HOME AUTOMATION USING IOT TECHNOLOGY

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ABSTRACT

In this project, a novel architecture for low cost and flexible home control and monitoring system using Android based Smart phone is proposed and implemented. The proposed architecture utilizes a micro web server and Bluetooth communication as an interoperable application layer for communicating between the remote user and the home devices. Any Android based Smart phone with built in support for Wi-Fi can be used to access and control the devices at home. When a Wi-Fi connection is not available, mobile cellular networks such as 3G or 4G can engine thus eliminating the need for an external voice recognition module.

1. IOT TECHNOLOGY

1.1 INTRODUCTION:

The internet of things can be described as the technology in which the actual physical entities (electronic devices) with data sensing, processing &self adoption capacity can be used to interact with other such device and process that data to take an intelligent decision which will prove useful for our daily day to day life . IOT is defined As an environment in which objects (devices) are given unique identifiers and the ability to transfer data over a network without having human-to-human or human-to-computer interaction. IOT is being formed from two words internet and things which combine means any object or person which can be distinguishable by the real world can be connected to global system of interconnected computer networks and governs by standard protocol.

They defined IOT as ―An open and comprehensive network of intelligent objects that have the capacity to auto- organize, share information, data and resources, reacting and acting in face of situations and changes in the environment‖ The internet of things is a new era of intelligence computing and it is providing a privilege to communicate around the world. The objective of IOT is anything, anyone, anytime, anyplace, any service and any network.
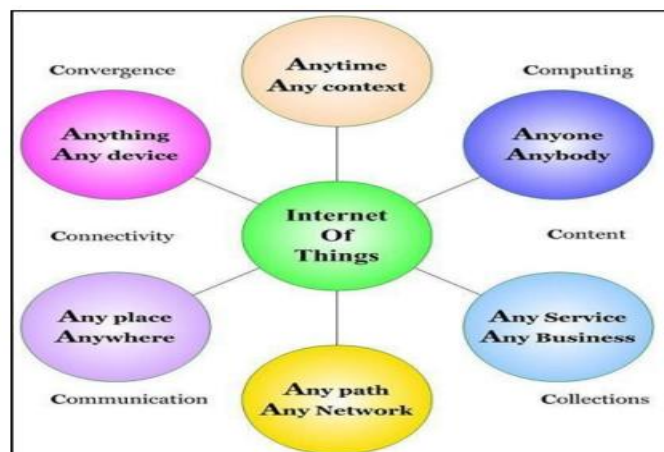

Figure:1.1Objective of IOT
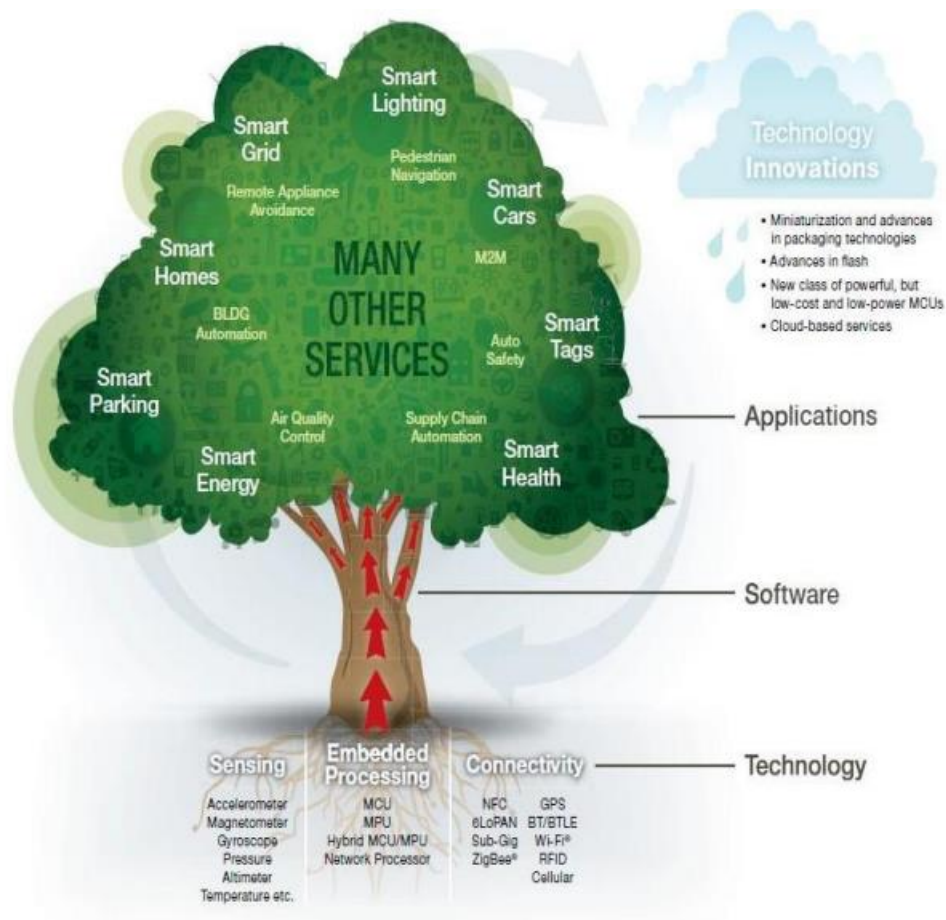
1.2 THE IOT DIFFERENT SERVICES AND TECHNOLOGIES

