International Journal of Advance Research in Science and Engineering
Volume No.07, Special Issue No.07, April 2018
www.ijarse.com
IJARSE
ISSN: 2319-8354

WSN-Based Smart Sensors And Actuators For Power Management In intelligent Buildings

Apoorva B.S.[1], Likhitha Reddy[2], Sucharitha Reddy[3], Swathi K.V.[4], Divya M.N.[5]

[1,2,3,4,5] *B Tech School of ECE, REVA University, Bangalore*

ABSTRACT

Many people leave their houses without switching off the appliances, which lead to the wastage of power and energy. Wireless sensor networks (WSN) is a network where all the slave nodes are connected to a master node and where each slave node senses the data based on sensors. WSNs. has been increasingly used in home automation. This paper proposes a method of calculating the power consumed, analysing and controlling of appliances. The system is of low cost and flexible in operation. In this paper, ZigBee is used as the less complex wireless standard. The distributed sensor nodes are monitored remotely by connecting to the Cloud through the ESP 8266 Wi-Fi module.

Keywords: *cloud, energy management, WSN, ZigBee*

I. INTRODUCTION

A sensor is a output device which senses physical conditions such as temperature, humidity etc. Wireless sensor networks (WSN) have become increasingly important in the recent years. Its popular application is home automation. WSNs control and monitor the household appliances. Nowadays, many people prefer to live in "intelligent buildings". An intelligent building can be defined as a building which incorporates technologies to create an indoor environment which is safe and secure, comfortable and efficient for the people residing in the building. In order to save energy, power management is necessary. A flexible, low cost device used to continuously monitor and control depending upon on the customer specifications are in early stage of development. In this paper, we have proposed, designed and implemented a WSN based power management in intelligent buildings. ZigBee technology is used for wireless communication, because of its less complexity and can be employed in home and buildings.

Each slave node detects the physical and environmental conditions and this data is sent to the microcontroller for further processing. It also includes a ZigBee transceiver and a power source.

The slave nodes communicates wirelessly and the data is sent a master node where the controlling and monitoring of household appliances is done remotely. And the other part that we use the Cloud which helps the user to keep the track of power used, temperature and other parameters every day. It is easily accessible, of low

price, low maintenance and scalable. The paper centres on human-friendly technical alternatives for monitoring and easy management of household appliances.

II. RELATED WORK

The brief discussion about the existing papers of smart home systems based on technology of wireless communication.

Han et al. [4] proposed a Home Energy Management System (HEMS) to reduce the standby power by using the ZigBee technology. This proposed system includes a ZigBee hub, a server and an automatic standby power cut off outlet. When the energy consumption of the system connected to the power outlet is below a threshold value, the power outlet including a ZigBee module cuts off the ac power The ZigBee module controls these power channels and the hub collects information from the power channels. The hub transmits the current state information to a server. By using the HEMS user interface, a user can monitor or control the present energy usage. This facility can additionally may cause some uneasiness for the users.

Pan et al. [5] proposed a WSN-based intelligent light control system for indoor environments, such as a home or building for reducing the energy consumption. In this paper, wireless sensors are chargeable for measuring cutting-edge illuminations and the lighting is controlled by making use of the model of user's moves and profiles.

Song et al. [1] suggested a home monitoring system using hybrid sensor networks. The simple concept of this paper is a roaming sensor that moves the right location and participates in the community whilst the network is disconnected.

III. PROPOSED WORK

There has been increasing development in the field of WSN technology. This technology has been widely used in military and commercial applications. Nowadays, it is become very essential to conserve non renewable energy sources like electricity. The power management is done by controlling and monitoring the household appliances at a home or building. This paper uses a Zigbee module as the wireless standard. The sensed data is transmitted wirelessly and will be stored in Cloud for analyzing purposes.

3.1 Methodology:

This paper proposes a method to avoid wastage of power. The developed system implements several slave nodes connecting to a central node. In each slave node, the energy meter calculates the power consumed and the microcontroller controls the appliances based on certain conditions. The temperature sensor senses the temperature and if the temperature is greater than a given threshold value, the fan is switched on. The PIR sensor detects the motion and by using the LDR, the light is turned on. The ZigBee module of each slave node transmits the required parameters wirelessly and is received by the ZigBee module of central node. These

parameters are stored in the Cloud and can be analysed further. The data is accessed through ThingSpeak platform.

