IoT Project: Best 30 Ideas With Cloud, Raspberry Pi, and Arduino
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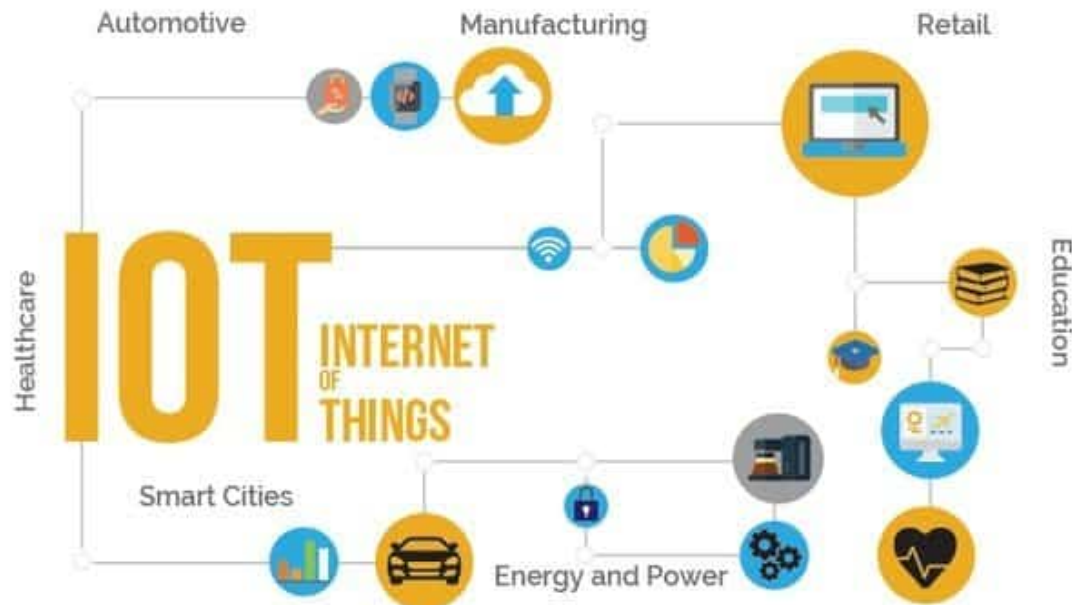Some of the authors of this publication are also working on these related projects:

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IoT Project: Best 30 Ideas With Cloud, Raspberry Pi, and Arduino

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When you plan to implement your academic knowledge with a real-life scenario, you need an IoT Project Idea. IoT is the automation and digitization of home appliances, industrial machinery, and everything through the internet and cloud computing. One IoT idea can change your future life. We are here to help you try the 30 best internets of things project new ideas with cloud computing, raspberry pi 3, and Arduino.

IoT Projects Using Cloud Computing, Raspberry Pi, and Arduino

We can make the Internet of Things project with cloud computing, raspberry Pi 3, and Arduino. This article is for the knowledge seekers to generate some ideas to make a new IoT system.
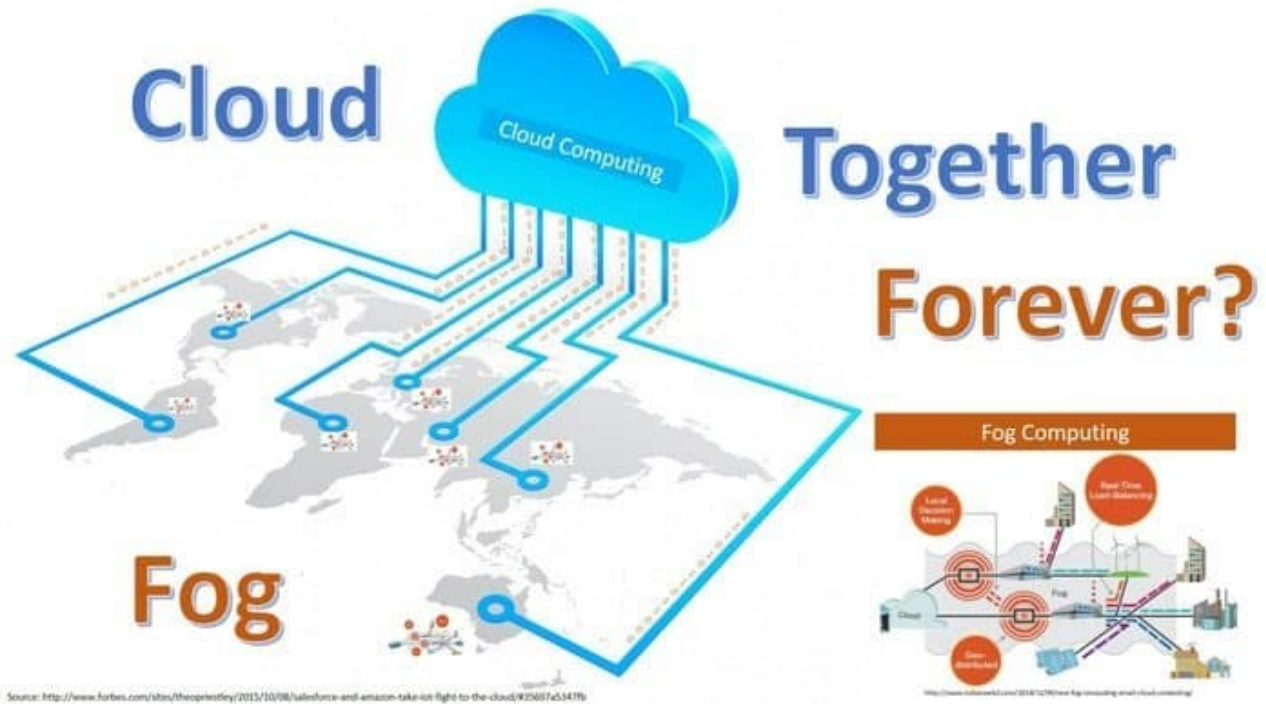
1. IoT Weather Monitoring System
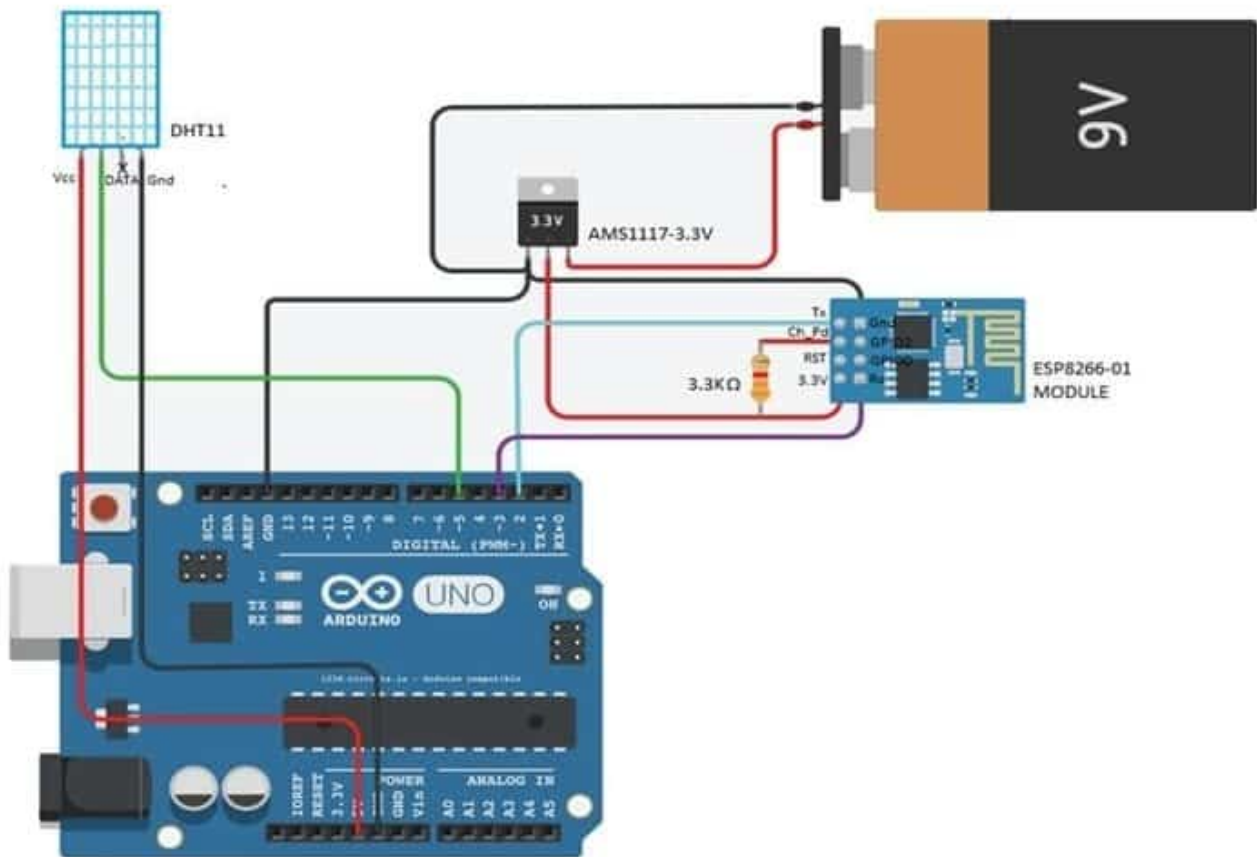
Weather Monitoring System is the most demanding IoT application for the modern era. Statistics show that more than 50 billion devices will use the service within the year 2021. Very few things require to develop Weather Monitoring System. A Cloud computing platform is required to implement Weather Monitoring System.

