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Development of Smart Home Automation System based on IoT

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ABSTRACT

Internet of Things (IoT) is the emerging technology that enables variable appliances utilized in day-to-day life to connect via internet and transform data. Smart home of IoT is one of the system that uses electronic or mobile devices to control or manage basic home needs automatically from anywhere in the world through internet. This paper presents the development of a real time home automation system with a four channel home automation that can control four home appliances. This system also has a provision to connect four sensors. Mobile App is also developed to enable to communicate with server and also to allow the client to control and monitor the developed system.

Keywords—Smart Home, IoT, Sensors.

INTRODUCTION

Every day the modern people expect new device and new technology to simplify their day-to-day life. The innovators and researchers are forever trying to find new things to satisfy the people but the process is still infinite.

In 21st century the people wants the world on their hands. It causes the revolution of computing and smart environment. IoT is an ideal up-and-coming technology to control the internet and communication with technologies. Simply IoT connects living and nonliving things via internet.

IoT allows people and objects to be connected Anytime, Anyplace, Anything and Anyone, by using ideally in Any Path or network and Any Service as shown in Fig1.

Nowadays the environment objects can be changed into smart devices using by computing technologies and a no. of algorithms and systems were implemented and proposed for security capacity based on wired networks. In many research papers, suggested a lot of security systems based on new technologies are Global System for Mobile Communication (GSM), General Packet Radio Service (GPRS), Internet, Microcontroller unit and sensor networks.

Home automation referred as 'Smart home' that can notice and identify automatically regulate the lights, fans, doors, play music, watering flowers, on security lights in night and switch off at morning, hot water for bath, stream to anyplace around world via the internet. To control systems and information technology, to control industrial equipment and processes, decreasing the needs for human involvement. It plays most significant task in the international economy. In Medical processes, electrocardiograph and analysis of blood plasmas, human genes, cells and tissues etc. are carried out at greater rate and accuracy. ATMs have introduced to obtain cash from anywhere without visiting the banks.

The main goal of this paper is to provide cost effective result that will control and security of Home devices through Mobile app. In this paper, Developing a device for Smart Home based on Wi-Fi works as IoT that allows the client to control with the device from everywhere in the world.

Fig 1: Objectives of IoT

RELATED WORK

Home automation is major issue during the past two decades. Various solutions have been implemented in [1-12]. In [1] Lin and his team used the existing electrical wiring and outlets as the medium for data communication within the home where no new wires are needed and several access routes are available around the house. Other systems used conventional phone line for monitor and control home appliances [2, 3].

In [4] this system, home gateway used as internet that requires a personal computer for Automation. However, it is hard to manage personal computer and keep it ON at anytime. Also large amount of power is consumed. W.L.Xu and his team describe a Java based smart home, this method proposes an embedded server but still it requires GPRS. In these systems, wired sensors are used to attach processors those are hard to install and difficult to move after installed i.e., increase cost and labors [5]. Smart Home by using Bluetooth is introduced in [6].In this, each home appliance is directly connected to Bluetooth sub-controller. The variable home appliances communicate with corresponding sub-controller by wired communications. From this sub-controller all communications are sent to main controller with the help of wireless communications. It is essential for each home device to have a dedicated Bluetooth module.

Remote Controller for office and home by using phone, it differs in the manner that the communications occur by fixed telephone and not by any Internet. This system accessed by implementation involves any telephone supports Dual Tone Multiple Frequency (DTMF). The drawbacks are as follows: users are not provided with Graphical User Interface (GUI), users have to remember an access code, and they have to remember which buttons to press for the control of connected devices. The communications that are mentioned are checked and processed by the home gateway and virtual home. This checking process involves communication with home network coordinator, which is integrated with the database of the home's device and it contains the significance of all the connected devices. Once checked the communications are sent to system and the respective device [7]. Additionally, a local ZigBee remote control based mechanism is used to directly control all other devices connected [8]. The technologies in the home are to improve the quality of service and its inhabitants by the different services like as SMS, multimedia and power conservation [9].

At present Internet as well as wireless communications is mostly use in home automations [10]. With the recent growth of mobile computing devices and mobile networks, new and better solutions can be developed to make home automation more convenient and accessible on the base of 24/7 from anywhere at any time.

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SYSTEM IMPLEMENTATION

The system presented in this paper provides reliable security, effortless installation and anywhere access. Sensors use communication through mobile app for sending information to control panel which makes the system easy to install. Control panel, which is acting as a home gateway, controls the operation of the automation system.

