The Internet of Things (IoT) – essential guide

Women Power Code

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Introduction

Internet of things have been around for many years and some might say that have become an invisible part of our life. There is a strong sentiment against the connecting your home to the internet. The rationale behind this is that your privacy gets exposed and your personal data can be collected.

TRUE! However, to fight against this is not to ignore the modern technology, but instead improve our understanding of this new technology and take the necessary security measures. Which is the overall aim of our project.

In order to apply the security steps efficiently, it is first very wise to understand how the machinery works and this task is best achieved by a 'hands on' approach – one of the primary goals of the Women Power project.

So here I provide an overview of the possibilities of the Internet of Things (IOT) which is relevant for our target group and is kept within the scope of the products which make sense in the personal and family environment.

After visiting different kinds of such IOT projects, we will address some security issues and further proceed specifically to the Raspberry PI platform which has been popular for many years and offers excellent possibilities to learn how to put together hardware, create and add software and finally make a fully functional and modern home appliance. So one learns how IOT really works and can then much better decide whether to buy an IOT gadget or to make it at home.

3D printing is a necessary and unavoidable step in the creation of the products of our projects. Since we shall use 3D printing as a tool, it is practical to first gain an understanding about the products that we shall produce as a part of this project.

Consequently a 3D printer is a complicated machine, not by the idea that is the basis of its function, but by the saying "The devil lies in the detail". So choosing the right type of filament, the right design for the printed object and so on can be discussed only after we know what we need to print. Another question is which kind of the 3D printer to obtain (currently we have the half professional Ira3D printer).

Overview

What is the Internet Of Things (IoT)?

The Internet of Things or IoT, is an umbrella term for a broad range of underlying technologies and services, which depend on the use case and in turn are part of a broader ecosystem which includes related technologies such as analytics, big data, connectivity solutions and more.

The Internet of Things is the interconnection of endpoints (devices and things) which can be uniquely addressed and identified with an IP (Internet Protocol) address. With the Internet of Things, devices can be connected to the Internet, sense, gather, receive and send data and communicate with each other and applications via IP technologies, platforms and connectivity solutions.

The interconnection of physical devices with embedded sensing and communication possibilities, including sensors and actuators, is not new. However, in the Internet of Things, physical endpoints are connected through uniquely identifiable IP addresses; whereby data can be gathered and communicated via embedded electronics and software, additional connectivity technologies and the cloud, networks or IoT platforms. The IoT is an additional layer of information, interaction, transaction and action which is added to the Internet thanks to devices, equiped with data sensing, analysis and communication capabilities, using Internet technologies. The Internet of Things further bridges digital and physical realities and powers information-driven automation and improvements on the level of business, society and people's lives.

The usage of the Internet of Things also happens at different speeds. IoT investments in the manufacturing industry, for instance, are far higher than in any other vertical industry and in the Consumer Internet of Things (CIoT) space (more about IoT in manufacturing). This is poised to change by 2020 although globally manufacturing will still account for the majority of IoT spend (hardware, software, services and connectivity). The manufacturing industry, along with transportation and utilities are the three main IoT investment areas and are part of what is known as the Industrial Internet of Things.

The Internet of Things as an evolving reality

Despite challenges, different speeds and the fast evolutions which we will see until the first years of the next decade, the Internet of Things is here.

In business and industry, there are thousands of Internet of Things use cases and real-life Internet of Things deployments across a variety of sectors with the three industries which we just mentioned accounting for a more than significant part of deployments and investments as the image on the right shows. In the consumer space (consumer Internet of Things was the fourth largest segment in 2016) there are many thousands of devices and applications for a broad variety of purposes.

The Internet of Things is a major force among the many phenomena and related technologies that show exponential growth in recent years and (will) result in digital transformation (initiatives). Predictions regarding the economic impact, sub segments, technologies and number of IoT-connected devices keep evolving as well.

Even if for most people the number of IoT devices is not a relevant metric, it's the one that gets most attention. Over the past few years predictions regarding the number of IoT devices by 2020 have been reviewed downwards. End 2016 most predictions varied anywhere between 20 and 30 billion devices by 2020.

The origins of the Internet of Things: how it all started

The idea of the Internet of Things goes back quite some time. We can even go back a very long time but will begin at the end of the previous Millennium where RFID has been a key development towards the Internet of Things and the term Internet of Things has been coined in an RFID context (and NFC), whereby we used RFID to track items in various operations such as supply chain management and logistics. The roots and origin of the Internet of Things go beyond just RFID.