The electronic device will collect the data through the sensor. A wifi or internet connection requires to transmit the data to the cloud server. This process happens through the cloud algorithm. The data will process and send anywhere else where requires.

Three major components need to build this project. First, the DHT Sensor to detect the temperature/ humidity changes in the environment. Second, Arduino Uno acts as the brain of the system and processes. Finally, WiFi Module or internet to integrate the system onto the cloud and transfer updates to the user.

2. IoT Irrigation System

Source: http://www.forbes.com/sites/theopriestley/2015/10/08/salesforce-and-amazon-take-iot-fight-to-the-cloud/#35697a5347fb

IoT is not an upcoming technology. Many countries using irrigation systems through IoT. This new IoT idea is a blessing to farmers. They are very much accepted on the internet. In this IoT irrigation project, very few things are required.

First, Soil Moisture Sensor to sense the moisture fluctuations in the soil. Arduino Uno uses the brain of the system and transfers voltage to the water pump. Finally, the water pump needs to irrigate water. Internet of WiFi module uses to get updates remotely.

3. Automated Street Lighting System
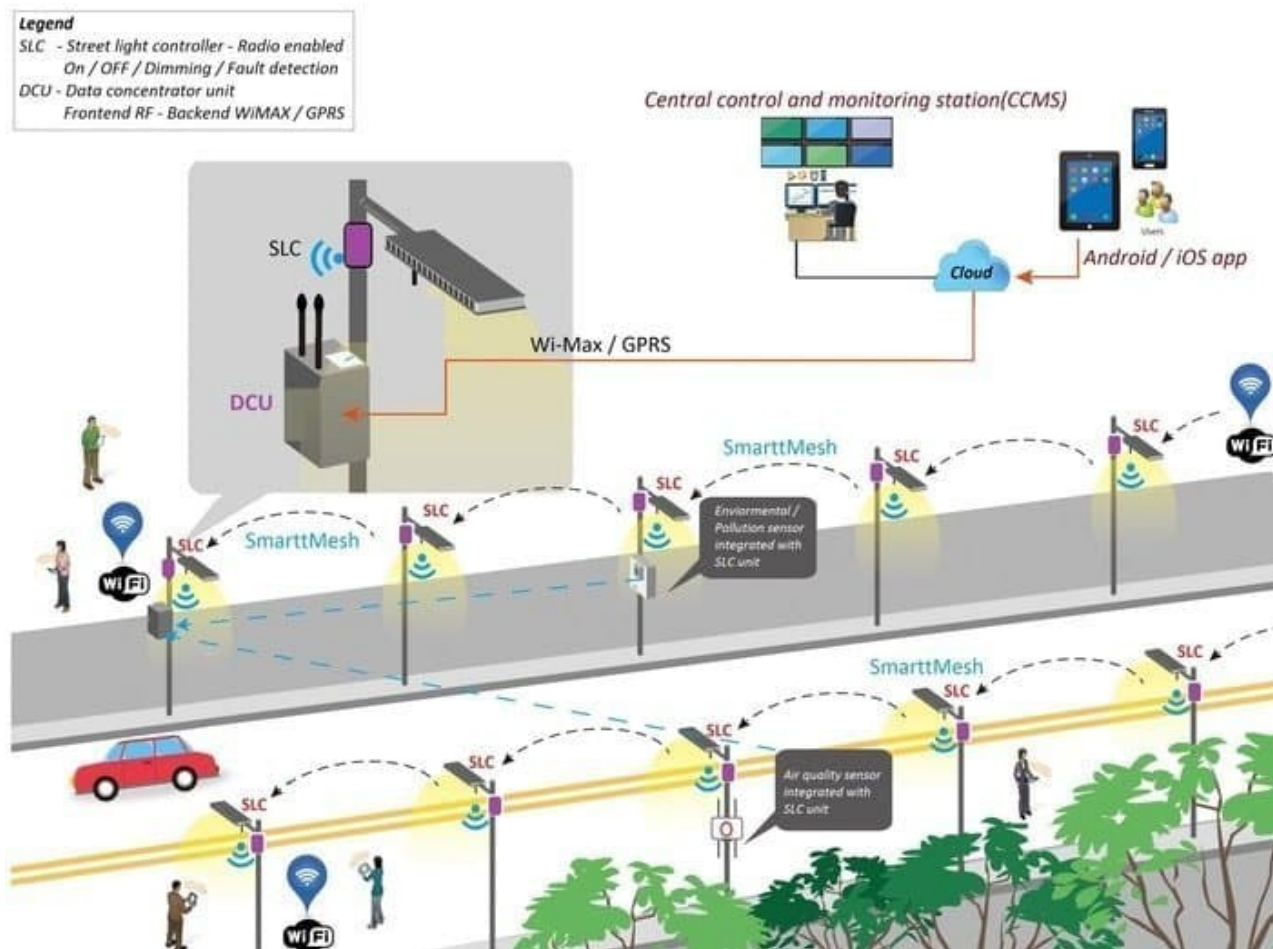
You have already seen there is a lot of light beside both roads of any city. There is someone who switches on or off those lights manually. If you take a project to make on or off using the mobile application, it will be wonderful. All the lights are connected and on or off at the same time. If you make an individual on-off system manually, then it will be time-consuming.

So you can develop an IoT process of an Automated Street Lighting System. It can be integrated with cloud computing. There will be a set of rules and regulations in the cloud server, such as first light and last light and on/off those street lights. Then the concerned person can switch on/ off through his application. This will reduce electricity consumption.