The applications and features are:

- Control & Monitor from anywhere in the world.
- Control is Possible with LAN even without internet disconnection.
- Auto update
- Simple to mount
- Using Solid State Relay(SSR) so No Noise
- Higher Ampere SSR than normally used in commercial products
- Mobile App control
- Flexibility

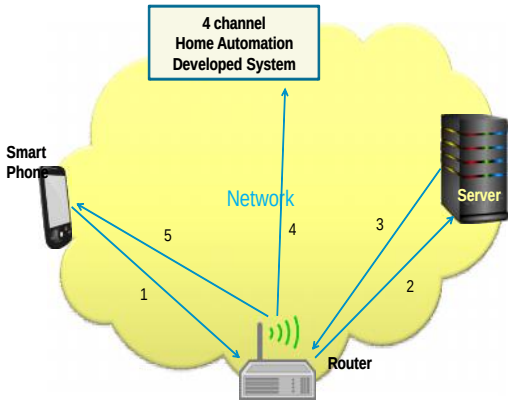

Fig 2: Block Diagram of Developed System

The proposed system controls home appliances through mobile app from mobile phone. The router receives information from mobile app via internet and send to the server. The server sends back acknowledgement to router and sensors are activated in 4-Channel Home Controller and perform the task by user.

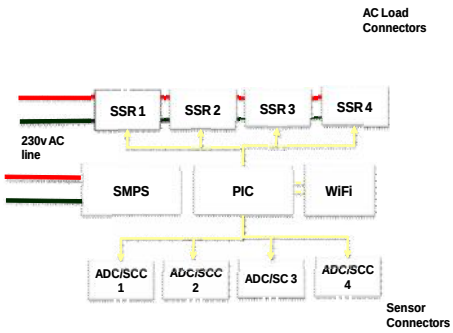

Fig 3: 4-Channel Home Automation Developed System

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A. Peripheral Interface Controller (PIC) is used as Micro Controller Unit in developed system. For program storage, flash memory is used and allows PIC to reprogrammable itself. Separate memories are allocated for both data and program. 6-pin, 8-pin and up to 144-pin of different PICs are available with different I/O pins and communication ports that are universal asynchronous receiver/transmitter, integrated circuit. 28-pin PIC 16F873 is used for developing system.

B. Switching Mode Power Supply (SMPS) is used to convert switching regulator into electrical power efficiently. SMPS transfers power from AC/DC source to DC. Unlike linear power supply, the transistor of SMPS continuously switches connecting low dissipation and spends high dissipation transitions at rarely and minimizes wasted energy.

C. Wi-Fi technology is an interaction with smart home network from outside, the other option is to use the Internet. To accomplish this, server is built to take requests from clients. The clients can send requests to control home devices by using mobile app. The home appliances can send their statuses to be displayed for the client through the server. One Mobile App is created as an interface where instructions can be submitted by the client to observe and control the status of the home devices. The Wi-Fi network was implemented by standard Wireless protocol (802.11b and 802.11g) ADSL Modem Router, with a 4 port switches. The modem provides two primary functions. This provides cost effective communication method with the home network, reduced infrastructure costs where Wi-Fi devices are already in use. Moreover, homeowners can observe and control the home from anyplace familiar technology and devices.

D. SSR (Solid-State Relay) is used as switch that controls on/off when minimum external power is applied. SSRs have a sensor responds to input, SSR switches control to load circuitry, and enable the control signal without disturbing internal parts. SSR is used to switch DC/AC to load without moving parts.