Think about machine-to-machine (M2M) networks. Or think about ATMs (automated teller machine or cash machines), which are connected to interbank networks, just as the point of sales terminals where you pay with your ATM cards. M2M solutions for ATMs have existed for a long time, just as RFID. These earlier forms of networks, connected devices and data are where the Internet of Things comes from. Yet, it's not the Internet of Things.

The role and impact of RFID

In the nineties, technologies such as RFID, sensors and a few wireless innovations led to several applications in the connecting of devices and "things". Most real-life implementations of RFID in those days happened in logistics, warehouses and the supply chain in general. However, there were many challenges and hurdles to overcome, as we covered end 1999 in a white paper for a Belgian RFID specialist who targeted the logistics industry (mainly warehousing and industrial logistics as RFID was still expensive). Gradually, the use of RFID (and along with it, several NFC or "near field communication", wireless technologies became popular in areas beyond logistics and supply chain management: from public transport, identification (from pets to people), electronic toll collection (see image), access control and authentication, traffic monitoring, retail to – back then – innovative forms of outdoor advertising. That growing usage was, among others, driven by the decreasing cost of RFID tags, increasing standardisation and NFC.

From RFID and M2M to IoT

The possibility of tagging, tracking, connecting and "reading" and analysing data from objects went hand in hand with what would become known as the Internet of Things around the beginning of this Millennium. It was obvious that the connection of the types of "things" and applications – as we saw them in RFID (and in M2M and more) – with the Internet would change a lot. It might surprise you but the concepts of connected refrigerators, telling you that you need to buy milk, the concept of what is now known as smart cities and the vision of an immersive shopping experience (without bar code scanning and leveraging smart real-time information obtained via connected devices and goods) go back since before the term Internet of Things even existed. Again, it took a long time. Furthermore, we shouldn't reduce the Internet of Things to just these popular and widely known concepts, even if consumer-related attention for the IoT without a doubt has led to the grown attention for it as you'll read further.

Internet of Things was coined in a context of RFID

According to the large majority of sources, the term Internet of Things was coined in 1999 by Kevin Ashton, the co-founder of the MIT's Auto-ID Center where a standard was developed for RFID, primarily from a retail perspective. RFID existed years before talked about the Internet of Things as a system, connecting the physical world and the Internet via omni-present sensors. It also already existed when he co-founded the Auto-ID Center (now called the Auto-ID labs) at MIT.

Ashton, who was a marketer at P&G, wanted to solve a challenge he had seen before as Wired reports: empty shelves for a specific product. When shelves are empty, obviously no one can buy what's supposed to be there. It's a typical problem of logistics and supply chain. Ashton found the solution in RFID tags, which were still far too expensive to be able to put them on each product. When the MIT Auto-ID Center was launched, funded by the major global retail brands who understood the challenge and obvious benefits of a solution, he was 'loaned' by P&G and became the executive director at that Center as Wired explains. The rest is a standard system, solving miniaturization challenges, lowering RFID tags prices and…history.

The Internet of Things and Data

This is part of that intelligent notion but it also brings us far closer to the essence. You can define the Internet of Things by simply describing all characteristics ("what it is") but you also need to look at its purpose ("the why"). Data is a crucial part of this equation, albeit just a first step as data as such is not enough. However, there is no Internet of Things without (big) data. Data as such is maybe not without value but it sure is without meaning unless it is used for a purpose and it is turned into meaning, insights, intelligence and actions. Maybe you heard about the good old DIKW model (from data to information to knowledge to wisdom – and action) ? Well, the data gathered and sensed by IoT devices needs to be communicated in order to even start turning it into actionable information, let alone knowledge, insights, wisdom or actions.

Experts agree that in the next decade, in 2020 and beyond, we will decreasingly speak about the Internet of Things. The Internet of Things is a misnomer in two senses;

- First, the things don't describe the essence of what it truly means and make it seem like a thing that is composed of connected things. However, as said it is not a thing as it's often referred to in popular media. On top of covering a vast connected ecosystem of myriad technologies, platforms and other components as such, the Internet of Things also fits in a technological and organization context whereby actionable intelligence is at the core of human and business value creation opportunities. The Internet of Things has no purpose nor means to exist without all these aspects.

