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ELECTRICAL APPLIANCES CONTROL USING WI-FI AND LAPTOP

Prof. S. A. Itkarkar, Swati Badgujar, Kanika Backar, Rutuja Ankushe

Dept. of Electronics and Telecommunication, Bharati Vidyapeeth's College of Engineering for Women, Pune, Maharashtra, India

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Abstract - *Nowadays, most of the work is based on computer and laptop as technology has become one of inseparable part of our life. In conventional system method for controlling the electrical equipment, the person has to use switch boards and they are placed in one particular place. So every time we have to go there and control electrical equipment by turning switch ON and OFF. It is time consuming and energy consuming task to control electrical equipment. To save the time and man force, the system is designed to control electrical appliances using Wi-Fi and laptop. In most of the offices or at any work places Wi-Fi is easily available. It can replace conventional ON/OFF system of electrical appliances. We are introducing a new mechanism so that the laptop can be leveraged to communicate with ARM7 processor and control the electrical appliances. Software application is created which will be installed on laptop so that person can control the electrical appliances by sending commands through software. Laptop is use to send the commands through Wi-Fi module. Wi-Fi module is used for Establishment the net connection through RJ45 connector. The microcontroller used is LPC2148 controller of ARM7 Processor family. Therefore according to the requirement person will send the commands from LAPTOP. Then the devices will be controlled through Wi-Fi module. This allows a device to wirelessly provide data to the system & reduces the manpower for operating the devices every time. Thus system provides flexibility; reduce manpower & less power consumption [1, 3].*

Key Words: **Wi-Fi module, Laptop, Embedded system, RJ45, ARM 7.**

1. INTRODUCTION

An **embedded system** is a special and multipurpose system in which the computer is completely encapsulated by or dedicated to the device or system it controls. Unlike a general-purpose computer, such as a desktop computer, an embedded system performs one or a few predefined tasks, usually with very specific requirements. Personal digital assistants (PDAs) or handheld computers are usually considered embedded devices because of the nature of their hardware design, even though they are more expandable in software terms. The concepts of embedded system are used to develop a System named **"ELECTRICAL APPLIANCES CONTROL USING Wi-Fi AND LAPTOP". [1]**

Electrical appliances automation is equipped with special facilities to enable occupants to control or program an array of automated devices. For example, Supervisor on vacation can arm a security system, control temperature gauges, switch appliances ON or OFF, control lighting, and perform many other tasks. Our main focus is to control the electrical appliances in place. The motivations behind the goal to control of electrical appliances are simply and easily. It's not always feasible to be physically near to the electric switch board still sometimes it's very important to control the appliances for many purposes. So the controlling the electrical appliances through Wi-Fi takes the control of the electrical appliances from the hands of the people. If a simple Wi-Fi and laptop takes the added responsibility to control the electrical appliances then the control is reachable from almost everywhere people who is present in that room or place. EMBEDDED wireless sensor networks (EWSNs) consist of sensor nodes with embedded sensors to sense data about a phenomenon and these sensor nodes communicate with neighbouring sensor nodes over wireless links. Many emerging EWSN applications (e.g., surveillance, volcano monitoring) require a plenty of sensors (e.g., acoustic, seismic, temperature, humidity and image sensors like smart cameras) embedded in the sensor nodes. Although traditional EWSNs design with scalar sensors (e.g., temperature like LDR, humidity) transmit most of the sensed information to a sink node (base station node). For example, consider a military EWSN deployed in a battlefield, which needed various sensors, such as imaging, acoustic, humidity and electromagnetic sensors. This application presents different challenges for existing EWSNs since transmission of high-resolution images and video transmitted over bandwidth-limited wireless links from transmitting nodes to the receiving node is infeasible. Although, meaningful processing of multimedia data (acoustic, image, and video in this example) in real-time exceeds the capabilities of conventional EWSNs consisting of single-core embedded sensor nodes, and requires more powerful embedded sensor nodes to realize this application. [3] This sort of high end technology is supposed to facilitate the various life easing utilities to a new age and bringing things out of the box to as near as one's fingers. There exists a number of available media for remotely communicate. Wi-Fi is a good example of this type of communication. Internet places virtually no bounds on geographical placement and is thus considered "enough" remote by our definition. So we are using Wi-Fi module for controlling the devices as per requirement of supervisor in the industry. [2]

