

IoT Enabled Smart-Home

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ABSTRACT

This research paper presents an approach to provide security and a simplest way of deploying Internet of Things (IoT) for smart home, together with due consideration given to user convenience in operating the system. The IoT smart home system runs on conventional wifi network implemented based on the ZigBee architecture. This IoT project allows objects to be sensed and controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer-based systems, and resulting in improved efficiency, accuracy and economic benefit.

Keywords: Internet of Things, Economical Benefit, Controlling remotely, ZigBee

I. INTRODUCTION

Internet of Things

IoT is the magic dust that turns the automated home into the smart home. With a combination of smart systems, IoT connects everyday objects to a network, enabling those objects to complete tasks and communicate with each other, with no user input. When you combine home automation, connected devices and IoT you get a Smart Home. And a modern smart home can be easily controlled through a smartphone, tablet or computer.

Home Automation

Home automation or smart home (also known as domotics or domotica) is the residential extension of building automation and involves the control and automation of lighting, heating (such as smart thermostats), ventilation, air conditioning (HVAC), and security, as well as home appliances such as washer/dryers, ovens or refrigerators/freezers that use WiFi for remote monitoring. Modern systems generally consist of switches and sensors connected to a central hub sometimes called a "gateway" from which the system is controlled with a user interface that is interacted either with a wall-mounted terminal, mobile

phone software, tablet computer or a web interface, often but not always via internet cloud services.

From flicking a light switch to opening your garage door with a remote control, our homes have been automated for decades. The concept goes as far back as the 1934 World's Fair in Chicago where the "home of the future" was unveiled. In the last 80 years, however, the automated home has morphed into the smart home, courtesy of the Internet, sensors and connectivity. The modern automated home can do more than turn on our heating and our lights-it can actually think for us.

In this guide, we'll explain what smart home automation is, how it can help you, and explore the latest and greatest technologies, products and services in the Home Automation field.

The terms "Home Automation," "Connected Devices" and "Internet of Things" are often used and interchangeably, but they are distinct parts of the Smart Home concept: This is where a home's electrical devices are connected to a central system that automates those devices based on user input. For example, you push a button and your shades go up, or you give a voice command and your lights turn on. These are electrical devices that are intelligent, courtesy of a connection to the Internet. These devices

know or are able to anticipate what a user needs. At first, this intelligence comes from user programming, but with time the device can learn and adapt to patterns and interact with its users.

II. METHODS AND MATERIAL

1. Raspberry

Raspberry being a small sized device, provides an energy saving environment, will be used to control the switches. Since a web server is required to host a website in the network, Raspberry pi handles all this requirement fruitfully. With the help of its numerous GPIO pins it is possible to control number of applications to control in home. Raspberry pi based home automation is better than other home automation methods is several ways. The proposed system has good modularity and configurability characteristics with very low power consumption in cost efficient way.

2. WIFI Router

A WIFI Router is required to create a personal network. This personal network ensures only the members of that area are able to take control of the applications. A WIFI provides wireless control of those applications providing convenience as well as quickness to meet our aim. A wireless router is a device that performs the functions of a router and also includes the functions of a wireless access point.

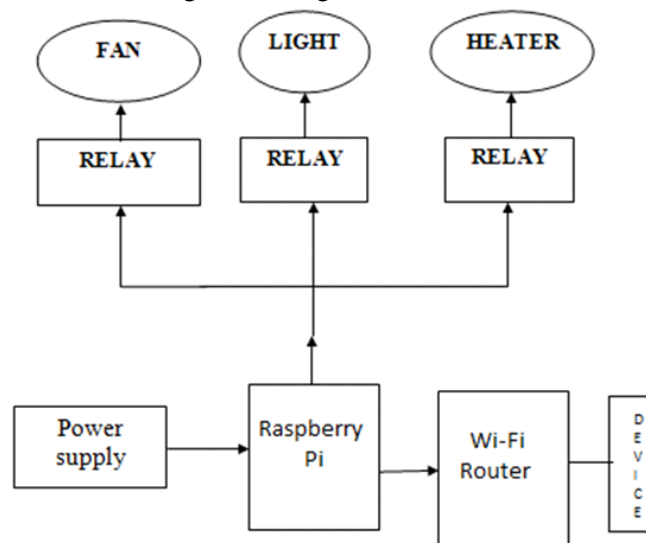
3. Relay Switch

Relay Switch is used to switch the applications mechanically. Its like a traditional mechanical switch uprooted on a switchboard but with the only difference it can controlled through a signal, via Pi in our case. The advantage of relays is that it takes a relatively small amount of power to operate the relay coil, but the relay itself can be used to control motors, heaters, lamps or AC circuits which themselves can draw a lot more electrical power.

4. Home Appliances

Home appliances are basic , generally , electric machines which helps to perform some household actions. These includes fans, lights, bulbs, heaters and so on.

More specifically, Collins dictionary defines "home appliance" as: "devices or machines, usually electrical, that are in your home and which you use to do jobs such as cleaning or cooking."



III. RESULTS AND DISCUSSION

PROPOSED FEATURES

1. Access from all over the Internet

You can connect to your Raspberry Pi from another computer anywhere in the world over the Internet. One method is to use port forwarding. Port forwarding requires you to change the configuration settings on your router. You must configure your router to forward the Internet traffic delivered to your public IP address on a specific TCP port number, to automatically route to the local network IP address of your Raspberry Pi. Most routers have this feature available through their configuration webpage. However, every router is different and there is no single set of instructions that applies to every router in use today. You will need to refer to the instruction manual for your router. The configurations can be tricky if your Pi is behind a firewall, or behind more than one router.

