Smart home monitoring and control using Android app

C.JAYA GOWRI, B.ANUSHA

[1]M- Tech, Department of ECE, ASR College of Engineering

[2]Assistant Professor, Department of ECE, ASR College of Engineering

ABSTRACT: The main aim of this paper is to provide open-source and open-hardware solution for home control automation systems. Final approach uses wireless communication, ARM-LPC2148 environment proved to be both flexible and development-friendly for such a task. System with multiple devices and different components was put together. Both simple and smart sensors were connected on brand new board with ATMEL microprocessor programmed in processing language used by ARM community This module communicates with ARM-LPC2148 programmed in python and acting as a server for data acquisition and database managing. User-friendly web interface then ensures impact and monitoring at a specific part of user's household from all over the world via internet by simple clicks.

Introduction:

This article deals with open-source and open-hardware solution for intelligent home modules. Nowadays, various companies exists which deliver automated and intelligent systems to our homes across the world. Their products are both powerful and reliable. However the flexibility and purchaseprice with additional service can be quite high. New technologies and open-source community together with open source development boards made programming and system development a lot easier. Apart of this personal computers considerably improved IT skills of its users across the whole population. Even though we live in consumer society, certain people still appreciate the possibility to make such a system by their own. The conditions were never been better for such a project. With tutorials, forums and open-source projects all over the internet, small kids can program and create their own intelligent home system.

The motivation for this particular thesis was to have the possibility to monitor and control our homes via internet from all over the world. To know the exact state of our home appliances such an oven, iron or stove are, can be calming element of our everyday lives. Such a system could not only save us substantial amount of money and time but keep us from some amount of stress which is the part of everyone's life today. Ease of Use.

Nowadays, new era of technology arises. The Internet of Things (IoT) covers extensive monitoring, flexible sensor arrays and control possibilities which one could only dream of just few years ago. Development of three key technological areas made this idea possible. The first is tremendous progress in the field of wireless technologies, where Wi-Fi, Bluetooth, ANT or ZigBee ensures the communication among devices with various speeds, distances and low power consumption.

The second field which helped the existence of IoT is microelectromechanical systems also known as MEMS. And the last was development of general internet applications, cloud applications and connectivity to internet everywhere at anytime.

MEMS technological advancement placed accelerometers, gyroscopes, pressure sensors and more others inside a tiny chip. Apart of this the development and new technologies for Internet and Embedded systems played the key role as well.

The idea of IoT is to connect all device ("things") to the internet and create a huge sensor network, which would provide enormous amount of precious data. This data can now be efficiently processed, used and stored thanks to the new technologies such a compression or data storage capacity are.Apart of few differences among the vendors and manufacturer of individual Home automation or IoT components the main differences are defined by communication protocol used. Several communication protocols exist. Among the most used ones Insteon, KNX, ZigBee and Z-Wave are.

COMMUNICATION STRUCTURE:

The first practical aim for intelligent home system is to design individual modules which could sense, control and monitor the environment around them. In this project multiple sensor array modules which could control several action units
are covered. There are multiple features one should consider.

Among the most crucial ones communication, placement, design, power supply, system architecture and sensor types are.The power consumption varies according to the range and data bitrate. Since the Beacon Units are expected to send and receive mostly only sensor and true or false values, the bitrate is mostly off the hook. Additionally, the range in a standard home will most probably not exceed few dozen meters. With these conclusions one can easily dismiss few wireless options available on the market.
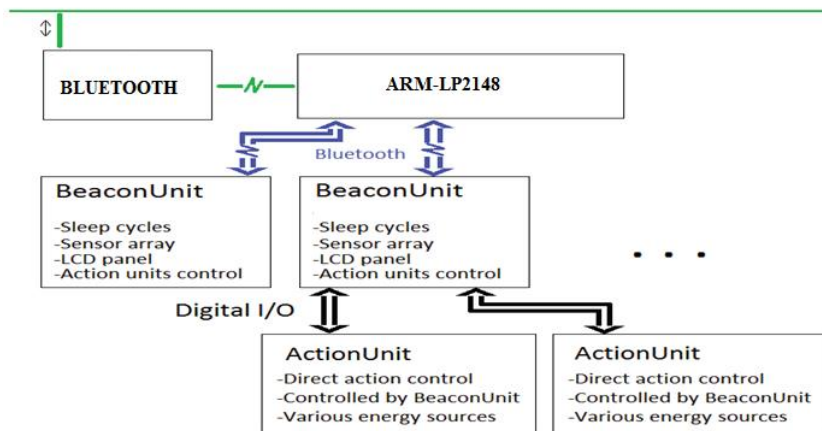
System's block diagram and communication

EMBEDDED SYSTEMS:

