

# Survey on Smart Home Automation System Using Arduino for Real Time Application

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**Abstract:** An effective and flexible home control and monitoring system with the aid of an integrated micro web server with IP connectivity for access to and control of equipment and devices remotely app. The proposed system does not require a dedicated server PC with respect to similar systems and offers a new communication protocol for monitoring and controlling the home environment with more than just switching functionality. Smart home interfaces and device definitions to ensure interoperability between ZigBee devices from various manufacturers of electrical equipment, meters and Smart Energy enables products to allow manufactured. We introduced the proposed home energy control systems design intelligent services for users.

**Keywords:** *Android, Home Automation, IOT, Smartphone, Smart Home.*

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## I. INTRODUCTION

Intelligent management of the power system, facilitate the joint use the current and minimizes power loss during transmission and power consumption is highlighted by the global community, academic institutions, and State administration. To gain full utility and customer protection dimensions, the idea of a smart grid enabling technologies used in In recent years, attracting a great deal of attention in the energy industry and academia Such studies. With continued growth in popularity and functionality of mobile devices, demand advanced mobile applications widespread human life continue to grow. Fig below shows the basic block diagram of System to be propose.

The use of Web Services is an open and interposable method for providing remote access service or applications can communicate with each other an attractive market for home. Automation and network of busy families and individuals will be physical Limitations. IBOARD is Ethernet Shield, and it was the smart Home micro web server. Arduino open source electronics prototyping platform based on

Flexible, easy to use hardware and software. The Arduino IBOARD Microcontroller Board of Based on the IBOARD with 54 digital input / output pins. The Ethernet interface is Arduino via the SPI pins. Low voltage switching relays were used to integrate Devices with Arduino is to show switching functionality. The Sensor is used to control a smart home environment. A supervisory control system Intranet, low cost and high performance can react The ZigBee technology. An end node, the node sends data to the coordinator, and the coordinator Hub sends the data back to

the terminal end of the loop. Since all devices have their own IP Address based on IPv6, they can be directly connected to an external network. So, all smart devices It can not only through the handheld remote control device to the central and local home, but can also be controlled remote computer control. Through the introduction of home Internet Gate way machine.

## II. LITERATURE SURVEY

**1. Vaishnavi S. Gunge, Pratibha S. Yalagi “Smart Home Automation: A Literature Review”International Journal of Computer Applications, National Seminar on Recent Trends in Data Mining (RTDM 2016)**

Home automation is becoming popular due to its numerous benefits. Home automation refers to the control of home appliances and domestic features by local networking or by remote control. Artificial Intelligence provides us the framework to go real-time decision and automation for Internet of Things (IoT). The work deals with discussion about different intelligent home automation systems and technologies from a various features standpoint. The work focuses on concept of home automation where the monitoring and control operations are facilitating through smart devices installed in residential buildings. Heterogeneous homeautomation systems and technologies considered in review with central controller based (Arduino or Raspberry pi), web based, email based, Bluetooth-based, mobile-based, SMS based, ZigBee based, Dual Tone Multi Frequency-based, cloud-based and the Internet with performance[IJCATM:[www.ijcaonline.org](http://www.ijcaonline.org)]

**2. Ana Marie. D Celebre, Ian Benedict A. Medina, Alec Zandrae D. Dubouzet, Adrian Neil M. Surposa, Engr. Reggie C. Gustilo “Home Automation Using Raspberry Pi through Siri Enabled Mobile Devices” 8th IEEE International Conference Humanoid, Nanotechnology, Information Technology, 9-12 December 2015, Waterfront Hotel, Cebu City, Philippines.**

Home automation is a system that has the technology to control devices automatically in order to convene the desires of security, comfort and efficiency. On the other hand, voice-based digital assistant such as Apple’s Siri provides a location independent access to the Internet and local networks. This study focuses on implementing a home automation system through Siri’s capability of speech recognition and through Raspberry Pi as a low cost control system to automate home devices, namely the air cooler, door, lights, TV and window. Siri Proxy is installed on the Raspberry Pi as a proxy server for Siri. By developing a SiriProxy plug-in, a set of commands for home automation could be custom-made by the user. [978-1-5090-0/15/\$31.00, 2015 IEEE]

