Smarthome
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Abstract:
Internet of Things (IoT) is an emerging technology that is making our world smarter. The idea of connected world cannot be imagined without IoT. In IoT enabled smart home environment various things such as home appliances, security etc. are all connected to the internet and allowing user to monitor and control things regardless of time and location constrain. This project is to develop a home automation system using arduino board with WIFI module being remotely controlled by any android OS smart phone. In order to receive data, a WIFI module is interfaced to the arduino board at the receiver end while on the transmitter end, the application on the cell phone sense ON/OFF command.

I. INTRODUCTION

In the present day, security systems play an important role in the protection of lives and investment. This is achieved by the incorporation of various subsystems into the security system with a single control unit such as surveillance, intruder control, access control, fire detection, etc. A smart home is one that is equipped with lighting, heating, and electronic devices that can be controlled remotely by smartphone or via the internet. An internet based home automation system focuses on controlling home electronic devices whether you are inside or outside your home. Home automation gives an individual the ability to remotely or automatically control things around the home. A home appliance is a device or instrument designed to perform a specific function, especially an electrical device, such as light, fan, for household use. The words appliance and devices are used interchangeably. Automation is to days fact, where things are being controlled automatically, usually the basic tasks of turning ON/OFF certain devices and beyond, either remotely or in close proximity. Automation lowers the human judgment to the lowest degree possible but does not completely eliminate it. The concept of remote management of household devices over the internet from anywhere, any time in the world today can be a reality. This user could walk back home and only find a very comfortable, pleasant home. The recent developments in technology which permit the use of Bluetooth and Wi-Fi have enabled different devices to have capabilities of connecting with each other. Using a WIFI shield to act as a Micro web server for the Arduino eliminates the need for wired connections between the Arduino board and computer which reduces cost and enables it to work as a standalone device. The Wi-Fi shield needs connection to the internet from a wireless router or wireless hotspot and this would act as the gateway for the Arduino to communicate with the internet. With this in mind, an internet based home automation system for remote control of home appliances is designed. A smart house should talk with you. It should give you real time notifications regarding improvements and adjustments that you can do, based on the feedback from the other houses. There are plenty information that can be delivered in real time based on the sensor readings. But also you should be able to talk with the house. For instance I’d like to tell my house that I’m coming home in 1 hour, and then the house will start the home appliances. Never the less the smart house should be able to interconnect with other smart devices, especially smart home electronics and appliances which at some point become part of the house. Despite that most of the appliances are featured with Wi-Fi capabilities there is no common language between them, there is no global communication protocol to make them communicate each other. With other words they are NOT smart. There is nothing smart in being able to watch YouTube on your TV or make an electronic shopping list on your fridge. Those are just tiny features which in reality are not making any difference. Instead manufacturers should provide a natural understandable API for configuring and controlling the device, so that you can then build an integrated system which can command on demand.

