System has advantages as it provides interaction between human and system. The person need not to stay at that particular location to monitor. Parameter values can be monitored from anywhere in this world. Also, this system is ready to accept the new changes in environment. This system is flexible in nature and gives faster and better response. Cyber Physical Systems has applications in various fields. These are used in civil infrastructure monitoring, Pilot–crew communications, humanoid robots, smart grid even in teaching etc.

II. SYSTEM ARCHITECTURE

In this proposed system sensors, LCD are connected to single PCB board for common power supply and ground. By using bus cable Raspberry pi and PCB are connected. GSM are also connected to PCB. Light and gas sensors give analog output, so analog to digital converter (MCP 3202) has been used. Major components of system are computer system, GSM, sensors.



Fig(a): Block diagram

A. Computer System:

The computer system used here is Raspberry pi [8]. Raspberry pi is a credit card size computer. Like CPU it has Ram, Rom. It also has 4 USB ports, 40 GPIO pins in all generations of Raspberry pi. In this system, third generation of Raspberry pi has been used, i.e., Raspberry pi 3 model b. It also has camera interface, display interface, inbuilt Bluetooth and WIFI. Firstly, download the operating system manager named NOOBS (New out of the box software) from the internet. The downloaded file is copied into the memory card, where raspberry pi retrieve OS from memory card and saved results are also stored in memory card. After placing memory card in raspberry pi, connect monitor, keyboard and mouse

 ISSN: 2454-4248
168 – 171

then use it like a computer. The supporting language used here is python . Whenever the power is on, it starts working and sends the data to devices having internet using wireless LAN based on IEEE802.11 b/g standards.

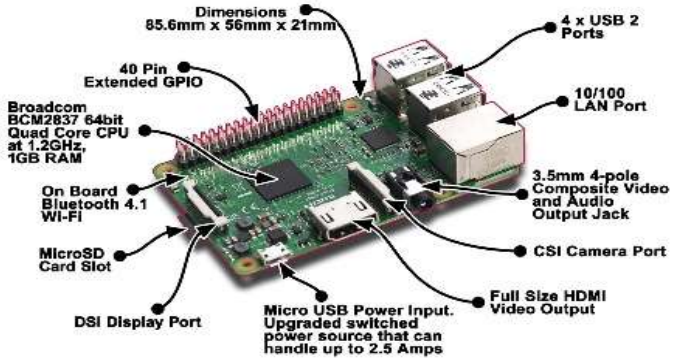


Fig (b): Raspberry pi

B. Global system for mobile communication:

Global system for mobile communication (GSM) used for transmitting mobile voice and data services [9]. It uses TDMA, CDMA technologies. It is same like a mobile phone by placing a SIM. It digitizes and compresses the data before sending. It operates at 900 MHZ or 1800 MHz frequency band. It sends SMS (short message services). Here the parameters are send to mobile whenever they change.

Fig (c): GSM

C. Sensors:

Sensor is an electronic component it detects changes in its environment. In this system three sensors are used to monitor the environmental conditions at remote locations. Temperature sensor, light sensor, gas sensor are used in this proposed system.

1. Temperature Sensor:

Temperature sensor used here is LM35 which measure temperature very accurately. The sensor is sealed and not subjected to oxidation etc. The LM35 generates a higher output voltage than thermocouples and may not require that the output voltage be amplified. A thermistor is a type of resistor whose resistance is dependent on temperature. Thermistors are widely used as inrush current limiter, temperature sensors, self-resetting over current protectors, and self-regulating heating elements. Whenever the value of temperature crosses reference value we get alarm by rotating dc motor. The temperature values are displayed on Liquid crystal display, internet and mobile phone.

Fig (d): Temperature sensor

2. Light Sensor:

Light dependent resistors (LDR) used for light/dark sensor circuits. Its resistivity is a function of incident magnetic radiation. The conductivity increases when light absorbed by the material. When torch light is fall on sensor the resistance of LDR will fall and current flow through it. When the light level is low the resistance of the LDR is high. This prevents current from flowing to the base of the transistors. In proposed system when sensor value crosses the reference value then bulb will glow. Here Blub is used as a alarm .

Fig (e): Light sensor

3. Gas Sensor:

Gas sensor detects gas leakage in the proposed system. Gas sensor used here is MQ2. It can detect i-butane, LPG, alcohol, methane, smoke, Hydrogen and so on. When in this system gas sensor detects any of above gas, the parameters of gas sensor changes. If the value crosses the reference value the buzzer will on. In this system buzzer is used as alarm.

Fig (f): Gas sensor

D. Liquid Crystal Display:

LCD stands for liquid crystal display .It displays the messages. The number of characters depend on LCD. In this system the parameter of sensors is shown. It also show the words like welcome, checking internet, send number in the proposed system.