- Secondly, after years of future visions around very old concepts and ideas such as connected 9/71 Internet of Things map – source Internet of Things Applications USA – click here for a larger version refrigerators, the current fascination with the possibilities that arise as a result of connecting 'things', the 'connected things' aspect will move to the back and IoT will be seen just as we look at the Internet today: an obvious phenomenon of increased connectivity that is like electricity. What is behind it, the sensors, the devices, the protocols, the essential possibilities, will not matter, except to people who need to realize Internet of Things projects in real life and watch over the technology aspect within frameworks of regulations, meaning and security. The question and evolution increasingly will not be about the Internet of Things but about the broader digital transformation economy picture with outcomes and integration in mind and de facto overlapping sets of technologies being a given. https://www.i-scoop.eu/internet-of-things-guide/

Internet of Things projects and examples

On top of looking at Internet of Things use cases and applications within specific industries it's worth the while to see how it is leveraged in practice, regardless of sector. When looking for use cases you will mainly find examples of scenarios and goals within which Internet of Things deployments can be categorized. These use cases tend to use a different taxonomy, depending on the research firm or company that uses them. Internet of Things examples in the sense of actual cases and real-life deployments help you see the business rationale behind implementations. As said, do check them out, regardless of industry as the sought benefits and results are often relatively universal.

Smart city Internet of Things example: tackling air pollution in Glasgow

This Internet of Things case fits in a smart city application (remember that smart cities aren't just about the Internet of Things nor even about just technologies). More specifically, this Internet of Things example zooms in on a challenge regarding environment and air quality monitoring in the city of Glasgow. It's interesting from the perspective of the goals but most of all from the viewpoint of an – additional – mobile component, which greatly enhanced the city's possibilities to monitor better and in more circumstances than before. This case is based upon a case study of Spain-based Libelium.

Read the case at:

https://www.i-scoop.eu/smart-cities-smart-city/smart-city-application-glasgow/

Environmental grassroots Internet of Things - A flood alert system

The Internet of Things is often used in an environmental context and the monitoring of potential dangers, from volcano eruptions as you can see in our example regarding flood monitoring. Keeping an eye on rising water levels and gathering the data in order to warn people and the necessary local instances faster in case of a potential flood is what this particular case is all about. It has a grassroots dimension and shows how the measurement of several parameters (also, for instance groundwater levels) can lead to systems for the greater good without breaking the bank. Read the case at https://www.i-scoop.eu/internet-of-things-guide/internet-things-case-flood-sensor/ property development market

The Internet of Things is also often used to develop new services, revenue streams and, ultimately, even business models. It's the essence of Industry 4.0 and digital transformation. We tackled the Internet of Things in smart buildings and smart facility management before. Here is a case that combines the potential to tap into new revenue streams in the scope of facility management. Dutch construction/building and property development company Heijmans understood the potential of smart facility management and smart buildings in office buildings. So, it started collaborating with a few other companies, including a natural ecosystem partner in the scope of office buildings, namely a cleaning firm, to work out a solution that doesn't only add services for its existing and future customers but also makes the lives of office workers (digital workspaces), cleaners, facility managers and senior management easier across a variety of tasks and needs per identified target segment. This resulted in a solution that offers a range of control, planning, maintenance and efficiency tools for each of the mentioned four target groups. For the company itself it's a way to expand its portfolio, up-sell and tap into new revenue streams for customers and anyone needing this kind of solution.

Read the case at:

https://www.i-scoop.eu/internet-of-things-guide/innovation-iot-case-smart-facility-management/

Automating telemedicine around the globe - Great Lakes NeuroTechnologies (GLNT)

Great Lakes NeuroTechnologies (GLNT) develops a line of IoT-enabled products that allow healthcare providers and researchers to monitor people who suffer from Parkinson's disease. The Internet of Things also helps Parkinson's patients get affordable access to quality care. For someone who can't visit a specialist, being able to relay relevant information through telemedicine can have a significant impact on the efficiency of their care and treatment.

Read this case study at:

https://www.jasper.com/customers/healthcare/great-lakes-success-story

Energy and remote monitoring in Nigeria with a smart solar system

In this case study from Microsoft and Schneider electric we learn how in Lagos (Nigeria) a project is set up that doesn't only provide much needed electricity via solar energy but also uses IoT in the smart systems to allow for remote monitoring and maintenance. Source: Microsoft.

Read this blog at:

https://blogs.microsoft.com/transform/feature/schneider-electric-harnesses-the-sun-to-power-remote-nigerian-schools-and-clinics/#sm.00000wpdeefanffm1qbtd1yr9h37m

Improving the production of kiwifruit with smart irrigation

Italy is one of the main producers of kiwifruit, which is a delicate fruit to grow and requires a lot of attention in order to obtain the right, marketable quality. Smart irrigation is one of the ways to make sure this happens as in this smart agriculture IoT case from Italy.

