SMART HOME AUTOMATION USING MOBILE APILCATION

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ABSTRACT:

Electronic devices such as lights in the house are generally controlled manually, which the homeowner often forget to turn off while going out and resulting in excessive use of electrical energy. The development of a web-based home automation system prototype using the raspberry pi can provide a solution to remotely control electronic devices Like Fan, Light, Motor.The raspberry pi will work as the web server enabling the user to be able to remotely control the electronic device and minimize excessive use of electrical energy.

This automation system uses Raspberry Pi 2 (Model B) as its brain. The controller used in system is Arduino Uno. The size of system is also small which makes it compact. As the system is interconnected the appliances can be controlled from on single centre. This system is designed to be flexible and generally programmable, extensively such that adding additional features is relatively simple and modular and forward compatible, so that new components can be added without redesigning the entire system. Our Automation is mainly based on Energy Conservation by avoiding wastage of energy. The Core concept of the system is to make it flexible so adding or reducing number of equipment and similarly number of rooms. The Raspberry pi has 40 GPIO pins hence adding new sensors are simple from hardware point of view. The software used are open source and available for free. Hence the system is easily editable and expandable.

INTRODUCTION:

The concept of Home Automation aims to bring the control of operating your every day home electrical appliances to the tip of your finger, thus giving user affordable lighting solutions, better energy conservation with optimum use of energy. Apart from just lighting solutions, the concept also further extends to have a overall control over your home security as well as build a centralised home entertainment system and much more.

The Internet of Things (or commonly referred to as IoT) based Home Automation system, as the name suggests aims to control all the devices of your smart home through internet protocols or cloud based computing.

The IoT based Home Automation system offer a lot of flexibility over the wired systems it comes with various advantages like ease-of-use, ease-of-installation, avoid complexity of running through wires or loose electrical connections, easy fault detection and triggering and above and all it even offers easy mobility.

A home automation system integrates electrical devices in a house with each other. The techniques employed in home automation include those in building automation as well as the control of the domestic activities. A typical home automation system allows one to control household appliances from a centralized control unit. These appliances include lights, fans, air conditioners, television sets, These appliances usually have to be specially designed to be compatible with each other and with the control unit for most commercially available home automation systems.

BACKGROUND:

Home automation or Smart Home is a key segment of the Internet of Things, in which everything has an appointed IP address, and can be checked and accessed remotely from anyplace whenever. It is where the home appliances and different gadgets are arranged to control over all parts of a smart home. For a long time, home automation frameworks have been in terms of lighting and straightforward apparatus control. As of late, innovation is empowering full control of our smart appearances at home from any place for the possibility of the interconnected world to turn into a reality . Home automation can direct how a gadget ought to respond, why and when it should respond. It brings comfort, complete control and can save money. Moreover, Home automation framework can alert the client to occasons that may happen when they are gone for example, water spills, gas holes, fire and unforeseen access to their home. At any time, the client can make any changes in the settings of automation framework dependent on his prerequisites and need of utilizing android application or other control gadget

- Conceptual Overview Project developed device
- Smart-Switch
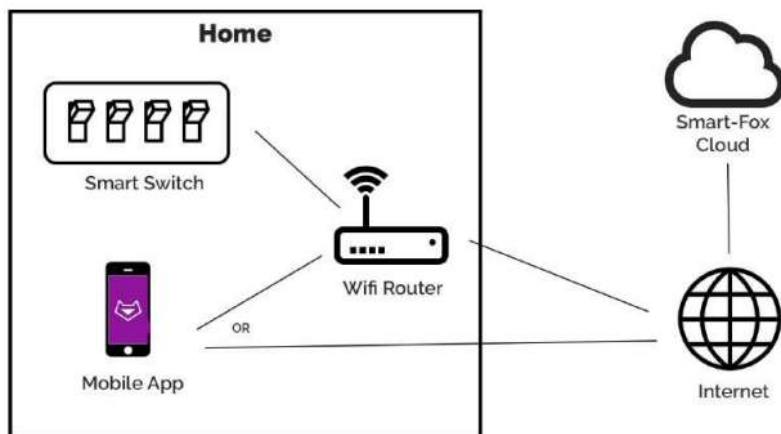
• Smart switch is operated by ESP8266 with Wi-Fi-module hardware which control and connect switch to internet though local Wi-Fi network

• Mobile app can connect to smart-switch using local Wi-Fi network and also using GSM internet or other Wi-Fi network.

• Cloud provide accessible to control switch though internet.

• Smart-Switch can be operated using manual switch and also through mobile app.

switch can be monitor from mobile app even if switch get used using manually

PROBLEM DEFINITION:

Prototyping model will be used to develop the system and it is a system development model that will assist developer and other stakeholder to better understand what is to be built when the requirement are fuzzy. A Web-based Prototype Home Automation System using Raspberry Pi will be built. It will simulate the lights controlling as a solution in dealing with problems that occur in current situation of homeowner. It can be seen that a PC or smartphone is the device that will be used to access the system website page so that it can control electricity on simulated devices with 4 lights via the internet.

