

INTELLECTUAL AUTOMATION OF GSM BASED SMART HOME MONITORING AND CONTROL

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Abstract— Security has becoming an important issue everywhere. Home security is becoming necessary nowadays as the possibilities of intrusion are increasing day by day. Safety from theft, leaking of raw gas and fire are the most important requirements of home security system for people. A traditional home security system gives the signals in terms of alarm. However, the GSM (Global System for Mobile communications) based security systems provides enhanced security as whenever a signal from sensor occurs, a text message is sent to a desired number to take necessary actions. This paper suggests four methods for home security system. The performance of the sensors of a low cost Short Message System (SMS) based home security system equipped with motion sensor, smoke detector, temperature sensor, humidity sensor and light sensors has been studied. The sensors are controlled by a microcontroller.

Index Terms— LM35 Temperature sensor, Smoke sensor, LDR Sensor , Microcontroller.

I. INTRODUCTION

An embedded system can be defined as a computing device that does a specific focused job. Appliances such as the air-conditioner, VCD player, DVD player, printer, fax machine, mobile phone etc. are examples of embedded systems. Each of these appliances will have a processor and special hardware to meet the specific requirement of the application along with the embedded software that is executed by the processor for meeting that specific requirement. The embedded software is also called “firm ware”. The desktop/laptop computer is a general purpose computer. You can use it for a variety of applications such as playing games, word processing, accounting, software development and so on. Embedded systems do a very specific task, they cannot be programmed to do different things. Embedded systems have very limited resources, particularly the memory. Generally, they do not have secondary storage devices such as the CDROM or the floppy disk. Embedded systems have to work against some deadlines. A specific job has to be completed within a specific time.

Industrial automation: Today a lot of industries use embedded systems for process control. These include pharmaceutical, cement, sugar, oil exploration, nuclear energy, electricity generation and transmission. The embedded systems for industrial use are designed to carry out specific tasks such as monitoring the temperature, pressure,

humidity, voltage, current etc., and then take appropriate action based on the monitored levels to control other devices or to send information to a centralized monitoring station.

In hazardous industrial environment, where human presence has to be avoided, robots are used, which are programmed to do specific jobs. The robots are now becoming very powerful and carry out many interesting and complicated tasks such as hardware assembly.

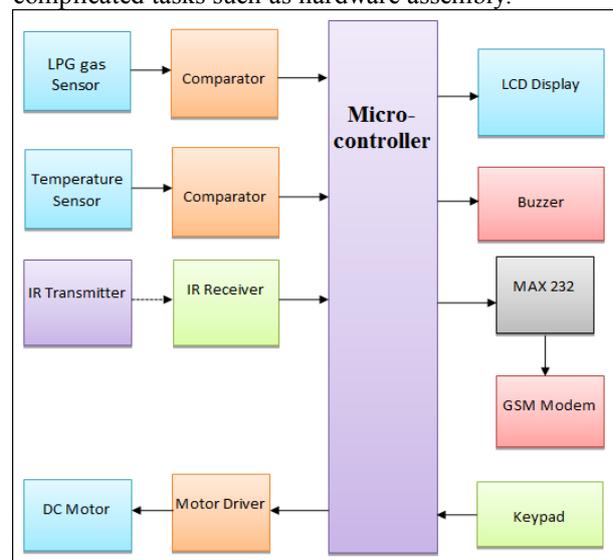


Figure 1. Block Diagram of the Intelligent automatic dwell monitoring and control

Wireless technologies: Advances in mobile communications are paving way for many interesting applications using embedded systems. The mobile phone is one of the marvels of the last decade of the 20th century. It is a very powerful embedded system that provides voice communication while we are on the move. The Personal Digital Assistants and the palmtops can now be used to access multimedia services over the Internet. Mobile communication infrastructure such as base station controllers, mobile switching centers are also powerful embedded systems.

Security: Security of persons and information has always been a major issue. We need to protect our homes and offices; and also the information we transmit and store. Developing embedded systems for security applications is one of the most lucrative businesses nowadays. Security devices at homes, offices, airports etc. for authentication and verification are embedded systems. Encryption devices are nearly 99 per cent of the processors that are manufactured end up in~ embedded systems. Embedded systems find applications in every industrial segment- consumer electronics, transportation, avionics, biomedical engineering, manufacturing, process control and industrial automation, data communication, telecommunication, defense, security etc. Used to encrypt the data/voice being transmitted on communication links such as telephone lines. Biometric systems using fingerprint and face

recognition are now being extensively used for user authentication in banking applications as well as for access control in high security buildings.

