ASSIGNMENT 2

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Unit number and title	**Unit 43: Internet of Things**		
Submission date		**Date Received 1st submission**	
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Student Name	Quach Cong Tuan	**Student ID**	BHAF200014
Class	PBIT17101	**Assessor name**	Le Van Thuan

Student declaration

I certify that the assignment submission is entirely my own work and I fully understand the consequences of plagiarism. I understand that making a false declaration is a form of malpractice.

Student's signature	

Grading grid

P1	P2	P3	P4	M1	M2	M3	M4	D1	D2

❒ Summative Feedback:		❒ Resubmission Feedback:
Grade:	**Assessor Signature:**	**Date:**
Internal Verifier's Comments:		
Signature & Date:		

Contents

Introduction

The internet of things is a huge element in it as well. As we all know, technology has a significant impact on people's lives in industries like business, agriculture, and transportation. I'll go over the basics of the internet of things in this article and look at a few different IoT functionality models. Then, we'll discuss the common architecture, frameworks, tools, hardware, and APIs that can be used in IoT programming. I will then decide which components are needed to make IoT apps. Finally, I identify a particular problem that IoT might be able to solve and offer a project proposal.

P1. Explore various forms of IoT functionality

1. Definition

The Internet of Things (IoT) describes the network of physical objects "things" that are embedded with sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems over the internet. These devices range from ordinary household objects to sophisticated industrial tools.

2. History of Internet of Thing

1982 – Students invent a connected Coke machine.

Students at Carnegie Mellon University connected the department vending machine to the main computer via the local network, enabling them to check if drinks were available and cold. Not everyone liked Coke, but they all loved this invention.

1989 – The World Wide Web is invented

British scientist Tim Berners-Lee invented the World Wide Web (WWW) while working at CERN. The Governmental system of satellites was complemented by privately held ones, providing future IoT systems with communications. The first website that Berners-Lee brought online from the Swiss Alps is still available.

1990-1993 – World's first IoT device invented

In 1990, John Romkey created the first IOT device – a toaster that could be turned on and off over the Internet. By 1991, he had automated the entire process by adding a crane system that inserted the bread as well.

Then in 1993, the world's first webcam prototype, the Trojan Room Coffee Pot, was installed at the University of Cambridge to monitor the amount of coffee remaining in the brewing machine.

1998 – Mark Weiser creates a connected water fountain

Father of ubiquitous computing Mark Weiser created a fountain outside his office. The flow and the height of the water mimicked the price trends and volume of the stock market in real-time.

The 2008 crisis would have been a spectacular sight.

1999 – "The Internet of Thing" is coined

Kevin Ashton, the founder of Auto-ID, titled a presentation he made at Procter & Gamble "The Internet of Things". Ashton linked the ideas of RFID (radio-frequency identification) and the Internet, which impressed the listeners with its innovativeness. While his idea of RFID-based device connectivity differs from today's IP-based (Internet Protocol) IoT, Ashton's breakthrough played an essential role in IoT history and technological development overall.

2005 – The first smart home device is created

Originally released in June 2005, the Nabaztag – an early version of smart home devices like Alexa and Google Home – was an ambient electronic device shaped like a rabbit, able to alert its owner and speak to them about the weather, stock market changes, RSS feeds, etc.

In 2019, the iconic bunny made a comeback for a limited time with a new Raspberry Pi brain.

2008-2009 – IoT is born

According to Cisco IBSG*, IoT was conceived between 2008 and 2009, when the number of connected machines surpassed the number of humans on the planet. Currently, there are about 21.5 billion connected devices in the world – almost three times the number of people on the planet.

2011 – IoT added to the hype-cycle for emerging technologies

In 2011, Gartner, the market research company that invented the famous "hype-cycle for emerging technologies", included "The Internet of Things" on their list. This year, Gartner named Vodafone as a Leader in its 2021 Magic Quadrant for Managed IoT Connectivity Services for the seventh time in a row **.

2013-2014 – IoT devices start using sensors

Thermostats and home lighting started using sensors to accurately sense the surrounding environment. This allowed people to control home lighting, garage doors and thermostats all from their phone.

2014 – The first "smart city" is created

As a smart city "testbed", Smart Docklands in Dublin provided a platform for innovators to test cutting-edge technology solutions to local challenges, such as smart bins, sensors monitoring flood levels and city sound monitoring sensors.

2018 – IoT enters the healthcare and health insurance industries

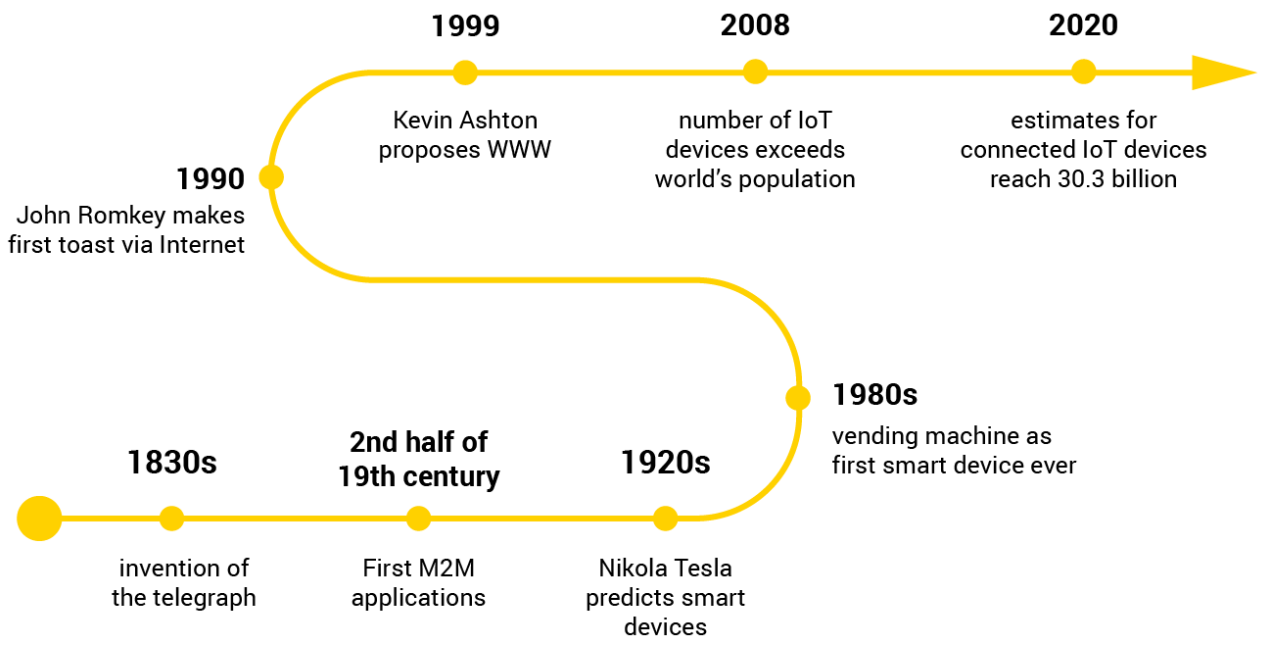
Healthcare devices represent one of the fastest-growing sectors of the IoT market. The value of this sector – sometimes called the Internet of Medical Things (IoMT) – is predicted to reach $176 billion by 2026***. IoT technology allows healthcare professionals to access patient data and improve the quality of wearable medical devices. Medical IoT solutions include blood glucose and heart rate monitoring, pacemakers, fall detection, geofencing and location monitoring.

2020 – IoT steps up in response to the COVID-19 crisis

In 2020, heat detection cameras started popping up in all sorts of public spaces to measure people's temperature. Using infrared technology, thermal cameras detect radiating heat from a body. Although these devices were originally not designed to be used for medical purposes – they are often deployed by firefighters to track smoldering embers and police to search for out-of-sight suspects

2021 - FIA creates IoT forum

The FIA IoT Forum provides a great opportunity for FIA members to work with other members under the banner of the FIA as the industry-leading voice to enable the fire industry and the customers we serve to benefit from IoT.


1830s
invention of the telegraph
2nd half of 19th century
First M2M applications
1920s
Nikola Tesla predicts smart devices
1980s
vending machine as first smart device ever
1990
John Romkey makes first toast via Internet
1999
Kevin Ashton proposes WWW
2008
number of IoT devices exceeds world's population
2020
estimates for connected IoT devices reach 30.3 billion

3. Characteristic of Internet of Thing

Today data is everything and everywhere. Hence, IoT can also be defined as the analysis of the data generate a meaning action, triggered subsequently after the interchange of data. IoT can be used to build applications for agriculture, assets tracking, energy sector, safety and security sector, defense, embedded applications, education, waste management, healthcare product, telemedicine, smart city applications, etc.

Characteristics of the Internet of Things:

3.1. Connectivity

Connectivity is an important requirement of the IoT infrastructure. Things of IoT should be connected to the IoT infrastructure. Anyone, anywhere, anytime can connect, this should be guaranteed at all times. For example, connection between people through internet devices like mobile phones, and other gadgets, also connection between Internet devices such as routers, gateways, sensors, etc.

3.2. Intelligence and Identity

The extraction of knowledge from the generated data is very important. For example, a sensor generates data, but that data will only be useful if it is interpreted properly. Each IoT device has a unique identity. This identification is helpful in tracking the equipment and at times for querying its status.

3.3. Scalability

The number of elements connected to the IoT zone is increasing day by day. Hence, an IoT setup should be capable of handling the massive expansion. The data generated as an outcome is enormous, and it should be handled appropriately.

3.4. Dynamic and Self-Adapting (Complexity)

IoT devices should dynamically adapt themselves to the changing contexts and scenarios. Assume a camera meant for the surveillance. It should be adaptable to work in different conditions and different light situations (morning, afternoon, night).

3.5. Architecture

IoT architecture cannot be homogeneous in nature. It should be hybrid, supporting different manufacturers 'products to function in the IoT network. IoT is not owned by anyone engineering branch. IoT is a reality when multiple domains come together.

