



Intelligent Office Area Monitoring and Control Using Internet of Things

Prof.S.A.Shaikh¹, Aparna S.Kapare²

Associate Professor, Dept. of E &Tc, Pravara Rural Engg College, Loni, Maharashtra, India¹

PG Student [Embedded &VLSI], Dept. of E &Tc, Pravara Rural Engg College, Loni, Maharashtra, India²

ABSTRACT: The paper presents the design and implementation of innovative office system for monitoring and controlling the electrical appliances using internet of things technology. The devices can be controlled using android mobile phone via Bluetooth communication protocol and android application. The proposed system monitors and controls the office appliances via smart phone using Wi-Fi internet connection and raspberry pi as server system. The Raspberry Pi and Arduino are integrated with RF modules are used in this smart design. The smart office prototype includes a gateway for that work to efficiently monitor the devices, through a graphical user interface that allows user to interact with the ambient surroundings.

KEYWORDS: Smart phone, internet of things, raspberry pi, bluetooth

I. INTRODUCTION

The development of the Internet of Things will revolutionize a number of sectors, from automation, transportation, energy, healthcare, financial services, and agriculture. IoT technology can also be useful to build a new model and widespread progress for smart homes to provide intelligence, comfort and to improve the quality of life.

Wireless technologies are becoming more popular around the world and the consumers appreciate this wireless existence which gives them relief of the well-known tedious “cable chaos” smart office and home provides intelligent living environment for day-to-day easy and convenient life. A smart office system usually consists of an embedded automation system, information technology, and automation technology, several controlled objects and corresponding sensors [1]. With the advancements in the new technology and android smart phone. The Bluetooth technology purposes to interchange data wirelessly in a short distance using short wavelength radio transmissions so as to provide convenience and controllability. This proposed system presents a low cost and flexible home control and monitoring system using an embedded web server, with IP connectivity for accessing and controlling devices and appliances distantly using Android based Smart phone app. The Internet might even be utilized in office automation that deals with several decisions from economical use of electricity bills to added comfort, protection and safety.

II. OVERVIEW OF INTERNET OF THINGS

The Internet of Things is the network of "things" that are connected to a common network path to communicate, exchange data or control each other. The network path can be interconnected or with the "things" being embedded software, hardware or any sensor. It represents the state where the things can have additional data and information linked with them and has a ability to communicate, create new information and become the integral part of the free world wide web. It also features internet connectivity and all other fields concerned with the era of internet.

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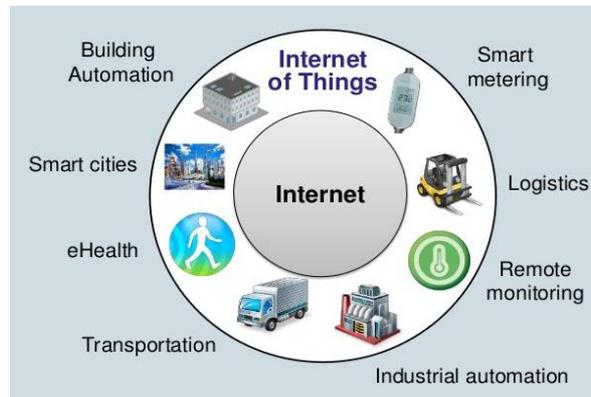


Fig.1 Shows Internet of Things applications

The Internet of Things is a new revolution of internet. It can transform a number of areas such as home automation, transportation, energy, healthcare, financial services, and logistics. IoT technology can also be useful to build a new model and extensive improvement space for smart home and office to provide intelligence, comfort and to improve the quality of life. Different devices and electrical appliances in the home such as lightings, air condition, home security and entertainment systems are nowadays being connected to the Internet so that it can be controlled remotely using the Smart phones or Tablets[2].

III. RELATED WORK

This paper presents the design and implementation of a low cost but yet flexible and secure cell phone based home automation system. The design is built on an individual Arduino BT board and the home appliances are connected to the input/ output ports of this board via relays. The communication between the cell phone and the Arduino BT board is wireless. This system is designed to be cost effective system [3].

