



IOT Online and Offline HomeAutomation

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Abstract : One can achieve home automation by simply connecting home appliance electrical devices to the internet or cloud storage. the reason for this demand of network enabled home automation is reaching the zenith in recent days for its simplicity and comparable affordability. Platforms based on cloud computing help to connect to the things surroundings everyone so that one can find it easy to access anything and everything at any time and place in a user friendly manner using custom defined portals. Hence, cloud act as a front end to access IOT. Here we are assuming a system which can control devices through wireless based network or cloud based approach. The automation system will have ability to be controlled from a central host PC, the internet, and also remotely accessed via a packet PC with a windows mobile based application

Keywords—It consists of various components like Node Mcu, 2 relay module and smartphone having proper internet connectivity.

INTRODUCTION

Home automation is constructing automation for a domestic, mentioned as a sensible home or smart house. In the IoT home automation ecosystem, you can control your devices like light, fan, TV, etc. A domestic automation system can monitor and/or manage home attributes adore lighting, climate, enjoyment systems, and appliances. It is very helpful to control your home devices. Smart Home automation refers to the use of technology to control and automate various functions in a home, such as lighting, heating, air conditioning, and security. In the context of IoT (Internet of Things) and M2M (Machine-to-Machine) communications, home automation systems can be controlled and monitored remotely through a network connection. In addition, IoT-enabled home automation systems can integrate with other smart home technologies, such as voice assistants like Alexa and Google Home, to provide additional functionality and convenience.

It specifically focuses on the development of an IOT based home automation system that is able to control various components via internet or be automatically programmed to operate from ambient conditions. In this project, we design the development of a firmware for smart control which can successfully be automated minimizing human interaction to preserve the integrity within whole electrical devices in the home. We used Node MCU, a popular open source IOT platform, to execute the process of automation. Different components of the system will use different transmission mode that will be implemented to communicate the control of the devices by the user through Node MCU to the actual appliance.

We are using a cloud server-based communication that would add to the practicality of the project by enabling unrestricted access of the appliances to the user irrespective of the distance factor. We provided a data transmission network to create a stronger automation. The status of the appliance would be available, along with the control on an android platform.

I. LITURARY S:URVEY

A. *What is an IOT*

The Internet of Things (IoT) is the ability to have devices communicate with one another via the internet or other networks, remotely tracking information to provide feedback to assist with decision making for commercial, industrial and residential purposes. This is commonly done using sensors connecting to a back-to-base system.[3]

Some common day-to-day examples could be:

Temperatures in refrigeration or food heating units in the food and beverage industry.

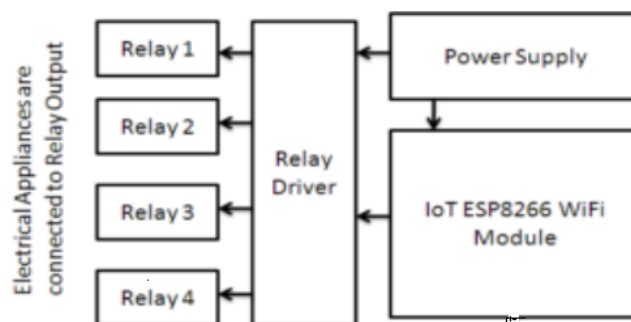
Assistance with the control of temperature and humidity levels.

Detection of gas and dust levels.

Monitoring of water levels and herd locations for agricultural purposes. Different applications in the automotive, aviation and nautical sectors such as the sensing of tyre pressures for trucking fleets.

An IoT ecosystem consists of web-enabled smart devices that use embedded systems, such as processors, sensors and communication hardware, to collect, send and act on data they acquire from their environments. IoT devices share the sensor data they collect by connecting to an IoT gateway or other edge device where data is either sent to the cloud to be analyzed or analyzed locally. Sometimes, these devices communicate with other related devices and act on the information they get from one another. The devices do most of the work without human intervention, although people can interact with the devices -- for instance, to set them up, give them instructions or access the data.

The connectivity, networking and communication protocols used with these web-enabled devices largely depend on the specific IoT applications deployed. IoT can also make use of artificial intelligence (AI) and machine learning to aid in making data collecting processes easier and more dynamic. The internet of things helps people live and work smarter, as well as gain complete control over their lives. In addition to offering smart devices to automate homes, IoT is essential to business. IoT provides businesses with a real-time look into how their systems really work, delivering insights into everything from the performance of machines to supply chain and logistics operations.[1] IoT is one of the most important technologies of everyday life, and it will continue to pick up steam as more businesses realize the potential of connected devices to keep them competitive.