3.6. Safety

There is a danger of the sensitive personal details of the users getting compromised when all his/her devices are connected to the internet. This can cause a loss to the user. Hence, data security is the major challenge. Besides, the equipment involved is huge. IoT networks may also be at the risk. Therefore, equipment safety is also critical.

4. The important of IoT

Over the past few years, IoT has become one of the most important technologies of the 21st century. Now that we can connect everyday objects—kitchen appliances, cars, thermostats, baby monitors—to the internet via embedded devices, seamless communication is possible between people, processes, and things.

By means of low-cost computing, the cloud, big data, analytics, and mobile technologies, physical things can share and collect data with minimal human intervention. In this hyperconnected world, digital systems can record,

monitor, and adjust each interaction between connected things. The physical world meets the digital world—and they cooperate.

5. Application

IoT Intelligent Applications are prebuilt software-as-a-service (SaaS) applications that can analyze and present captured IoT sensor data to business users via dashboards. We have a full set of IoT Intelligent Applications.

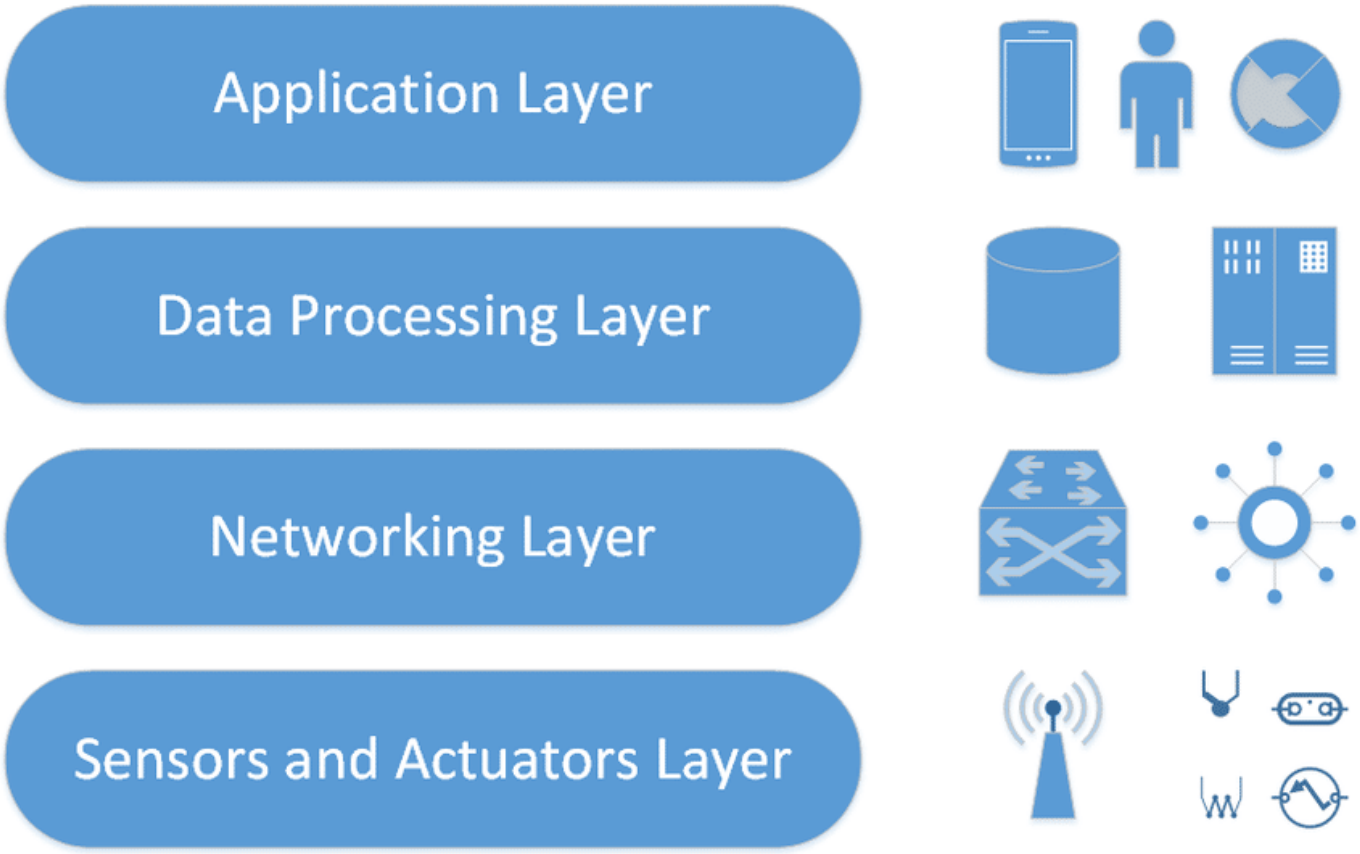
IoT applications use machine learning algorithms to analyze massive amounts of connected sensor data in the cloud. Using real-time IoT dashboards and alerts, you gain visibility into key performance indicators, statistics for mean time between failures, and other information. Machine learning–based algorithms can identify equipment anomalies and send alerts to users and even trigger automated fixes or proactive counter measures.

With cloud-based IoT applications, business users can quickly enhance existing processes for supply chains, customer service, human resources, and financial services. There’s no need to recreate entire business processes.

P2. Review standard architecture, frameworks, tools, hardware, and APIs available for use in IoT development

1. Architecture

The Internet of Things (IOT), which includes machine-to-machine, business-to-machine, human-to-human, and other types of connectivity, can be seen as the internet's future progression. It makes everything and everyone connected. It integrates automation and intelligence into internet network services. The IOT has become more widely used in a variety of fields as a result of rising demand. A new service will be established in response to future network and internet requirements.



Sensing Layer: Sensor, actuator, and device layers make up the sensing layer. These sensors or actuators gather information (physical/environmental properties), process it, and then send it across a network.

Network Layer: Data acquisition systems and Internet/Network gateways are found in the network layer (DAS). Data gathering and conversion are managed by DAS (Collecting data and aggregating data then converting analogue data of sensors to digital data etc.). In addition to connecting Sensor networks to the Internet, advanced

gateways also perform several basic gateway tasks, including filtering and virus prevention, making decisions based on inputted data, and data management services, among others.

Data Processing Layer: This layer processes data and serves as the brain of the Internet of Things. Prior to being delivered to a data center, where it may be accessed by software programs referred to as business applications, data is assessed here, pre-processed, and future actions are planned. Thus, edge IT or edge analytics come into play.

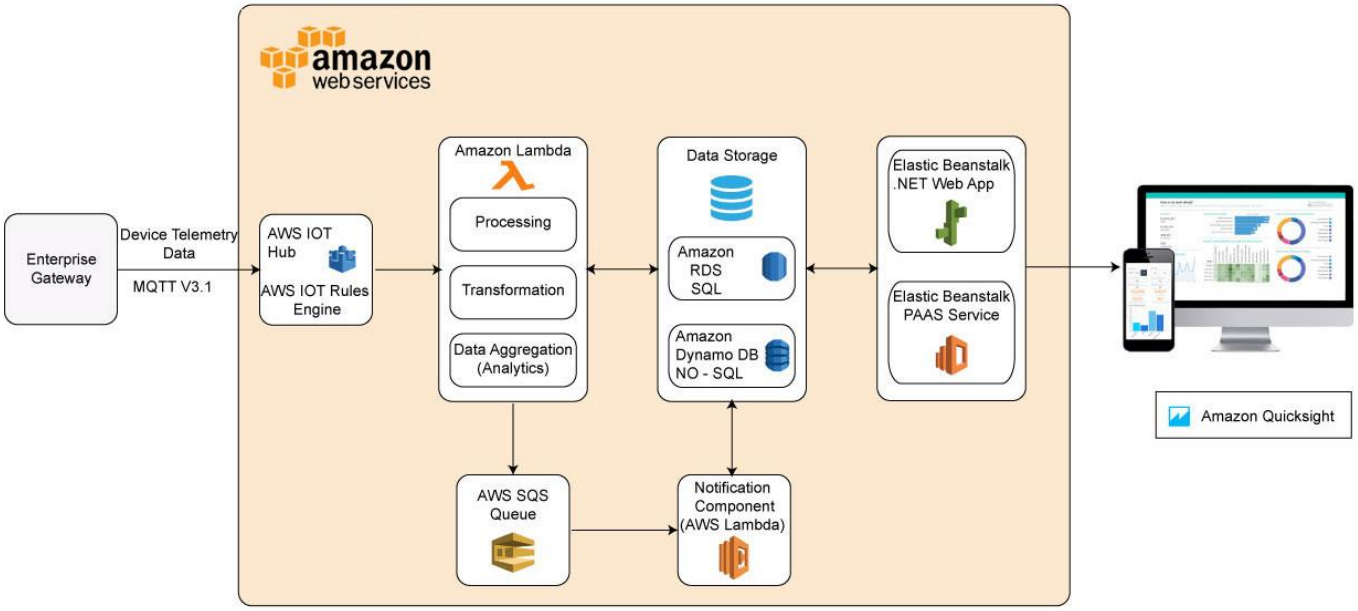
Application Layer: The application layer is the fourth and last stage of the IoT architecture. The data management phases of data centers or the cloud are where data is preserved and used by end-user applications like agriculture, health care, aerospace, farming, and the military, among others.

2. Framework

Some minimal set of requirements must be met in order for integration and interoperability in IoT to be achieved and for an IoT framework to be trusted and dependable. These frameworks are used by IoT research communities from organizational to academic research that concentrate on integrating items in IoT. We suggest a set of minimal requirements that IoT frameworks for integration must meet, given that the IoT paradigm is still in a growing state.