Figure:1.2 Application of IOT

1.3 HOME AUTOMATION USING IOT TECHNOLOGY

Home automation is the automatic control of electronic devices in your home. These devices are connected to the Internet, which allows them to be controlled remotely. With home automation, devices can trigger one another so you don't have to control them manually via an app or voice assistant. For example, you can put your lights on schedules so that they turn off when you normally go to sleep, or you can have your thermostat turn the A/C up about an hour before you return to work so you don't have to return to a stuffy house. Home automation makes life more convenient and can even save you money on heating, cooling and electricity bills. Home automation can also lead to greater safety with Internet of Things devices like security cameras and systems.

2. LITERATURE SURVEY

Design and Realization of Home Appliances Control System Based on The Android Smartphone present the information about the remote appliances control system based on the Android smart phone is designed and realized. A user logs into the smart phone interface, and clicks the buttons gently to send message commands which will be transmitted to home information Centre through the GSM network. Then the PIC processor recognizes the specified command, and controls the home appliance switches in the wireless radio frequency manner to achieve remote control of

appliances ultimately. Exploiting Bluetooth on android mobile devices for home security application present the information about mobile devoice has been integrated into our everyday life.

Home automation and security are becoming increasingly prominent features on mobile devoices the mobile devoice and security system communicates via Bluetooth because a short-range-only communication system was desired. With the help of android mobile we can control task such as locking the doors, turning on/off lights remotely. According to kaue, home automation can be useful to those who need to access home appliances while away from their home and can improve the lives of the disabled

3. EMBEDDED SYSTEM

3.1 EMBEDDED SYSTEM

An embedded system is a computer system designed to perform one or a few dedicated functions often with real-time computing constraints. It is embedded as part of a complete device often including hardware and mechanical parts. By contrast, a generalpurpose computer, such as a personal computer (PC), is designed to be flexible and to meet a wide range of end-user needs. Embedded systems control many devices in common use today.

Embedded systems are controlled by one or more main processing cores that are typically either microcontrollers or digital signal processors (DSP). The key characteristic, however, is being dedicated to handle a particular task, which may require very powerful processors. Since the embedded system is dedicated to specific tasks, design engineers can optimize it to reduce the size and cost of the product and increase the reliability and performance. Some embedded systems are mass-produced, benefiting from economies of scale.
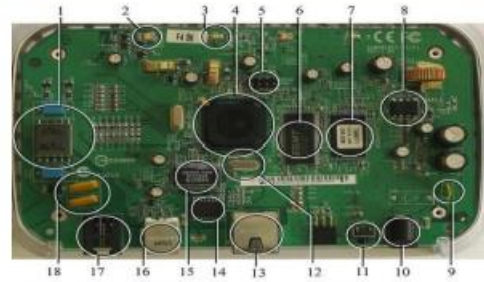

Fig 3.1:A modern example of embedded system

3.2 NEED OF EMBEDDED SYSTEM

The uses of embedded systems are virtually limitless, because every day new products are introduced to the market that utilizes embedded computers in novel ways. In recent years, hardware such as microprocessors, microcontrollers, and FPGA chips have become much cheaper. So when implementing a new form of control, it's wiser to just buy the generic chip and write your own custom software for it. Producing a custom-made chip to handle a particular task or set of tasks costs far more time and money. Many embedded computers even come with extensive libraries, so that "writing your own software" becomes a very trivial task indeed.

3.4 APPLICATIONS OF EMBEDDED SYSTEMS

Consumer applications: At home we use a number of embedded systems which include microwave oven, remote control, VCD players, DVD players, camera etc….