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,wordprocessing,

accounting, software development and so on. In contrast, the software in the embedded systems is always fixed listed below, 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. In some embedded systems, called real-time systems, the deadlines are stringent. Missing a deadline may cause a catastrophe-loss of life or damage to property. Embedded systems are constrained for power. As many embedded systems operate through a battery, the power consumption has to be very low. Some embedded systems have to operate in extreme environmental conditions such as very high temperatures and humidity.
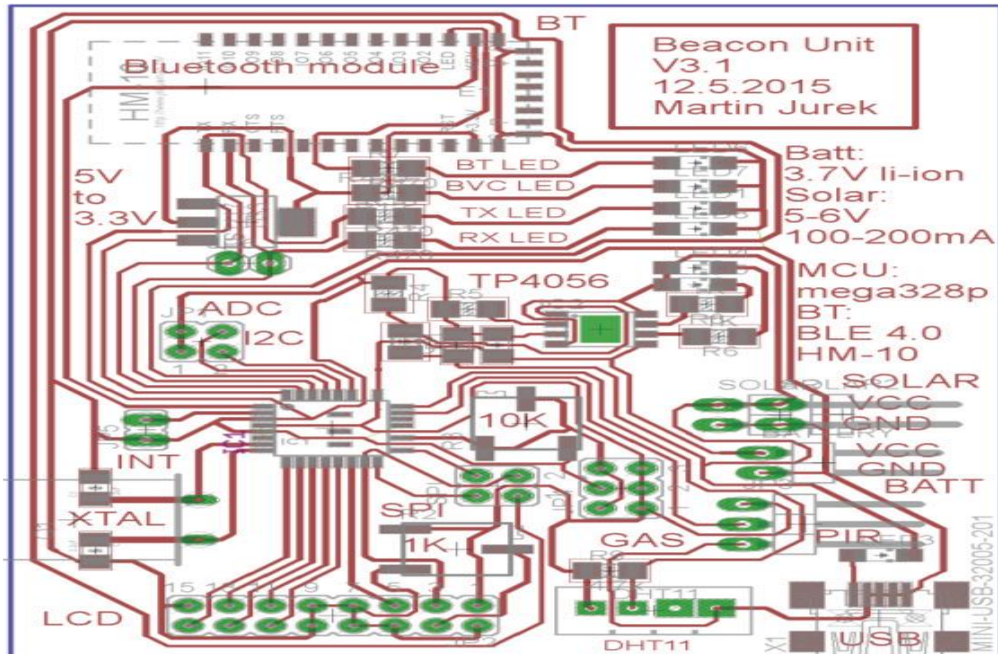
Industrial automation:

 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.
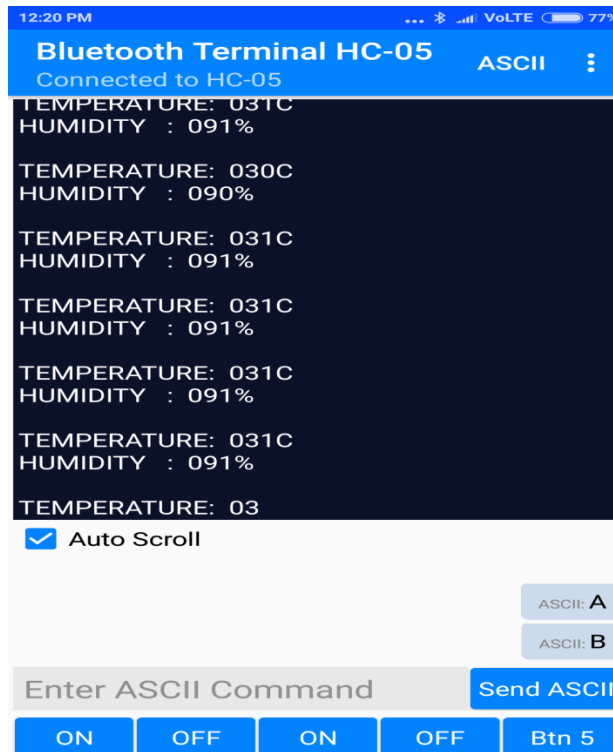
Security:

        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.
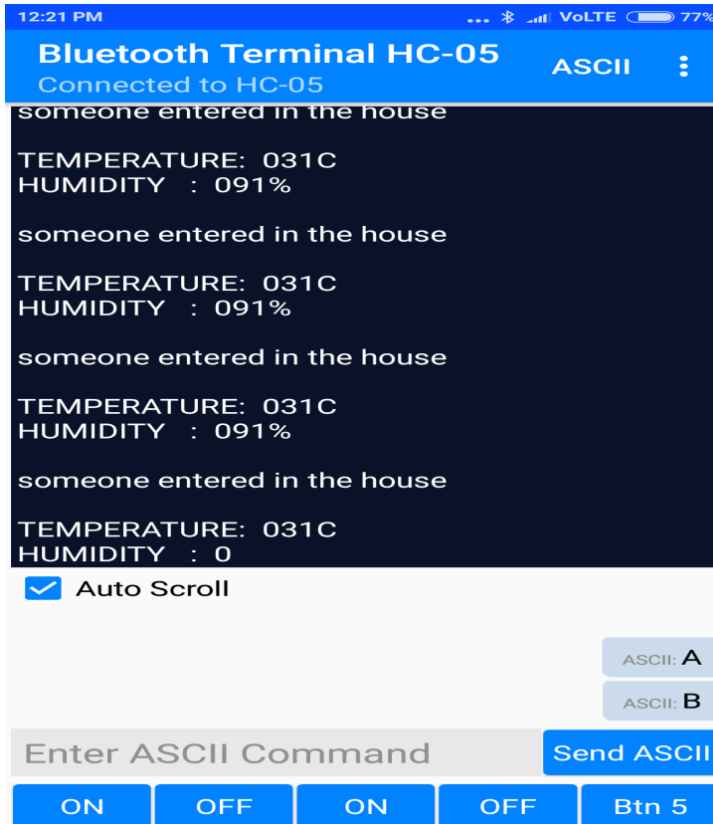
International Journal of Research Available at
https://edupediapublications.org/journals

e-ISSN: 2348-6848
p-ISSN: 2348-795X
Volume 05 Issue 12
April 2018

RESULTS SUMMERY

Sensor module PCB layout

CONCLUSION:

The work on project of open-source modules for intelligent home was dedicated to search for the current technologies and provide their features as an open-source platform. Sensor array modules including PCB schematics, layout development and 3D models were designed and assembled. The most relevant, accessible and effective sensors available on the market with respect to the open-source approach were selected.

ARM-LPC2148 environment proved to be both flexible and development-friendly for such a task. System with multiple devices and different components was put together. Both simple and smart sensors were connected on brand new board with ATMEL microprocessor programmed in processing language used by ARM community This module communicates with ARM-LPC2148 programmed in python and acting as a server for data acquisition and database managing. User-friendly web interface then ensures impact and monitoring at a specific part of user's household from all over the world via internet by simple clicks.

REFERENCES:

[1] DUBRAVAC, PH.D., Shawn a Carlo RATTI, PH.D. The Internet of Things: Evolution or Revolution? [online].2015,2015(1), 27 [cit. 2016- 01-21]. Available at: http://www.aig.com/Chartis/internet/US/en/AIG%20White%20Paper%20-20IoT%20English%20DIGITAL_tcm3171-677828_tcm3171- 698578.pdf

[2] JURANEK, M., KULHANEK, J. 2011.The use of MEMs accelerometers for measurement of driver seat comfort," Carpathian Control Conference (ICCC), 2011 12th International, vol., no., pp. 172-175, 25-28 May 2011, ISBN 978-1-61284-360-5.

[3] INSTEON. 2013. Insteon: WHITEPAPER: Compared. Irvine, CA.Available at:http://cache.insteon.com/documentation/insteon_compared.pdf

[4] CARLSEN, John. 2014. A Guide to Home Automation Protocols. In:Toptenreviews [online]. [cit. 2015-05-12]. Available at: http://homeautomation-systems-review.toptenreviews.com/a-guide-to-homeautomation-protocols.html

[5] Home Automation White Paper / X-10 vs. Insteon vs. Z-Wave vs.RadioRA 2. 2014. Simply Automated [online]. (47-8-2014) [cit. 2015-05-12]. Available at: http://simply-automated.com/blog/2014/10/homeautomation-white-paper/

[6] Power Consumption and Energy Efficiency Comparisons of WLAN Products. In: WHITE PAPER [online]. QUALCOMM, 2013 [cit. 2015- 04-22]. DOI: 991-00005-001. Available at: http://www.qca.qualcomm.com/wp-ntent/uploads/2013/09/Power_Consumption_whitepaper.pdf

[7] MAHDAL, M. 2012. Solar Energy as Alternative Power Supply for Communication System IEEE 802.15.4 Standard. *13th International Carpathian Control Conference ICCC´2012*. High Tatras, Slovak Republic, on May 28-31, 2012, pp. 470 - 473. (4 p.). ISBN 978-1-4577- 1866-3.

[8] XBee® & XBee-PRO® ZB: Embedded RF Module Family for OEMs. Digi International Inc., 2015. Available at: http://www.digi.com/pdf/ds_xbeezbmodules.pdf [9] ZALOKER, Joseph. ANT/ANT+. Arrow Electronics, 2014. Available at: https://www.arrownac.com/solutions-applications/machine-tomachine/files/atd-ant.pdf

[10] Bluetooth 4.0 for Arduino. [Online]. August 2013 [cit. 2015-04-22].Available at: http://letsmakerobots.com/content/bluetooth-40-arduino