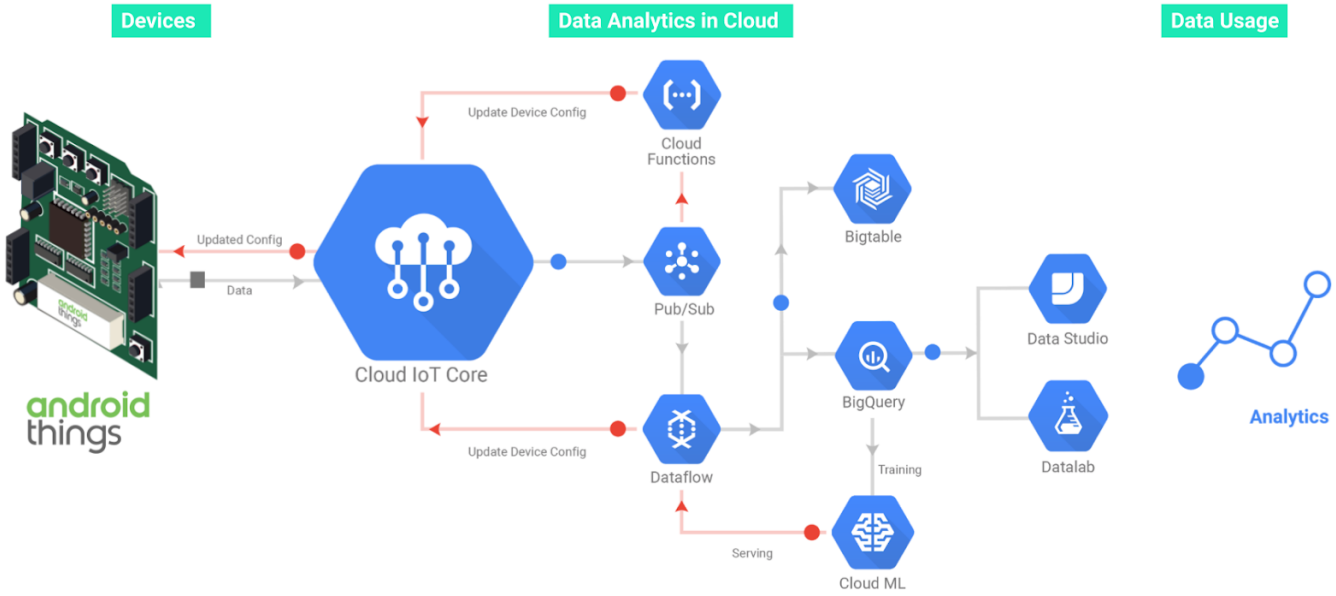
2.1. Amazon Web Services (AWS) IoT framework

Amazon Web Services (AWS) is an IoT platform provided by Amazon. This IoT platform provides cloud computing, database, and security services through the AWS Console. There are so many other services such as Regions, Availability Zones, and Virtual Private Clouds (VPCs). It helps to ease out the improving durability, distribution, availability of the application. It provides Registry for recognizing devices, Secure Device Gateway, Compatible Software Development Kit for devices which AWS partnered with HW manufacturers like Intel, Texas Instruments, Broadcom and Qualcomm.



2.2. Google Cloud Platform – IoT framework

Things can be done by Google. Google Cloud is one of the best IoT systems available today with its end-to-end platform. Google stands out from the others because it can process the large quantity of information using Cloud IoT Core. Due to Google's Cloud Data Studio and Big Query you get advanced analysis. With the help of Google Cloud Platform, you can accelerate your business and with that, you can speed up your device.



2.3. Salesforce IoT

Salesforce is power by thunder. Thunder allows companies to unlock earlier unseen ideas and allows anyone to take proactive, personalized activities from any device to bring their clients closer than ever. More than 150,000 clients worldwide were held by Salesforce. Salesforce has a 19.7% market share in the globe of CRM. SAP (12.%1), Microsoft (6.2%), Oracle (9.1%) are far behind its nearest rivals. Many businesses now develop their apps or migrate to Salesforce on the Salesforce platform. This has raised demand for developers and administrators from Salesforce.

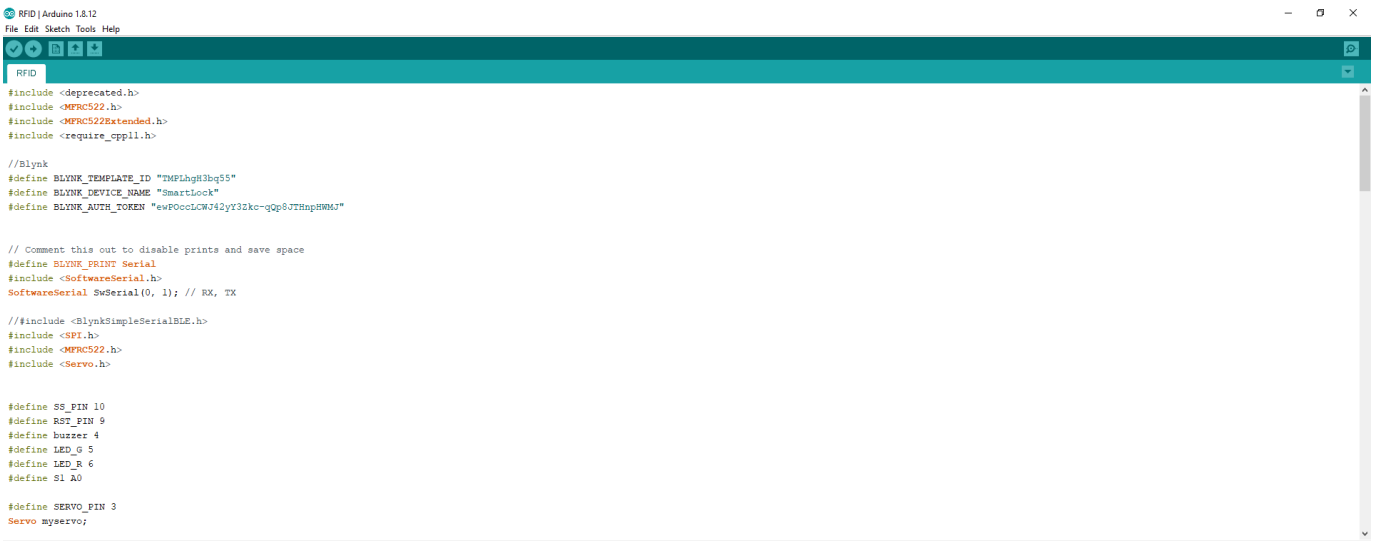
3. Tools

Internet of Things Tools are referred to as IoT Tools. It is a network or connection that includes, among other things, gadgets, vehicles, machinery with embedded electronics, home appliances, and structures. This facilitates the gathering and exchange of various kinds of data. Additionally, it allows for network-based remote control of the devices by the user. IoT is the newest buzzword in today's internet-driven culture and has taken over the IT industry. It has created a multitude of brand-new prospects for businesses and IoT developers. IoT app development has led to the creation of many incredible things. Internet of Things solution providers are creating hardware and software designs to help IoT developers create innovative new IoT devices and apps.

The term "IOT Tools" refers to Internet of Things Tools. It is a collection of gadgets, cars, machinery with embedded electronics, home appliances, structures, and more. This facilitates the gathering and exchange of many types of data. The ability to remotely control the devices across a network is another benefit. Here are some developer tools:

3.1. Arduino

Arduino is the leading company on the IoT market that produces electronic devices and software for them. Arduino hardware offerings include microcontroller boards, modules, shields and kits. Hardware specifications are suitable for creating various projects, such as robotics and home automation.

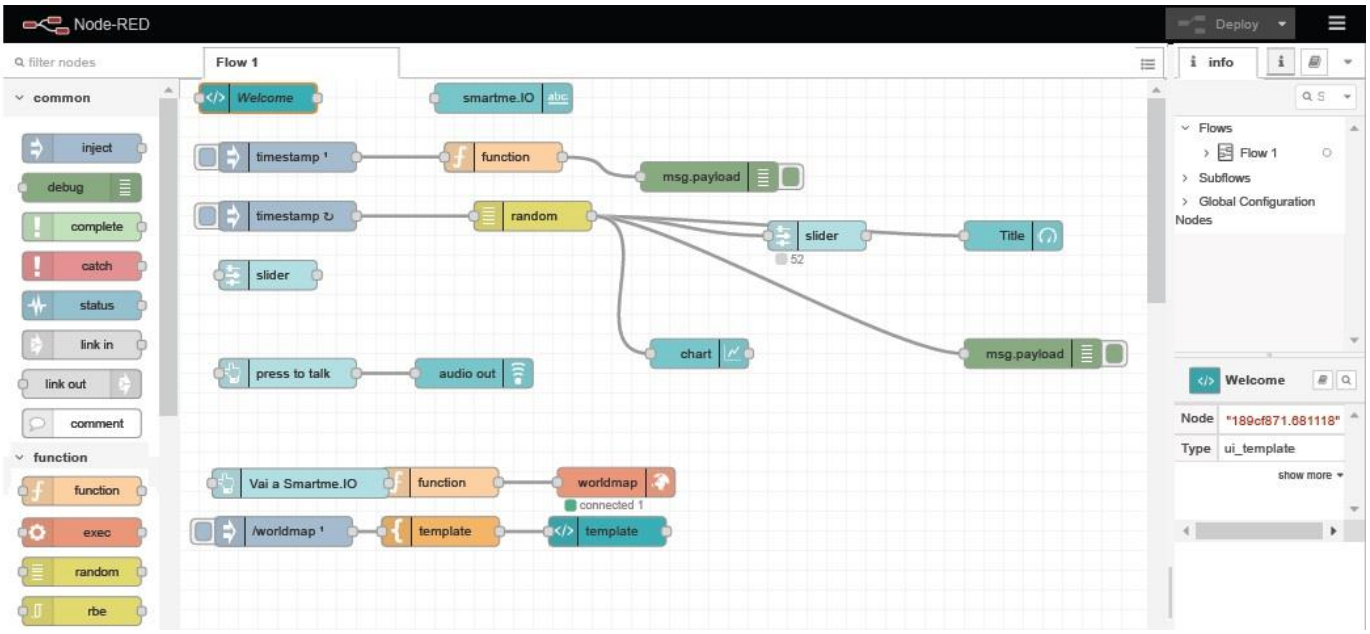


3.2. Flutter

Another hardware product for IoT solutions is Flutter — a programmable processor core. The board is based on Arduino, has a powerful ARM processor, built-in battery charging and a security chip. A long-range wireless transmitter makes this board the perfect fit for wireless networks of sensors.

