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HOW TO BUILD A SMART HOME

K Yashwanth Reddy

Computer Science & Engineering, St. Peter's Engineering College

Hyderabad, Telangana.

Abstract: ***With the fast-growing technology, the electronics are becoming handier. Now a days people are upgrading to latest technology, this enables users to interact with devices seamlessly. One of the best methods to convert normal home into smart home is to make use of automation. With smart home automation we can connect to devices at our home from anywhere and anytime.***

I. Introduction:

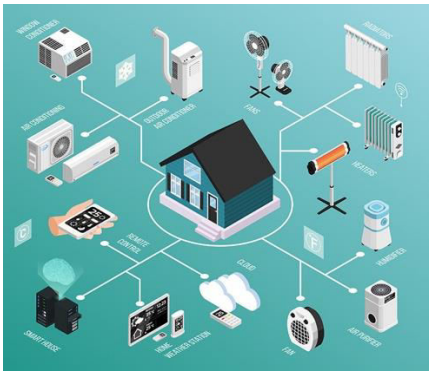
Smart Home is the allows the user to access their electronics at their home from anywhere anytime. The idea behind this project is to save power and make use of technology in a better way. Home automation uses IoT (Internet of Things), where all the devices are connected to internet hence, can be access anytime. The examples of smart home are Motion detected and alert indoor camera. Switch On/Off electronics over internet. Automatic coffee maker before you wake up. And so on.

II. How Smart Home Can Save Electricity:

Sometimes we forgot to turn off water heater after use, or turnoff kettle after boiling liquid. And sometimes we forget to switch off Fan's, Tv's, Light bulbs, etc., These things consume so much of electricity, The smart home automation can help you remind to turn off these electronics or they you can schedule a timer for automatic switch on/off. Using smart home, we can save so much of electricity. Another best example is, when you return home from a heavy load of work, everyone wants to take a fresh shower but coming home and wait for water to heat up is time consuming. But with the help of smart home, we can do that easily. As a matter of fact, home automation does it automatically, that means water is already heated up moments before you reach home. This uses GPS in mobile and calculates the time requires you to reach home.

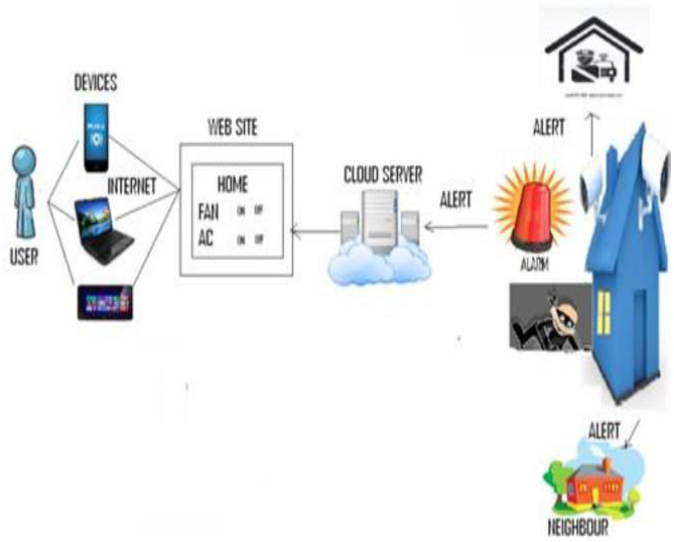
III. The Use of IoT in Smart Home:

Internet of Things helps the devices to say connected to the internet so that, we can access the devices from anywhere. IoT contributes the internet connection and remote management of mobile appliances, incorporated with a variety of sensors. ... And so, it embeds computer intelligence into home devices to provide ways to measure home conditions and monitor home appliances' functionality.



A. Cloud Computing:

It conveys the home automation as a service based on cloud computing, which assist in shrinking residential computing workload. The system allows the user to control appliances and lights in their home from a smart phones and pc from anywhere in the world though an internet connection. Cloud computing provides scalable computing power, storage space and applications, for developing, maintaining, running home services, and accessing home devices anywhere at any time. The rule-based event processing system provides the control and orchestration of the entire advanced smart home composition.



i. SAAS (Software as a Solution):

It allows users to connect and use cloud based application aver internet. The most commonly used SAAS services are Email, Office tools, Calendar. Software as a service is a software licensing and delivery model in which software is licensed on a subscription basis and is centrally hosted. SaaS is also known as "on-demand software" and Web-based/Web-hosted software.

ii. PAAS (Platform as a Solution):

PaaS (Platform as a Service), as the name suggests, provides you computing platforms which typically includes operating system, programming language execution environment, database, web server etc. Examples: AWS Elastic Beanstalk, Windows Azure, Heroku, Force.com, Google App Engine, Apache Stratos.