Read this case at:

http://www.libelium.com/smart-irrigation-system-to-improve-kiwi-production-in-italy/

Precision farming to control irrigation and improve fertilization strategies on corn crops

Omica is an Italian start-up focused on Smart Agriculture. Its mission is developing innovative products that integrate new disrupting technologies such as the Internet of Things. In collaboration with Libelium technology they have deployed a wireless sensor network to improve crops yields by identifying less productive zones and also monitoring crop water and fertilizer requirements during the growth period. Via Libelium.

Read this case at:

http://www.libelium.com/precision-farming-to-control-irrigation-and-improve-fertilization-strategies-on-corn-crops/

Remote blood pressure monitoring and EHR integration

Ochsner Health System decided to integrate its electronic health record (EHR) system with IoT technology and devices to monitor patient health. Wireless scales and blood pressure cuffs monitor vitals and feed data directly into each patient's medical record using the patient's smartphone. From there, doctors, pharmacists and health coaches can remotely monitor patient status and track potential trends or problems.

Read this case at:

http://www.healthcareitnews.com/news/best-hospital-it-2016-ochsner-innovates-remote-blood-pressure-monitoring-and-ehr-integration

The Consumer Internet of Things

Give or take 5 years ago, consumers rarely saw what the Internet of Things would mean to their private lives. Today, they increasingly do: not just because they are are interested in technology but mainly because a range of new applications and connected devices has hit the market.

These devices and their possibilities are getting major attention on virtually every news outlet and website that covers technology. Wearables and smart watches, connected and smart home applications (with Google's Nest being a popular one but certainly not the first): there are ample of you know the examples. Although it is said that there is some technology fatigue appearing, the combination of applications in a consumer context and of technology fascination undoubtedly plays a role in the growing attention for the Internet of Things. That consumer fascination aspect comes on top of all the real-life possibilities as they start getting implemented and the contextual and technological realities, making the Internet of Things one of those many pervasive technological umbrella terms. Obviously, the Consumer Internet of Things market is not just driven by new technology fascination: their manufacturers push the market heavily as adoption means news business possibilities with a key role for data.

Consumer electronics

With the Consumer Internet of Things we are strictly in a consumer electronics reality. 47% of consumers are concerned about privacy and security issues regarding the Internet of Things While some of the applications in this space already are popular (fitness and personal health, for instance), the real growth still needs to come.

Below are some consumer electronics challenges to tackle first:

- Smarter devices. Consumers are waiting for smarter generations of wearables and Internet of Things products, which are able to fulfil more functions without being too dependent from smartphones, as is the case with many of such devices today (think the first generations of smartwatches, which need a smartphone).

- Security. Consumers don't trust the Internet of Things yet, further strengthened by breaches and the coverage of these breaches. Moreover, it's not just about the security of the devices but also about, among others, the security of low data communication protocols (and Internet of Things operating systems). An example: home automation standard Zigbee was proven easy to crack in November 2016.

- Data and privacy. On top of security concerns, there are also concerns regarding data usage and privacy. The lack of trust in regards with data, privacy and security was already an issue before these breaches as we cover in our overview of the consumer electronics market evolutions.

- A "compelling reason to buy". The current devices which are categorized as Consumer Internet of Things appliances are still relatively expensive, "dumb" and hard to use. They also often lack a unique benefit that makes consumers massively buy them.

Experiences and benefits

The focus of the Industrial Internet of Things is more on the benefits of applications, the Consumer Internet of Things is more about new and immersive customer-centric experiences. Consumer Internet of Things purchases, the fourth largest market segment in 2016, will become the third largest segment by 2020 (IDC, 2017).

It is expected that the market will really start picking up as of end 2017 or 2018, when the Consumer Internet of Things will grow rapidly across several types of devices and applications, once manufacturers are able to meet the various challenges.

As mentioned, the Consumer Internet of Things typically is about smart wearables and smart home appliances but also about smart televisions, drones for consumer applications and a broad range of gadgets with Internet of Things connectivity. It's important to note that de facto the Consumer Internet of Things overlaps with the use of the Internet of Things across several industries.

On top of examples such as smart meters, as explained above, it is clear that the CIoT offers manufacturers of devices and applications important opportunities to leverage data to build new revenue streams and even new partnerships and ecosystems to leverage this data in various ways. Data privacy and security will remain a challenge for several years to come but at the same time new generations of devices with clear benefits and a focus on the consumer experience will boost the market.

IOT Security

5 ways to protect your internet of things

A survey by ESET and the National Cyber Security Alliance reveals nearly one quarter of consumers have an internet-connected device such as a thermostat or appliance in their home, and use an app to control it. Yet, more than 40% are "not confident at all" that IoT devices are safe, secure, and able to protect personal information. So take these 5 steps now and in the future to increase security on your own internet of Things. Then, check out the other survey results on the "Internet of Stranger Things" infographic below, as well as a summary of the survey data and key takeaways.)