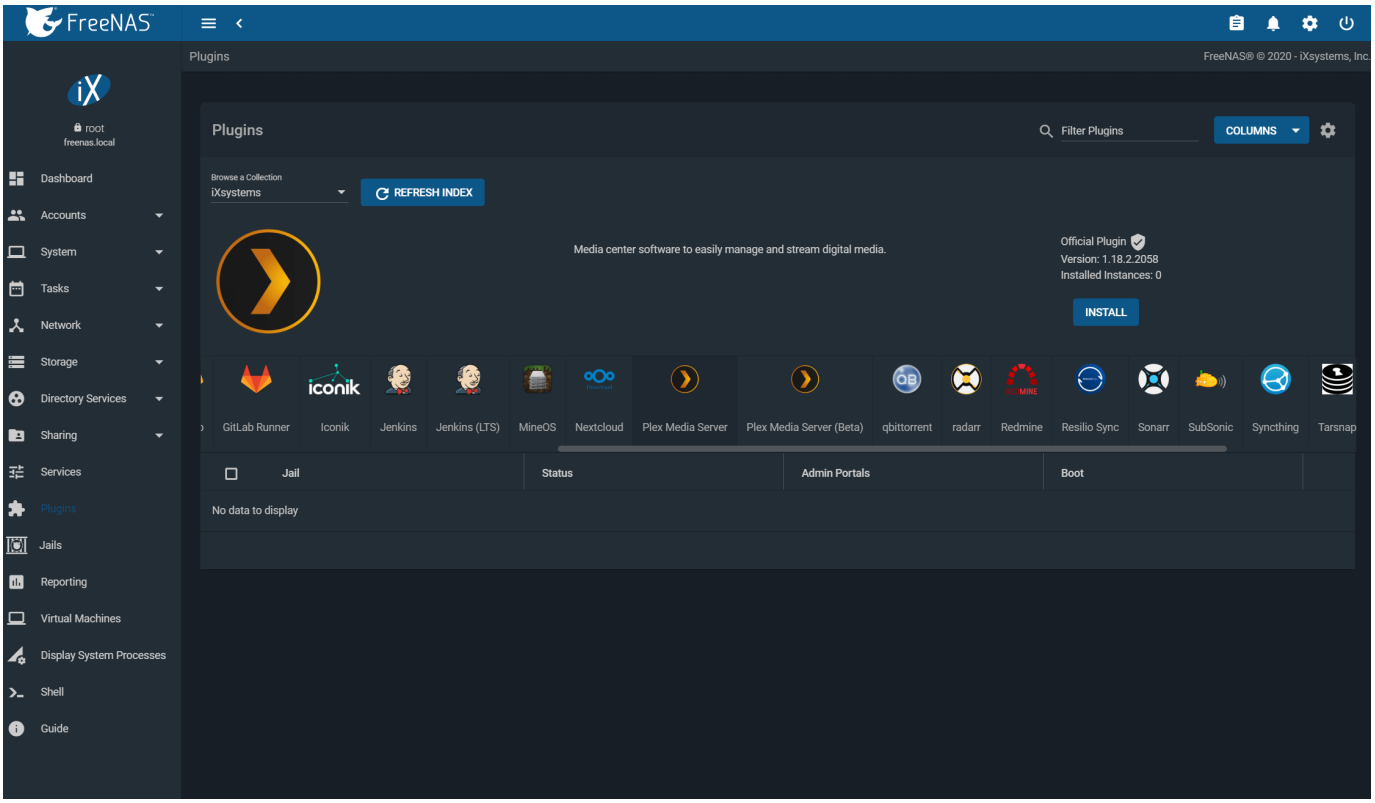
3.3. Kinoma

A group of software engineers from Marvell Technology, Inc., a leading manufacturer of memory devices, microcontrollers, telecom equipment and semiconductor devices, has developed a line of open-source Kinoma software and hardware products for the Internet of Things and embedded solutions.



3.4. Raspberry Pi OS (ex. Raspbian)

Raspberry Pi OS, formerly known as Raspbian, is the official operating system for the Raspberry Pi hardware. A 32-bit version is available currently, with a 64-bit version in active development. This is a free, Debian-based system. Raspberry includes basic programs and utilities to make the hardware run, but it also compiles thousands of packages and pre-compiled software for easy installation.



4. Hardware

IoT hardware covers a variety of devices, including sensors, bridges, routing devices, and more. These IoT devices handle important duties and operations such system activation, security, action definitions, communication, and goal- and action-specific goal detection.

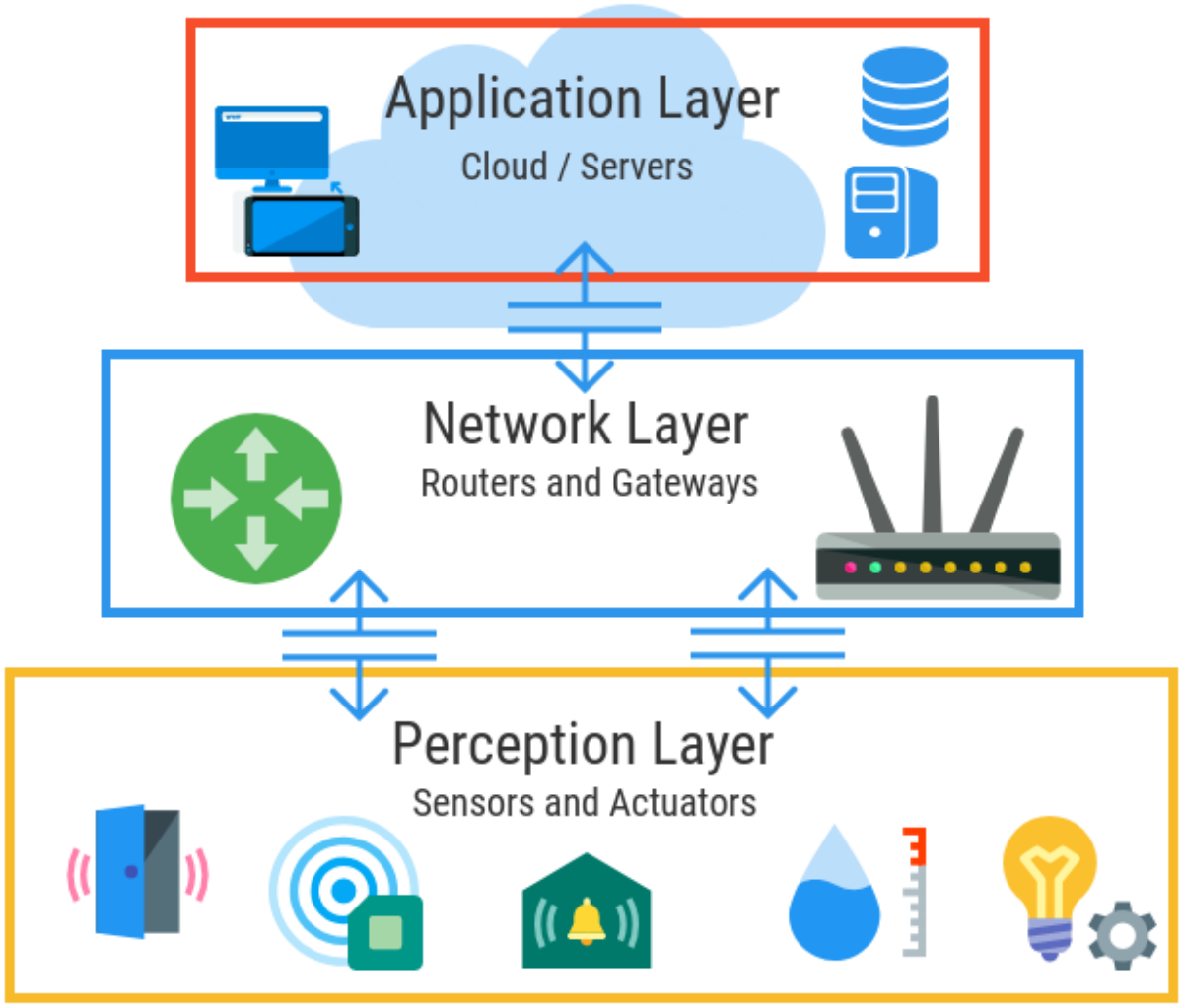
5. APIs

For the purpose of creating software applications, a collection of procedures, protocols, and tools known as an API are used. Because they enable you to securely expose connected devices to customers, go-to-market channels, and other applications in your IT infrastructure, APIs are closely related to the Internet of Things (IoT). Because APIs link significant "things" like automobiles, medical equipment, smart grids, and thermostats to your ecosystem, it is more necessary than ever to implement flexible, scalable, and secure API administration.

IoT APIs allow applications to read sensors and analyze smart city or smart campus data, automate home appliances, utilize voice commands, manage proximity beacons, automate smart cars, manage edge computing, manage manufacturing and industrial equipment, and so much more.

P3. Investigate architecture, frameworks, tools, hardware, and API techniques available to develop IoT applications

1. Architecture



According to the definition of IoT, any IoT system consists of objects or gadgets that produce data, a network that transmits that data, and services that store and process that data. The three levels that make up an IoT system are as follows:

1.1. Physical layer

The physical layer is made up of devices, sensors and controllers. They are what make the IoT environment. Devices may be smartphones or tablets, laptops, devices with microchips or a brownfield device with RFID tags.

1.2. Edge computing layer

Storing and processing data near the devices where it is generated rather than the servers located far away is called edge computing. The edge computing layer defines the networks and communication protocols to be used for connectivity as well as edge computing. The processing of IoT data starts at the edge of the network.

