ABBES LAGHROUR Khenchela University
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جامعة عباس الغرور خنشلة
كلية العلوم والتكنولوجيا
قسم الهندسة الصناعية

End of education memory

For obtaining the master's degree (L.M.D)
Specialty: Industrial Engineering
Option : automatic and informatic industrial

THEME

Study and realization of a control system for an automatic vehicle barrier

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Thank You

I thank God the Almighty who gave me the strength and the will to

do this modest work.

I would first like to thank Mr. BOUMAARAF abdelaali

Professor at ABBES LAGHROUR University, for having accepted to be my supervisor during this work, and for the trust he gave me and his

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memory near or far.

I thank all my dear colleagues, my friends, and my loved ones

warmly thanking all my family who still have me

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of study.

Thank you all guys

Dedications

To my father and my mother

To my brothers and sisters

To all my family

To my colleagues

To my friends

to my beloved one

Abdelmalek Mansouri

Table of content

Introduction

1 General Introduction

Security at the university is a very important and It needs to be preserved to prevent intruders from entering the university to ensure that there are no problems ,and to create a safe environment for the university student.

We'll talk about security at abbes laghrour khenchela university everything starts at the front door ,If the doors were secured, we would eliminate a large percentage of the intruder problem in the university
In the front door there is a barrier operated by a security agent, so students and professors and only authorized people , are allowed to enter the university.
But what if this security agent is absent one day? What if he had to go for 10 minutes, or he had a lunch break for example?
Should he leave the door closed and prevent everyone from entering the university?
Or does he leave it open and allow everyone to enter, including strangers from the university?
In this search we developed a solution to this problem
We will simply replace that security agent with an automatic barrier 24 Voltage working barrier
This barrier never sleep …available all the time…and much more
We'll use ANPR to run this automatic barrier
So what is ANPR? How we will operate this barrier?

Chapter 1
Barriers

2 Chapter 1:Barriers

when you are driving out of a parking structure and you're met with a horizontal bar that stands between the exit and the street, you've encountered a barrier!

2.1 What is a barrier?

Pic1…… barrier

A barrier is made up of a pole or bar which is pivoted from a fixed point to move in a vertical direction. This bar or pole allows to block the access of any vehicle or even a person through an entry gate. barriers are employed at all the known places to ensure that no one enters the premises of a building or a compound without the permission of the concerned authorities.

Barriers may be operated with remote control, push button or an RFID card. Once the open feature is initiated, the barrier moves up in a vertical direction, allowing passage.

2.2 Types of barriers

Barriers used to be hand operated for a long time. But, due to the demand of barrier gates in commercial spaces which involved the movement of huge trucks and carriers, there are automatic barriers employed.

2.2.1 Manual barriers

Manual barriers are a low maintenance, cost effective way of manually controlling access to unauthorized areas.

Available in spans of up to 9 meters. The low maintenance pivot assembly, manufactured from steel box section. The shaft, zinc coated pivoting on two heavy duty stainless steel bearing blocks. The manual rising arm barrier's easy to operate and typically found used for vehicle barriers and commercial applications. The rising arm is manufactured from Aluminum. **[20]**

We can take frontier pitts France barriers for example

2.2.1.1 BML lifting manual barrier

Length of the boom: from 2 to 10 m

Pic 2……. BML lifting manual barrier

Description

The BML Frontier Pitts barrier is a manual lifting barrier which has the function of controlling an access road with little traffic. It is operated using a counterweight system. Its low price, virtually non-existent maintenance and quick installation make it the ideal barrier for sites requiring occasional flow control. **[1]**

Construction

Depending on the width of the passage, it can be up to 10m long. It is a robust lifting barrier , good value for money and very easy to use. It is composed of a beam, a main foot post and a beam rest from 4m long. It belongs to the range of manual barriers . **[x1]**

Characteristics

Max boom length (without boom curtain)	From 2 to 10 m
Max boom length (with boom curtain)	From 2 to 7.5 m
BML barrier height	1100 mm
Mechanism	Against weight
Locking the boom	At the end of the rail
Type of use	One-off use

2.2.1.2 BMP swinging manual barrier

Length of the boom: from 2 to 10 m

Pic 3 ……BMP swinging manual barrier

Description

The BMP Frontier Pitts barrier is a pivoting manual barrier which has the function of controlling an access road with little traffic. It swivels 180 ° and the beam can be telescopic. **[2]**

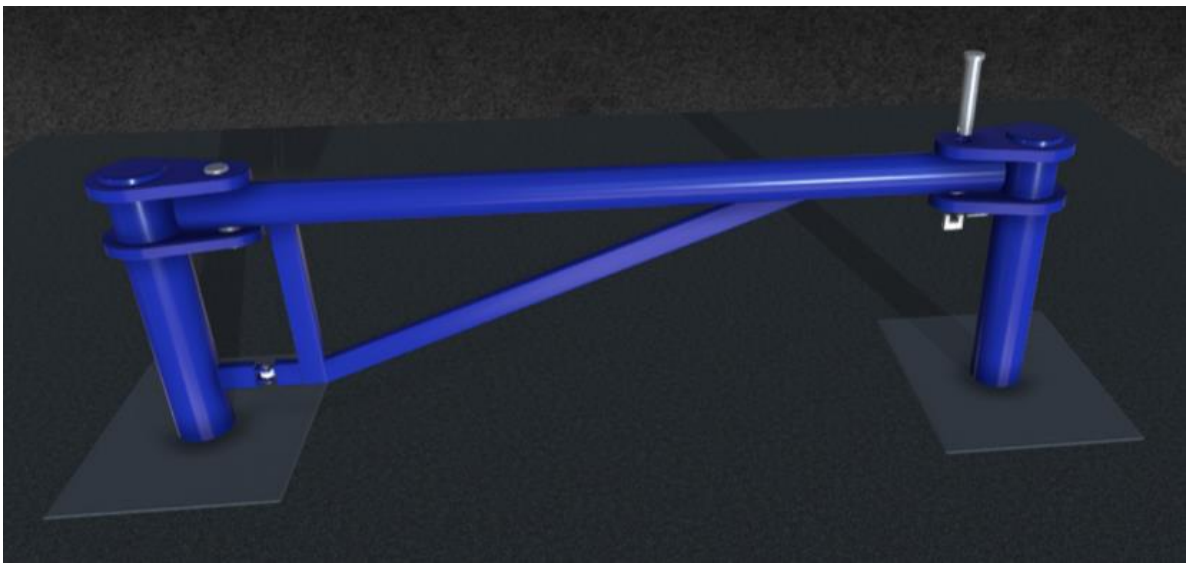
Construction

It is composed of a beam, a pivot post and two beam rests, one for the closed position, and the other for the open position (optional). Depending on the width of the passage, it can be up to 10m long. It is a robust barrier, good value for money and very easy to use. It is different from the manual lifting barrier . **[2]**

Characteristics

Max beam length	From 2 to 10 m
BMP barrier height	1100 mm
Mechanism	Pivot
Locking the boom	At the end of the rail
Type of use	One-off use

2.2.1.3 TERRA 180 ULTIMATE barrier



Pic 4 ……TERRA 180 ULTIMATE barrier

Description

Although oriented, the Terra pivoting 180 ULTIMATE barrier is a manual roadblock with 180 ° pivoting boom, crash tested and certified IWA 14-1 (it stops a 7200kg vehicle at 80km / h). Discreet by its design, it ensures a very high degree of safety. The Terra Pivotante 180 ULTIMATE barrier is perfectly suited for access with low traffic flow.