4. Smart Building
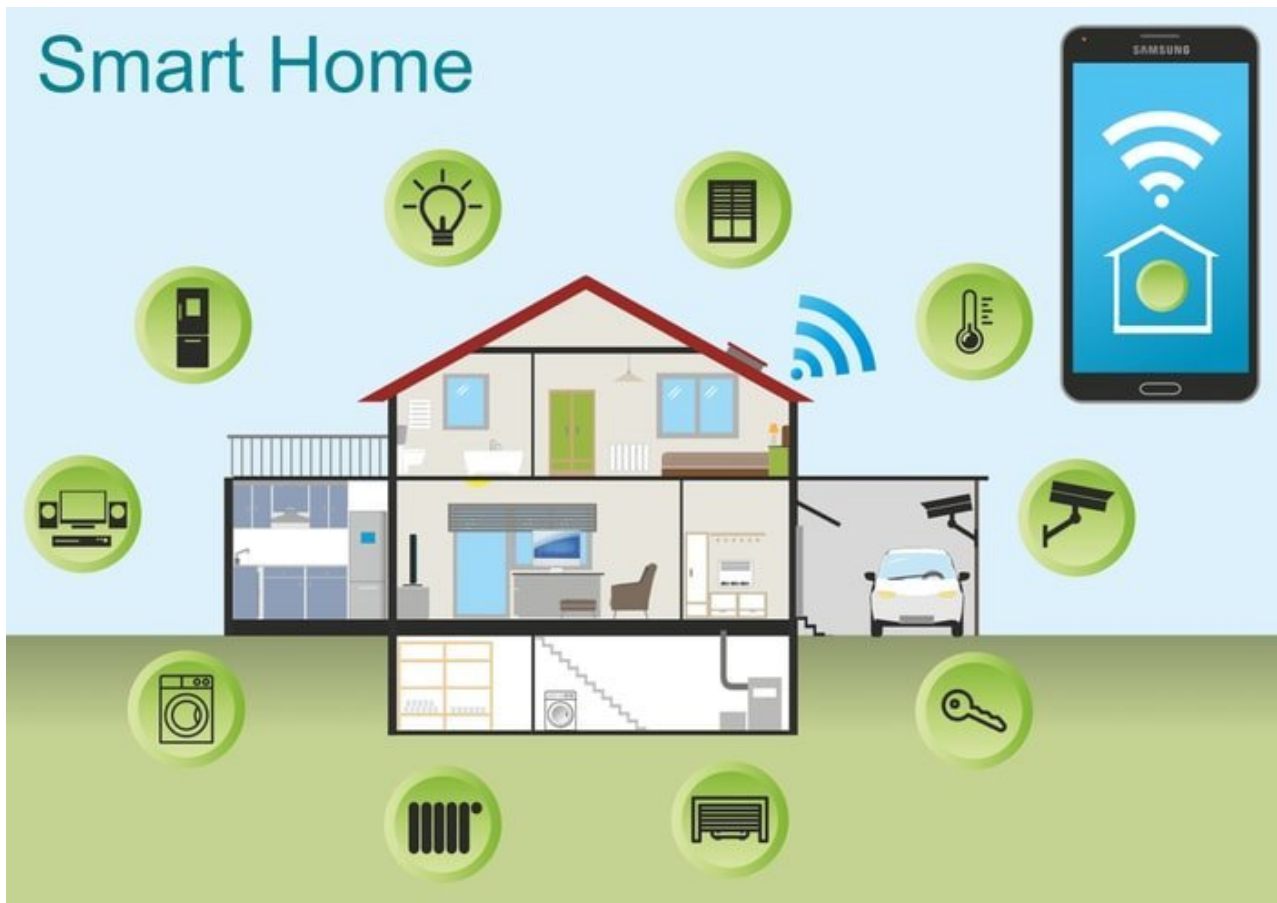
The smart home is a unique IoT application. It will develop using cloud server computing and the internet. The main IoT idea is when there is nobody inside the house or room, then all the electronic devices like light, fun, and AC will be switching off.

If somebody is there, then switch on some device based on the environment, timing, etc. This instruction has to store in the cloud server. A human's presence, behavior, and analysis can be made through cloud computing instruction.

5. Smart Water Metering

This is a cloud computing-based IoT project. An electronic device will collect water flow within the pipe and transfer data to the cloud. It will interpret the various result. The result will identify the volume of water consumed over time, detect leakage systems, and water monitoring purposes.

To develop the IoT idea, you need three major components. Firstly, the flow sensor detects the flow of water inside the water pipe. Finally, Arduino Uno works as the brain of the system. ESP 8266 WiFi module to integrate the total system and pass the data to the cloud server.

6. Cough Detection System Using Arduino

The Cough Detection System is one of the best projects against Covid-19 using Arduino. It can detect the difference between normal sound and cough sound. Moreover, with contactless temperature screening and various machine learning techniques, the project becomes successful.

It would be best to have Arduino 33 BLE Sense, LED, and Jumper wires to do the project. Arduino IDE and Edge Impulse studio is required to connect with the IoT Hardware.

7. Temperature and Humidity Monitor Using Raspberry Pi
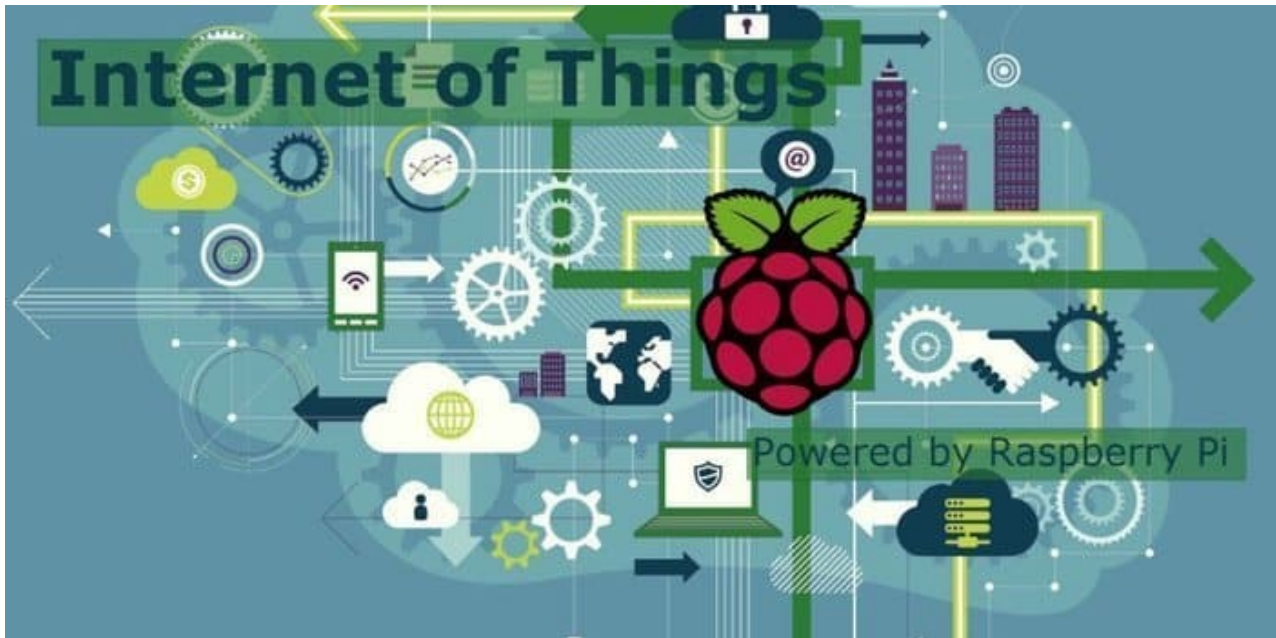
This IoT system is an amazing idea. You will be fascinated by this wonderful IoT idea. Raspberry Pi is a tiny size standalone PC that can work self-sufficiently and self-control a system. This project will send data on temperature and humidity over the internet.