1.3. Application layer

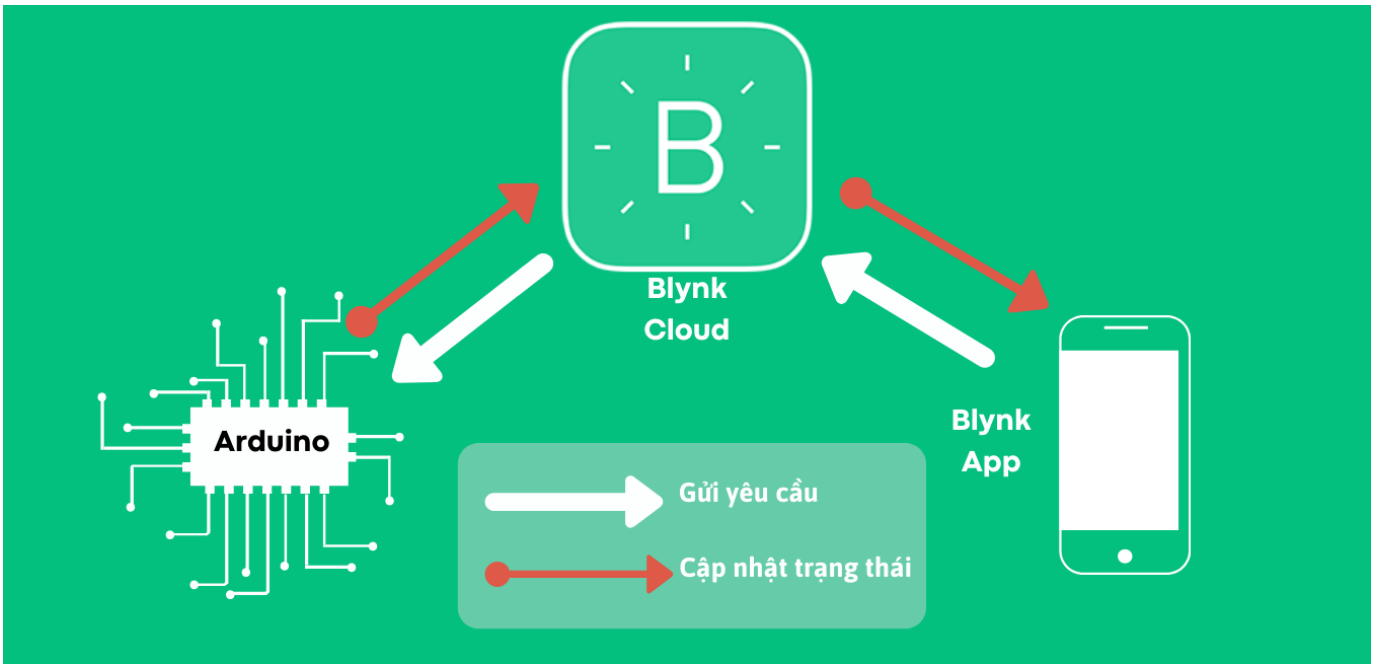
Beyond the edge computing layer, action moves to cloud. The application layer is a set of integrated services provided by the IoT cloud to gain useful insights and perspectives from the data gathered.

The data generated by the IoT devices is cleaned and relevant data stored on cloud servers for further processing to generate reports and insights. Businesses can get their own customized applications developed on top of the tools provided by cloud service providers.

2. Framework

The Internet of Things (IoT) Framework can be an ecosystem, comprising of several connected devices that communicate with each other, over the Internet. These connected devices usually work to transfer and sense data over the Internet, while requiring very little human intervention.

The IoT framework is what makes it possible for the connected devices to have smooth communication over the Internet. It is no wonder, then, that it is referred to as the 'Internet of Things' framework, or in other words, the framework that facilitates the interaction of 'Things' (devices) over the Internet.



The IoT framework is a very important element of technology in the modern world, finding application in almost every sector. For instance, one of the major applications of the IoT is in the designing of smart homes.

The IoT framework concept is also applied in the designing of different physical objects, such as thermostats, electrical devices, security and alarm systems, as well as vending machines, among many other objects.

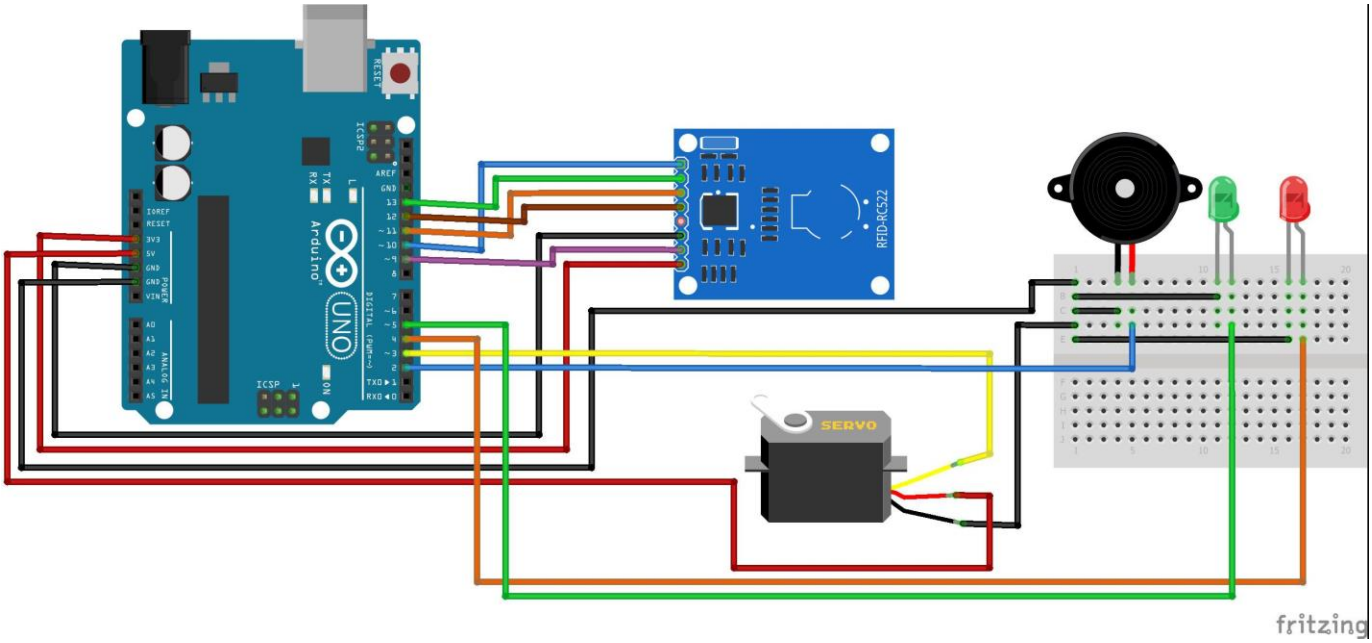
With Blynk, you can create smartphone applications that allow you to easily interact with microcontrollers or even full computers such as the Raspberry Pi.

The main focus of the Blynk platform is to make it super-easy to develop the mobile phone application. As you will see in this course, developing a mobile app that can talk to your Arduino is as easy as dragging a widget and configuring a pin.

With Blynk, you can control an LED or a motor from your mobile phone with literally zero programming. This is actually the first experiment that I will demonstrate in this course. Blynk is free to use for personal use and prototyping. Their business model generates profits by selling subscriptions to businesses that want to publish Blynk-powered apps for their hardware products or services.

3. Tools

IoT Tools stands for the Internet of Things Tools. It is a network or connection of devices, vehicles, equipment applying embedded electronics, home appliances, buildings and many more. This helps in collecting and exchanging different kinds of data. It also helps the user to control the devices remotely over a network.



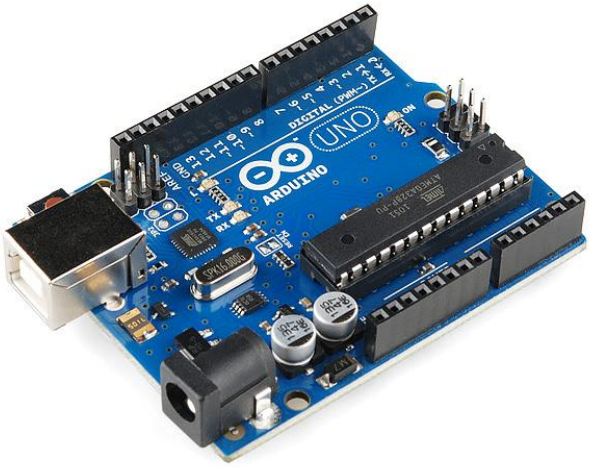
Some IoT tools and devices are discussed below:

Arduino

Arduino is an Italy based IT company that builds interactive objects and microcontroller boards. It is an open-source prototyping platform that offers both IoT hardware and software. Hardware specifications can be applied to interactive electronics and software includes Integrated Development Environment (IDE). It is the most preferable IDEs in all IoT development tools. This platform is easy and simple to use.

4. Hardware

Here are some of the most used typical hardware in our life:

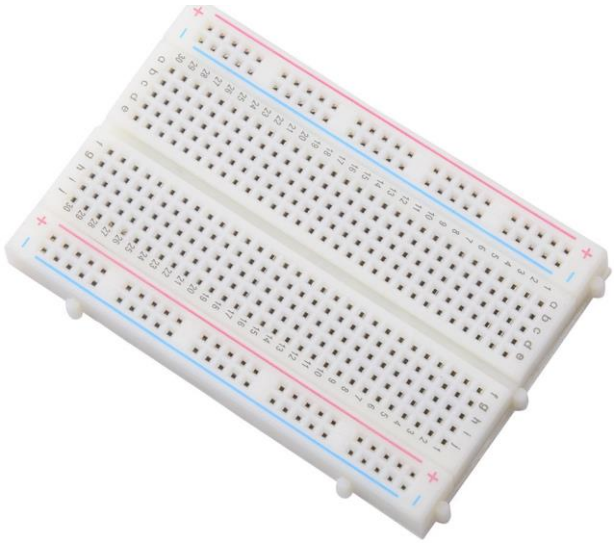
Image of Hardware	Name of Hardware	Description
	Arduino UNO R3	Arduino is an open-source platform used for building electronics projects. Arduino consists of both a physical programmable circuit board (often referred to as a microcontroller) and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board.
	RFID – PC522	RFID is an acronym for "radio-frequency identification" and refers to a technology whereby digital data encoded in RFID tags or smart labels (defined below) are captured by a reader via radio waves. RFID is similar to barcoding in that data from a tag or label are captured by a device that stores the data in a database. RFID, however, has several advantages over systems that use barcode asset tracking software.