Fig 3.2: Automatic coffee makes equipment

Office automation: We use systems like fax machine, modem, printer etc…

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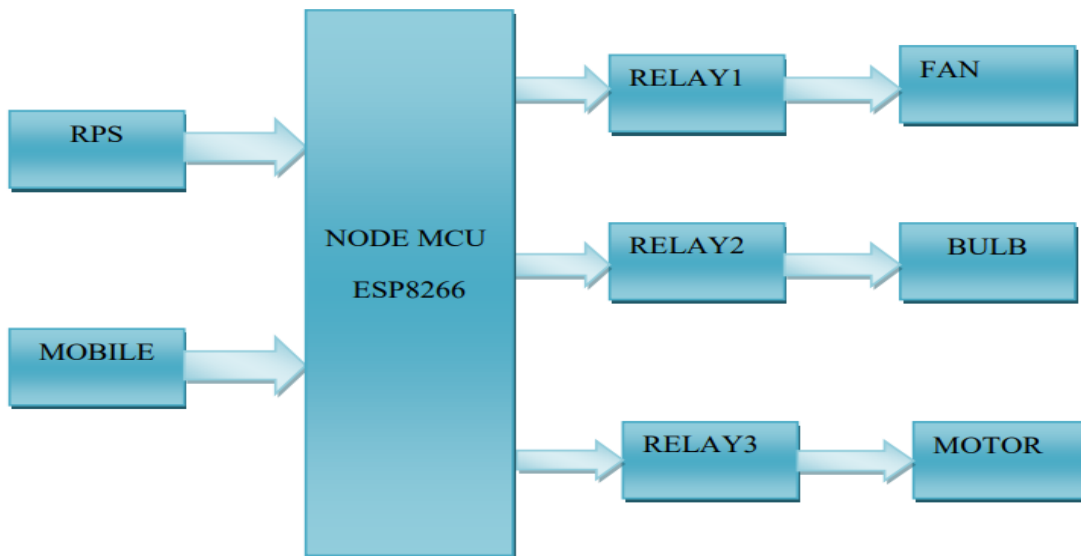
ISSN: 2457-0362

Fig 3.2: Fax machine

Fig 3.3 Block Diagram of Home Automation

4. IMPLEMENTATION DETAILS

4.1 INTRODUCTION TO NODEMCU

NodeMCU is an open-source LUA based firmware developed for the ESP8266 wifi chip. By exploring functionality with the ESP8266 chip, NodeMCU firmware comes with the ESP8266 Development board/kit i.e.NodeMCU Development board.

Fig 4.1 NodeMCU Development Board/kit v0.9 (Version1)

Since NodeMCU is an open-source platform, its hardware design is open for edit/modify/build. NodeMCU Dev Kit/board consist of ESP8266 wifi enabled chip. The ESP8266 is a lowcost Wi-Fi chip developed by Espressif Systems with TCP/IP protocol. For more information about ESP8266, you can refer to the ESP8266 WiFi Module. There is Version2 (V2) available for NodeMCU Dev Kit i.e.NodeMCU Development Board v1.0 (Version2), which usually comes in black colored PCB.

4.2 ESP8266

The ESP8266 is a low-cost Wi-Fi chip developed by Espressif Systems with TCP/IP protocol. For more information about ESP8266, you can refer to ESP8266 WiFi Module.

NodeMCU is an LUA based firmware which we need to download on the ESP8266 chip. To Download NodeMCU firmware, go to https://nodemcu-build.com/

•   Enter   your   email.

• Select branch to Build

4.3 NODEMCU DEVELOPMENT BOARD/KIT V1.0 (VERSION2)

For more information about NodeMCU Boards available in the market refer to NodeMCUDevelopment Boards NodeMCU Dev Kit has Arduino like Analog (i.e. A0) and

Digital (D0-D8) pins on its board. It supports serial communication protocols i.e. UART, SPI, I2C, etc. Using such serial protocols we can connect it with serial devices like I2C enabled LCD display, Magnetometer HMC5883, MPU-6050 Gyro meter + Accelerometer, RTC chips, GPS modules, touch screen displays, SD cards, etc.

4.4 START WITH NODEMCU NodeMCU

Development board is featured with wifi capability, analog pin, digital pins, and serial communication protocols. To get started with using NodeMCU for IoT applications first we need to know about how to write/download NodeMCU firmware in NodeMCU Development Boards. And before that where this NodeMCU firmware will get as per our requirement. There are online NodeMCU custom builds available using which we can easily get our custom NodeMCU firmware as per our requirement. To know more about how to build custom NodeMCU firmware online and download it refer to Getting started with NodeMCU.