**3. Syarif Hidayat, Syahrial Farid Firmanda “Scheduler and Voice Recognition on Home Automation Control System” 2015 3rd International Conference on Information and Communication Technology (ICoICT)**

Automated home or home automation or smart home can be described as a product to provide ease of doing homework. One of the simplest task is turning on or off light or any other electrical equipment at home remotely and or automatically. There are issues on building a house that could efficiently use electricity in a comfort way. Current development of technology enable production of cheaper and smaller size of computer. Raspberry known as a Single Board Computer (SBC) proposed in this paper to achieve those goal. Current development shows that home automation could be managed by the means of website or smartphone application such android or IOS application which required resident to access computer or smartphone [978-1-4799-7752-9/15/\$31.00, 2015 IEEE]

**4. P. BHASKAR RAO, S.K. UMA “RASPBERRY PI HOME AUTOMATION WITH WIRELESS SENSORS USING SMART PHONE” International Journal of Computer Science and Mobile Computing IJCSMC, Vol. 4, Issue. 5, May 2015.**

The project presents a low cost and flexible home control and monitoring system using an embedded microprocessor and microcontroller, with IP connectivity for accessing and controlling devices and appliances remotely using Smart phone application. The proposed system does not require a dedicated server PC with respect to similar systems and offers a novel communication protocol to monitor and

control the home environment with more than just the switching functionality. To demonstrate the feasibility and effectiveness of this system, devices such as light switches, power plug, temperature sensor and current sensor can be integrated with the home control system [© 2015, IJCSMC All Rights Reserved].

**5. Hamid Hussain Hadwan ,Y. P. Reddy “Smart Home Control by using Raspberry Pi & Arduino UNO” International Journal of Advanced Research in Computer and communication Engineering Vol. 5, Issue 4, April 2016.**

Home Automation is anything that your home does for you that makes living there more enjoyable or productive. A Smart Home appears to apply intelligence to make that happen. Although being able to email your light switch nodes is delightful. After all, you can control it. By providing information about the real world to your house, it is then able to make decisions by itself. This is the difference between a Smart Home and an automated home [DOI 10.17148/IJARCC.2016.5473].

**6. Satish Palaniappan, Naveen Hariharan, Naren T Kesh, Vidhyalakshimi S, Angel Deborah S “Home Automation Systems - A Study” International Journal of Computer Applications Volume 116 – No. 11, April 2015.**

With the increase in consumption of energy and population, there is a grave need to conserve energy in every way possible. The inability to access and control the appliances from remote locations is one of the major reasons for energy loss. A web or an android application is used by the users to give instructions to these systems. This system can make use of a host of communication methods such as Wi-Fi, GSM, Bluetooth, ZigBee. Different controlling devices and configurations can be found in existing systems. Such systems have been found already in many places for a wide variety of applications. This paper presents a survey of all such systems [10.5120/20379-2601].

### III. MOTIVATION

The goals are to reduce the impact of wireless interference on a smart home control network and unnecessary energy consumption of a smart home. An isolated WSN with one coordinator, which is integrated into the PLC transceiver, is established in each room. The coordinator is responsible for transferring environmental parameters obtained by WSNs to the management station via PLCs. The control messages for home appliances are directly transferred using PLCs rather than WSNs. According to experimental results, the impact of wireless interference on the proposed smart home control network is substantially mitigated on Architecture of smart home

control network based on (a) WSN with relay nodes, (b) WSN plus PLCB. Brain of the system a central controller (our Arduino board) receives user commands to execute. It has Internet connectivity through an Ethernet shield mounted on the Arduino. On the user side, a mobile device provides interface with the system as a whole through a user friendly application. The mobile device can be either wired to the central controller (through USB cable for instance), or communicates with it wirelessly. Within the scope of the home, wireless connectivity can be achieved using an Ethernet shield on the central controller. This way, we would be able to access the controller either locally or remotely through the Internet.

The proposed System has several advantages.