Led Light

LEDs are small, powerful lights that are used in many different applications. To start, we will work on blinking an LED, the Hello World of microcontrollers. It is as simple as turning a light on and off.

Servo SG-90

Micro Servo Motor SG90 is a tiny and lightweight server motor with high output power. Servo can rotate approximately 180 degrees (90 in each direction), and works just like the standard kinds but smaller. You can use any servo code, hardware or library to control these servos.



Bread Broad

A breadboard is a solderless device for temporary prototype with electronics and test circuit designs. Most electronic components in electronic circuits can be interconnected by inserting their leads or terminals into the holes and then making connections through wires where appropriate.

Jumper Wire

To connect between among hardware in my project.

P4. Determine a specific problem to solve using IoT

1. Problem definition

As technology develops, smart homes will become more common. If a home has electrical and electronic equipment that can be controlled, automated, or at least partially automated, it is said to be a smart home. replace some of the administration and control tasks with machines. This electronic system may communicate with the user via an interior electronic board, a mobile phone app, a tablet computer, or a web interface.

With the project of automatic doors and smart door locks used on RFID cards or doors can be opened on the application on smartphone devices or even websites. I believe that my product will help people a lot in the future. Its applicability will be very high when used by everyone, which shows that today people will find things connected to the system, and smartphone devices will become very convenient and helpful for them in life.

2. Purpose of the project

In daily life, people must carry a lot of keys or sometimes they will forget where the keys are. Carrying a lot of keys also makes people another way of saying "bulky". The purpose I use the product is to create everyday convenience for people. Users only need to open doors using their card for multiple doors, even though they can open doors with their handheld devices. So, when they forget their RFID card or phone, they can borrow other devices to log in and open the door. The door's password or the door's access management is also quite easy. Users can have a good experience in managing houses or apartments, and offices, ...

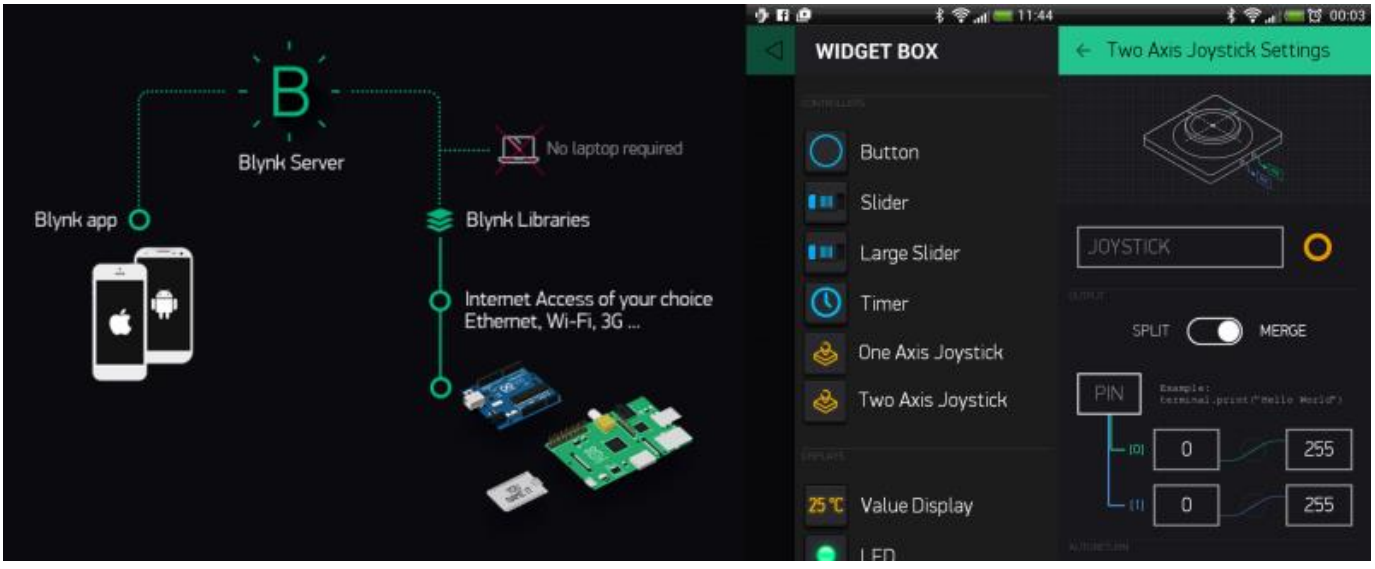
3. Functions of the project

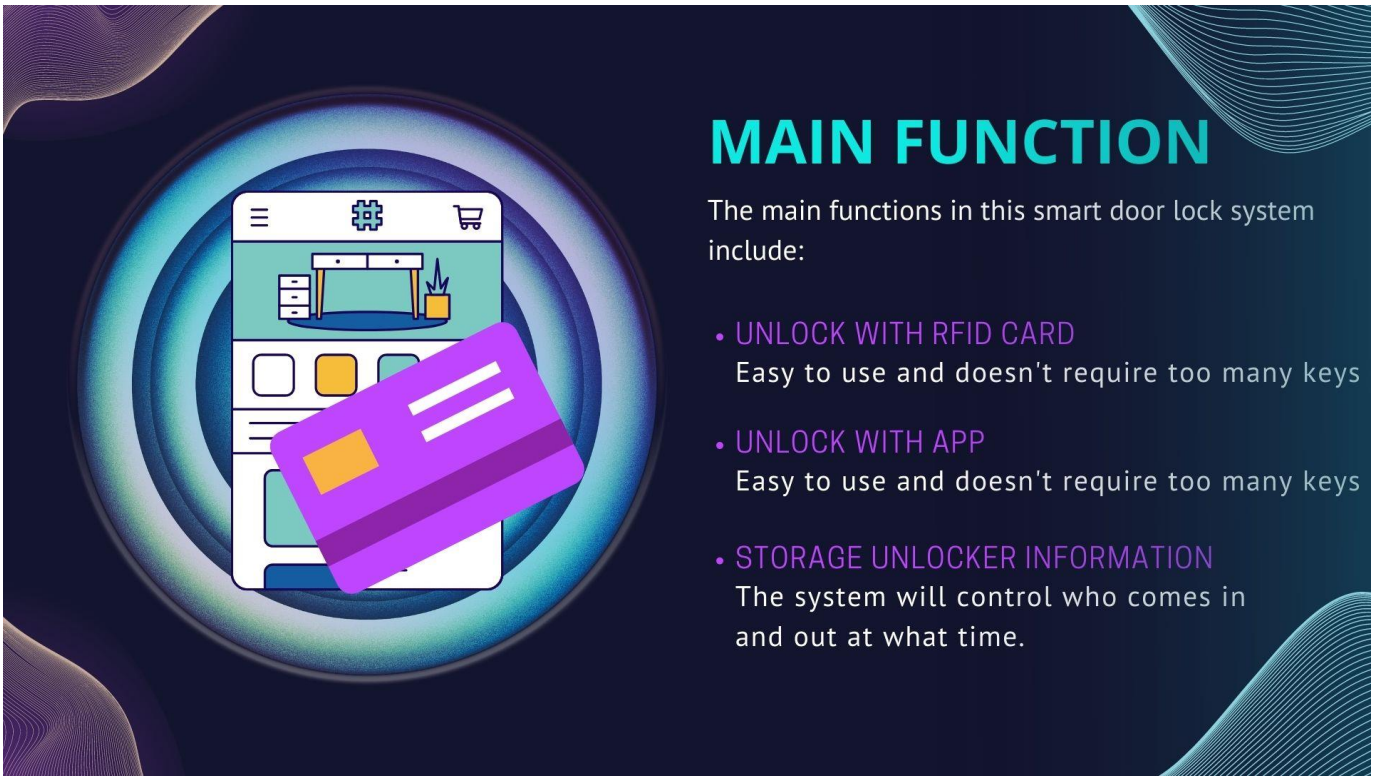
The main functions that I put into use will include functions such as opening the door with RFID, opening the door with the connected application.

I will explain more about how RFID works. The RC522 is a 13.56MHz RFID module based on the MFRC522 controller from NXP semiconductors consisting of an RFID reader, an RFID tag, and an RF key. The 13.56MHz frequency is an industrial band (ISM) and can therefore be used without licensing issues.

An RFID system consists of two main components, the tag placed on the object we want to identify and the transceiver or reader.

Using the application to open the door will be connected by me through a framework called Blynk. In this application, users will log in and perform opening and closing operations with buttons that have been designed by me.




MAIN FUNCTION
The main functions in this smart door lock system include:
• UNLOCK WITH RFID CARD
Easy to use and doesn't require too many keys
• UNLOCK WITH APP
Easy to use and doesn't require too many keys
• STORAGE UNLOCKER INFORMATION
The system will control who comes in and out at what time.

M1 – M2. Evaluate and review the impact of common IoT architecture, frameworks, tools, hardware and APIs in the software development lifecycle.

