

The HOME AUTOMATION USING IOT

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Abstract :

Home automation or smart home is basically a wireless smart controlling or operating of all home appliances like lights, fans, doors, refrigerators, washing machines etc ... where all the devices which are connected to the internet , that they are the part of internet of things. These thing helps people to monitor their home from anywhere by these we can save electricity, water, soon. We can monitor our home from different place or different country too. It is a basic microcontroller Arduino UNO connected to the internet via USB serial or ESP8266 (ESP-01)Wifi module. These helps to ease human efforts and to maintain comfortable life within a home, by monitoring their home and automation utilizing. And home automation topic in iot gaining more popularity in nowadays, because of many advantages. Everyone can achieve home automation by simply connecting their electrical devices to the internet or cloud storage and it is simplicity and comparable affordability. It is used in user friendly manner using custom defined portals , where cloud act as a front end to access iot . we can easily automate our home by using phone from anywhere.

Keywords: Smart home, IOT based Automated, Automation home, Home Security

I. Introduction:

The home automation is controlling of home devices from central control point, automation is today's leading project where most of the things are being completely automated. Where , every task of turning on or off certain devices and beyond, either remotely or in close proximity. The concept of this is wireless connected network such as IEEE 802.11 (Wi-Fi) . Nowadays the popularity of wireless networks at home (sensors also) has increased a lot, and the advanced computer technology has made easy to communicate through the wireless networks. Hence, it is suitable for using RF-based location, these system to estimate location of the personal digital device in a home environment with high data transmission. Where supporting to multimedia application , it may be feasible in WLAN.



Fig 1: Smart Home Control System

Once if there is possible application is wireless network for home automation. Just imagine if private home developed with motion light temperature and where other sensor actuators for opening the door dimming lights with a remote control as complex as setting up a network of items in our home, these can be programmed using a main controller. The basic idea of home automation is to employ sensor and controlling the system for monitor dwelling and accordingly to adjust various mechanism that provides heat ventilation lighting and various other service. These automated (“ intelligent ”) home can provide more safer and comfortable and more economical dwelling. In these intelligent home automation system there are many possible solution for how and from where to control the automation system and single device a user interface can be a computer based system mechanical switch a single light , a door, a loudspeaker, a tv with a microphone or a some kind of personal remote controller using normal PC(personal computer) , table pc , or a laptop by stand alone software or by web based user interface. In feature all home electronic applications will be networked.