B. *General block diagram:*C. *Schematic representation:*

D. Components:

1. Node MCU

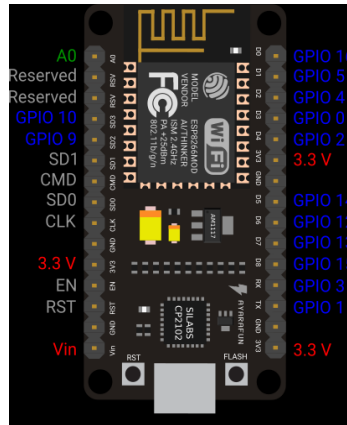


Fig. 1) Node MCU

Fig. 1) The NodeMCU (Node Microcontroller Unit) is an open-source software and hardware development environment built around an inexpensive System-on-a-Chip (SoC) called the ESP8266. The ESP8266, designed and manufactured by Expressive Systems, contains the crucial elements of a computer: CPU, RAM, networking (Wi-Fi), and even a modern operating system and SDK. That makes it an excellent choice for Internet of Things (IoT) projects of all kinds.[3]

However, as a chip, the ESP8266 is also hard to access and use. You must solder wires, with the appropriate analog voltage, to its pins for the simplest tasks such as powering it on or sending a keystroke to the “computer” on the chip. You also have to program it in low-level machine instructions that can be interpreted by the chip hardware. This level of integration is not a problem using the ESP8266 as an embedded controller chip in mass-produced electronics. It is a huge burden for hobbyists, hackers, or students who want to experiment with it in their own IoT projects.

But, what about Arduino? The Arduino project created an open-source hardware design and software SDK for their versatile IoT controller. Similar to NodeMCU, the Arduino hardware is a microcontroller board with a USB connector, LED lights, and standard data pins. It also defines standard interfaces to interact with sensors or other boards.[5] But unlike NodeMCU, the Arduino board can have different types of CPU chips (typically an ARM or Intel x86 chip) with memory chips, and a variety of programming environments. There is an Arduino reference design for the ESP8266 chip as well. However, the flexibility of Arduino also means significant variations across different vendors. For example, most Arduino boards do not have WiFi capabilities, and some even have a serial data port instead of a USB port.

The NodeMCU is available in various package styles. Common to all the designs is the base ESP8266 core. Designs based on the architecture have maintained the standard 30-pin layout. Some designs use the more common narrow (0.9”) footprint, while others use a wide (1.1”) footprint – an important consideration to be aware of.

The most common models of the NodeMCU are the Amica (based on the standard narrow pin-spacing) and the LoLin which has the wider pin spacing and larger board. The open-source design of the base ESP8266 enables the market to design new variants of the NodeMCU continually.

3.2 relay module



fig: 2) 2 relay module

Fig. 2) The 2 Channels Relay Module is a convenient board which can be used to control high voltage, high current load such as motor, solenoid valves, lamps and AC load. It is designed to interface with microcontroller such as Arduino, PIC and etc. The relays terminal (COM, NO and NC) is being brought out with screw terminal. It also comes with a LED to indicate the status of relay.[4]

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The two-channel relay module is designed to allow your Arduino to control two high-powered devices. It has two relays, each with a maximum current rating of 10A at 250VAC or 30VDC. Modules with one, four, and eight channels are also available.

The relay module is an electrically operated switch that can be turned on or off deciding to let current flow through or not. They are designed to be controlled with low voltages like 3.3V like the ESP32, ESP8266, etc. or 5V like Arduino.

Specification:

Digital output controllable
 Compatible with any 5V microcontroller such as Arduino.
 Rated through-current: 10A (NO) 5A (NC)
 Control signal: TTL level
 Max. switching voltage 250VAC/30VDC
 Max. switching current 10A
 Size: 50mm x 38mm x 17mm

Packing List:

1 x 2 Channels 5V Relay Module

E. Execution:

Applications of Home Automation

IoT based home automation can revive the way people use technology. There is a considerable range of possibilities when we speak about applications of home automation.

- Controlled electrical fixtures such as lights and air conditioners
- Simplified garden or lawn management
- HVAC
- Controlled smart home appliances
- Enhanced safety and security at home
- Water and air quality control and monitoring
- Voice based home assistant supporting natural language
- Smart locks and switches

Google Assistant

Google Assistant is Google's voice assistant. When it launched, Google Assistant was an extension of Google Now, designed to be personal while expanding on Google's existing "OK Google" voice controls. Originally, Google Now smartly pulled out relevant information for you. It knew where you worked, your meetings and travel plans, the sports teams you liked, and what interested you so that it could present you with information that mattered to you. Google has long since killed Google Now, but Assistant lives in the same space, fusing these personalized elements with a wide-range of voice control. Google Assistant supports both text or voice entry and it will follow the conversation whichever entry method you're using.

What can Google Assistant do?