II. LITERATURE SURVEY

Continuous increase in global energy consumption gives rise to the current energy crisis and the environmental problem. Residential energy consumption accounted for 22 % of US total energy consumption in 2009 [2]. The increasing number of home appliances and consumer electronics causes the growth of home energy use. Therefore, reducing energy use in homes is a very challenging target to mitigate the energy crisis and the environmental problem. The technology to reduce and manage home energy use is known as home energy management system (HEMS). A number of HEMS were proposed and developed [3]-[5]. The previous HEMS's monitored and controlled home devices, and showed home energy information. Some research showed that the feedback on energy consumption to energy users is effective to reduce total energy use [6].

Another research showed that total energy consumption was reduced by 12 % by setting up the 'energy consumption information system' that displays energy consumption of the whole house and home appliances [7]. However, the previous works just showed the energy consumption information of homes and home appliances. Users cannot figure out whether a specific home appliance is energy efficient. It is necessary to compare energy usage of a home appliance to that of the same kind of typical home appliances or other's home appliances. In this paper, we propose a green home energy management system through comparison of energy usage between the same kinds of home appliances. The electrical outlets have a function of energy measurement of home appliances and the capability of ZigBee communication as in [4]. ZigBee network is well known as a low power communication method [8]. They measure the power and energy usage of home appliances and transfer the measured power and energy information to the home server through ZigBee network.

A user can register the home appliance in the HEMS on the home server by assigning the electrical outlet number to it. The HEMS identifies the home appliances via the corresponding electrical outlet number.

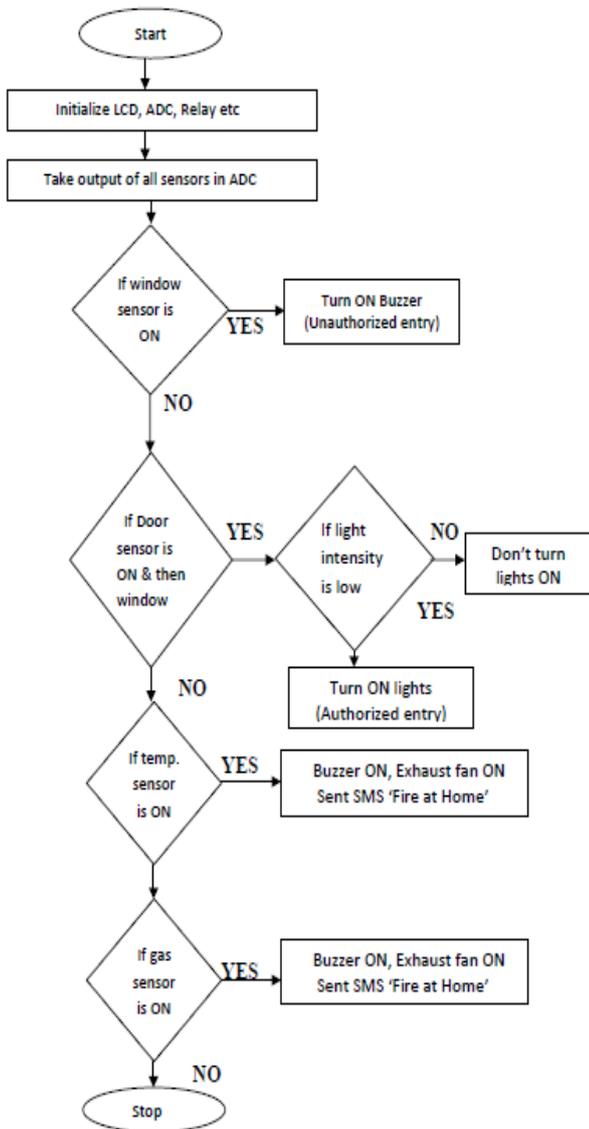
III. TEMPERATURE SENSOR

In this project, in order to obtain the fan speed based on temperature, initially this temperature value has to be read and fed to the microcontroller. This temperature value has to be sensed. Thus a sensor has to be used and the sensor used in this project is LM35. It converts temperature value into electrical signals.

LM35 series sensors are precision integrated-circuit temperature sensors whose output voltage is linearly proportional to the Celsius temperature. The LM35 requires no external calibration since it is internally calibrated. The LM35 does not require any external calibration or trimming to provide typical accuracies of $\pm 1/4^{\circ}\text{C}$ at room temperature and $\pm 3/4^{\circ}\text{C}$ over a full -55 to $+150^{\circ}\text{C}$ temperature range. The LM35's low output impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy. It can be used with single power supplies, or with plus and minus supplies. As it draws only $60\ \mu\text{A}$ from its supply, it has very low self-heating, less than 0.1°C in still air.