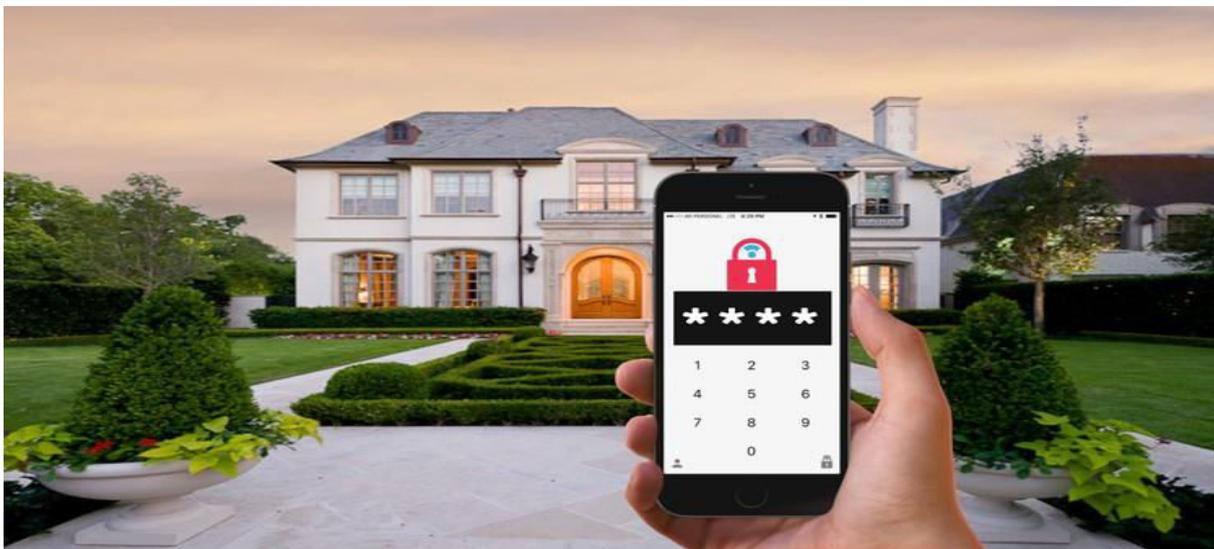


Fig 2: Smart Home Security System

The internet of things (iot) is the network of physical objects or where the things are embedded with the software, electronics and then the network connectivity , which enable these objects to collect and transfer data. Where iot(internet of things) helps the objects to be sensed and controlled with remotely across the existing network infrastructure , creating opportunity for more direct integration b/w the physical world and computer based system , and resulting in improving the efficiency , accuracy and the economic benefits.

II. Literature survey/ existing system:

We know there are lots of ways of connections in home automation workings so lets we discuss some of them :

- Bluetooth- based home automation system by using cell phones:

Here we will connect our home appliances to Arduino BT board at input and output ports by using relay. These Arduino BT board is high level programmed with c language and it is connected through Bluetooth.

- Zigbee -based home automation system by using cell phones:

Here we implemented and designed zigbee for monitoring and controlling the home appliances and it is connected via WiFi , it used 4 switch ports standard wireless ADSL modern router. Here the network SSID and WiFi security is preconfigured.

- GSM- based home automation system by using cell phones:

Here the GSM based home automation tempting to research because of the mobile phone and GSM technology, where the SMS, GPRS, and DTMF based home automation , these we considered mainly for communication in GSM.

- Wi-Fi- based home automation system by using cell phones:

Here wifi based system means we consists mainly three modules like , the server , the hardware interface, and the software package. Here the server is connected to the internet, so the remote users can easily access server web based application, and the software of the latest home automation is splited into server application software and microcontroller(Arduino) firmware.

- Home automation by using- RF module:

here important goal of Home Automation System is to build by using a RF controlled remote. Even it is more problematic for the old persons or physically handicapped people to use so, Home Automation by using remote implements an easier solution with RF technology.

- Home automation by using -Android ADK:

Mostly devices of home are associate to the ADK and the Connection is established between the Android device and ADK. The home appliances are linked to the input/output ports of the board (EMBEDDED SYSTEM) and their current situation will have passed to the ADK. Where The microcontroller board (Arduino ADK) is based on the ATmega2560 and It has a USB host connection to associate(or to communicate) with Android based phones, and that is based on the MAX3421e IC.

- By Cloud -Based home automation system:

Home Automation by using cloud based system it mainly focuses on design and implementation of the home gateway where to collect data from home appliances and then send to the cloud-based data server for storing data on Hadoop Distributed File System, where it is used to process by using MapReduce and use to implement a monitoring tasks to Remote user Presently home Automation System. The current automation system consists of mainly three important units:

1. the first part is cloud server, handle and controls the data and information of client and users and the status of devices
2. The hardware interface module is the second part which implement the relevant connection to the actuators and sensing devices which give the physical service.
3. Last part is Home Server, which construct the hardware device and gives the user interface. This paper main intension is to focus to build the web services by using cloud which is need for security and storage and availability of the data. The current system(cloud -based home

automation system) is cost efficient, reliable ,easy usable and comfortable which also gives a secured home automation system for entire family.

III. Methodology/ design and development:

First: The purpose and requirements for the system may be described as follows: A home automation system is nothing but controlling of the lights in a home remotely by using a web application and the system should have auto and manual modes. where we require system management requirement(to provide remote monitoring and control functions), data analysis requirement(perform local analysis of the data) , application development requirement(should be accessible remotely but developed locally), security requirement(basic user authentication capability).

Second : In second step it used to define the process specification. The used cases of iot(internet of things) system are formally described based on. Where use case : circle denotes a state or an attribute . we know that in auto mode , the system monitors and when the light level is low then the system changes the state of the light to “on “ otherwise the light is “off”. Where in the manual mode the system checks the light state set by the user in “off or on”.