It turns out to be ideal for sites that are regularly vandalized (barriers too easily neutralized) and which do not want access control that is too visually aggressive or for accesses where electricity is not available.

Characteristics

Length of the Terra Pivoting Barrier 180 ULTIMATE	From 2 to 6 m
Height of the Terra Pivoting Barrier 180 ULTIMATE	950 mm
Civil engineering depth	500 mm
Type of use	Punctual use in manual version / intense in auto version

2.2.1.4 TERRA Swing Gate 180

Pic 5 ……TERRA Swing Gate 180

Description

The Swing Gate 180 barrier is a manual roadblock with a 180 ° pivoting boom, crash tested and certified IWA 14-1 (it stops a 7200kg vehicle at 48km / h). Discreet by its design, it ensures a very high degree of safety. The Terra Swing Gate 180 is perfectly suited for access with low traffic flow.

It turns out to be ideal for sites that are regularly vandalized (barriers too easily neutralized) and which do not want access control that is too aggressive visually or for access where electricity is not available.

Characteristics

Length of the TERRA MANUAL SWING GATE 180	From 2 to 6 m
Height of the TERRA MANUAL SWING GATE 180	950 mm
Civil engineering depth (Excluding Slab)	350 mm
Type of use	Punctual Use

2.2.1.5 TERRA-Manual barrier

Pic 6 …….TERRA-Manual barrier

Description

The Terra Manual barrier was designed, not only to regulate access to a site, but also to prevent the force intrusion of a ram vehicle. The TERRA MANUAL barrier secures your accesses from 3 to 4.5m without power supply for attacks by ram vehicles of 7500kg at 48km / h. It is ideal for firefighter access to sensitive sites where space requirements must be reduced compared to the TERRA 180 barrier . **[3]**

Construction

Mechanically welded structure in high resistance steel. Hollow High Strength Steel Circular Section Tube Trellis **[3]**

Characteristics

TERRA MANUAL barrier length	From 3 to 4.5 m
TERRA MANUAL barrier height	1000 mm
Civil engineering depth	500 mm
Type of use	Punctual Use

Pic 7 ……..a truck hit a TERRA-Manual barrier

2.2.2 Automatic Barriers

These barriers are electro-mechanical and they are operated with 24VDC drive unit. They are reliable and can operate at high speeds to keep up with the constant movement of vehicles through the checkpoint. Moreover, these barrier gates don't even generate heat making them the ideal option for use in commercial space

Barriers are extensively used in residential complexes for the simple reason of improved security. With barriers, unauthorized access becomes difficult.

This advanced technology has made boom barriers important.

All automatic safety barriers offered by Frontier Pitts France: road barriers, anti-vandals, TERRA, etc. These automatic barriers, suitable for areas deemed to be at risk, guarantee a high level of security in order to avoid unwanted intrusions.

2.2.2.1 FB lifting barrier

Pic 8……..FB lifting barrier

Description

The FB has been specially designed to equip industrial sites with wide access (for trucks), warehouses, etc. But also to prevent access to pedestrians thanks to an integral rail curtain (optional). This product can be used as an automatic parking barrier or as a security barrier at the entrance to an activity zone . **[4]**

Construction

Just like the other Frontier Pitts France barriers, the installation and maintenance of this parking / camping / shops barrier has been simplified. The beam is in aluminum, the cabinet and the beam rest in steel. All these elements are treated against rust with epoxy paint. **[4]**

Characteristics

Barrier length FB	From 2 to 9 m
Barrier height FB	1000 mm
Mechanism	Electric
Arm position	To the left or to the right
Supply voltage	240 V
Locking the boom	Suction cup (option)
Opening time	7 or 10 s (depending on engine)
Bottom rail curtain	Optionally available up to 7.5 m of boom
Integral rail curtain	Optionally available up to 5.5 m of boom
Type of use	Intensive use

2.2.2.2 FBC lifting barrier

Pic 9……. FBC lifting barrier

Length of the boom: from 2 to 5 m

Description

The FBC has been specially designed for the control of car parks, small businesses, communities, or even campsites. The FBC allows access to be controlled in one direction (entry or exit). The FBC combines simplicity and attractive price . **[5]**

Construction

Easy to fit, install and maintain, the FBC access control barrier is of very robust construction. It accepts stringers from 2 to 5 meters long. It is part of the range of automatic safety barriers . The beam is in aluminum, the cabinet and the beam rest in steel. All these elements are painted with epoxy paint. **[5]**

Characteristics

FBC barrier length	From 2 to 5 m
FBC barrier height	900 mm
Mechanism	Electric
Arm position	Left (only)
Supply voltage	240 V
Locking the boom	No
Opening time	3 or 6 s (depending on the length of the beam)
Type of use	Intensive use

2.2.2.3 FBX rising barrier

Length of the boom: from 2 to 6.5 m

Pic 10 ……FBX rising barrier

Description

The FBX is a barrier designed for reliable intensive use. Its boom can cover up to 6.5m allows it to adapt to sites with wide access. The FBX can be installed vis-à-vis, thanks to its arm which can be mounted on the right or on the left. It also makes it possible to dissuade pedestrians from passing under the barrier thanks to a low rail curtain (optional). **[6]**

Construction

Easy to lay, install and maintain, the FBX automatic barrier is of very robust construction. The FBX automatic barrier accepts beams from 2 to 6.5 meters. The beam is in aluminum, the cabinet and the beam rest in steel. All these elements are treated against rust with epoxy paint. **[6]**

Characteristics

FBX barrier length	From 2 to 6.5 m
FBX barrier height	1000 mm
Mechanism	Electric
Arm position	To the left or to the right
Supply voltage	240 V
Locking the boom	Suction cup (option)
Opening time	4 or 7 s (depending on boom length)
Bottom rail curtain	Optionally available up to 5 m of boom
Integral rail curtain	Optionally available up to 3 m of boom
Operation	Intensive use

2.2.2.4 HB lifting barrier

Length of the beam: from 4 to 10 m

Pic 11……. HB lifting barrier

Description

The HB is an automatic lifting barrier with a hydraulic mechanism. It can support a beam much heavier than the other barriers in the Frontier Pitts range. It can be fitted with a full beam curtain up to 7.5m (optional).