You can configure such a way that an email will fire your email address if temperature and humidity increase above a certain level. This system needs two components. The first one is the DHT Sensor to detect the temperature/ humidity. The second one is Raspberry Pi to acts as the brain of the system and processes and sends the update to the cloud server.

8. Automatic Plant Watering System
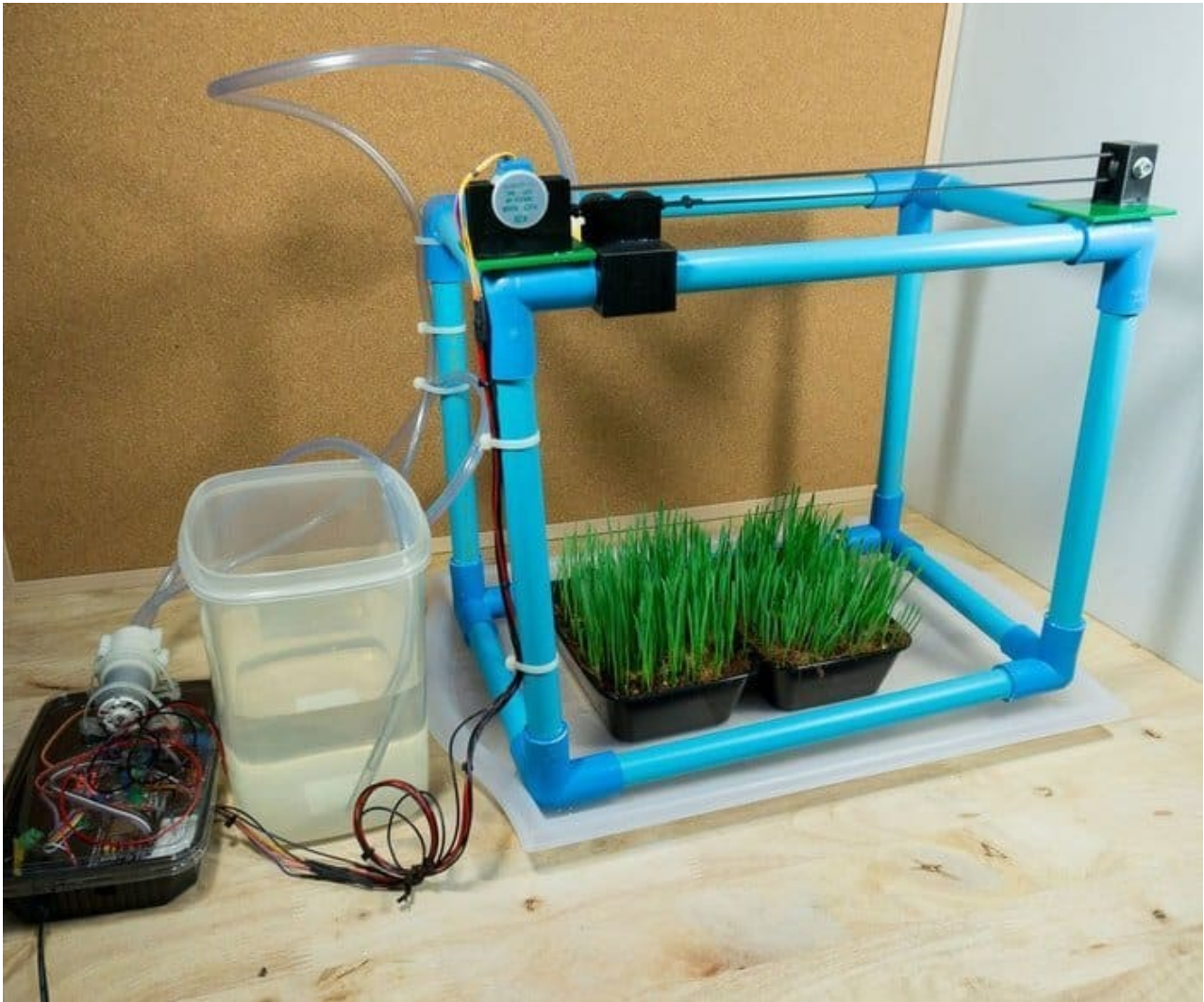
Are you an in-house plant lover? Thinking about leaving home. No problem, develop an Automatic Plant Watering System IoT System. To develop this project, you need Soil Moisture Sensor to sense the moisture changes of soil. Arduino Uno acts as the brain of the system. WiFi or internet Module to send the instruction from cloud finally water pump to provide water.

9. Voice Controlled FM Radio Using Arduino and Google Assistance

Before the availability of the internet and smartphone, FM was a great source of entertainment. To recall your old memory, you can make an FM Radio to control voice using Arduino. This radio will support worldwide frequency, brands, digital low-IF tuner, bass boost, and many more.

10. IoT Based Home Automation System

Smart Home
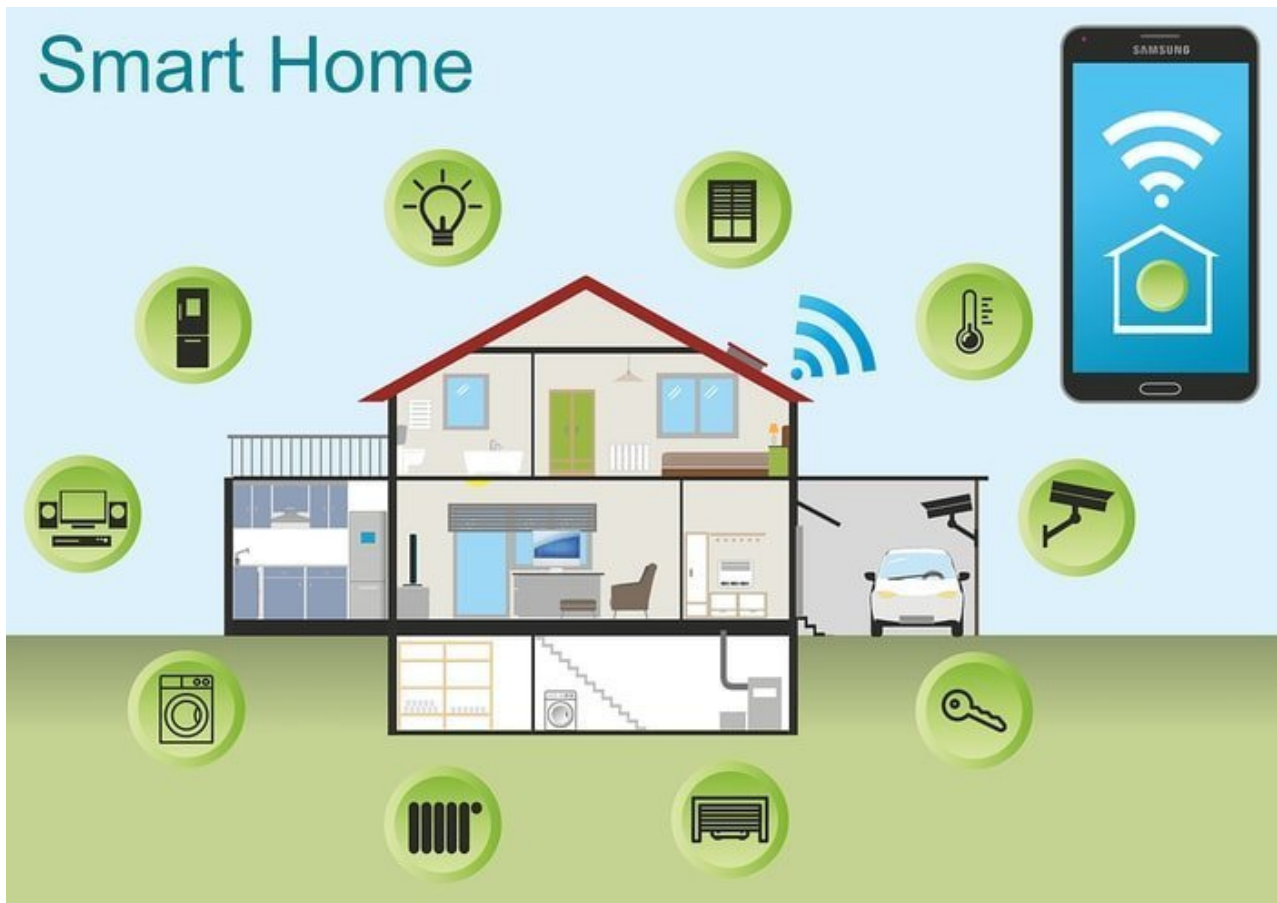
IoT is most popular for its IoT Based Home Automation System. Now maximum electronics developer focuses on the idea of IoT appliances. Television, Air conditioner, fan, light, and all the household devices.