The power supply is a device that provides a voltage source to Raspberry Pi. Raspberry Pi in this system is used as a Web Server and the controller for electrical devices through Relay Module. To enable the control of relay Module on Raspberry Pi, there is a GPIO Pin that can be used for communication with other devices and on this system there are 4 pins that will be used as output pins, namely GPIO 18, GPIO 23, GPIO 24, and GPIO 25. Raspberry Pi used in this system is the Raspberry Pi B model .

Relay is an electronic switch that can be controlled by providing logic value 0 or 1 which in the construction of this system, the input is obtained from Raspberry Pi GPIO pins. The relay used in the design of this system is the DT-I / O Quad Relay Board from Innovative Electronics. Relay on this system is used to control electrical devices that can be directly connected via a jumper cable to the Raspberry Pi mini pc.

OBJECTIVE:

The objective of this project is to design and build new hardware which can be control using mobile application from anywhere around the world and that can installed at every home and office at lowest possible cost. And it is also helpful for conservation of energy through the automation of house using raspberry pi and the system. It is also useful for elderly and handicapped people. The system can provide a great impact in the smart-home technology.

METHODOLOGY:

Home automation is the procedure to control home appliances automatically using various control system techniques. The electrical and electronic appliances arises in the home such as fan, lights, outdoor lights, fire alarm, kitchen timer, etc., can be controlled using various control techniques. There are various methods arises to control home appliances like IOT based home automation over the cloud, home automation under Wi-Fi through android apps from any smart phone and Arduino based home automation. Arduino is anopen-source hardware and software, project and user community which designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices and interactive objects that can sense and control objects in the actual and digital world. The proposed method also uses relay drivers. A relay permits you to turn ON or turn OFF a circuit using voltage and/or current much higher than what Arduino could handle. The proposed system consists of Arduino or controller, sensors, relay drivers and various devices connected to the relay drivers. Wi-Fi or Bluetooth is to be enabled in the mobile phone to handle the system. The Audrino Controller is used to control the system. The System can be handled using the Android device over the Internet. Various sensors are used to change the system state. The proposed system can be used to handle the household devices such as lights, fans and others to turn them on or off via remote distances.

A)HARDWARE REQUIREMENTS:

A. Raspberry Pi:

Raspberry Pi is a low cost credit card size computer that plugs into a computer monitor or TV and uses a standard keyboard and mouse. Most importantly it's open source hardware. Computing Programmable Language like python and scratch under Linux platform. Raspberry Pi 2 model B has CPU 900MHZ quad-core ARM cortx-A7 processor. The Ethernet adaptor is connected to an additional USB port. In model A and A+ the USB port is connected directly to the Silicon on Chip (SoC).
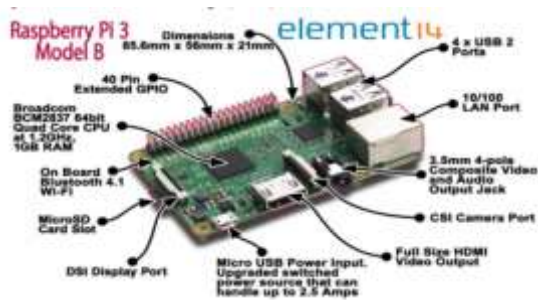
B. DC motor:

A DC motor is any class of rotary electrical machines that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic; to periodically change the direction of current flow in the part of DC motor. DC motors were the first type widely used, since they could be powered from existing direct-current lighting power distribution systems. A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings. Small DC motors are used in tools, toys, and appliances.

C. Motor driver circuit:

L293D is a typical Motor driver or Motor driver IC which allows DC motor to drive on either direction. L293D is a 16-pin IC which can control a set of two DC motors simultaneously in any direction. It means that you can control two DC motor with a single L293D IC.


D. Relay circuit:

Relays are switches that open and close circuits electromechanically or electronically. Relays control one electrical circuit by opening and closing contact in another circuit. When a relay contact is Normally Closed (NC), there is a closed contact when the relay is not energized. It is an electromagnetic switch operated by relatively small electric current that can turn on or off much larger electric current the heart of a relay is an electromagnet.Solid-state relays control power circuits with no moving parts, instead using a semiconductor device to perform switching. Relays with calibrated 8 operating characteristics and sometimes multiple operating coils are used to protect electrical circuits from overload or faults. Two channel relay diagram is shown in the figure.This is a 5V, 10A 2-Channel Relay interface board. It can be controlled various appliances, and other equipment with large current. It can be controlled directly with 3.3V or 5V logic signals from a microcontroller (ARM, 8051, PIC).

E. Wi-Fi module:

Wi-Pi is a high performance, cost effective WLAN USB module which connects the Raspberry Pi to a Wi-Fi local area network. Wi-Pi uses the latest 802.11n Wireless Technology. Wi-Pi also supports wireless roaming, ensuring a more consistent wireless connection to a wireless access point.