This paper presents the development of home appliances based on voice command using Android. This system has been designed to assist and provide the support to elderly and disabled people at home. Google application has been used as voice recognition and process the voice input from the smartphone. In this paper, the voice input has been captured by the android and will be sent to the Arduino Uno[4].

The project proposes an efficient implementation for IoT (Internet of Things) used for monitoring and controlling the home appliances via World Wide Web. This project aims at controlling home appliances via smartphone using Wi-Fi as communication protocol and raspberry pi as server system. The user here will move directly with the system through a web-based interface over the web. The server will be interfaced with relay hardware circuits that control the appliances running at home [5].

This paper presents a novel solution that makes this future a bit nearer. Voice controlled automation, as well as a universal remote control application on an Android platform, has been presented. The efficient utilization of various available apps on Google play store has been done. Using the Bluetooth module HC-05, Arduino Uno, and Android application, voice controlled automation [6].

In this paper, a platform is intended to connect sensor data with users daily life. As an application of it, Any Control - a home appliances monitoring and controlling system is implemented. The home appliances are becoming more intelligent day by day. Along with the manufacturers promoting new smart appliances there are also many smartphone concerned with remote controller products. The proposed system provides an approach to an IoT based Home Appliance Controlling System [7].

This paper presents the design and execution of a Java-based automation system that can monitor and control home appliances using the World Wide Web. The design is based on a standalone embedded system board integrated into a PC-based server at home. The appliances in home are smartly connected to the input/output ports of the embedded system board and their status is passed to the server. The monitoring and control software engine is based on the combination of Java Server Pages, JavaBeans, and Interactive C [8].

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In this paper, a security system that is used to interface with an Android mobile device is established. The mobile device and security system communicate via Bluetooth. The mobile application can be loaded onto any compatible device, and once loaded, interface with the security system. Commands to lock, unlock, or check the status of the door to which the security system is installed can be sent quickly from the mobile device via a simple, easy to use GUI. . This paper will discuss the development of a security system that integrates with an Android mobile device using Bluetooth as a wireless connection protocol [9].

Bluetooth is a popular mechanism for short distance point to point or point to multi-point communication. A general purpose controlling module is designed with the capability of controlling and sensing up to five devices simultaneously. The communication between the controlling module and the remote server, which drives the module, is done using Bluetooth technology. The server can communicate with many such modules simultaneously [10].

IP based systems are supposed to be simpler to be accessed and easier to manipulate. Home automation structure that is created on the IP is presented at low cost, secure and flexible model implementation intended at any home appliances. In this frame structure, the communication protocol between the hardware and the consumer electronics devices to be used in home automation have also been presented. The system proposes an optimized, self-adaptive communication protocol. The designed system will be open to expansions, further developments, and will enable the control of different types of devices as long as they are built within the guidelines of the protocol suggested. The system is designed to connect to a designated server for web accessibility without the need for any setup on the user side. This feature makes this system uniquely simple and easy to operate [11].

IV. PROPOSED SYSTEM

The proposed system is designed to overcome the shortcomings of previous system and to improve security, flexibility, efficiency.