You can control the device from any remote location. To develop this IoT idea, it requires Arduino Uno, WiFi Module, Relay Drive vers. Since it is a big project and your valuable device, you should better purchase it.

11. Home Security Model

The most valuable IoT idea is Home Security Model. In this Home Security Model, an electronic device connects to your mobile device. This Home Security Model will reduce your cost and tension.

If someone tries to break the security, then an SMS or email send to you. To develop the Home Security Model, you need three components. Firstly, Arduino Uno acts as the brain. Internet or wifi as data transfer means. Finally, an IR sensor to detect someone in the infra-red range.

12. Crowd Size Estimation Using Raspberry Pi 3

You already know the various applications of digital image processing for face recognition and object detection. But this project will assist in finding out the size of the crowd using Raspberry Pi and ThingSpeak. With the comparison of pre-trained model data, it will estimate the approximate crowd size. It would be best to have Raspberry Pi 3 and IP Camera ad hardware and ThingSpeak, Python 3.0, and OpenCV3.0 as software to do the project.

13. Biometrics Raspberry Pi IoT Project
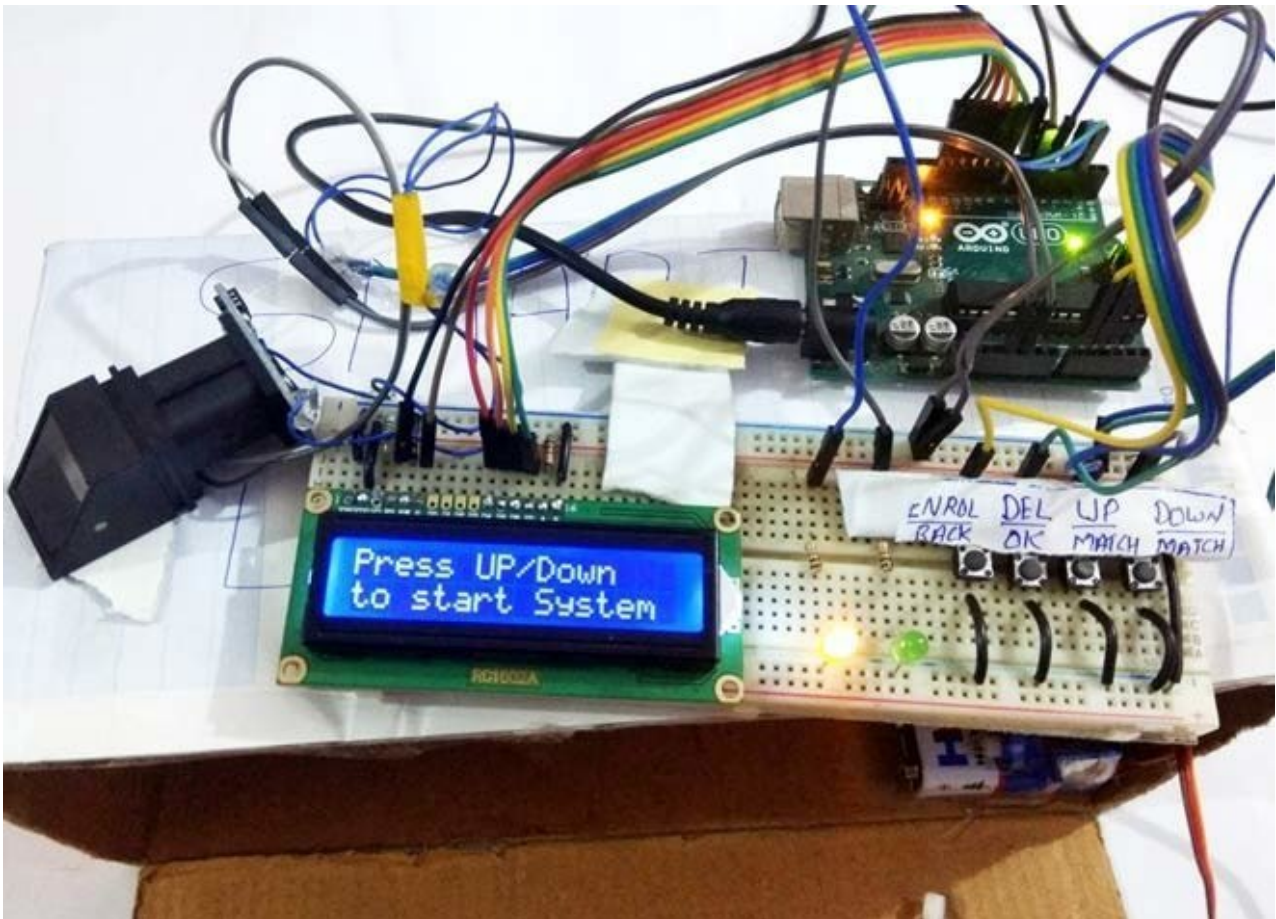
This new IoT idea includes making an authentication device for security purposes. It transfers data to the cloud. Because of authentication purposes, people use a Biometric-based system, which can be integrated with the internet as an IoT device. To develop these IoT ideas, you need a fingerprint scanner to collect data and Raspberry Pi to act as the system's brain and processes.

14. Motion Controlled Servos

The main purpose of this IoT application is to clarify the real-time data streaming over IoT devices. Four major components need to develop the system. Raspberry Pi acts as the brain. Servo Motors to receive command of Raspberry Pi and operates accordingly. Leap Motion Controller used for the motion tracking finally Glove to facilitate the sensing action.

15. Smart Trash Can

This is a waste collection bin card IoT system. This can reduce fuel consumption. RFID readers, RFID tags, and Raspberry Pi are required to do the project.

16. E-Health Glove Using IoT

The project is an application of wearable technology. The E-Health Glove is integrated with sensors to monitor the vitals of the patient. The data is sent to the cloud server so that anyone can access it. This is considered the greatest innovation next to mobile phones.

17. IoT Pet Feeder

Suppose you are outside of your home, and your pet is hungry. What will happen? No problem to develop an IoT Pet Feeder project and be tension-free.

