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IOT Based AC Controller

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ABSTARCT: One of the things that can cause a waste of electricity from operating air conditioning equipment, is the operation of the equipment continuously, even though no one is in the room, or the homeowner forgets to turn off the air conditioning equipment when leaving the house. For this reason, it is necessary to create a system that can control the work of AC equipment remotely, by applying the concept of the Internet of Things (IoT),where control is carried out via an androidsmart phone device. These controlsinclude on / off process, operating modes, so that equipment operation is moreeffective and can avoid wasting electrical energy. The method used in this research is the prototyping method, which includesthe stages of literature studies, field studiesand data collection, the design stages of both software and hardware design forsystem requirements, the manufacturing stages of both hardware and software, andthe system work testing stage. The results show that the system created can carry out the process of controlling the work of air conditioning equipment remotely via anAndroid Smartphone device, for the on / off process, setting the operating mode andsetting the air conditioning equipment. The practical goal of this paper has been tocreate a virtual, but practically usable, android home automation system. The android mobile is used to send the commands to the Arduino to control all thehome appliances.

I.INTRODUCTION

Things that can be done to minimize the waste of electrical energy from operating air conditioning equipment, is in terms of controlling the work of the air conditioning equipment. Control can be done by adjusting the work of the air conditioning equipment for the air conditioning process, based on thenumber of people in the room.In addition, regular maintenance of airconditioning equipment must be considered, in order to get optimal work. From the description of previous studies, in connection with the process of controlling the work of the air conditioner, it is still in the location where the air conditioner is installed. The problem is that if the air conditioner forgets to turn it off and continues to operate, it will have an impact on the consumption of electrical energy and can cause a waste of electricity. For this reason, it is necessary to make a system prototype that can control the work of remote air conditioning equipment, by utilizing the IoT concept, so that users canremote wherever the user is if they forget to turn off the air conditioner, in order to avoid wasting electricity.

The process of controlling the work of AC equipment remotely is carried out via an Android smartphone media that has been implanted with an Android application tocontrol AC work. Air conditioningequipment work control includes: On / Off process, operating mode settings and temperature settings for AC equipment. The communication process between the Android smartphone and the controller is done wirelessly via a web server application. In producing a work control system for IoT- based air conditioning equipment, the method used is the prototyping method, where the stages begin with a literature study which aims to obtain references in accordance with this research; Android, where Android is a Linux-based operating system designed for touch screen mobile devices such as smartphones and tablet computers. In this study, android is used to create an application program for controlling the work of IoT-based air conditioningequipment; The Arduino uno can be programmed with the Arduino software. At the ATMega328 on the Arduino there is a boot loader that allows you to upload new code without using an external hardware programmer. Arduino IDE is software written in Java. In this research, Arduino IDEsoftware is used as a medium in makingprograms for the needs of IoT-based air conditioning equipment work control systems [9]; NodeMCU is an open source IoT platform and development kit that uses the Lua programming language to assist in making IoT product prototypes or can use sketch with the Adruino IDE. This development kit is based on the ESP8266 module, which integrates GPIO, PWM (Pulse Width Modulation), IIC, 1-Wire and ADC (Analog to Digital Converter) all on one board. In this study,

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NodeMCU ESP8266 is used as a controller and data processor in an IoT-based working control system for air conditioning equipment. The next stage is the stage of designing and making the system, where at this stage the process of designing and manufacturing hardware is carried out in the form of a system block diagram and software in the form of a system work algorithm.

Internet of Things (IoT)

The Internet of Things (IoT) is the network of physical objects or "things" embedde with electronics, software, sensors, and network connectivity, which enables these objects to collect and exchange data. The Internet of Things allows objects to be sensed and controlled remotely across existing network infrastructure, creating opportunities for more direct integration between the physical world and computer- based systems, and resulting in improved efficiency, accuracy and economic benefit. Each thing is uniquely identifiable through its embedded computing system but is able to interoperate within the existing Internet infrastructure. Experts estimate that the IoT will consist of almost 50 billion objects by 2020.