Third: It is used to define domain model: it provides abstract representation of the concept, objects and entities in the domain. Where within the domain model , the iot(internet of things) designers know for which the system is to be designed. It defines the relationship b/w entities, objects, and concepts :

i) physical entity : ex pump , monitor , LCD.....The system provides information about physical entity by using sensors

ii) virtual entity : it represents physical entity in digital world , for each physical entity there is a virtual entity.

iii)device: it is median for the interaction between both virtual and physical entities, devices are used to gather information and to identify physical entities.

iv) resource: it is a software components on the device used for accessing, processing, and storing sensor information , these resources can also include the software components that enable network access for the device

v) service:

- Service can retrieve the current mode or it can sets mode to auto or manual.
- A service can retrieve the current light state, or it can sets the light appliance state to on/off.
- The controller service that runs as a native service based on the device.

Fourth: Here we can discuss about information model where it defines the structure of all information in the system. For example: attributes of virtual entities , relations etc...

Fifth: Here we define service specifications, it defines the services in the iot system, service endpoints.... From ps(process specification) and im(information model) we can identify the states and attributes. these services can change either states or attributes values or we can retrieve current value.

Controller service:

it runs as native service on the device, when in auto mode , it monitors light level and switches the light on/off and it will update in status database. When in manual mode, it retrieve the current state from the database and switches the light on/off.

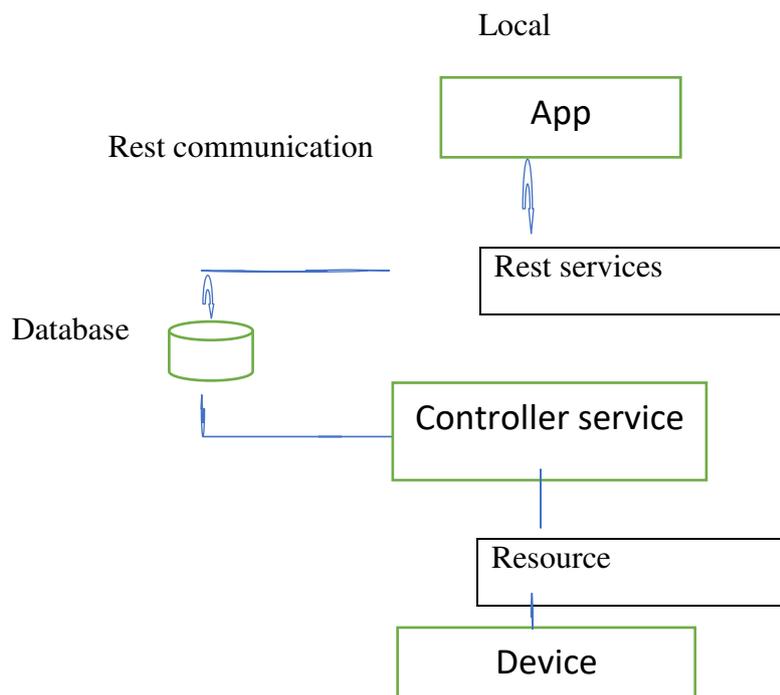
Mode service:

it is restfull service that sets the mode to auto or manual or retrieves the current mode and these mode can be updated to database or from database.

State service:

it is restfull web service that sets the light appliance state to on/off, or retrieves the current light state.