18. Smart Junction Box for Home Automation

Smart Junction Box is a higher-level project for IoT developers. It required a higher level of <u>IoT skill</u>. In this project, you can toggle your switch from the remote application. To enable the project, your computer or mobile phone requires an internet connection. If you understand the basic development concept, you can increase or decrease loads of AC voltage.
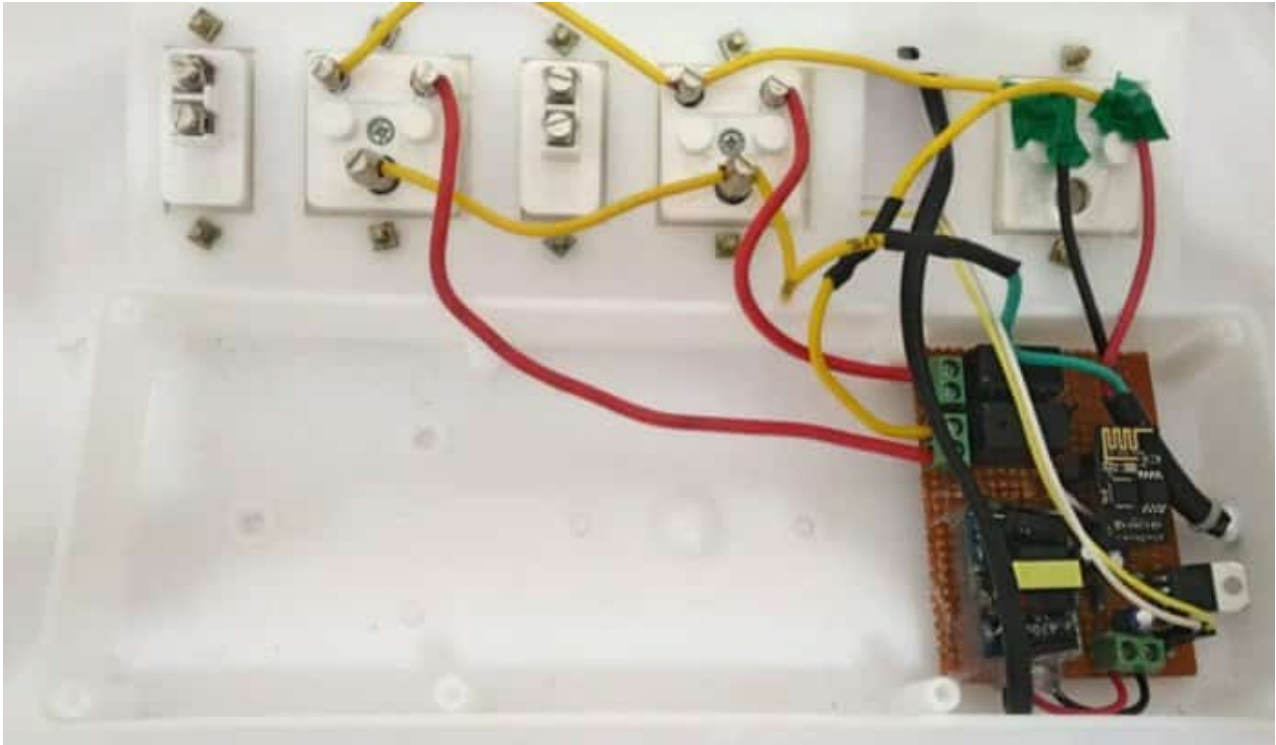
The requirement of this project are ESP8266, FTDI module (for Programming), 3V 5A, Electromagnetic Relay (2Nos), AC-DC converter module (5V/700mA or above), and BC547 (2Nos). For the junction Box, you also require the LM317 Regulator, 0.1 and 10uf capacitor, IN007 diode (2Nos), Junction box, Wires for connection, 220ohm, and 360ohm Resistor.

19. GPS Tracker IoT Project Using Arduino

GPS tracker is one of the best solutions to find out the particular location of an object. We use it for asset monitoring, fleet tracking, and potential control. Since it is a moving element, low power consumption is a significant concern. GPS tracking projects using LoRa help increase the longevity of the device battery.

20. IoT in Healthcare

According to research, most investment takes the place of IoT on <u>IoT in healthcare</u>. The doctors and researchers at trying to develop new projects regularly. There are lots of healthcare Internet projects available in the real world. Despite having all those projects,

the researchers are trying to find new project ideas to make human life comfortable. The breast cancer identification project can be another one. IoT healthcare developers are trying to develop wearable technology for breast cancer-affected women. The device will transfer the symptom of the breast, and the system analysis the condition.

Another new IoT idea can be the hearing aid. Suppose that your guess is knocking at your door, but you cannot hear properly because of your hearing problem. But if you prepare the signal project with the light, you will get the signal quickly to open the door. The frequent checkup will find out if there is any unusual change.

21. MQTT Based Home Automation Using Raspberry Pi

MQTT-based home automation is the best internet of things project idea for final year students. You can control the home appliance from anywhere in the world because MQTT is hosted on the cloud. You need Adafruit and MQTT brokers to control the project. This IoT Raspberry Pi 3 project's required hardware is Jumper Wires, bulb, relay module, and Raspbian stretch.

22. Wearable LED For Stage Show

The Internet of things has changed your lifestyle also. Your wearable clothes and equipment will not fall behind from its blessing. With the touch of your smartphone, you can change the color of your wearable dress.

Suppose you are going to present a stage show like dancing. In the sequence of your movement, you have to change the color of you for different times. Earlier it was manual switch-based LED lighting systems. With the advantages of technology, you can control the LED lights from your mobile phone using the internet. As a beginner internet of things engineer, you can implement this internet of things project.

The Requirement of the Project

- You need to gather different materials for the project.
- If you use Edison for the first time, you need to set up the project.
- You need a WiFi connection.
  Download Bluetooth SSP Pro
- Ensure about your serial port profile.
- On the Edison, enable Bluetooth and run Script.
- Connect your phone by scanning.
- Create SPP with App and connect.
- To the App button assigned it.
- Built the circuit.
- Required clothing
- Collect Solder LED strips

Source of This Project

23. Sound Pollution Monitoring Project Using Nodemcu

Sound is evident in our day-to-day life. Excessive sound is harmful. With the help of a decibel meter, you can make an IoT project using nodemcu. You can apply it to school or hospital areas. You can implement this IoT idea with hardware like a microphone sensor, ESP8266, a nodemcu board, and connecting wires.

24. Smart Garage Door
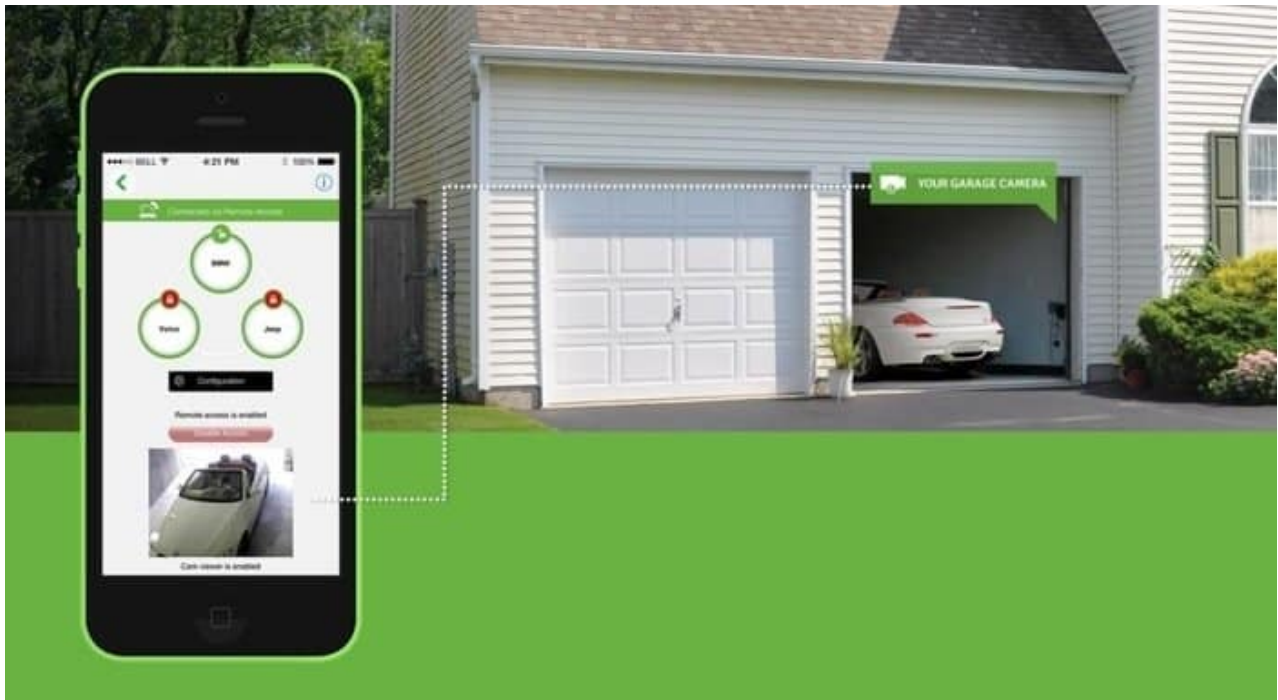
Smart Garage Door project for the internet of things lover is an interesting and useful application of IoT. You can implicate here IoT-based home security system and IoT smart alarm system. You can incorporate here IoT based patrolling system.