1. Change both the default login password on your home router and your Wifi password every 3 months: As this survey demonstrated, not many consumers change the default password that comes standard on their home routers. This means that a hacker can easily gain access to their router by guessing the password that comes default on common routers. Changing this password to something new every three months ensures that even if you share the password or it's accessed by some other means, you keep your router more secure.

2. Ensure software for all devices and connected systems is up to date (including router firmware): Manufacturers and software providers frequently issue product updates throughout the year. While some of these changes include new features that are available, or adjustments to an interface, they are often security related as well. Keeping software up to date on all connected devices ensures you have the latest protection the manufacturer/developer offers. Hint: Check your router's model number and visit the manufacturer's site to see whether there is a newer version available to download.

3. Confirm whether your home security software features router protection: Home security software is one important layer in protecting your personal data and information. Some home security software now features router protection, which allows you to easily view and manage the devices that access your network. If a device that you don't recognize is accessing your network, you can elect to block it. You can also add a master list of authorized devices and then set it so no other device will be able to join the network.

4. Ensure you understand what data is being collected and stored by your connected devices: As you know, the data we generate and information we transact online with is extremely valuable if it ends up in the wrong hands. Because of this, it's critical that you are aware of what data your connected devices collects, how it is stored and how it is shared. While it would cause a red flag if a connected fridge asked to access something such as your home security system, you might not think twice about letting your connected heating system store your weekly data log. However, a criminal that gains access to that log because it's not securely stored can tell when the home is not heated or the heat is turned down, signifying your home is vacant.

5. Limit device/app privileges: As with apps accessed on a mobile device, you should look to limit the access and privileges your connected devices have daily. Should your toaster be able to access your contact list? Will the fridge ever need to communicate with your front door lock? Ensure devices and apps don't have free rein to communicate with entities they don't need to so that even if one device is breached, it does not mean all your connected devices can be accessed.
https://www.eset.com/us/about/newsroom/corporate-blog/survey-internet-of-stranger-things/

Raspberry Pi Projects For Learning IoT

The Raspberry Pi isn't just a great platform for building Internet of Things project: It's a super platform for learning about the IoT. The Internet of Things (IoT) is, arguably, the hottest topic in IT. Every organization wants to participate in the IoT, and many IT professionals want to know how to add IoT skills to their resume. There are lots of options for learning about IoT, but nothing really beats the hands-on experience.

One of the key learning platforms for IoT is the Raspberry Pi. The RasPi is a popular platform because it offers a complete Linux server in a tiny platform for a very low cost. In fact, one of the most difficult parts of using Raspberry Pi for learning about IoT is picking the right projects with which to begin. If you go out and look on the Web you'll find thousands of projects based on the RasPi. Some are ambitious, many are silly, and some are great for learning about both the Raspberry Pi and common components of the IoT. I went out in search of projects in that last group.

What makes a great IoT learning project? In my opinion it takes a few things. The first is the use of some common sensor or controller types. I like custom-built hardware as much as the next geek, but for an education project you don't really want to go wild with the hardware builds.

Next, the project should have something interesting going on in the control software. While I don't think you need an epic development project for a meaningful learning experience, you should really do more than just call pre-existing scripts and applications.

Finally, the projects should be interesting and, dare I say it, fun. There's nothing worse than training that feels like drudgery. Good training projects should make trainees really want to move forward with their education.

For more information, see this link: https://www.informationweek.com/software/enterprise-applications/10-raspberry-pi-projects-for-learning-iot/d/d-id/1320757?

IoT based Web Controlled Home Automation using Raspberry Pi

Using this IoT based home automation system, you can control your Home appliances from anywhere in the world. This web server can be run from any device which can run HTML applications, like Smart Phone, tablet, computer etc.

Required Components:

For this project, the requirements will fall under two categories, Hardware and Software:

Hardware Requirements:

   Raspberry Pi 3 (Any other Version will be nice)

   Memory card 8 or 16GB running Raspbian Jessie

   5v Relays

   2n222 transistors

   Diodes

   Jumper Wires

   Connection Blocks

II. Software Requirements:

Asides the Raspbian Jessie operating system running on the raspberry pi, we will also be using the WebIOPi frame work, notepad++ running on your PC and filezila to copy files from the PC to the raspberry pi, especially the web app files.

Also you dont need to code in Python for this Home Automation Project, WebIOPi will do all the work.