British entrepreneur Kevin Ashton first coined the term in 1999 while working at Auto-ID Labs (originally called Auto-ID centers - referring to a global network of Radio-frequency identification (RFID) connected objects). Typically, IoT is expected to offer advanced connectivity of devices, systems, and services that goes beyond machine-to-machine communications (M2M) and covers a variety of protocols, domains, and applications. The interconnection of these embedded devices (including smart objects), is expected to usher in automation in nearly all fields, while also enabling advanced applications like a Smart Grid, and expanding to the areas such as smart cities. "Things," in the IoT sense, can refer to a wide variety of devices such as heart monitoring implants, biochip transponders on farm animals, electric clams in coastal waters, automobiles with built-in sensors, DNA analysis devices for environmental/food/pathogen monitoring or field operation devices that assist firefighters in search and rescue operations. These devices collect useful data with the help of various existing technologies and then autonomously flow the data between other devices. Current market examples include smart thermostat systems and washer/dryers that use Wi-Fi for remote monitoring. Besides the plethora of new application areas for Internet connected automation to expand into, IoT is also expected to generate large amounts of data from diverse locations that is aggregated very quickly, thereby increasing the need to better index, store and process such data.

Cloud computing

Cloud computing, also known as on- demand computing, is a kind of Internet- based computing, where shared resources, data and information are provided to computers and other devices on-demand. It is a model for enabling ubiquitous, on-demand access to a shared pool of configurable computing resources. Cloud computing and storage solutions provide users and enterprises with various capabilities to store and process their data in third-party data centers. It relies on sharing of resources to achieve coherence and economies of scale, similar to a utility (like the electricity grid) over a network. At the foundation of cloud computing is the broader concept of converged infrastructure and shared services.

Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications and services) that can be rapidly provisioned and released with minimal management effort. Cloud computing, or in simpler shorthand just "the cloud", also focuses on maximizing the effectiveness of the shared resources.

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Figure.2.Cloud Networking

Cloud resources are usually not only shared by multiare also dynamically reallocated per demand.This can work for allocating resources to users. For example, a cloud computer facility that serves European users during European business hours with a specific application(e.g., email) may reallocate the same resources to serve North American users during North America's business hours with a different application (e.g., a web server). This approach helps maximize the use of computing power while reducing the overall cost of resources by using less power, air conditioning, rack space, etc. to maintain the system. With cloud computing, multiple users can access a single server to retrieve and update their data without purchasing licenses for different applications.

Proponents claim that cloud computing allows companies to avoid upfront infrastructure costs, and focus on projects that differentiate their businesses instead of on infrastructure. Proponents also claim that cloud computing allows enterprises to get their applications up and running faster, with improved manageability and less maintenance, and enables IT to more rapidly adjust resources to meet fluctuating and unpredictable business demand. Cloud providers typically use a "pay as you go" model. This can lead to unexpectedly high charges if administrators do not adapt to the cloud pricing model. The present availability of high-capacity networks, low-cost computers and storage devices as well as the widespread adoption of hardware virtualization, service-oriented architecture, and autonomic and utility computing have led to a growth in cloud computing. Companies can scale up as computing needs increase and then scale down again as demands decrease.

II. EXISTING SYSTEM

Home automation can be defined as a system implemented at a residential place whereby the intention is to make the place intelligent so that energy is conserved and security is maintained. It makes the life of the residents flexible, healthy and comfortable. Initially systems were developed in this regard but those systems had to be deployed on Internet and heavy machineries like a big Personal Computer. Our system will be free from all this giant components, which, indirectly suggests that our system has a good quality of portability. Most systems would exchange data or would communicate with the help of Bluetooth, ZigBee and GSM.These systems have their own disadvantages.For example, system-implementing ZigBee has too low bandwidth for the data communication whereas the GSM implementing system has too large bandwidth for the data communication. Thus, there is wastage of the essential bandwidth, which goes without being used. The other systems, which were in use, are, for exampleJava Based Systems and SMS based systems.Java Based Systems still use web pages, which is a disadvantage if data intranet or Internet is off. SMS based system is more costly since it requires data transfer from the real time service provider. This Wi-Fi protocol has some upper hand benefits like itsrange is in the radius of 150-200m The mobile application can also extend thesecurity of the system via an implementation of the password protected application At home, there are all kinds of electrical devices. Also the gas may leak to fire. Once the danger happens, it will result in the huge losses. The smart home system is necessary for the safety. The system integrated the sensors to monitor the appliances whether they work normally. Once the exceptions have been tested, the owner can get the text massage immediately with the help of GSM. This system has a light cube. It has 512 lights. After test, this system works to monitor the home appliances very well at the low cost.

