International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056
Volume: 03 Issue: 07 | July-2016 www.irjet.net p-ISSN: 2395-0072

Smart Sensor Network for Monitoring and Control of Society Automation

Snehalata V Rawate[1], Mr.M.D.Patil[2]

[1]Student,Dept.of E&TC Engineering,SITS College,Narhe,Pune,Maharashtra,India
[2]Professor,Dept.of E&TC Engineering,SITS College,Narhe,Pune,Maharashtra,India

---

Abstract - *The design and development of a smart detecting and controlling system for household electrical appliances has been reported . The wireless sensor networks are highly being used to control electric appliances. WSNs plays vital role to achieve security by instantly sensing undesirable conditions and ZigBee is used for effective communication to provide security. The developed system is very flexible in operation, have low cost and can save electricity expense of the consumers.*

***Keywords—Wireless communication, Sensors, security, ZigBee*.**

1.INTRODUCTION

It is foreseen that service and personal care wireless mechatronic systems will become more and more omnipresent at home in the near future and will be very useful in assistive healthcare particularly for the elderly and disabled people [2]. Wireless mechatronic systems consist of numerous spatially distributed sensors with limited data collection and processing capability to monitor the environmental situation. Wireless sensor networks (WSNs) have become increasingly important because of their ability to monitor and manage situational information for various intelligent services. Due to those advantages, WSNs has been applied in many fields, such as the military, industry, environmental monitoring, and healthcare [3][5]. For energy controlling services the WSNs are increasingly being utilized in the home. WSNs installed in the home can monitor and control regular household appliances [6]. The ZigBee Alliance, wireless communication platform is presently examining Japans new smart home wireless system implication by having a new initiative with Japans Government that will evaluate use of the forthcoming ZigBee, Internet Protocol (IP) specification, and the IEEE 802.15.4g standard to help Japan to create smart homes that improve energy management and efficiency [7].Recently, organizations use ZigBee to effectively deliver solutions for a variety of areas including consumer electronic device control, energy management and efficiency home and commercial building automation as well as industrial plant management. As an ecosystem, the Agreement offers everything future product and service companies need to develop ZigBee products. The smart energy networks could include both ZigBee 2006 and IEEE 802.15.4. It is suggested that the majority of the nodes in the network should be based on one stack profile or the other to get reliable performance. ZigBee smart energy certified products must be based upon a ZigBee Compliant Platform (ZCP). In this project, I have designed and implemented a ZigBee-based intelligent home energy management and control service. The ZigBee is used (the IEEE 802.15.4 standard) technology for networking and communication, because it has low-cost and low-power characteristics, which enable it to be widely used in home and building environments. The main focus of my project is on human-friendly technical solutions for monitoring and easy control of household appliances. The citizens comfort will be increased and better assistance can be provided.

1.1 Need of Automation

Automation is the use of various control system for operating different equipments. The biggest benefit of automation is that it saves labor , and also it is very usefull in saving energy and materials and to improve quality , precision and accuracy. In recent years, the home environment has seen a rapid introduction of network enabled digital This technology offers new and exciting opportunities to increase the connectivity of devices within the home for the purpose of home automation.. However, the adoption of home automation systems has been slow. This paper identifies the reasons for this slow adoption and evaluates the potential of ZigBee for addressing these problems through the design and implementation of a flexible home automation architecture. A ZigBee based home automation system and Wi-Fi network are integrated through a common home gateway. The home gateway provides network interoperability, a simple and flexible user interface, and remote access to the system. A dedicated virtual home is implemented to cater for the system's security and safety needs. To demonstrate the feasibility and effectiveness of the proposed system, four devices, a light switch, radiator valve, safety sensor and ZigBee remote control have been developed and evaluated with the home automation system.

1.2 Organization of Paper

The rest of the paper is organized as follows: Section 2 presents previous work carried out related to parking

system .Section 3 formulates the problem statement and the proposed system. Section 4 describes experimental results. Section 5 concludes with conclusion and further research direction.

2. RELATED WORK

For household electrical appliances in real time smart monitoring and controlling the system is designed and developed in this paper. In this the electrical parameters of household appliances such as current and voltage are monitored and by considering this the consumed power is calculated [1].