Platform as a service (PaaS) or application platform as a service (PaaS) or platform-based service is a category of cloud computing services that allows customers to provision, instantiate, run, and manage a modular bundle comprising a computing platform and one or more applications, without the complexity of building and maintaining the infrastructure typically associated with developing and launching the application(s); and to allow developers to create, develop, and package such software bundles.

iii. IAAS (Infrastructure as a Solution):

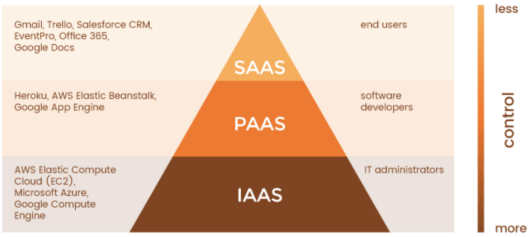
Infrastructure as a service (IaaS) is a type of cloud computing service that offers essential compute, storage and networking resources on demand, on a pay-as-you-go basis. IaaS is one of the four types of cloud services, along with software as a service (SaaS), platform as a service (PaaS) and serverless.

Examples of IAAS are:

- Amazon Web Service
- Microsoft Azure
- Google Compute Engine

Infrastructure as a service are online services that provide high-level APIs used to dereference various low-level details of underlying network

infrastructure like physical computing resources, location, data partitioning, scaling, security, backup etc.



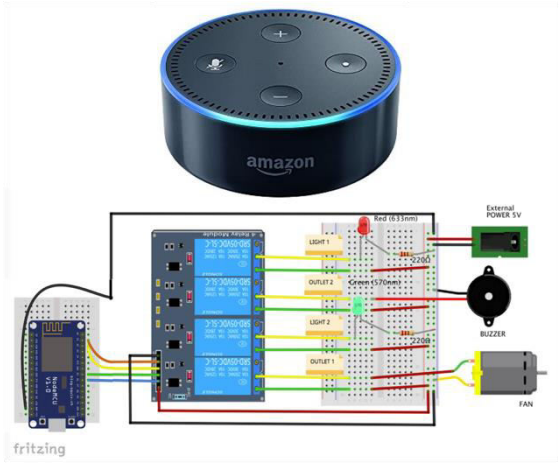
A. Existing Challenges:

- Intelligent decision making
- Secure identification, and authentication Continuous connectivity
- Data security
- Privacy issues.

IV. Working:

a. AI Based Automation:

One the of most commonly used method involves Artificial Intelligence like Amazon Alexa, Google Assistant and Apple Siri. These are the leading AI companies that allows its users to control home electronics through cloud.
The on-market devices like Phillips's hub directly connects to these AI's.



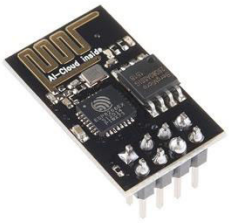
b. Raspberry Pi:

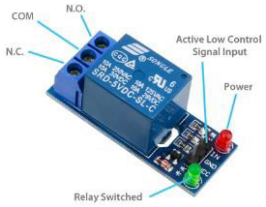
The Raspberry pi is a single board computer. It is typically used my computer and electronic fields. It has become more popular due to is low cost, open design and modularity. It also comes in variety of versions, allows the user to focus only on the objective. There are many peripherals that can be attached to this minicomputer. The few peripherals that used in this project are Pi cam, LTE module and GPS module.

V. Building Automation:

a. ESP8266:

The ESP8266 is a low-cost Wi-Fi microchip, with built-in TCP/IP networking software, and microcontroller capability, produced by Espressif Systems in Shanghai, China. The chip first came to the attention of Western makers in August 2014 with the ESP-01 module, made by a third-party manufacturer Ai-Thinker.