1. provides more comfort
2. makes your home and business safer
3. Home automation will save your energy and money
4. With home automation you are ready for future

#### IV. PROBLEM DEFINATION

##### A. System under study

The busy families and individuals will be physical Limitations to gain full utility and customer protection dimensions, the idea of a smart grid enabling technologies used In recent years, attracting a great deal of attention in the energy industry and analyse Such studies. With continued growth in popularity and functionality of mobile devices, demand advanced mobile applications widespread human life continue to grow. The use of Web Services is an open and interoperable method for providing remote access service or applications can communicate with each other.

##### B. Problems with Raspberry Pi System

Raspberry pi cannot supports windows operating system. This is a new product, which leads exclusively to Raspberry Pi patents, also not much background to the success or failure to wide range of customers. Raspberry pi cannot add more RAM. It having some limitations to its hardware and software. Some common one like windows and Linux OS cannot compatible

#### V. OBJECTIVE(S)

The objectives of proposed work are:

1. We proposed a smart home micro web server makes it more convenient to use.
2. We proposed Arduino an open source electronics prototyping platform which makes the system more Flexible and easy to use.

3. The Arduino IBOARD Microcontroller Board of Based on the IBOARD with 54 digital input/output pins The Ethernet interface is Arduino via the SPI pins which makes circuitry easy.
4. The proposed system using arduino can be easy to program from aMac, Windows or Linux Computer.
5. Many shields just pluginto the top of the Arduino Board.
6. Low voltage switching relays were used to integrate Devices with Arduino to show a switching Functionality.

#### VI. DESCRIPTION OF THE PROPOSED WORK

A central controller (our Arduino board) receives user commands to execute. It has Internet connectivity through an Ethernet shield mounted on the Arduino. On the user side, a mobile device provides interface with the system as a whole through a user friendly application.

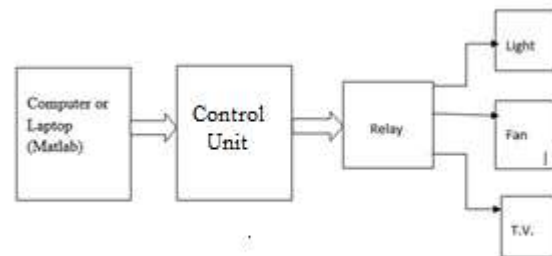
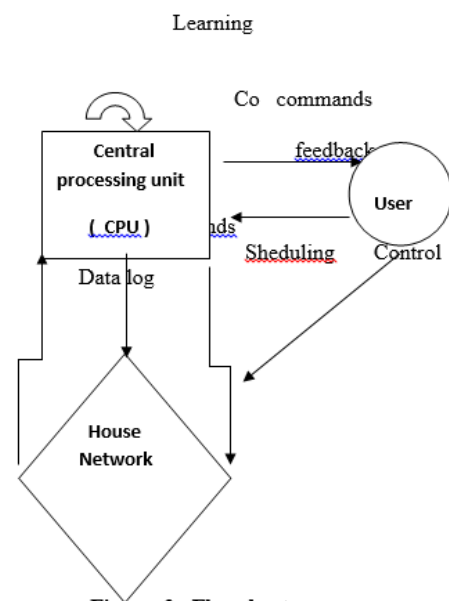


Fig: Block Diagram Of System

Fig below shows Flowchart of proposed system.



The mobile device can be either wired to the central controller (through USB cable for instance), or communicates with it wirelessly. Within the scope of the home, wireless connectivity can be achieved using an Ethernet shield on the central controller. This way, we

would be able to access the controller either locally or remotely through the Internet. Communication protocols between Home Automation devices Equations The control center of network is home gateway system, which is, from inside, to coordinate all household appliances, control their working condition and inquiry their current status, and, from outside, connect with Internet, receive remote users' instructions and transfer related information to business sites. Internal Communication Every data transmit between ZigBee networks can be communicated by each other, so people in any room can control the other room's devices. The query flowwork of home appliance is shown as follows: Appliance receives information from home gateway by ZigBee module and detects the household appliance's status, and then corresponding status will be transmitted to the home gateway by ZigBee module. If all appliances work properly, home gateway stores appliances status. If not, home gateway reports an error message to supplier. External Communication Home gateway interconnects Internet and the home network. It sends all devices information in home network to the portal server via TCP/IP socket. And also it can control and monitor the devices with date packet communication. Thus it enables users to control and monitor the home networks through Internet and even mobile phone since the portal server has the mobile interface.