This paper describes a ZigBee-based wireless sensor network node for the ultraviolet (UV) detection of flame. The sensor node is composed of, a current- sensitive front end including a high-gain current-to-voltage amplifier with 120 dB and a logarithm converter, a ZnSSe UV photo detector and a transceiver operated at a 2.4-GHz industrial, scientific, and medical band. A passive photo detector is designed to have a cutoff at 360 nm and convert the UV emission of flame into picoamperes. Including mixed signal processing and ZigBee transmission, the speed of flame detection is as fast as 70 ms. The sensor node consumes only an average of 2.3 mW from a 3.3-V supply[2].

This paper designs smart home device descriptions and standard practices for demand response and load management Smart Energy applications needed in a smart energy based residential or light commercial environment. The control application domains included in this initial version are sensing device control, pricing and demand response and load control applications. This paper introduces smart home interfaces and device definitions to allow interoperability among ZigBee devices produced by various manufacturers of electrical equipment, meters, and smart energy enabling products. They introduced the proposed home energy control systems design that provides intelligent services for users and demonstrate its implementation using a real testbed [3].

3. PROPOSED SYSTEM

The block diagram of proposed system is shown in figure 1,2. It is μC based. The different sensors including temperature sensor, light sensor, gas sensor, PIR sensor are interfacing into single board and also capturing real time information. Using an analog to digital converter to recording gas leakage, presence of human and environment information. Then the signal transmitted to ARM cortex M3 (LPC1768) for further other processing. These system information display on LCD and it information send to society terminal through zigbee modem.

A. LPC1768

For embedded applications, the LPC1768 Cortex-M3 microcontroller features a high level of integration and best-in-class peripheral support at frequencies up to 120 MHz. The architecture features a multi-layer AHB bus that supports multiple high-bandwidth data streams running simultaneously from peripherals such as Ethernet, USB, or CAN. Designers can compare different cores in the same socket, or quickly migrate designs from one core to the other. LPC1768 is the latest addition to the family features the IC in a 5 x 5 mm package saving designers valuable space in application designs while delivering high performance, multi-connectivity, and advanced peripherals in a small footprint.

B. ZigBee

ZigBee is a IEEE 802.15.4 simple standard that specifies the media access controller (MAC) and physical (phy) networking layers for packet data protocol. Its license free frequency bands are: 2.4 GHz (16 channels with baud rate of 250 kbit/s) 902 MHz - 928 MHz (10 channels with baud rate of 40 kbit/s) 868 MHz - 870 MHz (1 channel with baud rate of 20 kbit/s) North America, Europe, Australia and New Zealand use the sub 1 GHz bands whereas the rest of the world uses 2.4 GHz bands. It uses carrier sense multiple access with collison avoidance for channel access. In the home,a total home automation system to control lightings, blinds, air conditioning, security system,remote control and appliances can be implemented. We are going to use zigbee technology to control various electrical appliances remotely.

C. Finger print module

This unit is the heart of the complete system. This Unit is used for scanning the Fingers of the different Users. Optical fingerprint scanners provide robust fingerprint scanning, scratch resistance, long life and no effect of electrostatic current. They are suitable for large scale use and support thousands of scans per day. Support for chip based sensors is also available if required. Finger print module is interfaced with the microcontroller. This module is used to identify the finger prints of human being. The finger print module uses a sensor which identifies the human finger and store the data in the form of 32 bit data frame. Finger print module is interfaced with the microcontroller via RS232 standard. The finger print module can be commanded by microcontroller using its standard commands. Using these standard finger print module commands we can register the user, check (compare) and delete the user from this module.