Sixth: it define the IoT level for the system Monitoring node performs analysis , stores data



Seventh:

- The functional groups included in functional view includes
- Device
- Communication
- Services
- Management
- Security
- Application

Eighth:

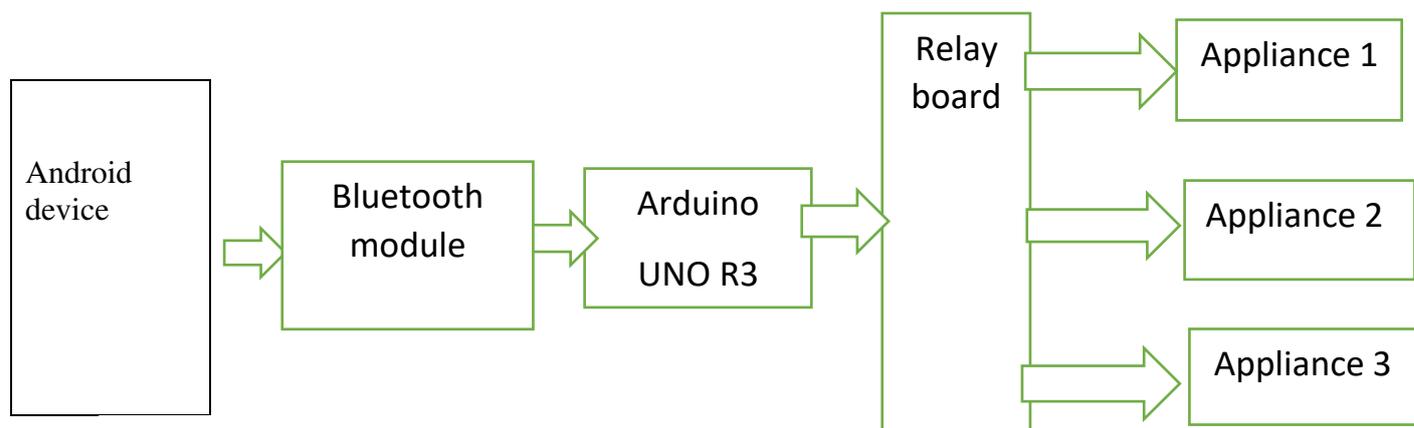
Here we define the operational specifications, various options pertaining to the IoT system development and operation are defined, such as, service hosting options, storage options, device options, etc..

Ninth:

It is the integration of the devices and components, the devices and components used in this example are Raspberry Pi mini-computer, LDR sensor (light dependent sensor) and relay switch actuator.

Here components required for the home automation is

- Arduino Uno: the Arduino Uno board is a microcontroller board and it has 14 digital input/output pins, 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header and a reset button. Arduino boards are able to read inputs- like light on a sensor, a finger on a button, and turn it into output.
- 2 Channel relay (5v): it is used to control directly wide range of microcontrollers such as Arduino, AVR, PIC, ARM, soon.. where it uses a low level triggered control signal to control delay. The triggering the relay where operates the open and closed contacts.
- Bluetooth Module: it is easy to use Bluetooth SPP (serial port protocol) module, where it is designed for transparent wireless serial connection setup. It provides switching, mode b/w master and slave mode which means it is able to use neither receiving and transmitting data.
- Load Bulb (220v): the specification for the lamp load allows for the fact that the switch on current of a filament lamp is n times greater than the related current. The resistance only rises sharply as a result of the filament heating up.
- Connecting Wires: wires are used for establishing electrical conductivity b/w two devices of an electrical circuit. They possess negligible resistance to the passage of current.
- Veroboard: it is a brand of stripboard, a pre-formed circuit board material of copper strips on an insulating bonded paper board which was originated and developed in the early 1960s.



IV. Results:

After the successful connection from home applications to the server, the data of sensor are sent to the web server for monitoring of the system. The figure shows the web server page which will allow us to monitor and control the system. By entering the assigned IP address in the web browser this web server page will appear.

The web server gives the information about the temperature in different places of the house and motion state in the house. It also gives the status of the various electrical appliances like light, fan etc which we can control remotely. The main result we can see, by operating devices from anywhere with our hands.

V. Conclusion:

The next phase for the home automation market will occur based on a few key improvements in the technology available in automation, such as improvements in wireless automation solutions as well as lowering of price points as the market begins to accept home automaton usage in larger volumes.

Some trends that we foresee for this phase of the industry are Big companies like philips, Siemens & scheidler will eventually bring out fairly mass market automation products with appealing user interface but at a lower price point today, and more people will be able to afford the products. Some foreign players will have niche in high and automation and focus fun the premium market.

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