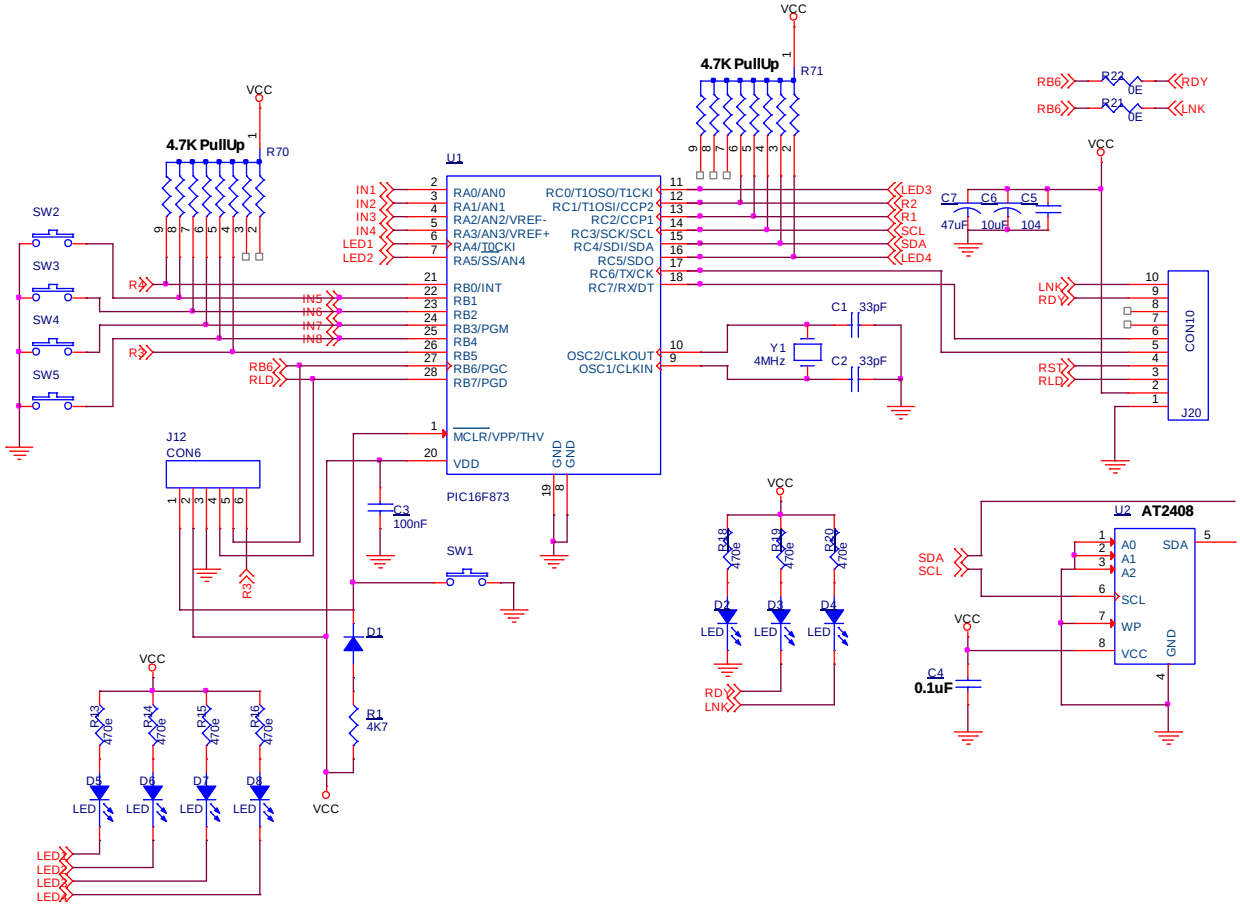

Fig 4: The complete Circuit Operation of the system

E. Strategic Cell Controller (SCC) program is to implement ergonomically designed human interfaces to support manufacturing technicians and process engineers working in semiconductor fabrication facilities.

EXPERIMENTAL RESULTS

A mobile app has been created to continuously monitor the home appliances through internet and it is enabled by Wi-Fi module and connected with web server. After the successful connection to the server, the data of sensor are sent to the web server for monitoring of the system. The Fig6 shows the mobile app page and allow us to monitor and control the system. The web server gives the statuses of different home appliances like lights, fans etc can control by using mobile app. Hence status displayed on the mobile app and user can control these variable appliances through the internet.