Features

- Calibrated directly in $^{\circ}\text{Celsius}$ (Centigrade)
- Linear $+ 10.0\ \text{mV}/^{\circ}\text{C}$ scale factor
- 0.5°C accuracy guaranteed (at $+25^{\circ}\text{C}$)
- Rated for full -55° to $+150^{\circ}\text{C}$ range
- Suitable for remote applications
- Low cost due to wafer-level trimming
- Operates from 4 to 30 volts
- Less than $60\ \mu\text{A}$ current drain
- Low self-heating, 0.08°C in still air
- Nonlinearity only $\pm 1/4^{\circ}\text{C}$ typical
- Low impedance output, $0.1\ \text{W}$ for $1\ \text{mA}$ load



Flow Chart 1. Showing the different sensors operating with different conditions

you to select the smoke alarms that may work best in your situation to effectively detect a fire.

VII. RESULTS & CONCLUSION

The GSM based home security system has been designed and tested with the mobile network. The user can get alerts anywhere through the GSM technology thus making the system location independent. A flexible way to control and explore the services of the mobile, AT commands is used in the system. The communication of home is only through the SMS which has been tested with the mobile networks and is working on any mobile network.

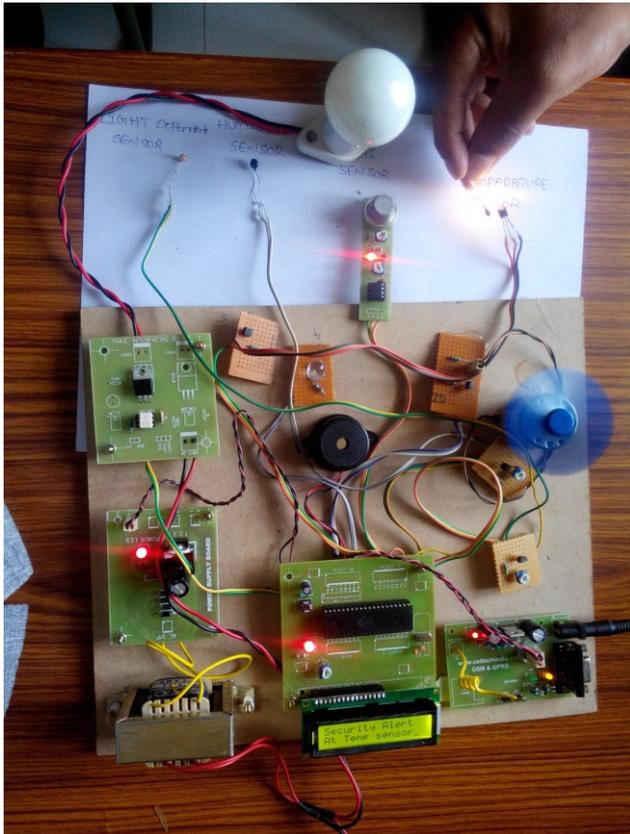


Figure 6. Detecting the Heat and Turn-On the fan

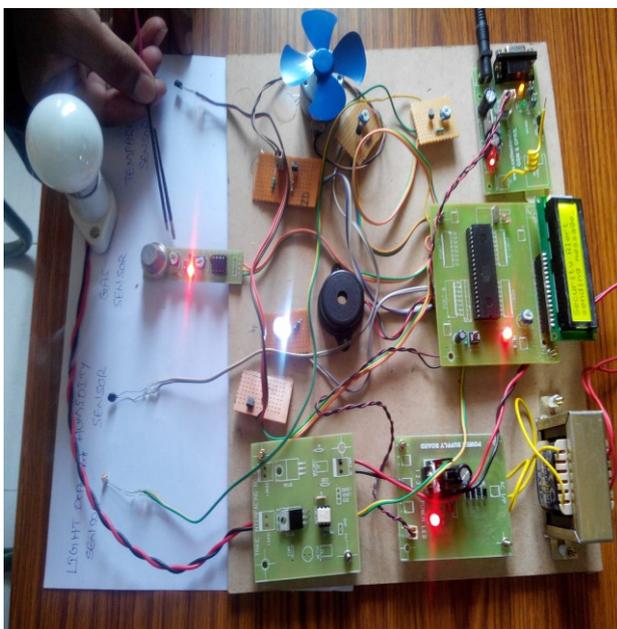


Figure 7. Detecting the Smoke and indicated with the LED

VIII. BIBLIOGRAPHY

[1] GREEN HOME ENERGY MANAGEMENT SYSTEM THROUGH COMPARISON OF ENERGY USAGE BETWEEN THE SAME KINDS OF HOME APPLIANCES Jinsoo Han, Chang-Sic Choi, Wan-Ki Park, Ilwoo Lee published in 2011 IEEE 15th International Symposium on Consumer Electronics

[2] U.S. Department of Energy/Energy Information Administration, "Annual Energy Review 2009," Aug. 2010.