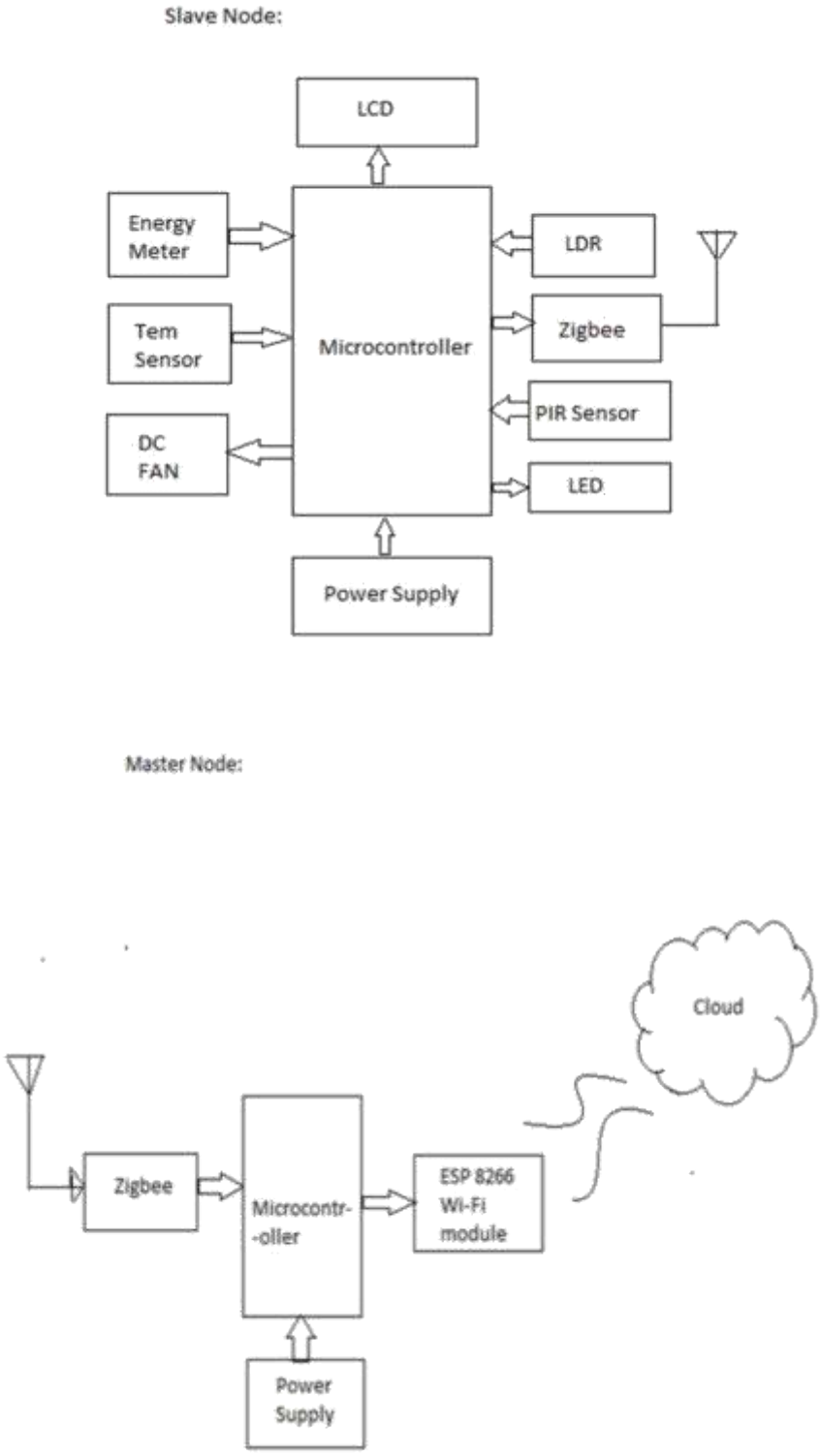

Fig.1: Block Diagram

IV. RESULT

The detected sensor data sent wirelessly to the master node is stored in the Cloud. We can access the information from the Cloud through a platform ThingSpeak. Each user has its username and password. The logging in and setting up of channels is done to analyse the stored information.