More on https://circuitdigest.com/microcontroller-projects/iot-raspberry-pi-home-automation

IoT Raspberry Pi Smart Container with Email Alert and Web Monitoring

You might have heard about Smart Refrigerator which can automatically order the food items which are running low in refrigerator, so inspiring from that we are here building a Raspberry Pi Smart Container using Load Cell and HX711 Weight Sensor.

This Smart Container can tell you about its status like whether it is full or empty, by sending a mail to your Email ID. We can also monitor the weight of container in real time using web browser, and that's make it a IoT project where you can monitor your container from anywhere using internet. Here the weight of the container will be updated in every 5 seconds on the web browser, this duration can be easily changed in HTML code file. We have set the threshold weight value of 300 gram to send the email about that "Container is Full", this limit can also be changed.

Required Components:

Here we are using Raspberry Pi 3 Raspbian Jessie OS. All the basic Hardware and Software requirements are previously discussed, you can look it up in the Raspberry Pi Introduction and Raspberry PI LED Blinking for getting started, other than that we need:

Raspberry Pi (any model should work)

Load cell

HX711 Load cell Amplifier Module

16x2 LCD

Power source or power bank

Connecting wires

Breadboard

Nut bolts, Frame and base

Here we have attached a wooden base with the Load cell for stability, with the help of nuts and bolts.

More on this here:

https://circuitdigest.com/microcontroller-projects/iot-raspberry-pi-smart-container

Raspberry Pi Surveillance Camera with Motion Capture

Security is major concern now days and there are lot of technologies present today to keep your place secure and monitored. CCTV cameras are very useful to keep an eye on your house or office. Although prices of these types of cameras have been reduced significantly since their beginning but still IP cameras, which have ability to send and receive the date over the network, are very expensive. And for True Surveillance, a camera must have ability to send its feed over the internet so that it can be watched from anywhere in the world.

Today we are making a very cheap Surveillance Motion Capture Camera using Raspberry Pi and a webcam. This is a great and very cheaper security tool, which have many configurable options and can be built in few minutes. Here we are using only Raspberry Pi and a USB web camera to build this Motion Capture camera. We have Raspbian Jessie OS installed on our Raspberry Pi board. You should check this article to install the Raspbian OS and getting started with Raspberry Pi.

Here we will go through a quick start guide first, so that you can have your Surveillance Camera ready in few minutes with all the default configurations and after that we will dive into the other details and configurations options to customize it according to your need.

 But before that, let's know something about the Motion (Surveillance Software), which is the heart of this project. Motion is free, open source motion detector CCTV software, developed for Linux. It detects the motion and start recording video of it. With 'Motion' installed in your Raspberry Pi, you can magically turn your Raspberry Pi into a Security Camera and can get following functionalities:

1. You can watch Live Video feed on a web browser by entering the IP address of Pi along with the port.

2. It will record and saves the Video whenever it detects Motion or any disturbance in the view area. It will keep recording the Video until there is some motion, then it stops and save the file, which can be watched later.

3. It can create a beautiful Timelapse Video.

4. It can take snapshots at regular interval or when there is some motion. Snapshots are also saved in the disk for later use.

Apart from that, It has several configuration options which we will discuss shortly and we can also set user defined 'triggers' on certain events. Motion currently only support USB camera out of the box, if you want to use Pi Camera then you need to use special build of Motion.

More on this here:

https://circuitdigest.com/microcontroller-projects/raspberry-pi-surveillance-camera

IOT based Security System with Voice Message Using ESP8266

This is another interesting IOT project in which we will build a Security system which can trigger an E-mail when it detects someone. This project has blend in the power of ESP8266, PIR sensor and ISD1820 Voice module. At the end of this article you would have built a fully functional Security system which can be Armed/Disarmed (Activated/De-activated) remotely via internet. You can record your own audio clip which will be played when a movement is detected and also send a mail with Date and time to a particular E-mail ID stating the intrusion. Cool enough.....!!!??

Materials Required:

The materials required to build this project is listed below

ESP8266

PIR sensor

ISD1820 Voice Module

LM317,LM7805

BC547 (2Nos)

1K, 200ohm,330ohm resistors

10uf and 0.1uf Capacitors

12V adapter / 9V battery to power the setup

Modules Explanation:

The project houses three important components which are the ESP8266 module, PIR sensor and ISD1820 Voice module. If you are familiar with these modules then you can skip this part on move on to the schematics but if you want to know how they work read on.

ESP8266 Module:

I am sure you would have come across this module some time or other. It is a very famous and powerful WiFi module which is mostly used in IOT projects.