[3] Young-Sung Son and Kyeong-Deok Moon, "Home Energy Management System Based on Power Line Communication," Proceedings of the 28th International Conference on Consumer Electronics (ICCE), 2010.

[4] Jinsoo Han, Chang-Sic Choi, and Ilwoo Lee, "More Efficient Home Energy Management System Based on ZigBee Communication and Infrared Remote Controls," Proceedings of the 29th International Conference on Consumer Electronics (ICCE), 2011.

[5] Chia-Hung Len, Ying-Wen Bai, Hsien-Chung Chen, and Chi-Huang Hung, "Home Appliance Energy Monitoring and Controlling Based on Power Line Communication," Proceedings of the 27th International Conference on Consumer Electronics (ICCE), 2009.

[6] Sarah Darby, "The Effectiveness of Feedback on Energy Consumption," Environmental Change Institute, Univ. of Oxford, Apr. 2006.

[7] Tsuyoshi Ueno, Ryo Inada, Osamu Saeki, and Kiichiro Tsuji, "Effectiveness of Displaying Energy Consumption Data in Residential Houses - Analysis on How the Residents Respond," Proceedings of ECEEE 2005 Summer Study, 2005.

[8] Sungjin Park, Eun Ju Lee, Jae Hong Ryu, Seong-Soon Joo, and Hyung Seok Kim, "Distributed Borrowing Addressing Scheme for ZigBee/IEEE 802.15.4 Wireless Sensor Networks," ETRI Journal, vol.31, no.5, pp525-533, Oct. 2009.

BIOGRAPHIES

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 MINI-PROJECT: Title :I2C Protocol



implementation(RTC module) Description: time and date display with automatic change can be implemented by interfacing RTC module device with 8051 micro controller.

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He is an Associate Member of IEI(The Institution of Engineers India) from 30th June 2013. He was elected as one of the

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He cordially invited as a **PCM(Program Committee Member) & Reviewer** for the related conferences of AIRCC(Academy & Industry Research Collaboration Center) which are "Third International workshop on Embedded Systems and Applications (EMSA-2014) " to be held in Chennai, India. The "Sixth International Conference on Wireless & Mobile Networks (WiMoN-2014)" to be held in Delhi, India. And The "Second International Conference of Soft Computing(SCOM 2014)" to be held in Dubai, UAE in the world wide.

He has many accepted International Journals & Conferences in that one of the Research Paper entitled "Design of Optimal Digital FIR Filter using Particle

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Many of his paper are indexed in **Academic Journal Database, Google Scholar, & DOAJ(Directory of Open Access Journals)**. Recently he reviewed some research papers of International Journals like **IJCNC, (International Journal of Computer networks and Communication & also he invited to review a paper from International Journal of Research in Environmental Science and Toxicology(JREST)**.

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He is one of the author for the Research Paper entitled "**An Efficient Carry Select Adder with Less Delay and Reduced Area using FPGA Quartus II verilog Design**" which was published in **IJSETR Volume 2 Issue 8 August 2013 Page No. 1592-1596**. He acted as **Co-Author** for the Research Paper entitled "**A Verilog Design in FPGA Implementation of QPSK Digital Modulator**" which was published in **IJESRT Volume 2 Issue 7 July 2013 Page No.1904-1909**.

He was cordially invited to be an **Editorial Board Member** of International Journal on Information Theory(IJIT)ISSN : 2319 - 7609 (Online) ; 2320 – 8465 (Print)Journal. and **PCM(Program Committee Member)** for the related conferences of AIRCC. A research paper entitled "**Implementation of Multi Swarm PSO Algorithm for Ripples Reduction in Digital FIR Low Pass Filter**" has **Accepted** for presentation in **ICCCCM 2013(International Conference on Control Computing Communication & Materials)**.

Recently his research paper was accepted in the 2nd International Conference on Emerging Trends in Engineering and Technology (ICETET'2014) that will take place on **May 30-31, 2014 at London** with conference paper id: E0514540, titled as "**Appliance Of PSO Algorithm in Reduction of Unwanted Residual Periodic Variation in Digital LPF**".

Participated in the Three days **National Level Short Term Training Programme** on "Lab VIEW Basics-I" from 27-08-2007 to 29-08-2007 conducted by Dept of EIE, RGM CET, Nandyal. Similarly, participated in Two days **Faculty Development Programme** on "ETIQUETTE, MANNERS AND VALUE SYSTEMS ACROSS CULTURES AND THEIR IMPACT ON WORK CULTURE" in September 2009, by Tirumala Engineering College, Narasaraopet.

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