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III.PROPOSED SYSTEM

This paper proposes a Home Automation system that employs the integration of multi-touch mobile devices, cloud networking, wireless communication, and power-line communication to provide the user with remote control of various lights and appliances within their home. Our researchers focus on the use of IOT for home/industry automation and monitoring various physical parameters over the internet. control the work of AC equipment remotely, by applying the concept of the Internet of Things (IoT), where control is carried out via an android smart phone device. These controls include on / off process, operating modes, so that equipment operation is more effective and can avoid wasting electrical energy. The method used in this research is the prototyping method, which includes the stages of literature studies, field studies and data collection, the design stages of both software and hardware design for system requirements, the manufacturing stages of both hardware and software, and the system work testing stage. The results show that the system created can carry out the process of controlling the work of air conditioning equipment remotely via an Android Smartphone device, for the on / off process, setting the operating mode and setting the air conditioning equipment.. Here you may find a wide list of projects related to internet of things. These internet of things projects have been proposed on existing system improvements and new innovative solutions to different problems. With the emerging possibility of connecting more and more hardware to the internet, our research on iot projects is never ending. We constantly research on newer and better iot project ideas every month.

ARDUINO UNO R3 MICROCONTROLLER

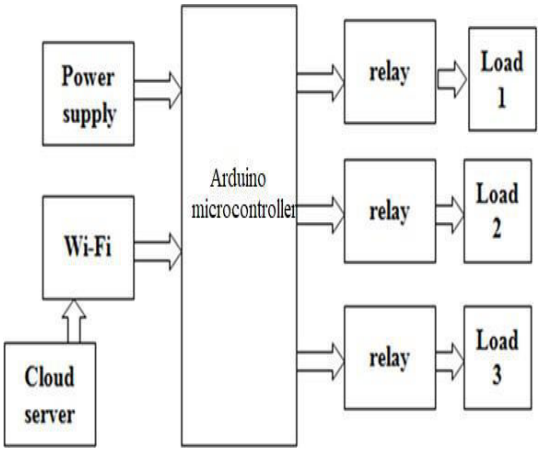
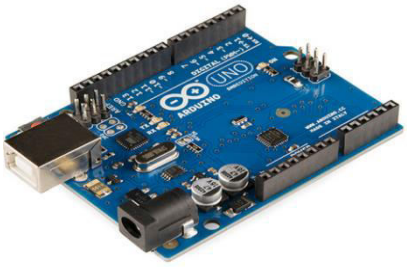


Figure.4.Microcontroller



The Arduino Uno R3 is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter. Revision 2 of the Uno board (A000046) has a resistor pulling the 8U2 HWB line to ground, making it easier to put into DFU mode.

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16x2 LCD:

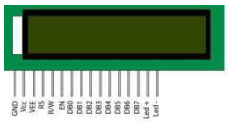

Figure.5.16x2LCD

A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD. Click to learn more about internal structure of a LCD.

Voltage regulators comprise a class of widely used ICs. Regulator IC units contain the circuitry for reference source, comparator amplifier, control device, and overload protection all in a single IC. IC units provide regulation of either a fixed positive voltage, a fixed negative voltage, or an adjustably set voltage. The regulators can be selected for operation with load currents from hundreds of milli amperes to tens of amperes, corresponding to power ratings from milli watts to tens of watts.

IV.HARDWARE RESULT

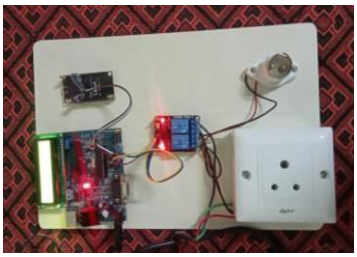

Figure.6. Hardware Model

V. CONCLUSION

The process of controlling electrical appliances remotely and to perform automation process concludes the use of microcontrollers like Arduino, Raspberry pi, etc. The advanced technology enables the Wi-Fi which is a wireless network to be easily controlled using any other Wi-Fi network i.e. connecting from any network tothe home network. The electricity cost can bereduced using smart automation as it turns offeverything when there is no one in home. The wireless connection doesn't require anyswitches and is automated. Power consumption inside the building when the loads were in off conditions can be monitored, controlled and easily managedusing smart applications that are designed forsaving energy.

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