Construction

The quality of its construction materials and its hydraulic mechanism make the HB the most powerful of the Frontier Pitts barriers . The installation and maintenance of the HB barrier has been simplified. The beam is in aluminum, the base and the rest of the beam in steel. All these elements are treated against rust with epoxy paint.

Characteristics

HB barrier length	From 4 to 10 m
HB barrier height	1000 mm
Mechanism	Hydraulic
Arm position	To the left or to the right
Supply voltage	240 V
Locking the boom	At the end of the rail
Opening time	10 to 15 s (depending on engine)
Bottom rail curtain	Optionally available up to 9 m of boom
Integral rail curtain	Optionally available up to 7.5 m of boom
Type of use	Intensive use

2.2.2.5 TERRA ULTIMATE lifting safety barrier

Pic 12 ……TERRA ULTIMATE lifting safety barrier

TERRA performance

Stops a 7,500 kg vehicle launched at 80km / h

Description

This security barrier was designed for sites with a high risk of intrusion. Its resistance to crash tests is incredible, it stops a 7.5 tonne vehicle launched at 80 km / h. **[7]**

Construction

The Ultimate automatic barrier is operated by a single-phase hydraulic unit which allows the extremely heavy boom to be raised and lowered, resistant to the impacts of ram vehicles . Like most TERRA Frontier Pitts France equipment, it is constructed from high strength steel for added safety. **[7]**

Characteristics

TERRA ULTIMATE length	From 2 to 4.5 m
TERRA ULTIMATE height	1050 mm
Mechanism	Hydraulic unit
Arm position	In the center
Supply voltage	240 V
Locking the boom	At the end of the rail
Opening time	10 to 15 s (depending on engine / length)
Bottom rail curtain	Included
Civil engineering depth	470 mm
Type of use	Intensive use

2.2.2.6 TERRA COMPACT barrier

TERRA performance

Stops a 3,500 kg vehicle launched at 50km / h

Description

The “Compact” automatic lifting barrier was designed not only to regulate access to a site, but also to prevent the force intrusion of a ram vehicle. The Compact barrier looks like any other parking barrier, but in reality it is capable of stopping a 3500 kg vehicle launched at 50 km / h. It has been crash tested and BSI PAS 68 certified .

It turns out to be ideal for sites that are regularly vandalized (barriers that are too easily neutralized) and that do not want access control that is too visually aggressive.

Construction

The particularity of the Compact barrier is based on its innovative technology. A high tensile strength cable has been inserted into the standard aluminum beam, which provides a damping effect during an impact. This optimizes the anti-intrusion capabilities of the Compact barrier.

Characteristics

TERRA COMPACT barrier length	From 2 to 6 m
Height of the TERRA COMPACT barrier	900 mm
Mechanism	Hydraulic
Arm position	To the left or to the right
Supply voltage	240 V
Locking the boom	At the end of the rail
Opening time	6 to 12 s (depending on motorization and arm length)
Bottom rail curtain	Included
Civil engineering depth	500 mm
Type of use	Intensive use

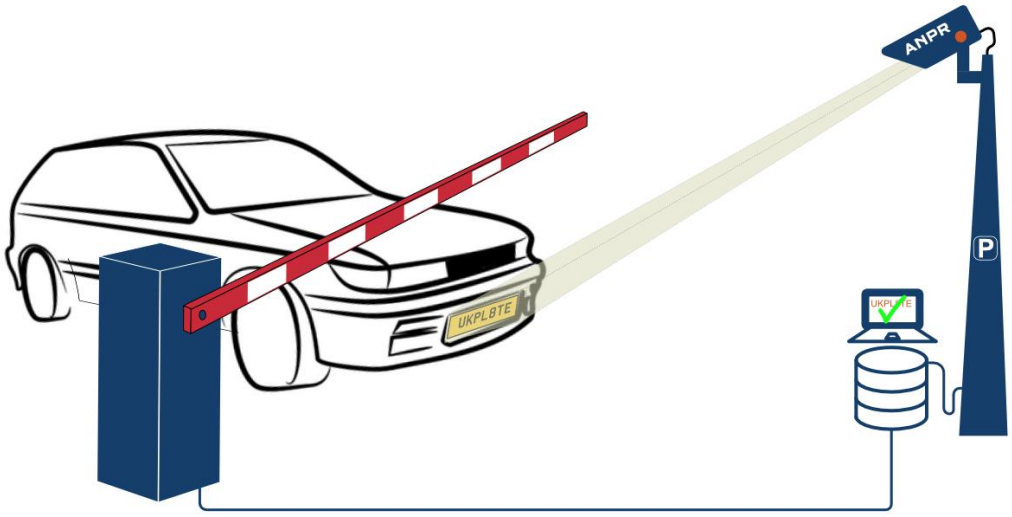
Pic 13 …….truck hit a TERRA COMPACT barrier

chapter 2

Hardware And Software

ANPR

Automatic Number-Plate Recognition



3 chapter 2: Hardware And Software

We are going to use anpr (Automatic Number-Plate Recognition)technology

3.1 What is ANPR ?

Automatic number plate recognition is a mass surveillance method that performs optical character recognition on images to read the license plates on vehicles.

ANPR can be used with either existing closed-circuit television or road-rule enforcement cameras, or ones specifically designed for the task.

ANPR is used by police forces around the world for law enforcement purposes, including to check if a vehicle is registered or licensed. It is also used for electronic toll collection on pay-per-use roads and as a method of cataloguing the movements of traffic, for example by highways agencies. **[8]**

ANPR is also known as:

- Automatic License Plate Recognition (ALPR)

- License Plate Recognition (LPR)

- Car Plate Recognition (CPR)

- Automatic Vehicle identification (AVI) **[9]**

3.1.1 Development

ANPR was invented in 1976 at the Police Scientific Development Branch in Britain.

Prototype systems were working by 1979, and contracts were awarded to produce industrial systems, first at EMI Electronics, and then at Computer Recognition Systems (CRS) in

Wokingham, UK. Early trial systems were deployed on the A1 road and at the Dartford Tunnel. The first arrest through detection of a stolen car was made in 1981.

However, ANPR did not become widely used until new developments in cheaper and easier to use software were pioneered during the 1990s.