This application is widely used as a commercial project. You can control it from anywhere in the world. If there is an unusual thing that happens, you can get a notification through your smartphone. So it will reduce the employment of a security guard.

IoT-based Smart Garage Door system allows you to open and close the door of the Garage. Moreover, it allows you to monitor the instant of your car garage. So, there is no doubt about security. As a novice IoT engineer, you can develop it commercially.

25. IoT Based Alarm Clock
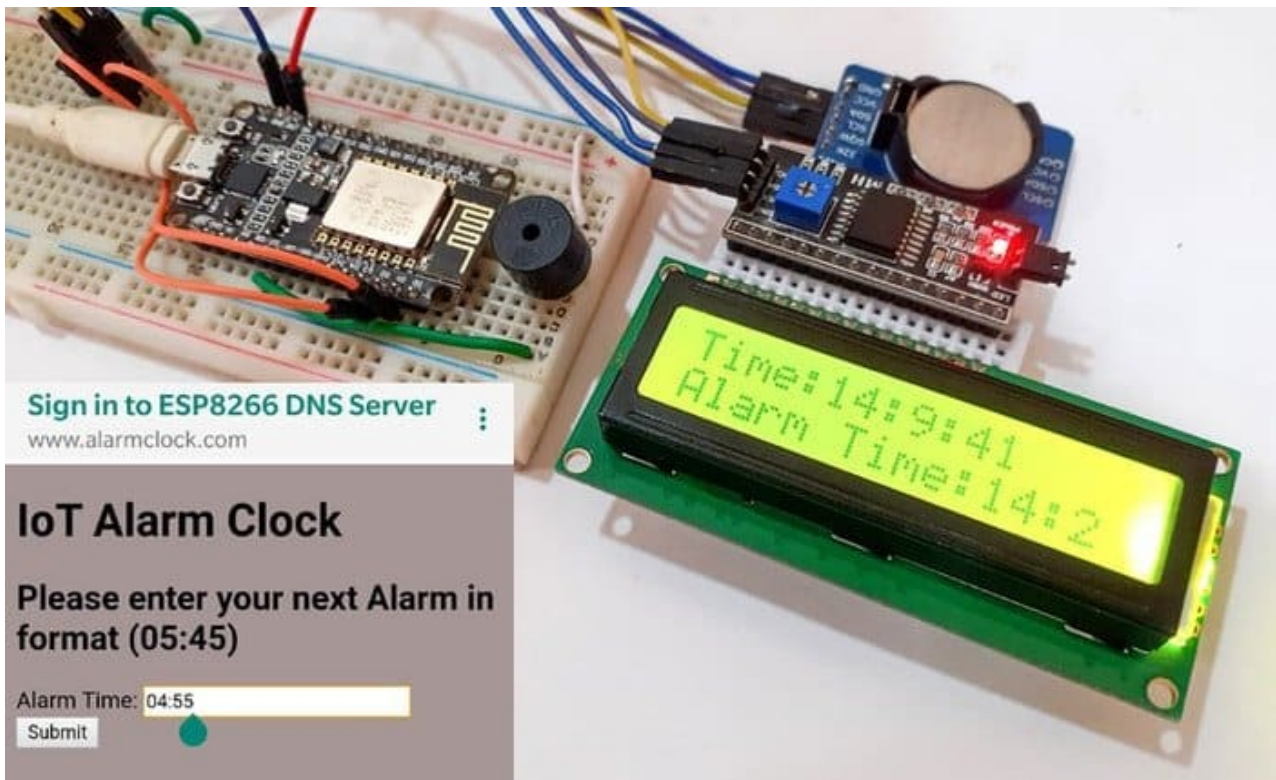
IoT Based Alarm Clock can be one of the best IoT new ideas for the novice and students. This alarm can be incorporated into a fire detection system, security system, or general smart alarm. It can be set from anywhere in the world. You can set this alarm for your friends and family.

Various technology developers like Amazon develops this smart alarm earlier. But it is costly for a student. With the help of some equipment like Button, Raspberry Pi 3 Model B, MFRC522 Card Reader, LED Light Bulbs, Buzzer, Resistor 10k ohm, Resistor 10k ohm, RPi PiCam, you can develop the project.

26. Night Patrolling Robot

IoT Night Patrolling Robot reason for the most wonderful internet project to ensure security and safety at night. It is an excellent idea to reduce dependency on humans. You can deploy the robots to any park, residential area, and industrial area.

27. Detail idea of This Project

The night patrolling robot project is a night vision camera and sensor-enabled robotic application operating on wheels. A fixed track like a railway is fixed surrounding the park, residential area, or industrial area. A sound detector is integrated with this application. Whenever there is any sound or movement, the robot will automatically come to the location and send a signal to the appropriate authority. Otherwise, the robot moves on a time interval basis on the track.

Advantage of This Project

- It will reduce the cost of employment for your security system.
- It is more reliable than human beings.
- The motion and sound detection capabilities are stronger than humans.
- No nepotism and compromise are possible with a machine.
- It is also one of the <u>best machine learning applications</u>.

Limitation of This Project

- If there is any animal also from robotic petrol, the robot will send a signal.
- If there is any normal sound, the robot will detect it.
- Investment in machine learning will be huge.

28. IoT Incubator Project Ideas

Another important project idea is the Incubator project for chicken production. With only $10, you can produce the chicken each after 21 days. You can make this with your household things. You need not have any IoT skills or software engineers. If you have any common sense of electricity, then you can produce the project.

What do You need?
Only simple items can make this project successful. A heatproof box and one incubator circuit, two electric bulbs, and two mini fans of power supply.

How To make the Egg IoT Incubator
Program the incubator circuit between 37.5 and 36.5-degree celsius. Take the power connection from the mainline to another from the circuit. If the heat is more than 37.5, it will shut off the power connection again. When the temperature is below 36.5, it will automatically go on. You can check the link below to see the egg project by IoT.

Make This Egg Project at Your Own

29. IoT Project Gantt Chart

You can not develop many projects alone. So it would help if you had a strong team to develop any IoT commercial project. The project manager's job is to assign the task to different groupmates and manage the schedule. The Gantt Chart is one of the best

schedule management software to manage the critical path method (CPM) and program evaluation and revenue techniques (PERT).

30. NB IoT

Narrowband-IoT (NB IoT) is the idea of low-power wide-area networking. It ensures long battery life by transmitting small amounts of data over a long time. It uses several technologies like Six-Fox, LoRa, etc. NB-IoT supports a large number of connected devices with low power consumption. Smart cities, small homes, agriculture, and healthcare are the best application of Narrowband internet.