Google Assistant offers voice commands, voice searching, and voice-activated device control, letting you complete a number of tasks after you've said the "OK Google" or "Hey Google" wake words. It is designed to give you conversational interactions.

Google Assistant will:

- Control your devices and your smart home
- Access information from your calendars and other personal information
- Find information online, from restaurant bookings to directions, weather and news
- Control your music
- Play content on your Chromecast or other compatible devices
- Run timers and reminders
- Make appointments and send messages
- Open apps on your phone
- Read your notifications to you
- Real-time spoken translations
- Play games

Continued Conversation means you don't have to say "Hey Google" for follow-up requests. Instead, once you've started talking to Google, it listens for a response without needing a trigger phrase all the time. Google can also recognize voice profiles for different people, so it knows who is talking to it and can tailor the responses accordingly. You can also ask for multiple things at the same time. As Google Assistant knows you and understands context, it will react in an informed or smart way. That's important as it gives voice control a lot more power and moves it on from only reacting to specific phrases or commands. It's designed to be more than just reactive.

Alexa

The Amazon Echo is one of a range of hands-free speakers and devices from Amazon that can be controlled with your voice. The voice-controlled "personal assistant" on these devices is called Alexa, which will perform various tasks for you and control various systems. As well as being available on Echo devices from Amazon directly, Alexa is available on a lot of third-party devices like speakers or TVs as well as through the Alexa app on phones. Alexa is also available in some cars and in some wearables.

What devices offer Alexa?

There are two sides to this question - devices that work with Alexa (such as Hue bulbs) - and devices that offer Amazon Voice Services, which is the platform that runs Alexa. First and foremost, Alexa is designed around Amazon's own Echo devices. The Amazon Echo range includes the Echo and Echo Dot, which are all speakers, and then the Echo Show models which also feature a display, so can give you visual feedback, like weather widgets, videos or song lyrics. There are several Amazon Alexa gadgets too, like the Echo Wall Clock for example.

The cheapest Echo device is the Echo Dot, which is a good starting point for building an Echo system and getting started. You can see all the Echo devices compared right here. There are plenty of other devices that offer Alexa voice control, such as the Sonos Era 100. You can see a range of Echo alternatives here that offer Alexa too.

All these devices feature far-field microphones that can pick out your voice through background noise and are waiting to take your command when they hear the Alexa wake word. Once you say this, Alexa will swing into action and respond to your commands. But what can Alexa actually do?

Advantages of Home Automation Using IoT

- Home security: With IoT home automation you are less worried about home security. You can control the security of your home with your phone. If anything goes wrong, you may receive notifications on your phone and you may probably operate your lights or locks through your phone.
- Energy efficiency and savings: You can increase the energy efficiency by controlling your electrical fixtures through IoT. If you are unsure whether your child has left lights on before leaving, you can check and control it through your phone.
- Convenience: This can be considered as one of the main advantages of home automation using IoT. You have the control of all your devices connected through IoT. It makes it very convenient for you to have all the devices adjusted just through your phone. For example, if you forgot to adjust your thermostat in the morning before you left your house, you can adjust it from your office.

Disadvantages of Home Automation Using IoT

- Internet dependency: A strong and reliable connection is necessary for all the tasks by smart voice command technology such as Alexa and Google Home. The internet allows all smart devices to function in sync. However, a poor internet connection might lead to hindrance. Thus, it is highly recommended to opt for 4G/5G speed of internet and good Wi-Fi services to avoid any inconvenience.
- Privacy concern: There are certain practices that users must abide by when it comes to smart homes. Although the internet is a safe data sharing space, there is still a chance of data breach. These incidents happen if the users show negligence towards certain safety precautions. Protect Wi-Fi breaches with a strong password and make sure the connection is private. This applies to any smart device that provides access to automation. Furthermore, one must evaluate these aspects and install smart technology from certified professionals only. These simple practices can safeguard end-users from data thefts.

Circuit model

Result:

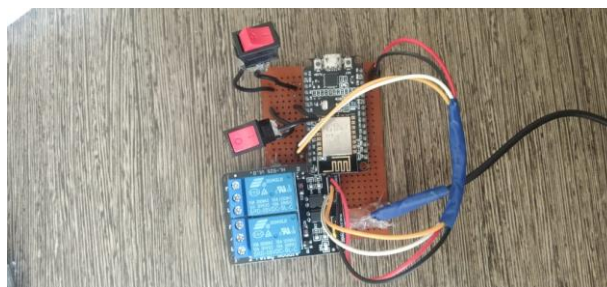


Fig.1 Model

In the fig 1 it is clearly showing the circuit and clear

Component details and connection what we needed for making home automation using alexa and google assistant.