The collection of ANPR data for future was documented in the early 2000s. The first documented case of ANPR being used to help solve a murder occurred in November 2005, in Bradford, UK, where ANPR played a vital role in locating and subsequently convicting killers of Sharon Beshenivsky. **[9]**

3.1.2 Why we use ANPR?

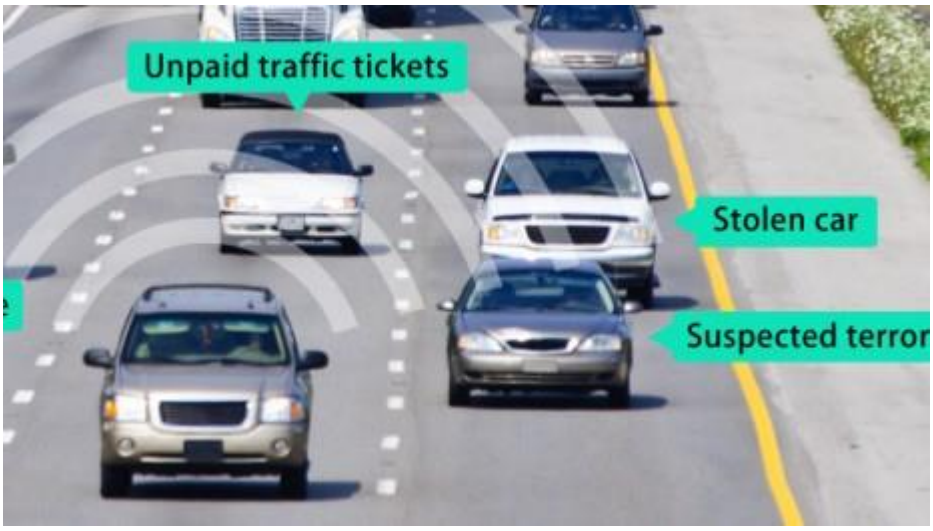
1. Faster traffic management at parking areas.

2. Easy usage of toll highways, bridges or tunnels.

3. Better security and prevention of car theft.

4. Ability to automate access control systems.

5. Allowing new and more effective law enforcement.



Pic 14…….. the use of anpr

And in this project we going to use it to control the traffic in to the university.

3.1.3 How does ANPR work?

1-2. Detection of the vehicle and image capture

a motion sensor will detect the movement of a moving car and it will allows the camera to take a photo for the plate of the car**[8]**

pic 15 ……..Detection of the vehicle and image capture

3.License plate recognition

There are **seven** primary algorithms that the software requires for identifying a license plate:

1-Plate localization – responsible for finding and isolating the plate on the picture

Pic 16 Plate localization

2-Plate orientation and sizing – compensates for the skew of the plate and adjusts the dimensions to the required size

3- adjusts the brightness and contrast of the image

4-Character segmentation – finds the individual characters on the plates

5-Optical character recognition

6-Syntactical/Geometrical analysis check characters and positions against country-specific rules

7-The averaging of the recognized value over multiple fields images to produce a more reliable or confident result. Especially since any single image may contain a reflected light flare, be partially obscured or other temporary effect.

The complexity of each of these subsections of the program determines the accuracy of the system. During the third phase (normalization), some systems use edge detection techniques to increase the picture difference between the letters and the plate backing. A median filter may also be used to reduce the visual noise on the image. **[9]**

3.1.4 Difficulties

There are a number of possible difficulties that the software must be able to cope with. These include:

- Poor file resolution, usually because the plate is too far away but sometimes resulting from the use of a low-quality camera
- Blurry images, particularly motion blur
- Poor lighting and low contrast due to overexposure, reflection or shadows
- An object obscuring (part of) the plate, quite often a tow bar, or dirt on the plate
- Vehicle lane change in the camera's angle of view during license plate reading
- A different font, popular for vanity plates (some countries do not allow such plates, eliminating the problem)
- Circumvention techniques

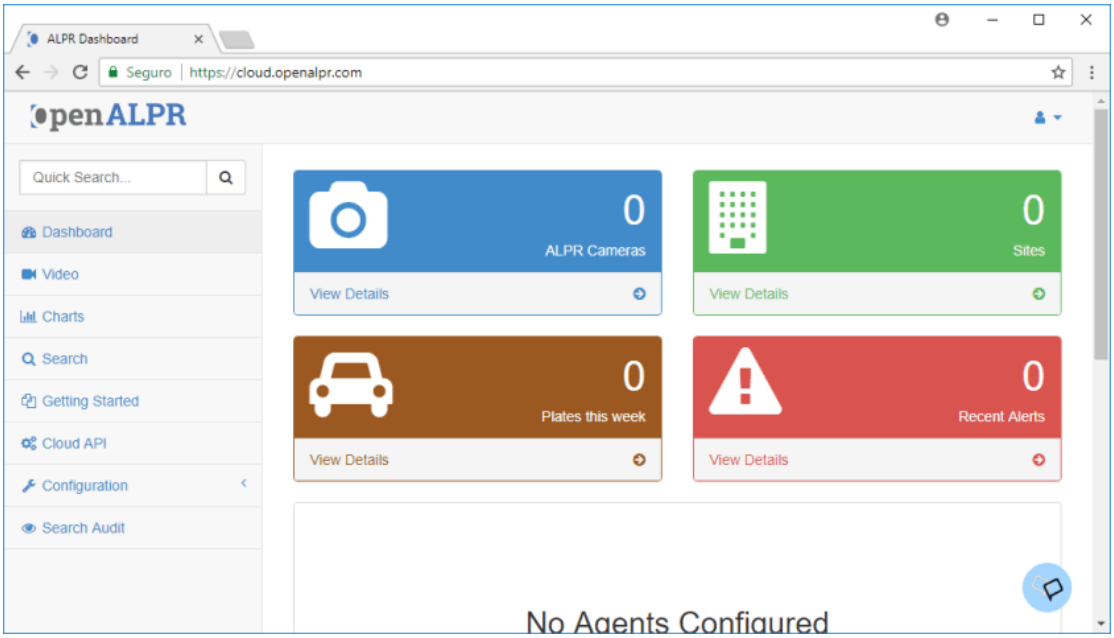
Note: in this project we will use OpenALPR

3.1.5 OpenALPR

OpenALPR is an open source Automatic License Plate Recognition library written in C++ with bindings in C#, Java, Node.js, Go, and Python. They also have the OpenALPR Cloud API which is a web service running in the cloud that analyzes images of vehicles and responds with license plate, model, color and much more. OpenALPR Cloud API has a free service that allows up to 2000 free recognitions per month.