2. LITERATURE SURVEY

Ahmed ElShafee, Karim Alaa Hamed., [1] in this paper presents a design and prototype implementation of new home automation system that uses Wi-Fi technology used as a network infrastructure connecting its parts. The proposed system consists of two main section; the first part is the server (web server), which presents system core that manages, controls, and monitors respective home. Users and system controller can locally (LAN) or remotely (internet) manages and control system code. Second part is hardware interface module, which provides appropriate interface to sensors and controller of home automation system. Unlike most of available home automation system in the market the proposed system is ascendable that one server can manage number of hardware interface modules as long as it exists in range of Wi-Fi network coverage. System supports a wide range of home automation devices like power management devices, and security devices. The proposed system is better from the flexibility and ascendablility point of view than the other home automation systems which are commercially available.

Sachin Kishor Khadke., [2] speciality of this proposed paper is that to control fan speed and light intensity. This paper is divided in two parts, hardware part called process unit and software part called monitoring unit. Process unit carry Bluetooth module LM400, LCD, dimmer circuit, and microcontroller PIC16F877 (40 pin IC). Monitoring unit carry only Smartphone. To improve efficiency dimmer circuit is designed using SCR. Home appliances can manage using android phone which has Bluetooth application. Bluetooth module is used for communication. It is remote technology. Dimmer circuit is used for controlling the intensity of light and fan speed.

Mahesh N. Jivani., [3] in this paper author proposed Home automation based on GSM system using App-inventor for Android mobile. In App inventor, programmer has to design different blocks than design the source code like in Lab VIEW software. Programming is not essential. The main purpose of this paper is to have simplicity in programming using App inventor and security using GSM. New smart phone app can be design using android base on app inverter platform. User has to login first online then start to design both part the screen objects (Designer) and the programming logics (blocks). User can control home equipment using GSM from anywhere in the world. In hardware, ULN2803 octal peripheral driver array, ATMEGA328 Arduino board with microcontroller, Relay and GSM modem etc. other small components are used. Arduino board worked as a transceiver. It has 23 I/O lines. In this paper hardware and software part is done separately.

D.Naresh, B.Chakradhar, S.Krishnaveni. ,[4] In this paper authors suggested that the two microcontroller development boards via ARM 7 and ARM 9 were used. ARM 9 (S3C2440A) is in transmitter side and ARM 7 (LPC2148) is in receiver side. for designing the application on ARM9O Wince6.0 operating system is used . In hardware parts ARM7, ARM 9, ULN2003, Relays, Bluetooth module are used. VB.NET is used for designing apps. Serial Port Profile modules Graphical User Interface module and are used in software part. Bulb, fan is controlled using Bluetooth, ARM – MDK kits acts as a processor. It is cost effective project.

Mohamed Salman, Jayavrinda Vrindavanam., [5] in this paper, authors introduced GSM technology with AT89S52 microcontroller. Simulation software is Proteus v7.7 and Keil compiler used for embedded C programming. Main goal of this project is if in future any accident will happen then system will send SMS messages to the user. At any time, user can send request for condition of system. Home appliances can be control using GSM by sending SMS so user can save his/her money and time. In proposed system, power supply gives 5V power to the system. AT89S52 is 8- bit, cost efficient controller. For conversion of signal MAX232 is used. Relay driver ULN2003 drives the all relays which connected to the loads. Last but not the least GSM module SIM300 is messenger between the microcontroller user and using AT command. This paper gives detail information about circuit diagram in Proteus simulation diagram and all necessary components.