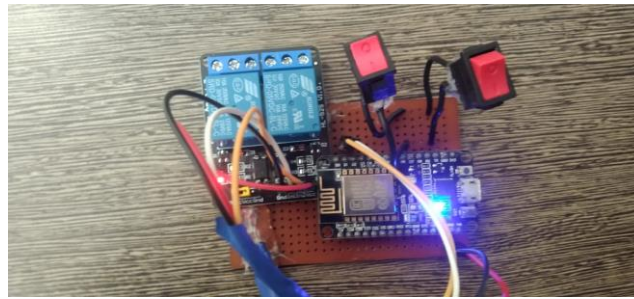


Fig.2 Model Output

In the fig 2 it is clearly showing manual mode of Light ON/OFF mode home automation model. In these when we apply a voltage to the model red light blinks by switching a switches that is manual home automation.



Fig.3 ALEXA

In the Fig 4 we Turn ON and OFF led using ALEXA application in that we can operate manually as well as ALEXA voice assistant.

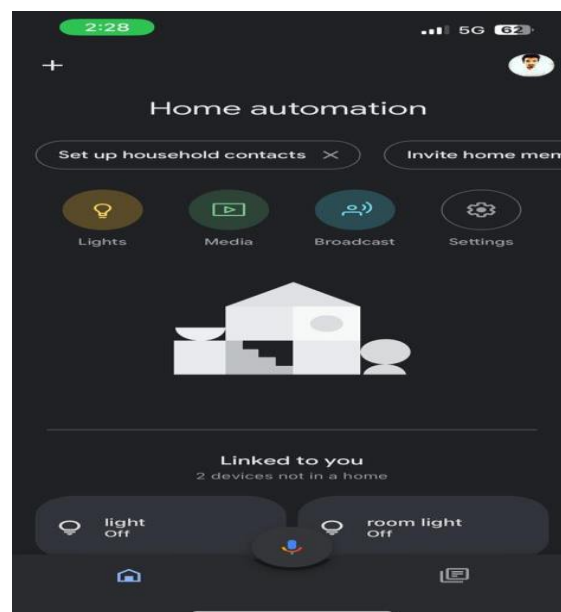


Fig.4 GOOGLE ASSISTANT

In the above picture we Turn ON and OFF led using Google assistant application in that we can operate manually as well as Google voice assistant.

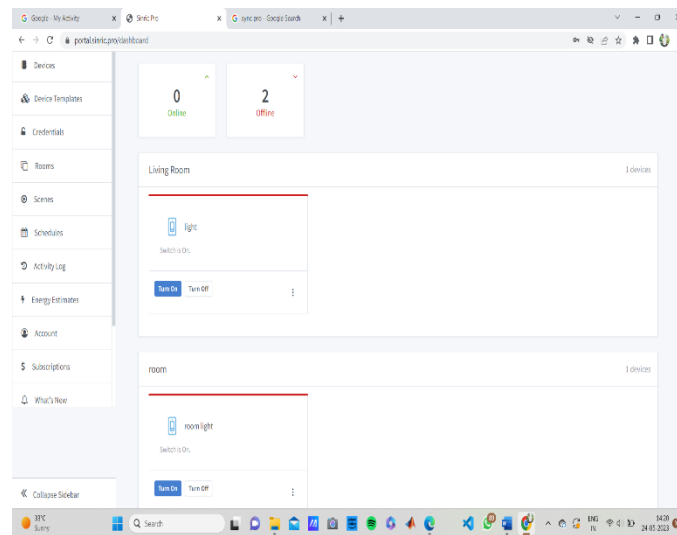


Fig.5 SINRIC PRO

In the fig 5 is sinric pro web application

In these site first we have develop an account

Then we add a 2 device and we generate an id of that two devices then we add that id on our Program after that we installed ALEXA and google assistant application on our mobile in that we add device and we search sinric pro then we select that sinric pro on both application which we have installed in our mobile after that our google assistant and ALEXA application is ready to use.

II. DISCUSSION:

The future scope of this work is to use to make our home automation brighter with wireless sensor. It involves various kinds of sensors for switching every useful device when you enter your room like automatic AC switch on with proper regulation of temperature, opening/ closing doors by itself. With advancement in technology safety and security will be major concern, so for safety measures wireless locker with proper alarm and fingerprints mechanism should be used.

Clapping switch for on/off will be used and many more features can be included. It is possible to have a great control features. Home automation is just not limited to only switch on/off the devices by mobile application or any voice mode but with time the scenario is completely changing, wireless network of sensor is combining with home automation to understand human nature of living lifestyle so that Artificial Intelligence can better manage the home. sensor like humidity sensor , temperature sensor, smoke detector , motion sensor are implemented in home automation and sensor data are further analysed to understand the use pattern and in favour of that deep learning is used for the intelligence device of data. The future will be completely boom with advanced sensor and artificial intelligence.

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