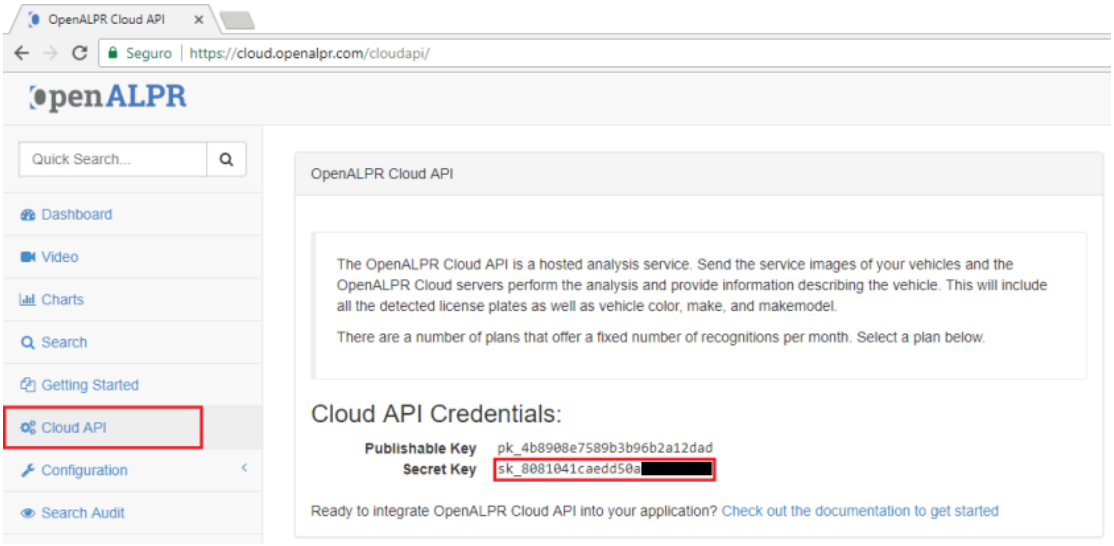
Creating a free account

To get started with OpenALPR Cloud API, you can create a free account. After completing your account creation, you should have access to the following page:



Pic 17……..alpr dashboard

Open the Cloud API tab to access your Secret Key. You need it to make requests to the API.



Pic 18…… your Secret Key

In my case, the secret key is: sk_8081041caedd50a———

Save your secret key in a safe place, because you'll need it in just a moment.

Raspberry Pi

3.2 Raspberry Pi
Ref.12

Now over four years old, the Raspberry Pi, a cheap credit-card sized computer, has taken the computing and DIY world by storm.

pic 19 ……Raspberry Pi 4 Model B

3.2.1 What Is the Raspberry Pi?

The Raspberry Pi is a series of small single-board computers developed in the United Kingdom by the Raspberry Pi Foundation to put the power of computing and digital making into the hands of people all over the world.

at the beginning the aims of the Raspberry Pi project were leaned towards the promotion of teaching of basic computer science in schools and in developing countries, it rapidly expanded into a wider range of uses, as the original model became far more popular than anticipated, selling outside its target market for uses such as robotics. It is now widely used even in research projects, such as for weather monitoring because of its low cost and portability.

After the release of the second board type, the Raspberry Pi Foundation set up a new entity, named Raspberry Pi Trading, and installed Eben Upton as CEO, with the responsibility of developing technology. The Foundation was rededicated as an educational charity for promoting the teaching of basic computer science in schools and developing countries.

The Raspberry Pi is one of the best-selling British computers. As of December 2019, more than thirty million boards have been sold. Most Pis are made in a Sony factory in Pencoed, Wales, while others are made in China and Japan. **[10]**

3.2.2 Generations

Several generations of Raspberry Pis have been released.

The first generation (**Raspberry Pi Model B**) was released in February 2012, followed by the simpler and cheaper Model A. In 2014, the Foundation released a board with an improved design, Raspberry Pi Model B+. These boards are approximately credit-card sized and represent the standard mainline form-factor.

Improved A+ and B+ models were released a year later. A "Compute Module" was released in April 2014 for embedded applications. **[10]**

The Raspberry Pi 2, which featured a 900 MHz quad-core ARM Cortex-A7 processor and 1 GiB RAM, was released in February 2015. **[10]**

Pic20 ….. Raspberry Pi 2 Model B

Raspberry Pi Zero with smaller size and reduced input/output (I/O) and general-purpose input/output (GPIO) capabilities was released in November 2015.

On 28 February 2017, the Raspberry Pi Zero W was launched, a version of the Zero with Wi-Fi and Bluetooth capabilities. On 12 January 2018, the Raspberry Pi Zero WH was launched, a version of the Zero W with pre-soldered GPIO headers. **[10]**

Pic 21 ….Raspberry Pi Zero

Raspberry Pi 3 Model B was released in February 2016 with a 1.2 GHz 64-bit quad core processor, on-board 802.11n Wi-Fi, Bluetooth and USB boot capabilities.

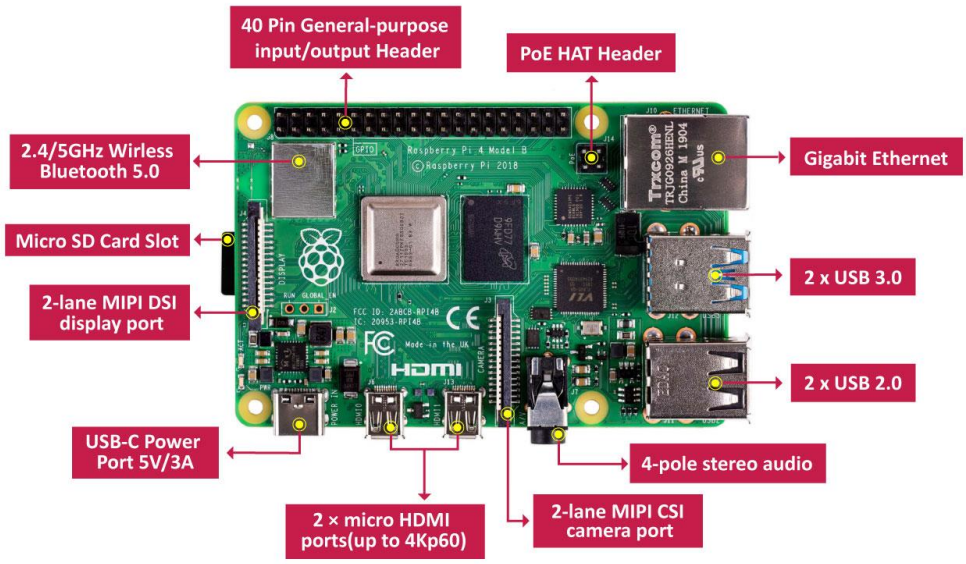
On Pi Day 2018, the Raspberry Pi 3 Model B+ was launched with a faster 1.4 GHz processor and a three-times faster gigabit Ethernet (throughput limited to ca. 300 Mbit/s by the internal USB 2.0 connection) or 2.4 / 5 GHz dual-band 802.11ac Wi-Fi (100 Mbit/s). Other features are Power over Ethernet (PoE) (with the add-on PoE HAT), USB boot and network boot (an SD card is no longer required). **[10]**

Pic 22 …..Raspberry Pi 3 Model B

Raspberry Pi 4 Model B was released in June 2019 with a 1.5 GHz 64-bit quad core ARM Cortex-A72 processor, on-board 802.11ac Wi-Fi, Bluetooth 5, full gigabit Ethernet (throughput not limited), two USB 2.0 ports, two USB 3.0 ports, and dual-monitor support via a pair of micro HDMI (HDMI Type D) ports for up to 4K resolution. The Pi 4 is also powered via a USB-C port, enabling additional power to be provided to downstream peripherals, when used with an appropriate PSU.