In all above paper's different methods home automation system are discussed. In all above papers the technology developed was only for home automation purpose which is limited for homes only. To overcome this problem we develop a system that is not only used for home but also for other places where Wi-Fi is easily available

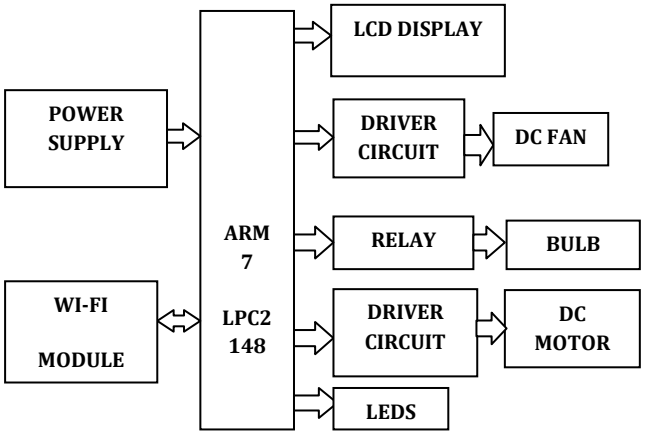
3. METHODOLOGY

The proposed system consists of two main components;

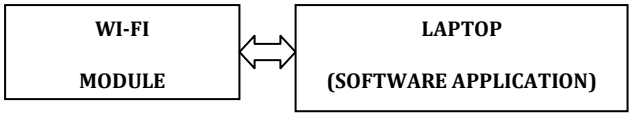
1) Controlling section: Laptop with Terminal application.
2) Distributed section: various appliances connected to Wi-Fi module to receive command from controlling section with help of microcontroller (LPC2148).

In proposed system we use Wi-Fi technology as a network infrastructure so that the relevant parameters at distributed section are controlled through WI-FI this is very useful in the case when the user want to control the parameters in industrial area with help of any Wi-Fi compatible devices such as Laptop, Mobile, PDA, Tablet etc. User need to just run the connection terminal software from the Laptop or any Wi-Fi compatible device and establish the connection with Wi-Fi module present at distributed section as TCP client by entering its local IP address and port number.
After connection is established Controlling of the devices at distributed section is done by just sending commands through connection terminal software running in the Laptop, Mobile, PDA, Tablet etc. But in our project we are using laptop in controlling section.

4. System Block Diagram



Controlling Block



5. SYSTEM WORKFLOW

1. Start
2. System will be initialized.
3. Initially all control devices will be OFF after power-on.
4. Wifi module will be initialized in UART-Wi-Fi mode.
4. Open Serial Terminal Software on Laptop.
5. Establish connection between Wi-Fi module and Serial Terminal Software on Laptop.
6. Display Welcome message on LCD.
7. Display welcome message on Serial Terminal software.
8. Waiting for control command to be received from Laptop Serial Terminal Software.
9. Send control command (ON/OFF device) from Laptop Serial Terminal Software.
10. Check received control command format.
11. If received command is @BnON* then ON n'th Device.
12. If received command is @BnOFF* then OFF n'th Device.
13. Display the action performed on LCD.
14. Stop.

6. RESULT

By using this project, we can control different electrical equipments using Wi-Fi. Following are results which are achieved by this project:

1. Improves quality of controlling electrical appliances.
2. Ability to work in any hostile environment
3. Save manpower
4. Improve efficiency and quality

3. FUTURE SCOPE

Since proposed system is based on Wi-Fi which works at 2.5GHz frequency and whose range is around 32 metres (105 ft.).The region covered by one or several Wireless access points is called a hotspot. Wi-Fi device can connect to the internet or Local area network using an access point, but the device must be in the range of that Wireless access point. Wireless access point (WAP) connects a group of wireless devices to an adjacent wired LAN. Therefore we can connect our proposed system to internet (to make it IoT based project) in future to increase the range worldwide for monitoring and controlling the industrial or home appliance.

3. CONCLUSIONS

This paper proposes a secure, ubiquitously accessible, auto-configurable, remotely controlled solution. The approach discussed in the paper is novel and has achieved the target to control home appliances wirelessly using the Wi-Fi technology to connect system parts, satisfying user needs and requirements. Wi-Fi technology capable solution has proved to be controlled wirelessly, provide security and is cost-effective as compared to the previously existing systems. Hence we can conclude that the required goals and objectives of home automation system have been fulfilled. The system design and architecture are discussed above, and prototype presents the basic level of home appliance control and remote monitoring has been implemented. Finally, the proposed system is much better from the scalability and flexibility point of view than the conventionally available home automation systems.

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