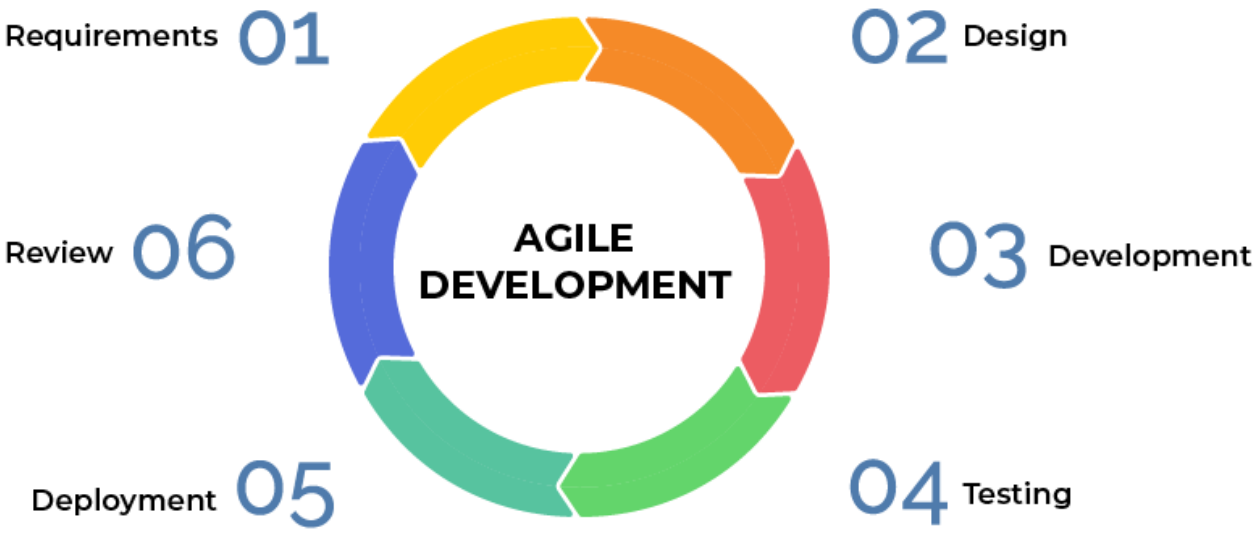
1. The impact of common IoT platform in software development

Software has long been connected to a state of crisis because of how successful it is. The growth of devices with Internet access, also referred to as the "Internet of Things," increases the complexity of software systems. The characteristics of these systems, such as their enormous scale and variety, present an ever-growing number of new issues. In this essay, we'll first give a brief introduction to the IoT paradigm and the state of software development right now. After providing a general overview of the methods and resources available for planning, creating, and testing such systems, we next go into the intricacies of developing software for IoT systems and systems of systems.

Software systems are now much more complex overall than they were in the past. They involve hybrid development teams, challenging programming, and ongoing data gathering.

IoT technologies are incredibly beneficial to software development companies. Professionals that can keep up with the newest advancements in IT will succeed in their careers to a great extent. Learning IoT software development requires the development of several skills, including machine learning and AI. IoT platforms accommodate a variety of gadgets, plug-and-play sensors, and third-party applications. The necessary building blocks for creating and administering an IoT solution are offered by these platforms.

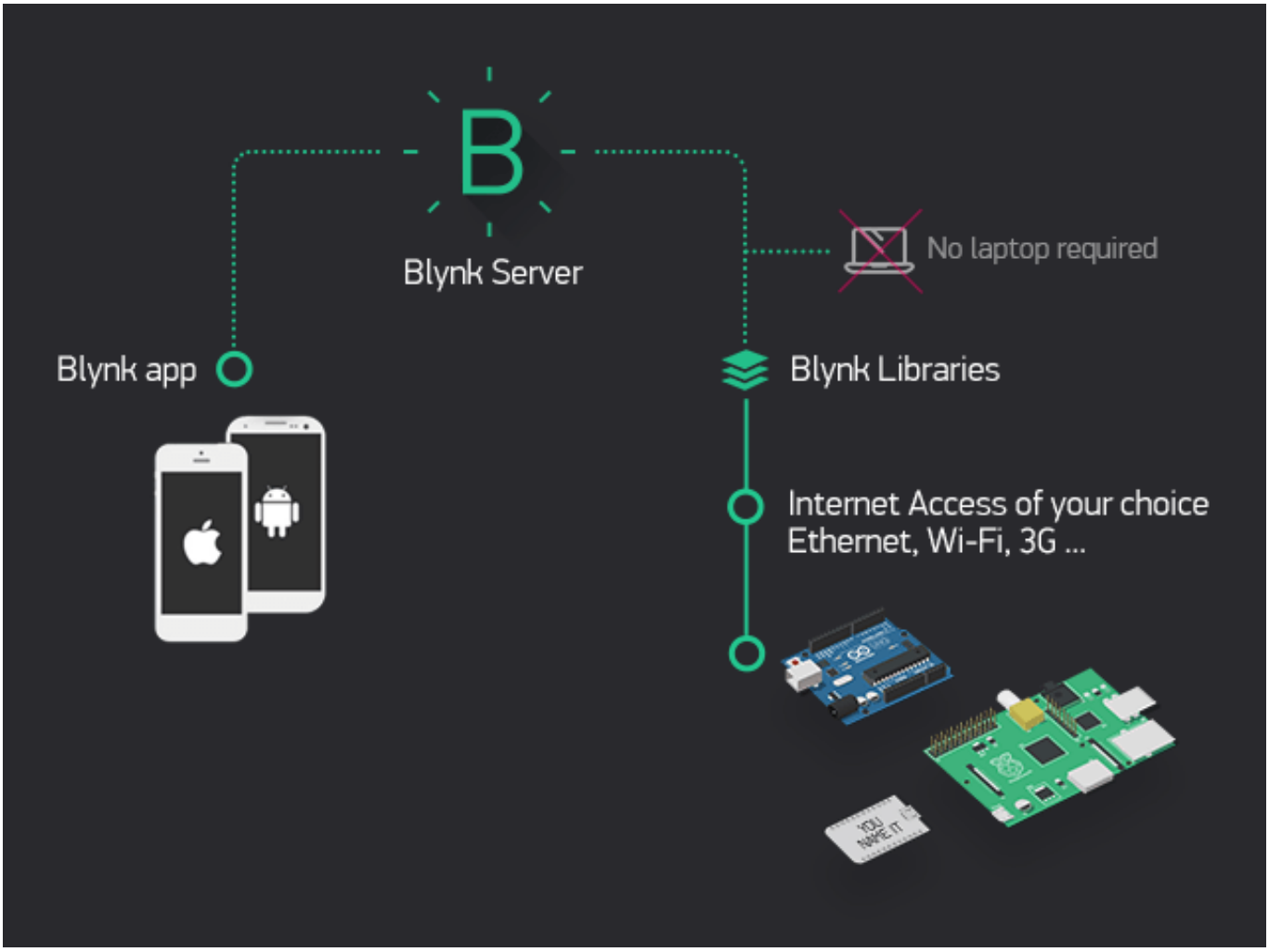
As low-code or no-code platforms grow more accommodating to businesses, the relationship between IoT solutions and software development is projected to continue.



The Internet of Things (IoT) has resulted in several unanticipated yet wonderful changes in our daily lives. The way individuals connect has significantly changed as a result of the Internet of Things. Both hardware and software

have benefited from technological advancements. Successful software development is essential to many businesses.

2. Architecture physical



2.1. Network Layer

Blynk Cloud is open source, giving you the freedom to develop. Can run on your server, local server, business server, or right on your computer. Blynk Server can be installed and used within minutes. Can manage and control billions of requests from your devices.

The network layer works for the transmission of data from one host to the other located in different networks. It also takes care of packet routing i.e., selection of the shortest path to transmit the packet, from the number of routes available. The sender & receiver's IP addresses are placed in the header by the network layer.

The functions of the Network layer are:

- Routing: The network layer protocols determine which route is suitable from source to destination. This function of the network layer is known as routing.

- Logical Addressing: In order to identify each device on internetwork uniquely, the network layer defines an addressing scheme. The sender & receiver's IP addresses are placed in the header by the network layer. Such an address distinguishes each device uniquely and universally.

Blynk Library will be uploaded to control circuits such as Arduino, Esp8266... on circuits that can connect to many sensors, and devices,... And connected to Blynk Server via Wifi, Ethernet, 3G, LTE...

Blynk App installs on the phone connected to Blynk Server via Wifi or LTE. Will receive the parameters that the control circuits send to the Server, and also send commands and control signals to the Server and send to the control circuits.

2.2. Application Layer

Blynk is an IoT platform for iOS or Android smartphones that is used to control Arduino, Raspberry Pi and NodeMCU via the Internet. This application is used to create a graphical interface or human machine interface (HMI) by compiling and providing the appropriate address on the available widgets. 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.

At the very top of the OSI Reference Model stack of layers, we find the Application layer which is implemented by the network applications. These applications produce the data, which has to be transferred over the network. This layer also serves as a window for the application services to access the network and for displaying the received information to the user.

M3. Select the most appropriate IoT architecture, frameworks, tools, hardware and API techniques to include in an application to solve this problem.

In the development project of automatic door opener and smart door lock. I have carefully considered the choice of architecture, framework, tools and equipment to be able to make a real product and easy to put into life. With the technologies I have chosen to carry out the project, I believe that the devices I choose below as well as the platform will help me complete this project in the best way.

For this project, I will be using techniques from the Blynk and Arduino platforms. The architecture I will choose and implement on the perception, network and application layers. These layers will help the shared platform use the OSI model data including all the information to be transformed.

1. Architecture

Perception Layer: I will be using equipment including Arduino UNO R3, Servo SG90, Led light and RFID reader among others.

Networking Layer: In the Network layer I will use wired connection, and in the next section I will try to improve and develop it using Wi-Fi. In this floor there will be some connections via RFID waves. This will keep the system running in the best possible way. Blynk Cloud Server will be the place to operate and connect information between the Perception layers.

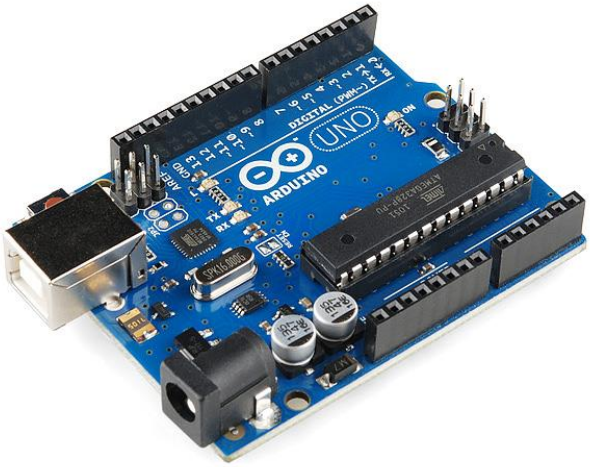
Application Layer: At the application layer I will use Blynk's website or the Blynk application which is available on the download platforms of the Appstore and Google Play. This will be the user layer that can experience and interact with the Perception layer.

2. Framework and Tools: BLYNK AND ARDUINO IDE

In the framework I choose Blynk. This is going to be a platform that helps me greatly improve control and through an open-source code. And Blynk is also a free software to be able to use and save a lot of operating costs.