II. LITERATURE SURVEY

Smart home is defined as a home that has programmable electronic controls and sensors that regulate heating, cooling, ventilation, lighting, and appliance and equipment operation in a way that responds to interior climate conditions in order to conserve energy. Smart homes use home automation technologies to provide homeowners with intelligent feedback and information by monitoring many aspects of a home on daily basis. Main elements of smart home: 1. Internal network wire, cable, wireless. 2. Intelligent control gateway to manage the systems. 3. Home automation products within the homes and links to services and systems outside the home. [1] The range of different smart home technologies available is expanding rapidly along with developments in computer controls and sensors. Smart homes present exciting opportunities to change the way we live and work, and to reduce energy consumption at the same time. [3] There are already various implementations of smart homes. Most of the implementations use wireless technologies for communication between home appliances and main unit. The main problem that people are trying to solve in smart home is how to make a home that will help people to automate regular daily activities. For example, like adjusting home temperature, ensuring that there is enough light in your home and make home secure. Lead with this idea, people developed smart homes based on different technologies:
1) Smart home based on custom micro controller and mobile application. Smart home system is using Bluetooth for communication between mobile application and systems. It depends on the controller that it is using. Some
microcontrollers are used more than others, which makes those smart home systems more flexible 2) Smart home based on a custom microcontroller and computer. Smart home system is using Bluetooth for communication between appliances. It is based on a computer as entry point for communication between user and smart home system. Computer is connected using wire to the microcontroller. 3) Smart home based on Arduino and mobile application. Smart home system is using Bluetooth for communication between mobile application and Arduino. This system is flexible and scalable. Limitation of this system is Bluetooth range. 4) Smart home based on a computer. Smart home system is using Wi-Fi for communication between appliances and main computer. Main computer is communicating with appliances through microcontroller. Main advantage of this system is that unlimited number of appliances can be connected to it. Some of the solutions mentioned above use Bluetooth for communication between main computer / microcontroller and appliances. Also, some of the solutions are based on remote control using mobile phone, which also use Bluetooth for communication between mobile and main computer. Smart homes today offer similar functionality to the end user. [That functionality is based on the following: Integration with sensors for tracking conditions in smart home. Single point of control for the whole smart home. Remote control of smart home. [4].

III. BLOCK DIAGRAM

Figure.1. (Block Diagram)
In this chapter we are describe the block diagram and its hardware components involved in smart home system.

A. solar charge controller

Figure.2. (Solar Charge Controller)
This circuit describe about power generation using solar panel (150w) in smart home automation. We are using polycrystalline solar panel for generating 150 watts, the generated power is stored in battery (80Ah). Before supply is stored in a battery, it passes through with the help of relay (12v attraction type). The 5v supply from relay is given to Arduino Uno, Which starts the program encoded in Arduino Uno. The program is based on to enable the battery to get recharged fully and to disable the connection between battery and solar panel using relay when battery gets 100 percent charge. Here the LCD display is used for monitoring battery percentage.

B. Temperature Sensor

Figure.3. (Temperature Sensor)
LM35 is an analog, linear temperature sensor whose output voltage varies linearly with change in temperature. It is a three terminal linear temperature sensor from national semiconductors. It can measure temperature from -55 to +150 degree Celsius. It can be operate from 5v supply and the stand by current is less than 60uA. A 16X2 LCD display with LM35 and Arduino-interface and let's display the temperature values on this LCD display. We are using Arduino Uno as our board and LM35 can be connected to Arduino U LM35 is an analog, linear temperature sensor whose output voltage varies linearly with change in temperature. LM35 is three terminal linear temperature sensor from National semiconductors. It can measure temperature from -55 degree Celsius to +150 degree Celsius. The voltage output of the LM35 increases 10mV per degree Celsius rise in temperature. LM35 can be operated from a 5v supply and the stand by current is less than 60uA.

C. Power Supply

Figure.4. (Power Supply)
The L7800 series of three-terminal positive regulators is available in TO-220 ISOWATT220 TO3 and D2PAK packages and several fixed output voltages, making it useful in a wide range of applications. These regulators can provide local on-card regulation, eliminating the distribution problems associated with single point regulation. Each type employs internal current limiting, thermal shut-down and safe area protection, making it essentially indestructible. If adequate heat sinking is provided, they can deliver over 1A output current. Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltages and currents.
1) Electrical Characteristics for LM7812:

<table>
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<th>Typ.</th>
<th>Max.</th>
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<td>0.75</td>
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</table>

Table 1

D. Door Locking System

Figure 5. (Door Locking System)

IV. COMPONENTS

A. ARDUINO UNO

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog input pins, a 16 MHz ceramic resonator, 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 a 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 has a resistor pulling the 8U2 HWB line to ground, making it easier to put into DFU mode.

1) Description: Arduino Uno is a microcontroller board based on 8-bit ATmega328P microcontroller. Along with ATmega328P, it consists other components such as crystal oscillator, serial communication, voltage regulator, etc.