ISSN: 2454-4248
168 – 171

Fig (g): LCD

III. RESULTS

Raspberry pi retrieves the code from the path and starts executing line by line, whenever the system starts. The observations are shown in LCD. First it search for internet connection, if connection establishes then it asks for mobile number. The mobile number is send where the values are monitored. There is a facility to give available mobile number whenever the system starts. The mobile number is displayed on LCD. Through IoT platform Raspberry pi sends the status or values to webpage, and also sends SMS to mobile continuously through GSM within seconds. Here for alarming bulb, dc motor, buzzer are used. Fig (h) is embedded board of proposed system. To monitor values in internet a web page has been created. To open this page we need to login with user id and password. Fig (i) is webpage where the temperature, LCD, gas values are displayed with date and time. Fig (j) is graphical representation of values with date and time. Here at particular time and date what is value of temperature sensor, light sensor, gas sensor is shown in a form of graph. Fig (k) is SMS send by GSM to the number we send.

Fig (h): Embedded board of Proposed system

Fig (i): Sensor values in webpage

Fig (j): Graphical view of sensor values

 ISSN: 2454-4248
168 – 171

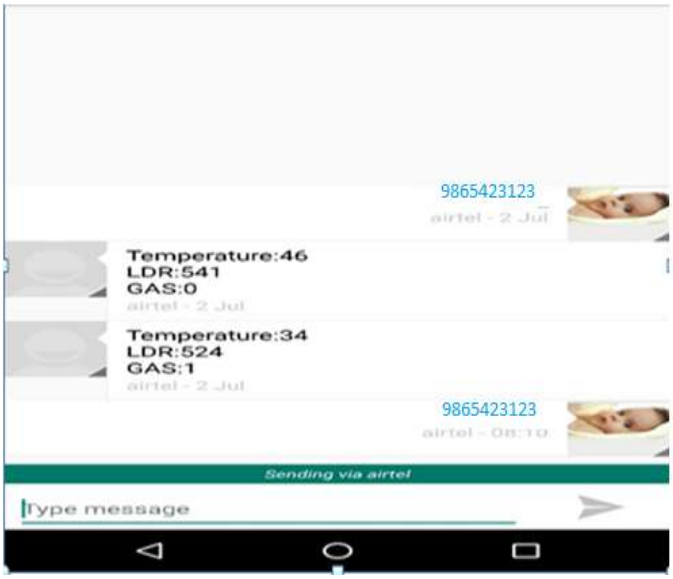


Fig (k): SMS of sensor values

IV. CONCLUSION

The environmental parameters from sensors provided to internet by wireless LAN based on IEEE 802.11b/g standards and also to mobile phones as SMS by GSM was presented. Messages are send to internet and mobile phones. This method eliminates bulky solutions, provides data where the WI-FI network protection exists. Messages are also shown on LCD at particular location where the sensors are placed. These also used in large number of monitoring purposes. Future work intends to enhance the reliability and protection of the proposed system.

REFERENCES

[1] J.-Y. Kim, C.-H. Chu, and S.-M. Shin, "ISSAQ: An integrated sensing systems for real-time indoor air quality monitoring," IEEE Sensors J., vol. 14, no. 12, pp. 4230–4244, Dec. 2014.

[2] L. Zhang and F. Tian, "Performance study of multilayer perceptrons in a low-cost electronic nose," IEEE Trans. Instrum. Meas., vol. 63, no. 7, pp. 1670–1679, Jul. 2014.

[3] S. Sharma, V. N. Mishra, R. Dwivedi, and R. R. Das, "Quantification of individual gases/odors using dynamic responses of gas sensor array with ASM feature technique," IEEE Sensors J., vol. 14, no. 4, pp. 1006–1011, Apr. 2014.

[4] J. Wan, M. Chen, F. Xia, D. Li, and K. Zhou, "From machine-tomachine communications towards cyber-physical systems," Comput. Sci. Inf. Syst., vol. 10, no. 3, pp. 1105–1128, 2013.

[5] M. Broy, M. V. Cengarle, and E. Geisberger, "Cyber-physical systems: Imminent challenges," in Large-Scale Complex IT Systems. Development, Operation and Management (Lecture Notes in Computer Science), vol. 7539, R. Calinescu and D. Garlan, Eds. Heidelberg, Germany: Springer, 2012, pp. 1–28.

[6] George Mois, Teodora Sanislav, and Silviu C. Folea, IEEE Transactions on Instrumentation and Measurement, vol. 65, no. 6, June 2016

[7] A. Zaslavsky.(Sep. 2013).Internet of Things and Ubiquitous Sensing. [Online]. Available: http://www.computer.org/portal/web/ computingnow/archive/september2013, accessed Sep. 2014

[8] Gaurav jadhav, kunal jadhav , "Environmental monitoring system using raspberry pi" , international research journal of engineering and technology.

[9] Aparna m.telgote ,Vishnu narayanan, navid ahmed n.dave , " technologies for sustainable development (ictsd) ,2015 internatinal conference.