More on this here:

https://circuitdigest.com/microcontroller-projects/esp8266-based-iot-security-system

Appendix 1

Summary of resources to be considered by partners

Theme	Resource Type	Description	Aspects	URL
3D Printing	Programmable bracelets	"Friendship bracelets which can be programmed based on Arduino. Create programs and upload them to the bracelets. The three basic programming concepts are Sketch, Setup and Loop. Sketches are called the programs, Setup is the code which will trigger when the bracelt is switched on and Loop is the code which will be run repeatedly by the bracelet when on. Each bracelet has four LEDs which are called Objects and take the place of any real life object, such as car, cat, etc."	"Excellent introduction to object programming which is fundamental also for IoT programming. In the "Jewelbots Friendship Coding" mode, it can be used by mothers and daughters to collectively engage with programming and enhance understanding of concepts relevant also to the IoT world. Great way of connecting the online And offline worlds for introduction to programming"	https://jewelbots.com
Training Course	Teaching Women how to code	"This organisation provides full time and part time training courses only for Women to teach them how to code all over the UK. Their goal is similar to our where they want to get more women in the tech industries and prepare them to go into tech jobs. They have free courses and paid courses. They also do events so it might be useful for us to speak at one of these as part of Dissemination. I know this isn't 3D printing but it is useful to consider."	"The courses cover HTML, CSS, Git & Github, Bootstrap and JQuery, and at the end of it you build your own website using what you have learnt. As part of dissemination we could talk at one of the events they Run as it is likely that these women will be interested in our IoT approach"	http://www.codefirstgirls.org.uk/
IOT	Device that can add groceries to your online shopping list.	Supermarket is testing a small device with a microphone and a barcode scanner that is connected to your home network. Speak the messages or scan the products with the device and they are automatically added to your online shopping list.	This shows that technology can help you in you daily life. Connects the Internet with the real world.	http://www.dutchcowboys.nl/technology/albert-heijn-gaat-nieuwe-slimme-koelkastmagneet-hiku-testen
Digital Learning Tool	Learn basic programming knowledge and computational thinking skills in a playfull way.	Bomberbot is a digital learning tool that offers coding for kids aged 8 to 14. By solving logic-based puzzles with visual programming blocks, children develop basic programming knowledge and computational thinking skills.	This can work as inpiration to the project. You can learn childeren in a playfull way basic programming knowledge and computational thinking skills. We can learn our target group (women) the basics in a playfull way.	http://landing.bomberbot.com/
3D Printing	Print your shoes	Have you ever been shopping for shoes and found it hard to get exactly the style you want? Now, with the help of a couple of Ultimaker 3D printers, fashion retailer	I think every woman would be interested in this!	https://ultimaker.com/en/stories/50761-eram-heels-

				[3d-printing-personalized-shoes-in-store](#)
		Eram and Unistudio design studio are giving customers the power to create their own high heel designs and print them in-store.		
IOT	Home`s temperature control	ProSmart BBoil RF is a product that allows fast automatization of every electrical device, regardless of its manufacturer or model. It is a complex system with which you not only turn on and off your devices remotely, but manage and adjust a number of devices in your home, office, house or villa. It allows the users to receive real time information for all connected devices – their work and current status	Echo can be used again as a good example how you can use IoT in yor everyday life. An example is how you can use it in the kitchen to turn on your coffee mashine and make a coffee through a voice command while your hands are busy while cooking or to control your home appliance. And the way to connect it to a normal coffee mashine is to use basic coding to tune up the smart key.	https://prosmartsystem.com/en/bboil-rf
IOT	Amazon Echo	Echo and other Alexa devices let you instantly connect to Alexa to play music, control your smart home, get information, news, weather, and more using just your voice.	Echo can be used again as a good example how you can use IoT in yor everyday life. An example is how you can use it in the kitchen to turn on your coffee mashine and make a coffee through a voice command while your hands are busy while cooking or to control your home appliance. And the way to connect it to a normal coffee mashine is to use basic coding to tune up the smart key.	https://www.amazon.com/Amazon-Echo-And-Alexa-Devices/b?ie=UTF8&node=9818047011
3D Printing	3D printing of cookie cutters	CookieCaster lets you design, share and create custom cookie cutters.	The site makes it easy to create a 3D model of your cookie cutter. You can show off your designs to friends, family and fellow cookie cutter enthusiasts in the gallery and check out what others have made. If you have your own 3D printer, you can download the 3D model of your design for printing at home.	http://www.cookiecaster.com/
3D Printing	e-SHOP on 3dprinting jewels	e-SHOP on 3dprinting jewels, also for famous fashion brands such as Gianfranco Ferrè. The innovative design, the result of the creativity of designers and artists of international renown, and the originality and uniqueness of the shapes, make .bijouets a ready-to-wear brand that has revolutionized the world of jewelry and fashion accessories!	Good example of marketing for 3d printing accessories addressed to women. An interesting example of how to do marketing on products created using the 3d printing technique	http://bijouets-italia.com/en/
3D Printing	e-SHOP on 3dprinting jewels	3D printed jewelry pieces presented like they were little architectural study models	Other good marketing platform for such innovative jewels created and promoted by a female company	https://www.emergingobjectsjewelry.com/about/
3D Printing	e-learning platform for	Learning platform for women to upgrade their design skills, also in the field of 3d	Very good inspiration for training contents and training methods	https://kirakira.com/