3. Hardware

Below are the devices I brought into design and develop a product.

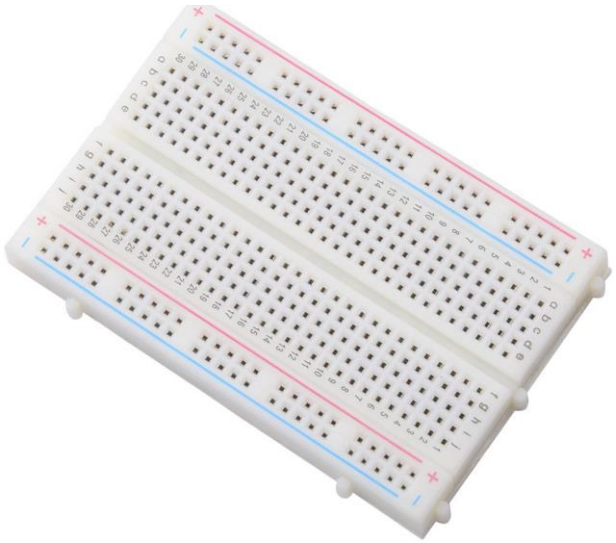
Image of Hardware	Name of Hardware	Description
	Arduino UNO R3	Arduino is an open-source platform used for building electronics projects. Arduino consists of both a physical programmable circuit board (often referred to as a microcontroller) and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board.
	RFID – PC522	RFID is an acronym for "radio-frequency identification" and refers to a technology whereby digital data encoded in RFID tags or smart labels (defined below) are captured by a reader via radio waves. RFID is similar to barcoding in that data from a tag or label are captured by a device that stores the data in a database. RFID, however, has several advantages over systems that use barcode asset tracking software.

Led Light

LEDs are small, powerful lights that are used in many different applications. To start, we will work on blinking an LED, the Hello World of microcontrollers. It is as simple as turning a light on and off.

Servo SG-90

Micro Servo Motor SG90 is a tiny and lightweight server motor with high output power. Servo can rotate approximately 180 degrees (90 in each direction), and works just like the standard kinds but smaller. You can use any servo code, hardware or library to control these servos.



Bread Broad

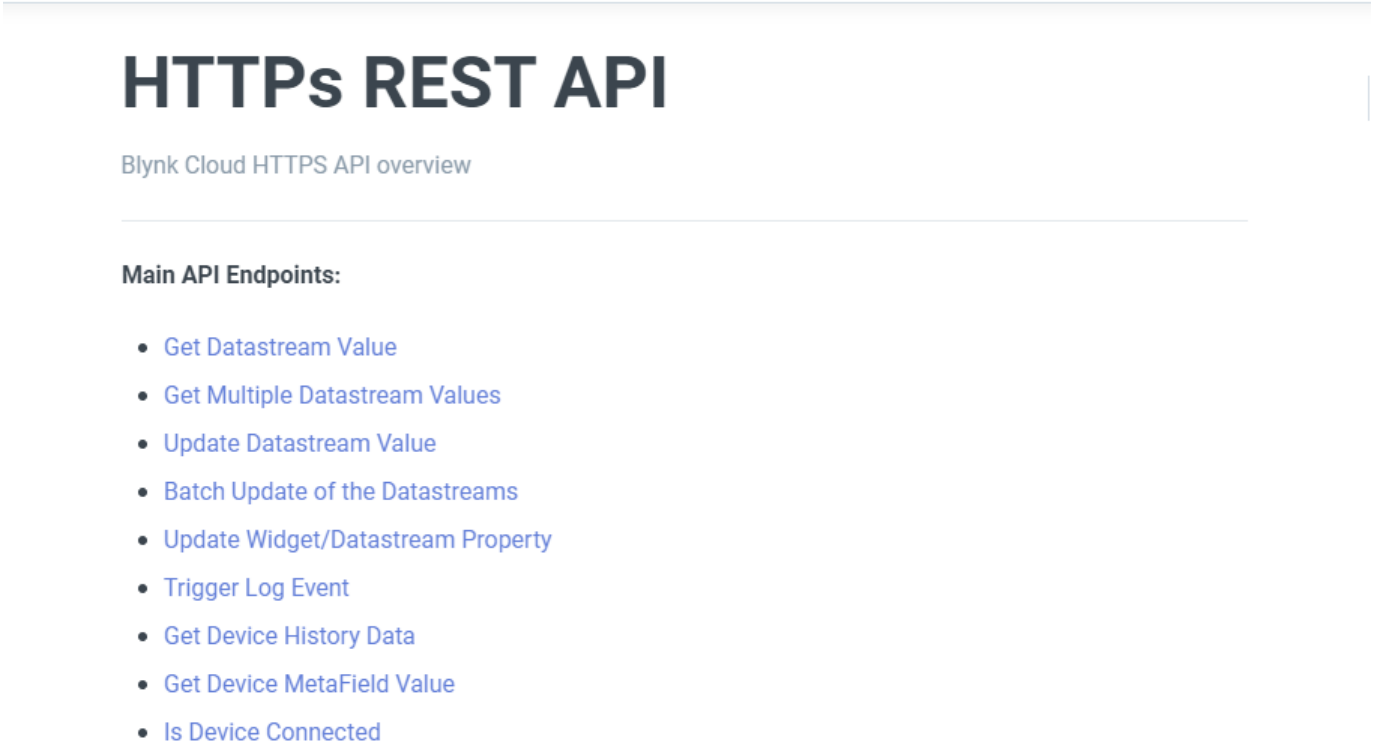
A breadboard is a solderless device for temporary prototype with electronics and test circuit designs. Most electronic components in electronic circuits can be interconnected by inserting their leads or terminals into the holes and then making connections through wires where appropriate.

Jumper Wire

To connect between among hardware in my project.

4. API

In the API I used the API to perform functions like getting DataStream Value. These data have all been coded by me on the Arduino device and synchronized via Blynk.



HTTPs REST API

Blynk Cloud HTTPS API overview

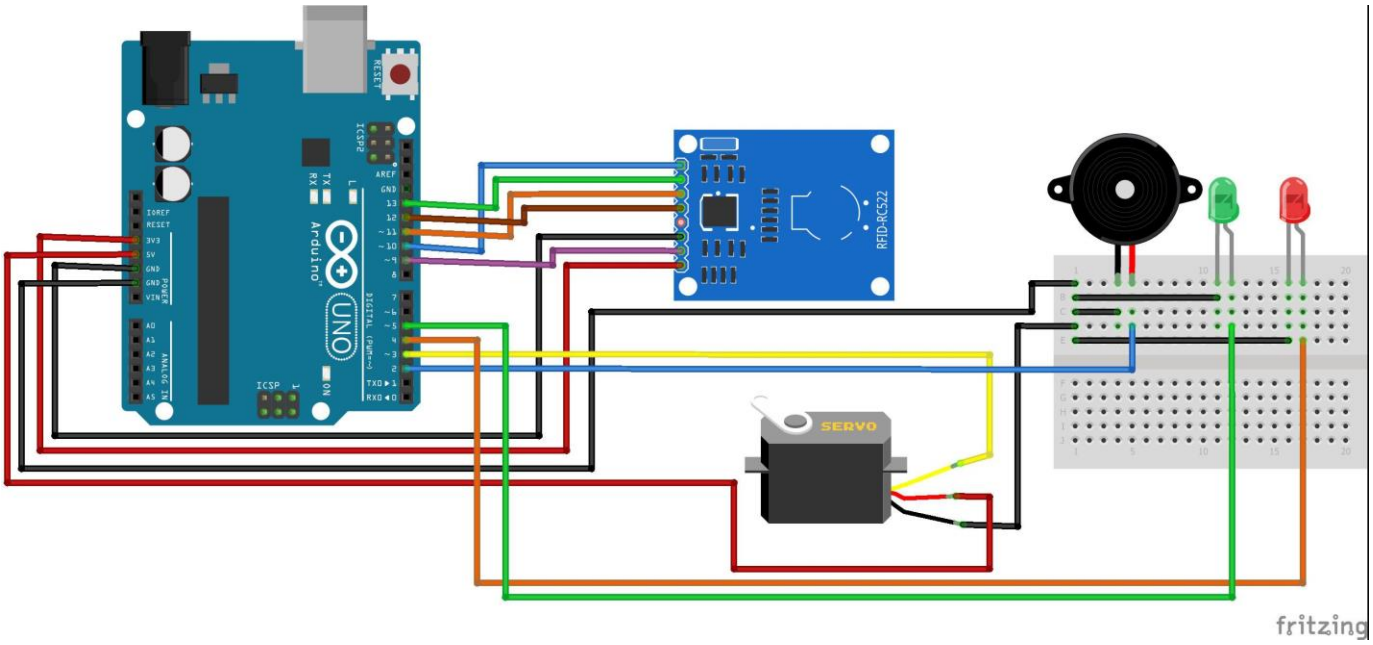
Main API Endpoints:

- Get Datastream Value
- Get Multiple Datastream Values
- Update Datastream Value
- Batch Update of the Datastreams
- Update Widget/Datastream Property
- Trigger Log Event
- Get Device History Data
- Get Device MetaField Value
- Is Device Connected

Besides, Get Device History Data is also one of the parts implemented in Blynk Premium. The API sends their active user information on the Blynk device and stores it on Blynk's cloud server.

M4. Apply your selected techniques to create an IoT application development plan.

Below is a model I designed for the connections between devices. With this implementation model, I was able to ensure that the features were runnable for the original purpose of the project.



After combining devices and using techniques, I was able to demo a product that performed the basic functions of the project. In this project, my product under development is presented on Youtube

Link Demo: https://youtu.be/EHO7bzI3x1A and Smart Lock - Connect Blynk | Internet of Things | Quach Cong Tuan - YouTube

Conclusion

I've looked at which IoT components are necessary and appropriate for software application design, and I've also outlined a plan for a good IoT application using industry-standard hardware, software, frameworks, and APIs. Additionally, I created an IoT application development strategy using the tools I had selected.

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