The initial Raspberry Pi 4 board has a design flaw where third-party e-marked USB cables, such as those used on Apple MacBooks, incorrectly identify it and refuse to provide power.

Tom's Hardware tested 14 different cables and found that 11 of them turned on and powered the Pi without issue. The design flaw was fixed in revision 1.2 of the board, released in late 2019. **[10]**



Note:

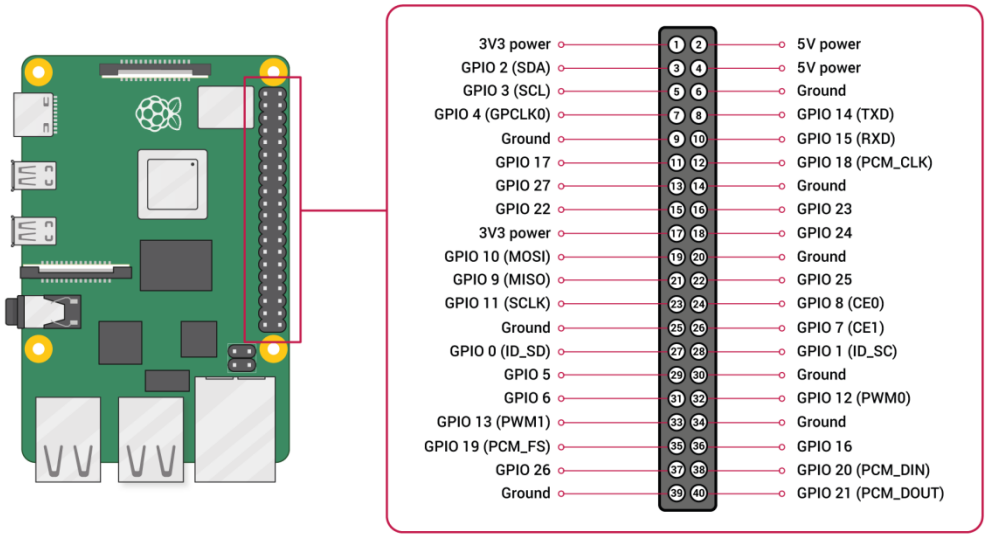
Processor speed ranges from 700 MHz to 1.4 GHz for the Pi 3 Model B+ or 1.5 GHz for the Pi 4; on-board memory ranges from 256 MiB to 1 GiB random-access memory (RAM), with up to 8 GiB available on the Pi 4. Secure Digital (SD) cards in MicroSDHC form factor (SDHC on early models) are used to store the operating system and program memory. The boards have one to five USB ports. For video output, HDMI and composite video are supported, with a standard 3.5 mm tip-ring-sleeve jack for audio output. Lower-level output is provided by a number of GPIO pins.

The B-models have an 8P8C Ethernet port and the Pi 3, Pi 4 and Pi Zero W have on-board Wi-Fi 802.11n and Bluetooth.

3.2.3 General purpose input-output (GPIO) connector

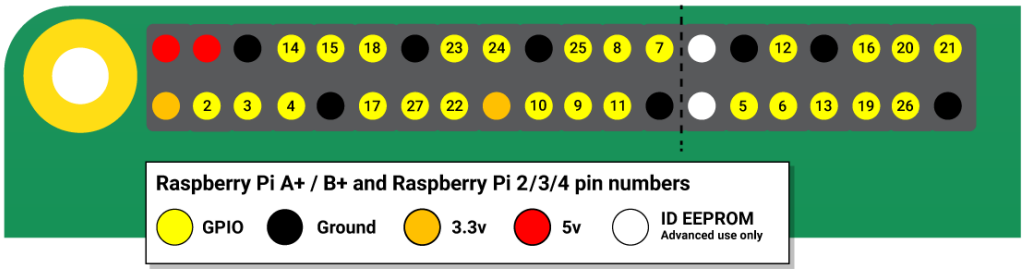
Ref : 1

A powerful feature of the Raspberry Pi is the row of GPIO (general-purpose input/output) pins along the top edge of the board. A 40-pin GPIO header is found on all current Raspberry Pi boards (unpopulated on Pi Zero and Pi Zero W). Prior to the Pi 1 Model B+ (2014), boards comprised a shorter 26-pin header. **[11]**



pic 23 ……..GPIOS

Any of the GPIO pins can be designated (in software) as an input or output pin and used for a wide range of purposes. **[11]**



pic 24……. raspberry pi a+/b+ and pi 2/3/4 pin numbers

Voltages

Two 5V pins and two 3V3 pins are present on the board, as well as a number of ground pins (0V), which are unconfigurable. The remaining pins are all general purpose 3V3 pins, meaning outputs are set to 3V3 and inputs are 3V3-tolerant.

Outputs

A GPIO pin designated as an output pin can be set to high (5V) or low (0V)

Inputs

A GPIO pin designated as an input pin can be read as high (3V3) or low (0V). This is made easier with the use of internal pull-up or pull-down resistors. Pins GPIO2 and

GPIO3 have fixed pull-up resistors, but for other pins this can be configured in software. **[11]**