	3d printing accessories	printing. Main goal is to teach girls and young women the most hidden corners of 3D modeling and 3D printing technology.	and approaches	
IOT	Nike+	Nike+ was an early example of a commercially successful "Internet of Things" (IoT) product. The Nike+ sneakers had sensors in them that transmitted data to a user's iPod and uploaded that data to the cloud: what we now know as a "smart fitness tracker." But what caught my attention back in 2006, what made me pause and say, "There's something special going on here" was how the product enabled users to form teams and to set and achieve collective goals. Nike+ was more than a pair of sneakers for an individual. It was a dynamic system that helped groups of people help each other.		
IOT	blended reality system	"The magic mirror would be a step up from Amazon's Echo Look camera, which is currently being marketed on an invitation-only basis as a fashion "style assistant." Echo Look lets you take your picture with the assistance of Amazon's voice-commanded Alexa AI assistant, and then produces blended-reality photos that show you wearing the clothes you've picked out. The blended-reality display, described in a patent published today, relies on a system of cameras, projectors, displays, mirrors and lights that can add layers of pixels to your moving image on a real-time basis."		https://www.geekwire.com/2018/amazon-patents-blended-reality-mirror-shows-wearing-virtual-clothes-virtual-locales/
IOT	Watch me	"Simplecom's "Watch Me" solution address the need of groups in the society to have a smart and simple communication devices & accessories with the ability to be monitored and get immediate, intelligent response in emergency no matter where they go. Drawing on the worldwide reach and robust security of our unique SIM-IOT embedded in the "Watch Me" solution, Simplecom deliver Critical human source tracking, health and wellness monitoring and social network communication anytime, anywhere. Simplecom "Watch Me" intelligent Solution developed together with variety of devices such as "Small Track", "Care Watch", "Child Watch" to provide features such as SOS button, auto answering, uncommon situation detection and critical reminders."		http://www.simplecom-group.com/IOT/Telecom/Solution/Watch-Me

3D Printing	Print 3D	3D printing	" In order to print a 3D object, it is necessary to have a computer model, which represents the future physical object through digital images. Following paper-based sketches and exact dimensions, we can translate your project onto your computer through computerized and ready-to-print 3D programs."	"https://3dgo.ro/cauta-modele-3d/ http://www.print3dbucuresti.ro/servicii-3d-printing-romania/"
Learning Tool		Learning HTML5, CSS, JavaScript and Node.js.	over 100 hours of interactive tasks and videos, no matter your level of knowledge.	https://codeberryschool.com/ro/
IOT	Smart City	"Urbanization of cities quickly presents infrastructure challenges for governments and municipalities. As cities grow and expand their services, administration and governance are becoming more and more complex. Thus, cities need to be transformed to address social, economic, engineering and environmental challenges."	"energy efficiency, cyber security and data confidentiality, intelligent (energy, communications, water) networks and intelligent transport systems."	http://romaniasmartcities.ro/
IOT	Innovative and advanced technology	"Software development Network equipment installation; Server installation; Maintenance and assistance (to ensure the proper functionality of the applications developed, as of the statistical reporting resulted from the data base); Hosting of servers and IT equipment Rental of IT equipment (data servers, back-up servers, mobile devices for mobile applications)"	finding the best solutions to increase performance for the services offered by railway transportation companies.	http://railsoft.ro/
Learning programme	Learning Programmes	" You have the motivation and drive for development, we offer you the context and the resources. Choose a learning program that prepares you in an applied and engaging way for a career in the tech area."	"Android iOS Ruby on rails Backend - Ruby on Rails Frontend Frontend Graphic design Graphic Design Sysops SysOps Marketing Social Media Marketing"	http://devacademy.ro/