B)CIRCUIT DIAGRAM:
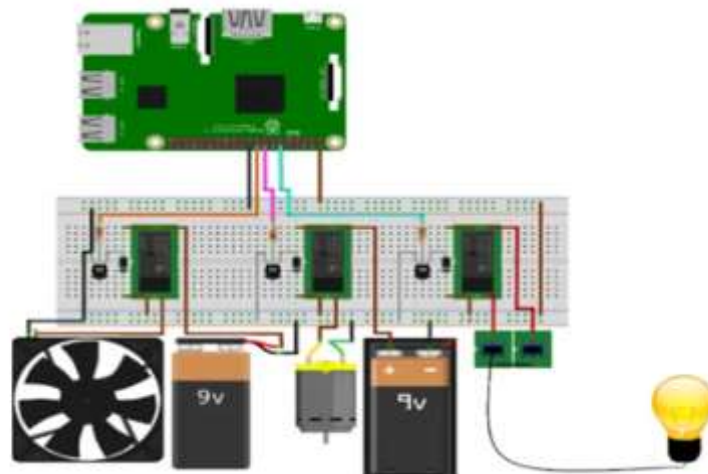
C) SOFTWARE REQUIRMENT:

A. Python: Python is a widely used high-level programming language for general-purpose programming first released in 1991. An interpreted language, Python has a design philosophy which emphasizes code readability (notably using whitespace indentation to delimit code blocks rather than curly braces or keywords), and a syntax which allows programmers to express concepts in fewer lines of code than possible in languages such as C++ or Java. The language provides constructs intended to enable writing clear programs on both a small and large scale.

RESULTS AND DISCUSSION:

Thus, From this we conclude that the project is very useful for demonstration of energy conservation through the automation of house using raspberry pi and the system. It is also useful for elderly and handicapped people. The system can provide a great impact in the smart-home technology. This system is also easy to upgrade hence it is a great upgrading tool for computer enthusiast. This system focuses more on conservation of energy. Using this system house hold appliances can be controlled from a centralized control unit in a typical home automation

All buttons are off.   Light button is on.

CONCULSION AND FUTURE SCOPE:

We conclude that from the project with this system enables the monitoring and controlling process easier and more efficient. The system as the name indicates, 'Home automation' makes the system more flexible and provides attractive user interface compared to other home automation systems. In this system we integrate mobile devices into home automation systems. A novel architecture for a home automation system is proposed using the relatively new communication technologies.

WIFI technology capable solution has proved to be controlled remotely, provide home security and is cost effective as compared to the previously existing systems. Hence we can conclude that the required goals and objectives of home automation system going to be achieved. The system design and architecture were discussed, and prototype presents the basic level of home appliance control and remote monitoring has been implemented. Finally, the proposed system is better from the scalability and flexibility point of view than the commercially available home automation systems.

FUTURE MODIFICATION AND ENHANCEMENTS :

The home automation system is already enough for complete automation of lighting and pumping system and also the safety system is included in the form of smoke sensing capability of the anti-theft provision should be added to the system. The system is also compatible to add cameras for security. These all are areas where system can possibly evolve. Most of people have smartphone these days. Thus Bluetooth or Wi-Fi wireless controlling can be added to the system as user interface. One of the major disadvantage of the system is that it does not have any GUI (Graphical user interface). Hence the modification and upgradation are done through the Linux operation system and through Arduino IDE.

REFERENCE:

https://www.researchgate.net/publication/349431060_IoT_Based_Home_Automation_System_using_Raspberry_Pi_4

https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3568411

https://www.academia.edu/39014546/IoT_based_home_automation_using_Raspberry_Pi

APPENDIX:

A)CODE:

```
from machine import Pin,UART
from machine import Pin
led = Pin(25, Pin.OUT)
led1 = Pin(21, Pin.OUT)
led2 = Pin(20, Pin.OUT)
led3 = Pin(19, Pin.OUT)
led4 = Pin(18, Pin.OUT)
led.value(1)
led1.value(1)
led2.value(1)
led3.value(1)
led4.value(1)
led.toggle()
uart = UART(0,9600)
while True:
  # print('checking BT')
  if uart.any():
    command = uart.readline()
    print(command[0])
    if(command[0]==50):
      print("led1 on")
```

```python
    led.value(1)
elif(command[0]==49):
    print("led1 off")
    led.value(0)
elif(command[0]==51):
    print("led2 on")
    led1.value(1)
elif(command[0]==52):
    print("led2 off")
    led1.value(0)
elif(command[0]==53):
    print("led3 on")
    led2.value(1)
elif(command[0]==54):
    print("led3 off")
    led2.value(0)
elif(command[0]==55):
    print("led4 on")
    led3.value(1)
elif(command[0]==56):
    print("led4 off")
    led3.value(0)
elif(command[0]==57):
    print("led4 on")
    led4.value(1)
elif(command[0]==48):
    print("led4 off")
    led4.value(0)
```