How to start the first IoT Project Idea

Many of us are confused about developing the first project of the internet of things. It is a grand opportunity for the students, project manager, project leader, team manager, and business organization to develop the IoT project. For the newbies, we will discuss some points to start any simple project internet of things.

1. Learn the Basic

If you want to be an IT project manager, team developer, lead manager, or developer on any project, you must learn the basics. You may develop a checklist of your requirements. The checklist includes technical knowledge, theoretical knowledge, required equipment, internet connectivity, and many other related issues. The required recruitment is already provided with each of the IoT ideas. Now we are providing you a technical checklist to enhance your idea to develop an internet of things project.

- IoT Software
- Its Applications in Real Life
- IoT Protocols
- IoT Platform
- The Skills of IoT
- IoT OS

2. Understand the Big Picture

before the development of any project, you have to understand the big picture of your requirement. In the internet of things world, every specific requirement is special. So you have to be more particular about your requirements. For example, you want to make any home-based automation for the smart home.

To make this internet of things project, you have to collect your home's layout, the electrical configuration, the load capacity, circuits, and the sensor you support. After understanding the big picture will be able to specialize and focus on minor issues.

On the other hand, if you want to develop a self-driven car project, you must understand the GPS mechanism, automobile mechanism, and physics theory. For irrigation, harvesting, or traffic monitoring, whatever you like, you have to understand the total mechanism first.

3. Select the Technical Lead

If you are the owner of any organization, you have to choose any technically sound person to develop the internet of things. You will be technically the lead of your project. An experienced person with various IoT certifications, long-term serving experience, and strong leadership qualities may be the lead of your project. If you want to develop the project on your own, for example, you are a student. You have to consult with an expert. An example can be for developing a traffic monitoring system. You may consult with the municipal specialist.

4. Develop a Road Map of This Project

Now you have to phase out your project. You can solve this problem with project management software. You can develop your project into several parts. Start working with requirement analysis to coding.

5. Test your New IoT Idea

In the meantime, for your project, you have to test several times. Because the internet of things is a combination of several networks and sensors. Testing the user interface is also important.

6. Select an IoT Reference Architecture

The project you are developing is not new in the world. I have some references which you help a lot. To develop your project, a written consult with the previous references. IoT consultancy farm can help you in this aspect.

7. Select Your Project Team

To develop any big internet of things project, you have to accumulate technical personnel. You may pick some person who has machine learning skills. There is a huge difference between IoT engineers and general software engineers. So you should be more cautious about selecting your project team.

8. Select Your Project Infrastructure

IoT application is a combination of various sensors, storage, data, and software. For your specific requirement to choose the infrastructure. There are many infrastructures like raspberry pi and Arduino.

9. Develop Teamwork Habits

It is tough for a loan to develop a big IoT system. To make the application more usable, you have to conduct brainstorming, various sessions, meetings, etc. It will help you to solve new types of problems.

10. Knowledge of Fog Computing

Fog computing is Cisco's developed computer extension, which is used widely in networking services. It connects between cloud computing and your hand devices. To implement the internet of things, the knowledge of computers is a must. Because the internet of things works on small memory and small capacity, you can check out fog computing knowledge to enrich your knowledge.

Challenges of the Internet of Things Implementation

To implement the internet of things projects, lots of challenges are there. In research, it was found that 21% of the investment of the IoT project goes for the sensors. The data analyst investment is 23% percent, and network investment is 30%, system integration is 41%, security is 60%.

So in the study, we found that the majority percentage of investment goes for the security aspect. Because security is the most challenging part of implementing any project, besides the security aspect, there are many aspects we should follow, such as:

1. Developing a Quality product

29% executive believes that it is difficult to maintain the quality as per expectation. Before implementing any project, you should define the user requirement, approve the user interface from the appropriate authority, and lock you're all of your needs. Many IoT companies have a quality control department to solve this issue.

2. User awareness

Many IoT uses are not aware of the security and uses of IoT products. The unauthorized sharing of open applications can be a security hazard issue. It is not important to be technically strong, but security is mast because your wrong decision may lose your data.

3. Data security and privacy issue

Most of the big organizations have an issue, that is, the privacy issue. Because of the ransomware attack, there is a lack of confidence in data. The technology expert revealed that almost 25% of cyber attacks would cause IoT devices. More than 35% of users do not change the default password after getting any solution.
Some other challenges are:

- Malware infection is 24%
- Credential at 6%
- Privilege escalation 9 %
- Device misconfiguration issue 11%
- Social engineering attack 18%
- Phishing attack 24%

4. Analysis of intelligence

According to HubSpot's report, almost 44% of stakeholders face difficulties collecting data, and 30% of challenges are data authenticity. Two types of negative incidents can happen, like false-positive and false-negative results, out of those and unauthentic data. So before implementing any IoT process, you should ensure The authenticity of data.

5. Capabilities of data capturing

Capturing data is all the challenge for the data scientist. How do devices collect data from various sources like sensors and situations? The technology reporter express that 86% of business district holders agreed that only 8% of continuous information could be collected from the sensor. Do the internet of things is a new concern to the world to mitigate the challenges as soon as possible.

6. Challenges of unstructured data

There are more challenges for converting unstructured data. The sensor collects the data in a structured way. So more than 80% of IoT systems, it is difficult to manage unstructured data. Sometimes it is known as metadata, so if there is no standard guideline to use this data, it will be a great challenge to manage the project's internet.

7. Connectivity challenges

One of the most important challenges is internet connectivity. Without internet connectivity, your IoT system will be invaluable. We have described an IoT-based security system, patrolling system, and live surveillance in our IoT ideas. There is no internet connectivity, then the implementation of the internet of things will not be possible. Moreover, internet connectivity is not possible to provide everywhere.

8. IoT product integration with IoT platform

Are the movies or beginners of IoT project ideas a great challenge for integrating IoT platforms with the internet of things project? You are going to implement any new internet of things project. But if your sensor is not transmitting the data through the IoT software platform, or product will have no use. So, to implement any internet of things idea, configure the integration between the IoT platform and the product.

9. Identification and authentication

Important challenges are the identification of the appropriate user and authentication of the collected data. If the wrong person provides the wrong data, your system will vanish. Moreover, identification is a security issue for all personal.

10. Acceptance by different systems

You may develop your IoT new project ideas for your use. But if your project does not support the other systems, you cannot collect data from different sources. Without appropriate data, your system will not work. So it is a great challenge to maintain the compatibility and interoperability of different internet of things projects.

Essential Hardware Platform

- Raspberry Pi
- Arduino
- ESP 8266
- Intel Edison

> *Another misconception may misguide you, which is IoT projects without hardware. It is almost impossible. But, because of your ingenuity, you can develop your hardware.*

The IoT Programming language You can use in Project.

Java, C/C++, Python, PHP, and Java-Script are commonly used for IoT. But, Python is widely used for IoT because of the following features:

- Python is easy to code.
- The syntax of this language is simple.
- The integrator system and prototyping are more comfortable.
- It is embeddable and allows integration with maximum IoT languages.
- This extensible language is portable and supports all machines.
- Python is free and open-source with a large community.
- It is easy to learn, debug, and get library support.

IoT Project Without Internet

Since the words are "Internet of Things," you can think it is impossible to do the project without the internet. Many projects do not require it when the project requires to trigger any action to the user's remote device.

IoT takes information from its surroundings and triggers required action. But when triggering action is not required, then you can develop IoT systems without the internet. An IP camera system on a local network and home automation using the FOG network is the best example of IoT without the internet.

Final Thought

I hope you did like this list. Though the IoT project is comparatively new, trends and thoughts, you can still follow the above-mentioned IoT ideas for making some awesome IoT projects. If you liked it, then please share these ideas on your social media profile. And don't forget to share your suggestion in the comment section.