More

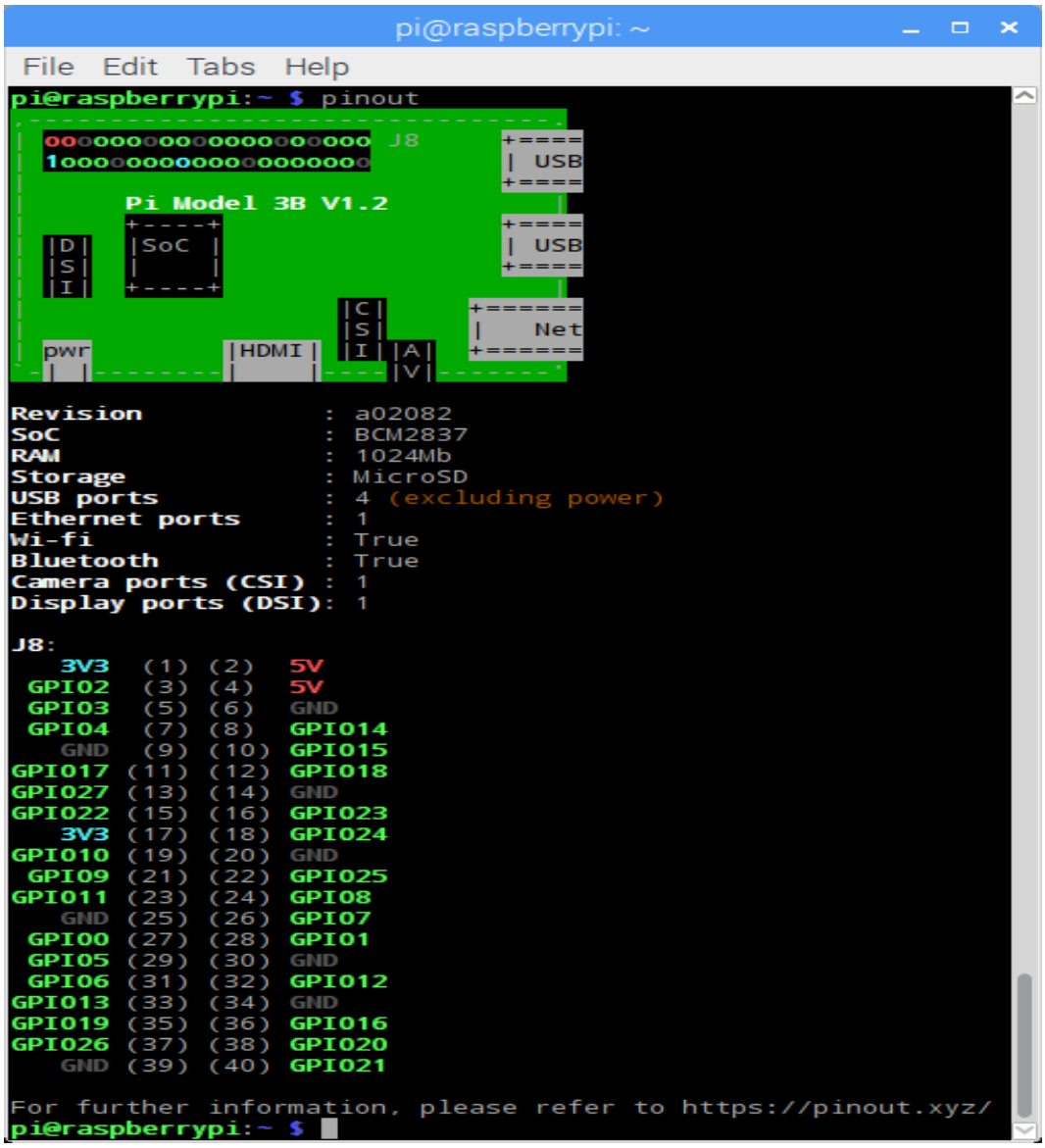
As well as simple input and output devices, the GPIO pins can be used with a variety of alternative functions, some are available on all pins, others on specific pins.

- PWM (pulse-width modulation)
    - Software PWM available on all pins
    - Hardware PWM available on GPIO12, GPIO13, GPIO18, GPIO19
- SPI(Serial Peripheral Interface)
    - SPI0: MOSI (GPIO10); MISO (GPIO9); SCLK (GPIO11); CE0 (GPIO8), CE1 (GPIO7)
    - SPI1: MOSI (GPIO20); MISO (GPIO19); SCLK (GPIO21); CE0 (GPIO18); CE1 (GPIO17); CE2 (GPIO16)
- I2C (Inter-Integrated Circuit)
    - Data: (GPIO2); Clock (GPIO3)
    - EEPROM Data: (GPIO0); EEPROM Clock (GPIO1)
- Serial
    - TX (GPIO14); RX (GPIO15) **[11]**

GPIO pinout

A handy reference can be accessed on the Raspberry Pi by opening a terminal window and running the command "pinout". This tool is provided by the GPIO Zero Python library, which is installed by default on the Raspberry Pi OS desktop image, but not on Raspberry Pi OS Lite.

pic 25 .....terminal window



3.2.4 Raspberry Pi OS

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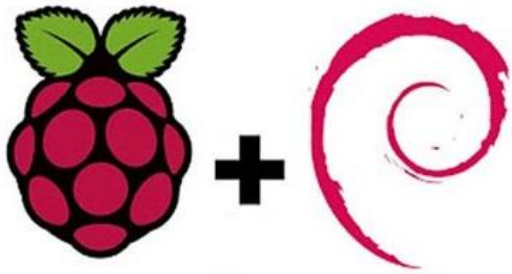
Raspberry Pi OS (formerly Raspbian) is a Debian-based operating system for Raspberry Pi. Since 2015 it has been officially provided by the Raspberry Pi Foundation as the primary operating system for the family of Raspberry Pi single-board computers. **[12]**

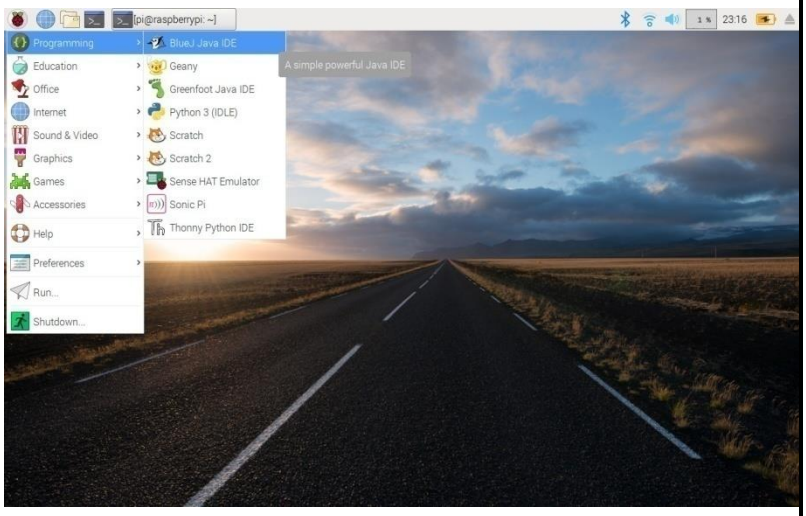


Pic 26…….. Raspbian logo

The original Raspbian OS was created by Mike Thompson and Peter Green as an independent 2012.

Previous Pi OS have been 32bit and based on Raspbian core, taking the name Raspbian. Since recent 64bit versions no longer use the Raspbian core, the name has been changed to Raspberry Pi OS for both 64bit and 32bit versions. As of 1 August 2020, the 64-bit version is a beta and is not suitable for general use .