EXCECUTION DETAILS

The Arduino is a family of microcontroller boards to simplify electronic design, prototyping and experimenting for artists, hackers, hobbyists, but also many professionals. People use it as brains for their robots, to build new digital music instruments, or to build a system that lets your house plants tweet you when they're dry. Arduinos (we use the standard Arduino Uno) are built around an AT mega microcontroller — essentially a complete computer with CPU, RAM, Flash memory, and input/output
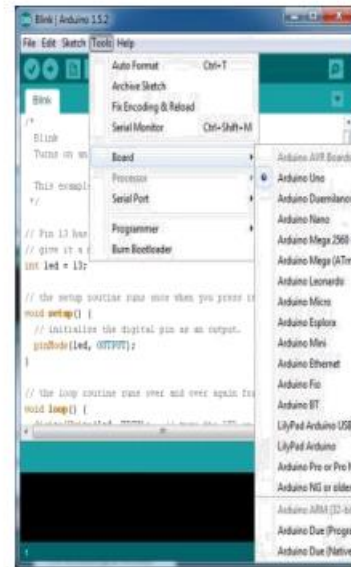

Installing the Drivers for the Arduino Uno (from Arduino.cc)

Plug in your board and wait for Windows to begin it's driver installation process After a few moments, the process will fail, despite its best efforts

Click on the Start Menu, and open up the Control Panel

While in the Control Panel, navigate to System and Security. Next, click on System Once the System window is up, open the Device Manager Look under Ports (COM & LPT). You should see an open port named ―Arduino UNO (COMxx)‖.

If there is no COM & LPT section, look under ‗Other Devices' for ‗Unknown Device'
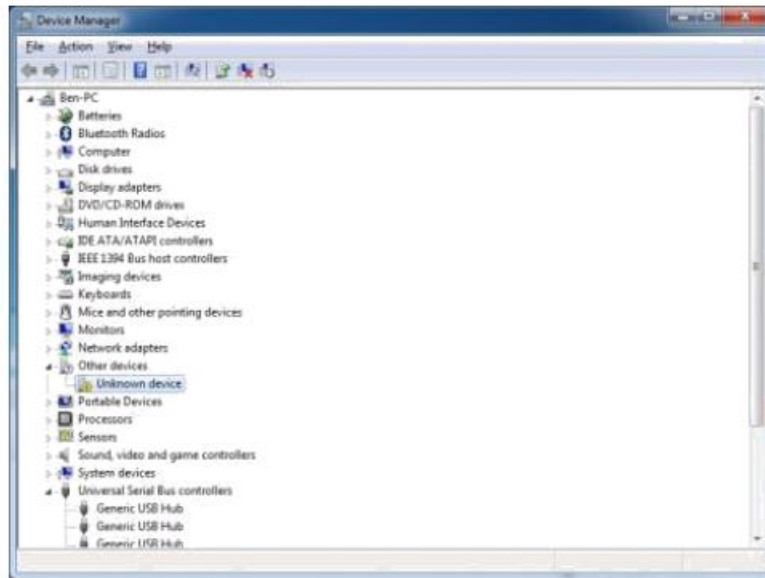
Right click on the ―Arduino UNO (COMxx)‖ or ―Unknown Device‖ port and choose the ―Update Driver Software‖ opt Next, choose the ―Browse my computer for Driver software ―option

Finally, navigate to and select the Uno's driver file, named ―ArduinoUNO.inf‖, located in the ―Drivers‖ folder of the Arduino Software download (not the ―FTDI USB Drivers‖ subdirectory). If you cannot see the .inf file, it is probably just hidden. You can select the _drivers' folder with the _search sub-folders' option selected instead.

CONCLUSION

It gives an overview about smart home which was managed with the help of iot technology. It specifies various technologies used for executing the project. As every class of society has the right to secure their home considering this the project was made pocket friendly for everyone.In this project, a novel architecture

for low cost and flexible home control and monitoring system using Android based Smart phone is proposed and implemented. The proposed architecture utilizes a micro web server and Bluetooth communication as an interoperable application layer for communicating between the remote user and the home devices. Any Android based Smart phone with built in support for Wi-Fi can be used to access and control the devices at home. When a Wi-Fi connection is not available, mobile cellular networks such as 3G or 4G can engine thus eliminating the need for an external voice recognition module.

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