Fig.2: it has two fields date(time) and units.
It is based on user's consumption and is measured in kilowatt- hour.

Fig.3: it has two fields date(time) and temperature.
If the temperature is above a threshold value, the fan is switched on.

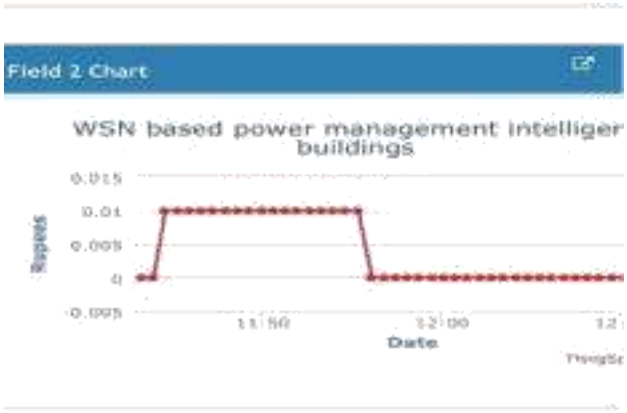

Fig.4: it has two fields date(time) and rupees.
We have considered as per the components used in the implementation.

V. CONCLUSION

It can be presumed that the design and implementation of WSN based smart sensors and actuators for power management in intelligent buildings was indeed a successful one. This framework comprises of Arduino Nano Board, a WIFI Module, a LCD screen, PIR Sensors, ZigBee, Energy Meter. It calculates the power and helps the power and efficiently automates the devices. We can store the information in cloud and we can fetch the information from the cloud as needed and we can analyse the data. hence, this system could be used for intelligent buildings.

VI. REFERENCES

[1] G. Song, Z. Wei, W. Zhang, and A. Song, "A hybrid sensor network system for home monitoring applications," IEEE Trans. Consumer Electron., vol. 53, no. 4, pp. 1434–1439, Nov. 2016.

[2] C. Suh and Y. B. Ko, "Design and implementation of intelligent home control systems based on active sensor networks," IEEE Trans. Consumer Electron., vol. 54, no. 3, pp. 1177–1184, Aug. 2016.

[3] K. D. Nguyen, I. M. Chen, Z. Luo, S. H. Yeo, and H. B. L. Duh, "A wearable sensing system for tracking and monitoring of functional arm movement," IEEE /ASME Trans. Mechatronics, vol. 16, no. 2, pp. 213– 220, Apr. 2017.

[4] J. Han, C. S. Choi, and I. Lee, "More efficient home energy management system based on ZigBee communication and infrared remote controls," IEEE Trans. Consumer Electron., vol. 57, no. 1, pp. 85–89, Feb. 2011.

[5] M. S. Pan, L. W. Yeh, Y. A. Chen, Y. H. Lin, and Y. C. Tseng, "A WSN-based intelligent light control system considering user activities and profiles," IEEE Sensors J., vol. 8, no. 10, pp. 1710–1721, Oct. 2008.

[6] J. Misic and V. B. Misic, "Bridge performance in a multitier wireless network for healthcare monitoring,"

[7] M. Erol-Kantarci and H. T. Mouftah, "Wireless sensor networks for costefficient residential energy management in the smart grid," IEEE Trans. Smart Grid, vol. 2, no. 2, pp. 314–325, Jun. 2011.
[8] ZigBee alliance examining Japan's new smart home recommendations (accessed on 8 Aug., 2012). [Online]. Available: http://www.smartmeters. com/the-news/3449-zigbee-allianceJ. Misic and V. B. Misic, "Bridge performance in a multitier wireless network for healthcare monitoring," IEEE Wireless Commun., vol. 17, no. 1, pp. 90–95, Feb. 2017.