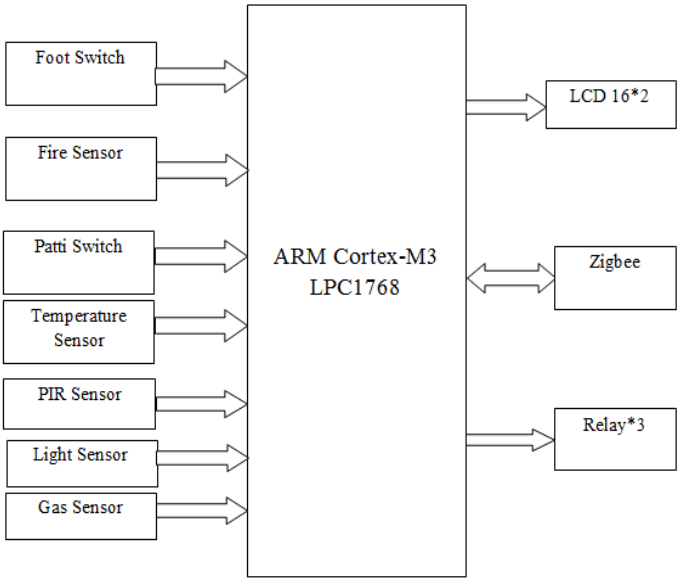

Figure1: Block diagram of proposed system at flat terminal

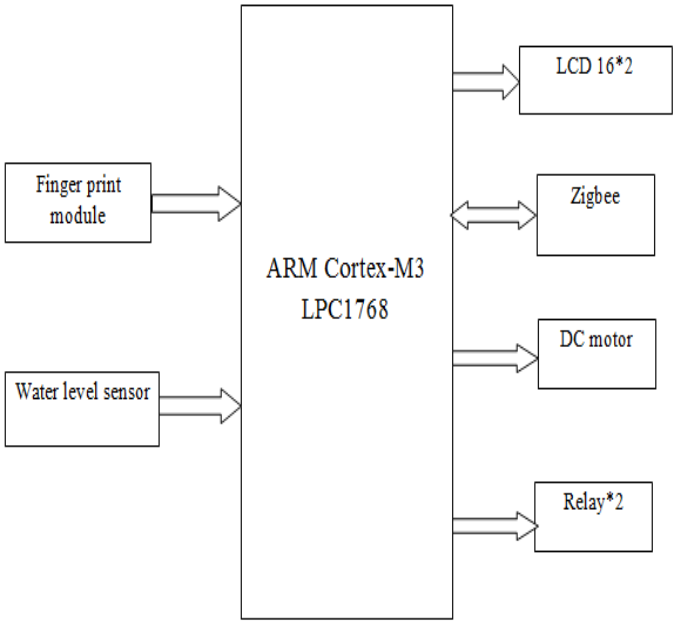

Figure 2: Block diagram of proposed system at society terminal.

4. EXPERIMENTAL RESULT

Following figures shows the Smart Sensor Network Security for Monitoring and Control of Society Automation, which monitors the system for security and automation.

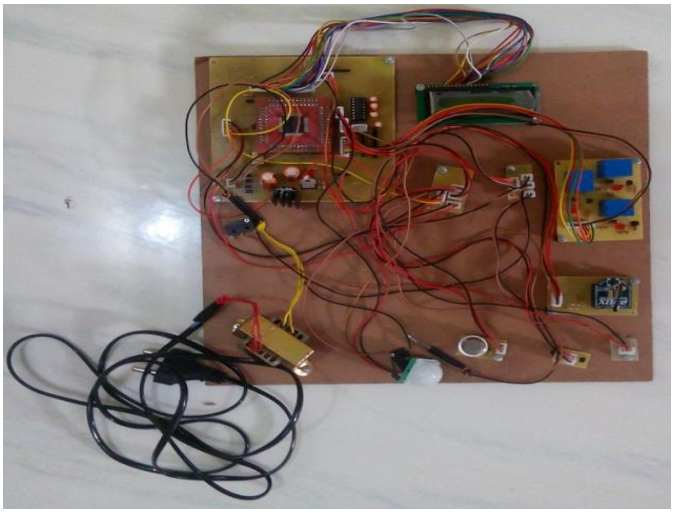

Figure 3: Circuit implementation of system at flat terminal.

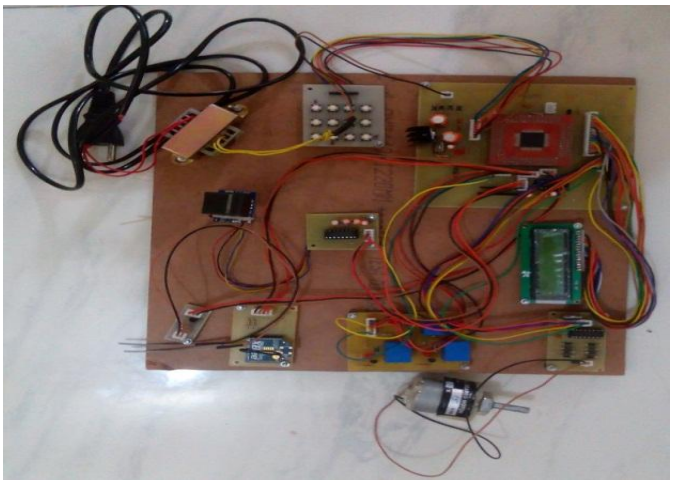

Figure 4 : Circuit implementation of system at society terminal.