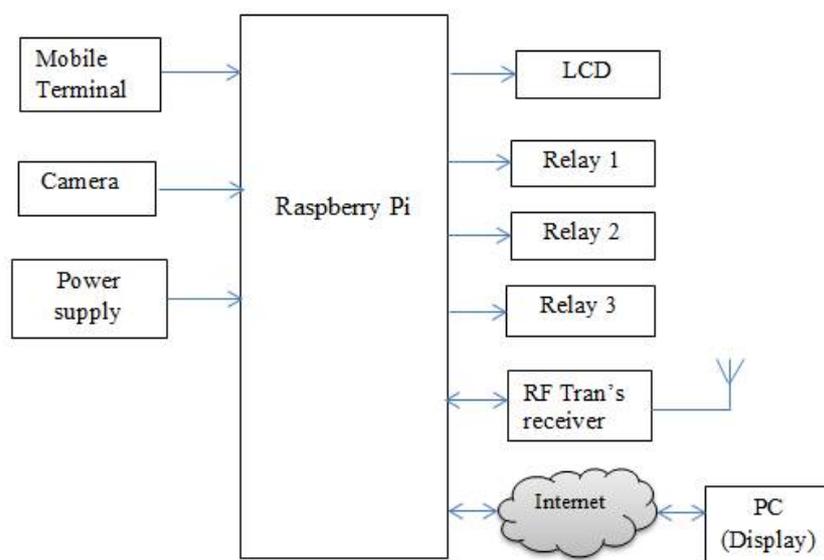


Fig.2 Shows central control Unit-1

The system is interactive to provide ease in day to day life, also saves electricity, human efforts. This system introduces a wireless solution based on Internet protocol to manage the smart office units easily. Based on this approach, we design an office area monitoring system with the implementation of related software and hardware. The Voice-operated

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Android and Raspberry Pi office automation system uses an Android based Bluetooth enabled phone to turn ON/OFF of devices. The system is simplified by allowing appliances to be controlled by voice input using mobile terminal. It can react to voice command and control the on/off status of electrical devices, such as lamps, fans, television etc., in the office. The Bluetooth wireless environment has been used. The module assists the use of this system from various locations in the office.

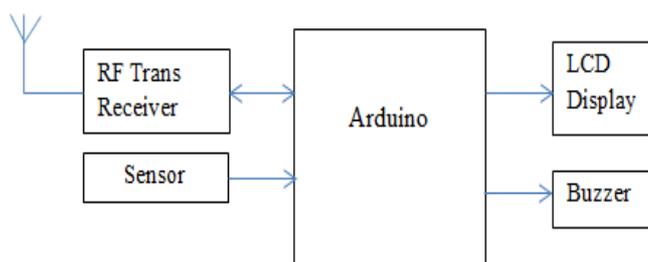


Fig.3Shows office room unit-2

The RF Tran receiver module is used to transmit voice to unit -2.It transmits voice to text on Arduino Uno (Unit-2). Android smartphone serves as an advance microphone for voice commands. Arduino receives the commands from raspberry pi using RF Tran's receiver. It converts the recognized speech command in text format messages.

V. SYSTEM IMPLEMENTATION

To demonstrate the practicability and efficiency of the system, devices such as relays, power plug, raspberry pi and sensor have been integrated with the proposed intelligent office system.The system uses Raspberry Pi module B.It is supposed to be a credit-card-sized single-board computer technologically advanced by the Raspberry Pi Foundation. It is developed with the aim of providing the guidelines for basic computer science.

1. Raspberry Pi:

The Raspberry Pi is a low cost, credit-card sized computer. Raspberry Pi is small, inexpensive, portable credit-size single board computer with support for a large number of peripherals and network communications. Raspberry Pi 3 ascertains to be a powerful, economic and an efficient platform for implementing the smart home and office automation.It consists of General purpose I/O pins. The GPIO pins of the raspberry pi are programmed using Python programming language [12].

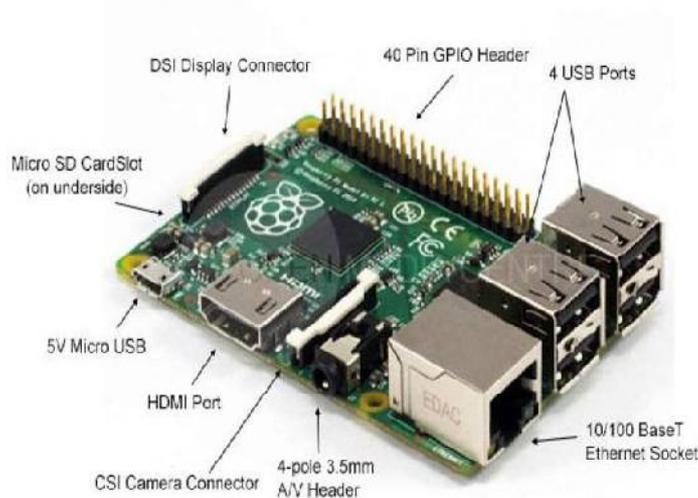


Fig.4 Shows Raspberry Pi 3 Module



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Vol. 6, Issue 6, June 2017

2. Arduino Board:

The Arduino Uno is a microcontroller board based on the ATmega328 microcontroller. Arduino is an open source platform. The Arduino has a specially designed circuit board for programming and prototyping with microcontrollers. Arduino is an open source platform. It can interface many real time hardwires with greater compatibility. It contains everything needed to support the microcontroller [13].