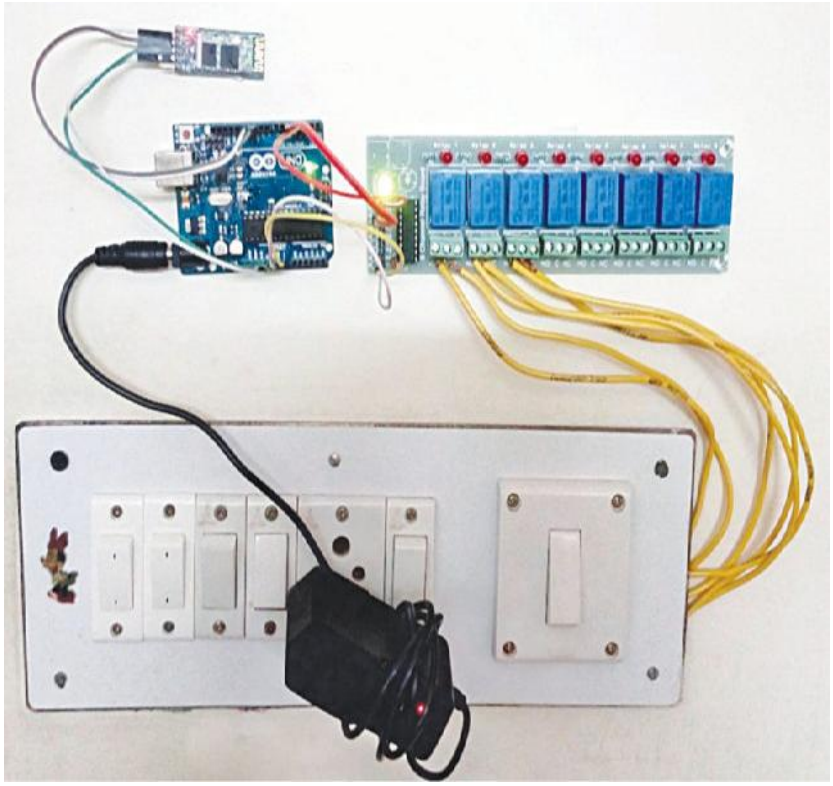

Fig 5: Experimental setup

To enable security of everything is connected by the sensors to control system. For example:

- Smart home gateway and the server security
- Authenticate home automation devices
- Networking devices data secured through communication
- To update software for protecting software
- Checking reliability of devices with router enabled network access
- Authenticating sensors and devices in the automation network
- Software or firmware updates to protect IP and avoid operational interruptions

To control and monitor of home appliances by using Mobile App is shown in Fig6.

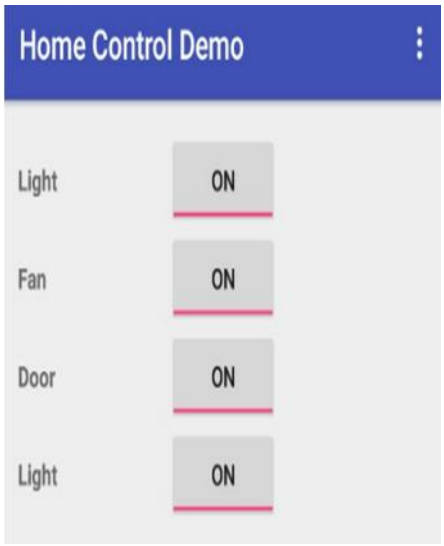

Fig 6: Controlling Home Appliances through Mobile App

CONCLUSION

Home automation focuses on making homes better, and often safer, through innovative technology and providing a luxurious upgrade for less expensive. The world has come a long way from relying on home security provided by large corporations operating from remote locations. Automation system provides comprehensive energy saving solutions to reduce energy usage. In this system evaluated a real product for the proposed home automation system based on IoT. The clients can send requests by using mobile app to server and allows that control and monitor home appliances. Storing sensor metadata in severely resource constrained sensor nodes to a local attribute search problem. However, through architecture, generalizing the proposed approach based on stimulate our future work.

REFERENCES

[1]. Y. J. Lin, etc. ” A power line Communication Network Infrastructure for the Smart Home”, IEEE Wireless Communications, Dec. 2002, pp. 104-1 11.
[2]. E.M.C, Wong,” phone-based remote controller for home and office automation”, IEEE Transactions on Consumer Electronics, Volume: 40 Issue: 1, Feb 1994, pp:28 -34.
[3]. S. Chemishkian, “Building smart services for smart home”, Proceedings of IEEE 4thInternational Workshop on Networked Appliances, 2002 pp: 215 -224.
[4]. BarisYuksekkaya, M. BilgehanTosun, M. KaanOzcan and Ali ZiyaAlkar. "A GSM, Internet and Speech Controlled Wireless Interactive Home Automation System" IEEE Transactions on Consumer Electronics, Vol.52 No. 3, pp: 837-843, 2006.
[5]. M. Van Der Werff, X. GUI and W.L. Xu. "A Mobile-Based Home Automation System" 2nd International conference on mobile technology, Applications and systems. Pp 1-5,2005.
[6]. N. Sriskanthan, F. Tan and A. Karande, "Bluetooth based home automation system", Microprocessors and Microsystems, Vol. 26, no. 6, pp. 281-289, 2002.
[7]. H. Ardam and I. Coskun, "A remote control for home and office appliances by telephone", IEEE Transactions on Consumer Electronics, Vol. 44, no. 4, pp. 1291-1297, 1998.
[8]. Khusvinder Gill, Shuang-Hua Yang, Fang Yao, and XinLu,”AZigBee Based Home Automation System”, IEEE Transactions on Consumer Electronics, Vol. 55, No. 2, MAY 2009
[9]. Minal S. Khandare, Anjali Mahajan " Mobile Monitoring System For Smart Home", 3rd International conference on Emerging Trends in Engineering and Technology. IEEE 2010
[10]. R. Shepherd “Bluetooth wireless technology in the home”, Electronics & Communication Engineering Journal, V. 13, I. 5, Oct 2001, pp: 195 -203.