2. Reduced power consumption

There are two primary things you can do to reduce power consumption:

- Minimize the amount of power consuming peripherals attached and running
- Minimize the workload. A major consumer of power is the CPU. When it is idle, it consumes less power than it. The pi is a low power device compared to regular computers, but not so low

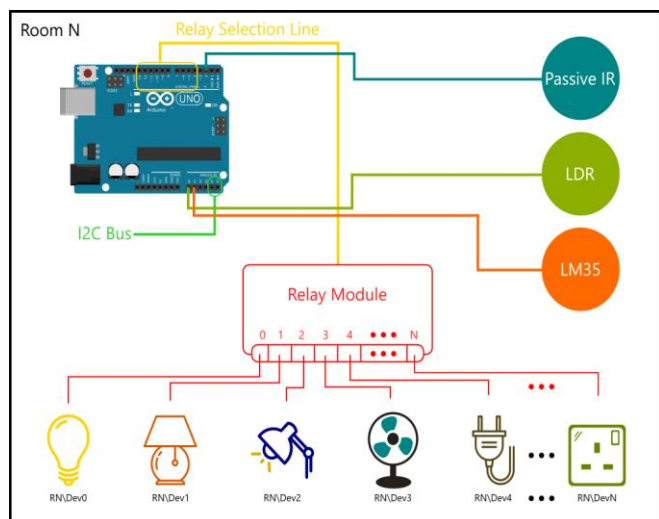
power compared to many mobile devices such as smart phones. Unfortunately, there is not really much that can be done about that without adding more hardware

3. Security Systems are more Secure

Automated home security systems tend to offer a wider range of features than their predecessors. Systems respond to voice and biometric data, and locks can be upgraded to keypads that are opened with codes or swipe cards. These systems can be turned on or off via remote control, email, or phone, and camera feeds can be sent directly to one's computer. Audible alarms can be used to alert one of intruders, while silent alarms can be used to alert the authorities. That awful feeling of uncertainty that some people feel about having locked all the doors when leaving the house can be eliminated. One can simply lock the offending door remotely and carry on without giving it a second thought.

4. Wireless Sensor and Networks

Sensor network technology has been widely used in urban infrastructure construction with marked achievements. However, in different sensor network applications, network embedded sensing or controlling devices are usually based on different hardware platforms, operating systems, databases and middleware. And they cannot be deployed in a variety of heterogeneous network environments with free exchange of information except if supported by dedicated business systems and application management platforms. In terms of architecture design, most application environments of sensor network are designed in tightly coupled closed architectures.



IV. FUTURE SCOPE

Using this system as framework, the system can be expanded to include various other options which could include home security feature like capturing the photo of a person moving around the house and storing it onto the cloud. This will reduce the data storage than using the CCTV camera which will record all the time and stores it. The system can be expanded for energy monitoring, or weather stations. This kind of a system with respective changes can be implemented in the hospitals for disable people or in industries where human invasion is impossible or dangerous, and it can also be implemented for environmental monitoring.

Humans are going to move from being primary production agents to becoming primary consumption agents.

IoT is going to give the net a more objective way of gathering data, meaning that the conclusions that will be drawn by AI and Machine Learning algorithms are potentially going to be very different from what we expect. It's also going to mean that the scale and quality of decisions being made by virtual agents is going to become an order of magnitude better than it is today. From the current writing, it's pretty clear that exactly how that will look, even in the next 20 years is an known unknown to us, right now we can't see what it'll mean.

Data and computing are going to become completely ambient

The scale of data and devices around us are going to become overwhelming. To the point where two or three generations down the line, it may be hard to explain what the "internet" even is. People will understand that it's basic infrastructure like electricity, but beyond that, who knows?

Literally everything will be generating data, reviewing insights and feeding it back into your environment. For example, this means that your wardrobe will work with the rest of your home and weather systems provided by third parties, so when you get dressed in the morning, the "suggested outfit" will be something warm enough for your home, your car and your office (depending on your itinerary), but will need to be supplemented with a jacket if you plan to go anywhere warm (depending on

your dress sense). All of this will be ambient to you - it'll just be there. You won't have to put in any data (apart from allowing your home apps to access this), you'll just have to live life.

V. CONCLUSION

The home automation using Internet of Things has been experimentally proven to work satisfactorily by connecting simple appliances to it and the appliances were successfully controlled remotely through internet. The designed system not only monitors the sensor data, like temperature, gas, light, motion sensors, but also actuates a process according to the requirement, for example switching on the light when it gets dark. It also stores the sensor parameters in the webpage (database) in a timely manner. This will help the user to analyze the condition of various parameters in the home anytime anywhere. This project proposes a low cost, secure, ubiquitously accessible, auto-configurable, remotely controlled solution. The approach discussed in the project is novel and has achieved the target to control home appliances remotely using the WiFi technology to connect system parts, satisfying user needs and requirements. 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 have been achieved. The system design and architecture were discussed, and prototype presents the basic level of home appliance control and remote monitoring can be implemented. Finally, the proposed system is better from the scalability and flexibility point of view than the commercially available home automation systems.

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