3. Camera:

Camera can be used for security and surveillance. Using Raspberry Pi 3 module it is possible to directly interface the USB camera so as to monitor the office environments. The camera output can be displayed using internet and monitored remotely.

4. RF trans receiver:

The RF Tran receiver is used for wireless communication. The most important application of this transceiver is to make information in the form of data/ voice appropriate to be transmitted over the wireless medium so as to communicate with another device wirelessly.

VI. RESULTS

The office monitoring system works by using Raspberry pi as hardware tool. The board will have a wireless connection that connects to an Internet hub.

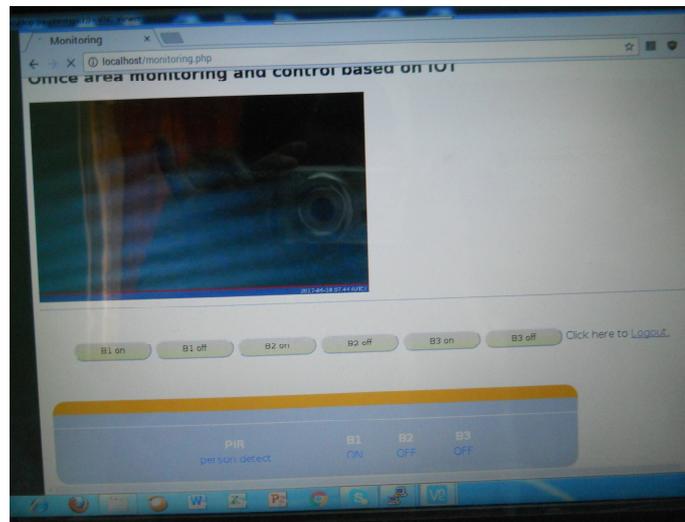


Fig.5 shows Display of GUI for monitoring electrical appliances

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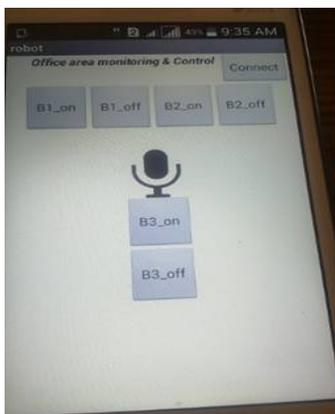


Fig.6 shows GUI for android based mobile application

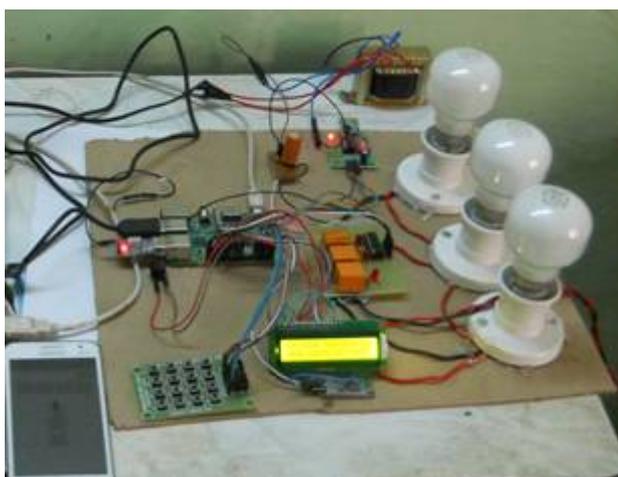


Fig.7 Shows test set up of Raspberry pi based Central office room

VI .CONCLUSION

The proposed system recommends a novel approach that allows existing embedded system to be integrated into an internet of things network. This paper presents a wireless solution based on Internet protocol to accomplish and monitor the office units easily. The application of the IoT technology, in Office area automation means integration of all appliances and the electronic devices like smart mobile phone, personal computer, tablet, along with the monitoring, control of work environment. The electrical appliances can be monitored and controlled using android smart phone and IoT. Thus it helps to build an autonomous work environment in the work spaces.

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