B. ARDUINO MEGA

Figure 7. (Arduino Mega)

1) Overview: The Arduino Mega 2560 is a microcontroller board based on the ATmega2560 (datasheet). It has 54 digital input/output pins (of which 14 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), 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 a AC-to-DC adapter or battery to get started. The Mega is compatible with most shields designed for the Arduino Duemilanove or Diecimila.

C. RFID TAG

RFID tagging uses small radio frequency identification devices to track and identify objects. An RFID tagging system includes the tag itself, also known as a transponder; a scanning antenna and receiver, often combined into one reader, also known as an interrogator; and a host system application for data collection, processing and transmission. Such systems are commonly used for the tracking and management of goods, animals and humans. The most common RFID application is to track and manage goods and people in industries ranging from healthcare and industrial to manufacturing, retail and business. An RFID system contains a transponder, interrogator and the host applications. RFID systems generally provide one-way communication, with a transponder transmitting data to the interrogator. RFID readers, or interrogators, are the devices that gather data from the tags. RFID readers are network-connected and can be permanently attached or portable devices. They use RF waves to transmit signals to activate RFID tags. Once activated, the tag sends a wave back to the reader, where it is translated. RFID tags do not have to be scanned directly and do not require line of sight with an interrogator. The range at which a reader can transmit with a tag depends on the frequency used. RFID host computers or networks are where the collected data is read, processed and passed onto the appropriate application for analysis and further use. Many RFID readers also contain onboard processing, running applications rather than relying on a host computer, or store the data until it can be uploaded to the host. RFID technology has a number of guidelines and specifications, the main ones being the International Organization for Standardization (ISO), Electronics Product Code Global Incorporated (EPCglobal) and International Electro technical Commission (IEC). Each radio frequency has associated support the microcontroller. Arduino Uno has 14 digital input/output pins (out of which 6 can be used as PWM outputs), 6 analog input pins, a USB connection, A Power barrel jack, an ICSP header and a reset button.
standards, including ISO 14223 and ISO/IEC 18000-2 for low-frequency RFID, ISO 15693 and ISO/IEC 14443 for high-frequency RFID, and ISO 18000-6C for ultra-high-frequency RFID. In the U.S., RFID regulations are covered by the Federal Communications Commission’s Code of Federal Regulations part 15, section 15.247. In the EU, regulations include ETSI EN 300-220 and ETSI EN 302-208. Regulations may include the frequency at which authorized RFID applications can run in certain frequency ranges, maximum wattage allowed, reader-to-tag communication techniques, and channels/channel spacing, which involves how a frequency range is divided and involves preventing reader-to-reader interference.

Figure.8. Rfid Tag

V. METHODOLOGY

In Our Project Home appliances are connected through online control. The Mobile phone is connected through internet and the open Blynk app to see the on/off buttons to control the home appliances. The Blynk is a Private IoT platform we are buy the app weights, We are using Node MCU Wi-Fi module to linked with the appliances and also our smart home having multiple sensor for security and safety, the sensor like vibration sensor, smoke sensor, proximity sensor, Temperature sensor, Motion sensor. The door control system like open/close is linked with IoT technology. The door locking system consist of some security features like pin system, RF tag system and manual control.

VI. OUTPUT

Figure .9. Working of Ardunio

Figure.10. Working of Battery Percentage

Figure.11. Entire Home Design

VII. CONCLUSION

Smart home provide new trendy way of communication. We are design the smart home using renewable energy source and fully automation. Smart home service is an important means to realize real-time and interactive response between the users, and to improve energy efficiency of end users. According to the actual needs of users completed smart interactive terminals, home smart sensor devices, networking programs and intelligent electricity service management platform research and development of related equipment and software platforms to achieve the smart home appliances Management and energy utilization.

VIII. REFERENCE