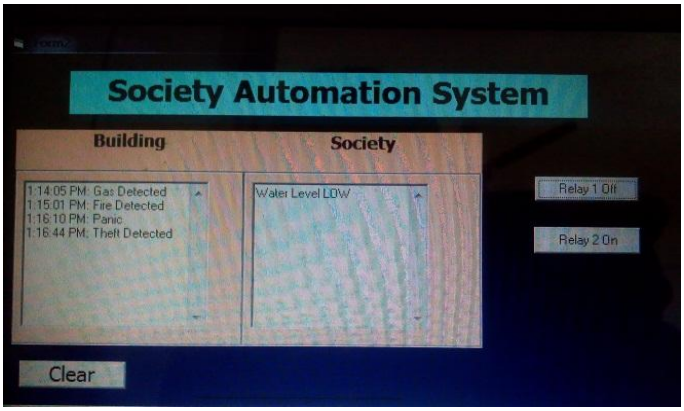

Figure 5: User interface of system developed in VB.

Above figures shows the Embedded hardware used in the project with all the sensors connected. The figure shows interfacing to µC to different sensors and the readings are

displayed on LCD. If any of the parameter exceeds the set point then the concern action will take place.

5. CONCLUSION

A smart sensor network for monitoring and control of society automation is designed. The developed system effectively monitor and controls the smart sensor network. The developed system is robust and flexible in operation. High level of security can be achieved with the use of automation. This system effectively reduces the human efforts and also energy can be saved by controlling the home appliances.

REFERENCES

[1] Nagender Kumar Suryadevara, Subhas Chandra Mukhopadhyay, Sean Dieter ,Tebje Kelly and Satinder Pal Singh Gill, "WSN based smart sensors and actuators for power management in intelligent buildings", IEEE Transactions on mechatronics, Vol. 20, No. 2, April 2015.

[2] X. P. Liu, W. Gueaieb, S. C. Mukhopadhyay, W. Warwick, and Z. Yin, "Guest editorial introduction to the focused section on wireless mechatronics", IEEE /ASME Transaction on Mechatronics, vol. 17, no. 3, pp. 397 to 403, Jun. 2012.

[3] D. S. Ghataoura, J. E. Mitchell, and G. E.Matich," Networking and application interface technology for wireless sensor network surveillance and monitoring", IEEE Communication Magazin, vol. 49, no. 10, pp. 90 to 97, Oct. 2011.

[4] P. Cheong, K.F. Chang, Y.H. Lai, S.K. Ho, I.K. Sou, and K.W. Tam, "A zigbee-based wireless sensor network node for ultraviolet detection of flame", IEEE Transaction on Industrial Electronics, vol. 58, no. 11, pp. 5271 to 5277, Nov. 2011.

[5] J. Misic and V. B. Misic, "Bridge performance in a multitier wireless network for healthcare monitoring", IEEE Wireless Communication, vol. 17, no. 1, pp. 90 to 95, Feb. 2010.

[6] L. Li, H. Xiaoguang, H. Jian, and H. Ketai, "Design of new architecture of AMR system in Smart Grid", in Proceeding 6th IEEE Conference Industrial Electronics Application, 2011, pp.2025 to 2029.

[7] D. Man Han and J. Hyun Lim, "Smart home energy management system using IEEE 802.15.4 and zigbee", IEEE Transaction Consumer Electronics, vol. 56, no. 3, pp. 1403 to 1410, Aug. 2010.

[8] V. N. Kamat," Enabling an electrical revolution using smart apparent energy meters tariffs",in Proceedings Annual IEEE India Conference, 2011, pp. 1 to 4.

[9] F. Benzi, N. Anglani, E. Bassi, and L. Frosini," Electricity smart meters interfacing the households", IEEE Transaction on Industrial Electronics, vol. 58, no. 10, pp. 4487 to 4494,Oct. 2011.

[10] K. Gill, S. H. Yang, F. Yao, and X. Lu," A zigbee-based home automation system", IEEE Transaction on Consumer Electronics, vol. 55, no. 2, pp. 422 to 430, May 2009.

[11] 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 Journal, vol. 8, no. 10, pp. 1710 to 1721, Oct. 2008.

[12] C. Suh and Y. B. Ko, "Design and implementation of intelligent home control systems based on active sensor networks", IEEE Transaction on Consumer Electronics, vol. 54, no. 3, pp. 1177 to 1184, Aug. 2008.