## VII. CONCLUSIONS

We propose a new architecture for the monitoring and control system that uses a flexible home based IOT at a reasonable price and implemented by X Bee wireless Trans receiver and IBOARD Arduino as well as using android app for system control configuration. The proposed architecture is used in a quiet based web services in an interoperable application layer for communication between the remote user and the home device. The Wi-Fi connection is the support built, the home access device to control. If the Internet is not possible, it can be access by used the 3G mobile phone system.

## REFERENCES

- [1] Andi Adriansyah, Akhmad Wahyu Dani" Design of Small Smart Home System Based on Arduino"2014 *Electrical Power, Electronics, Communications, Controls, and Informatics Seminar (EECCIS)*
- [2] Dae-Man Han and Jae-Hyun Lim, Member , IEEE" Design and Implementation of Smart Home Energy Management Systems IJARCEISSN (Online) 2278 -Vol. 5, Issue 2,February 2016 " *IEEE Transactions on Consumer Electronics*, Vol. 56, No. 3, August 2010
- [3] Mingfu Li, Hung - Ju Lin " Design and Implementation of Smart Home Control Systems Based on Wireless Sensor Networks and Power Line Communications" 10.1109/TIE .2014 .2379586, *IEEE Transactions on Industrial Electronics*.

- [4] Kim Baraka, Marc Ghobril, Sami Malek, Rouwaida Kanj, Ayman Kayssi" Low cost Arduino/Android - based Energy - Efficient Home Automation System with Smart Task Scheduling" 2013 *Fifth International Conference on Computational Intelligence, Communication Systems and Networks*
- [5] Zhenyu Zoua, Ke-Jun Lib\*, Ruzhen Lia and Shaofeng Wub"Smart Home System ased on IPV6 and ZIGBEE Technology" *Procedia Engineering 15 (2011) 1529 1533*
- [6] Rajeev Piyare" Internet of Things: Ubiquitous Home Control and Monitoring System using Android based Smart Phone" *International Journal of Internet of Things 2013, 2(1):*
- [7] Yue Li " Design of A Key Establishment Protocol for Smart Home Energy Management System" 2013 *Fifth International Conference on Computational Intelligence, Communication Systems and Networks*
- [8] Shiu Kumar " UBIQUITOUS SMART HOME SYSTEM USING ANDROID APPLICATION" *International Journal of Computer Networks & Communications (IJCNC) Vol.6, No.1, January 2014*
- [9] Andi Adriansyah, Akhmad Wahyu Dani" Design of Small Smart Home System Based on Arduino" 2014 *Electrical Power, Electronics, Communications, Controls, and Informatic Seminar*
- [10] IBoarddatasheetby"www.iteadstudio.com"TechSupport: [support@iteadstudio.com](mailto:support@iteadstudio.com)
- [11] XBee datasheet by Digi International, Inc. All rights reserved" [www.digi.com](http://www.digi.com)" rf [experts@digi.com](mailto:experts@digi.com)
- [12] Nazrul Anuar Nayan, Ili A.M. Ikhsan ,Yasuhiro Takahashi " Using Zig Bee Communication Technology in a smart Home Wireless Sensor Network "Proceedings of Second *International Conference on Modern Trends in Science, Engineering and Technology 2014"*
- [13] Arduino Technical specs " [www.arduino.cc/en/Main/arduinoboarduno](http://www.arduino.cc/en/Main/arduinoboarduno)"
- [14] " Getting Started with XBee RF Modules" Version 1.0 by Martin Hebel and George Bricker with Daniel Harris
- [15] " C Programming for Arduino" Julien Bayle Copyright © 2013 Packet