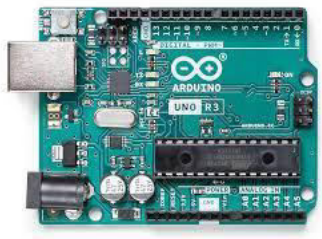




b. Arduino:

Arduino is a single board open-source electronic platform which allows users to interface various other modules such as, IR sensor, Ultrasonic sensor, Speed sensor, etc. It is very affordable is easy to use. This single-board small micro controller can hold up to 4MB of RAM and can be reprogrammable.

The Arduino comes in many versions out of which the popular Arduino is Arduino UNO. It consists of 14 Digital Signal pins and 6 Analogue Signal pins. The 5 pins in Digital Signal series are used for PWM (Pulse Width Modulation). The Input Pins are used to read input data and output pins are used to produce output. However, there are no specific labels for these pins. By mentioning state of the pins i.e., HIGH/LOW INPUT/ OUTPUT; the user can determine READ/WRITE function.



c. Relay Module:

A power relay module is an electrical switch that is operated by an electromagnet. The electromagnet is activated by a separate low-power signal from a micro controller. ... When switching off the current to the coil, the armature is returned, by force, to its relaxed position.

VI. Blynk:

How Blynk Works:

Blynk was designed for the Internet of Things. It can control hardware remotely, it can display sensor data, it can store data, visualize it and do many other cool things.

There are three major components in the platform:

Blynk App - allows to you create amazing interfaces for your projects using various widgets we provide.

Blynk Server - responsible for all the communications between the smartphone and hardware. You can use our Blynk Cloud or run your private Blynk server locally. It's open-source, could easily handle thousands of devices and can even be launched on a Raspberry Pi.

Blynk Libraries - for all the popular hardware platforms - enable communication with the server and process all the incoming and outcoming commands.

Now imagine: every time you press a Button in the Blynk app, the message travels to ~~space~~ the Blynk Cloud, where it magically finds its way to your hardware. It works the same in the opposite direction and everything happens in a blynk of an eye.

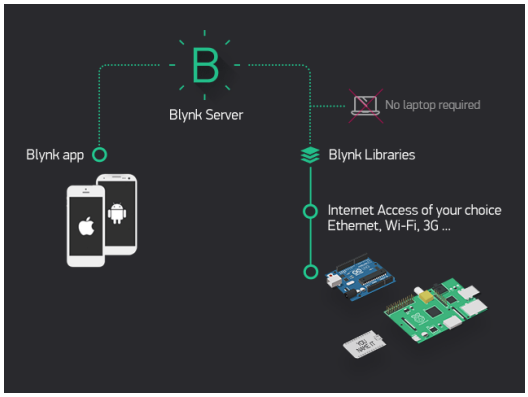
a. Features:

Similar API & UI for all supported hardware & devices Connection to the cloud using:

WIFI, Bluetooth and BLE, Ethernet, USB (Serial), GSM.

Set of easy-to-use Widgets

Direct pin manipulation with no code writing. Easy to integrate and add new functionality using virtual pins. History data monitoring via SuperChart widget. Device-to-Device communication using Bridge Widget. Sending emails, tweets, push notifications, etc.



b. Hardware.

An Arduino, Raspberry Pi, or a similar development kit.

Blynk works over the Internet. This means that the hardware you choose should be able to connect to the internet. Some of the boards, like Arduino Uno will need an Ethernet or Wi-Fi Shield to communicate, others are already Internet-enabled: like the ESP8266, Raspberry Pi with WIFI dongle, Particle Photon or SparkFun Blynk Board. But even if you don't have a shield, you can connect it over USB to your laptop or desktop (it's a bit more complicated for newbies, but we got you covered). What's cool, is that the list of hardware that works with Blynk is huge and will keep on growing.

VII. Conclusion:

Internet of things based home automation system can only work in the presence of internet. The rapid growth of IoT devices brings concerns and benefits. Even though Wi-Fi is not available we can go to 3G or 4G services. This is one big advantage of IOT In this project, the use of a camera connected to the microcontroller might help the user in taking decision whether to welcome the guest after receiving the captured picture of the guest or intruder, If the user identifies he is an unknown person then the user can further forward the same photograph to the police station by explaining his situation. This project can also be implemented by using Raspberry.

VIII. References:

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