Raspberry Pi OS is highly optimized for the Raspberry Pi lines of compact Single Board Computers with ARM CPUs. Raspberry Pi OS uses a modified LXDE as its desktop environment with the Openbox stacking window manager plus a new theme and few other changes. The distribution is shipped with a copy of the algebra program Wolfram Mathematica and a version of Minecraft called Minecraft Pi as well as a lightweight version of Chromium as of the latest version. **[12]**



Pic 27…… Raspbian OS desktop

3.2.5 What are the differences between Raspberry Pi and Arduino?

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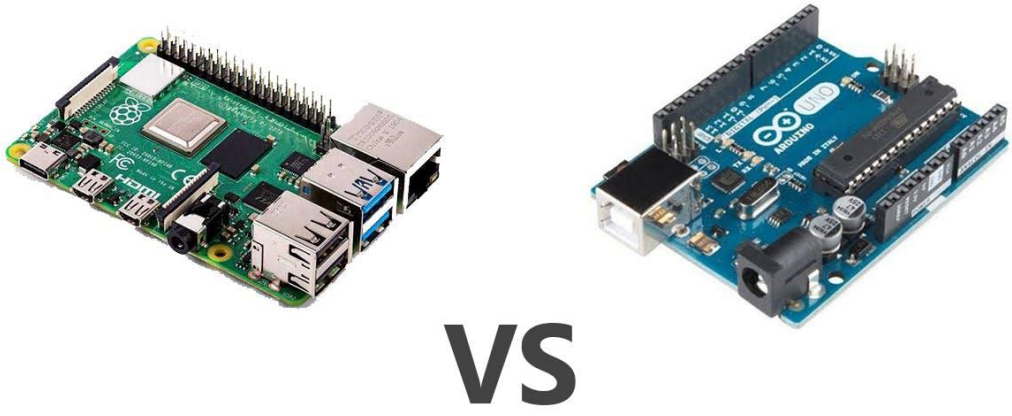


Raspberry Pi and Arduino are quite different boards. Each board has its own advantages and disadvantages. If you want to decide between the two, then it depends on the requirement of your project. Let understand these two boards in detail.

Arduino was invented by Massimo Benzi in Italy.

Arduino was a simple hardware prototyping tool, While raspberry pi as invented by Eben Upton at the University of Cambridge in the United Kingdom for improving the programming skills of his students.

These both teaching tools are suitable for beginners, hobbyists. The main difference between them is Arduino is microcontroller board while raspberry pi is a mini computer.

Thus Arduino is just a part of raspberry pi, Raspberry Pi is good at software applications, while Arduino makes hardware projects simple. **[13]**

Below table gives you some differences between them.

SL	Raspberry Pi	Arduino
1	It is a mini computer with Raspbian OS.It can run multiple programs at a time.	Arduino is a microcontroller, which is a part of the computer. It runs only one program again and again.
2	It is difficult to power using a battery pack.	Arduino can be powered using a battery pack.
3	It requires complex tasks like installing libraries and software for interfacing sensors and other components	It is very simple to interface sensors and other electronic components to Arduino.
4	It is expensive	It is available for low cost.
5	Raspberry Pi can be easily connected to the internet using Ethernet port and USB Wi-Fi dongles.	Arduino requires external hardware to connect to the internet and this hardware is addressed properly using code.
6	Raspberry Pi did not have storage on board. It provides an SD card port.	Arduino can provide onboard storage.
7	Raspberry Pi has 4 USB ports to connect different devices.	Arduino has only one USB port to connect to the computer.
8	The processor used is from ARM family.	Processor used in Arduino is from AVR family Atmega328P

9	This should be properly shutdown otherwise there is a risk of files corruption and software problems.	This is a just plug and play device. If power is connected it starts running the program and if disconnected it simply stops.
10	The Recommended programming language is python but C, C++, Python, ruby are pre-installed.	Arduino uses Arduino, C/C++.

These two boards run on very low power. But power interruption for raspberry pi may cause damage to the software and applications. In case of Arduino if there is any power cut it again restarts. So raspberry pi must be properly shutdown before disconnecting power.

Raspberry Pi comes with the fully functional operating system called Raspbian. It has all features of a computer with a processor, memory and graphics driver. Pi can use different operating systems. Although Linux is preferred android can also be installed. Arduino does not have any operating system. Its firmware simply interprets the code written to it. It is very easy to execute simple code.

input and output pins allow these boards to connect to other devices. Raspberry pi2 has 2 packs of input/output pins while Arduino Uno has 20 pins.

Pi is faster than Arduino by 40 times in clock speed.Pi has ram 128000 times more than Arduino.So Raspberry Pi is more powerful than Arduino.

Arduino has 32kb of storage on board.This is used for storing the code.This code decides the functions of the Arduino.Raspberry pi does not have any onboard storage.But it provides micro SD port.

Arduino can be expanded using external hardware like Wi-Fi, Ethernet, touchscreens, cameras etc. These boards are called shields. These shields are easily installed for Arduino. While raspberry is self-constrained board.Pi can also add some hats to add hardware like Touchscreen, GPS, RGB panels etc. but does not have many options like Arduino board has.

Arduino uses Arduino IDE for developing the code. While Raspberry Pi can use Scratch, IDLE anything that supports Linux. **[13]**

How to decide between Raspberry Pi and Arduino

So to decide between the two, first you should know what you want to do in your project.

-From above discussion we can understand that Arduino is good for repetitive tasks such as opening the garage door, switching the lights on and off.

-While pi good for performing multiple tasks, driving complicated robots.

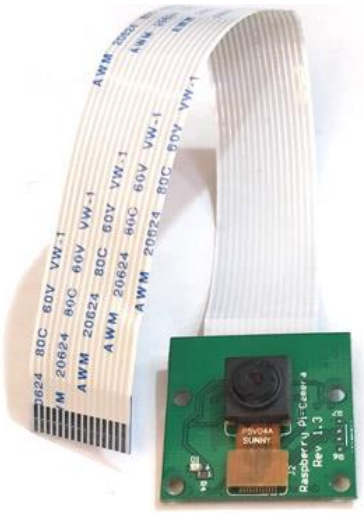
-For example, if you want to monitor the soil moisture and mail me if it is necessary to water the plants.For this application, arduino can be used.

-But if you want to monitor the moisture, mail me when the plants need to be watered and check the weather report from online.If there is rain do nothing. For this application Raspberry pi required.

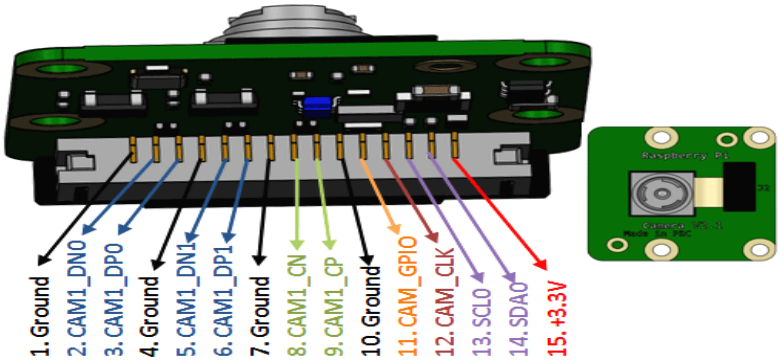
-In simple Arduino is used for beginners projects and some complicated projects can be easily handled by pi. **[13]**

3.3 Pi Camera

The Pi camera module is a portable light weight camera that supports Raspberry Pi. It communicates with Pi using the MIPI camera serial interface protocol. It is normally used in image processing, machine learning or in surveillance projects. It is commonly used in surveillance drones since th payload of camera is very less. Apa from these modules Pi can also u normal USB webcams that are used alo with computer. **[14]**



3.3.1 Pin Description



Pin Number	Pin Name	Description
1	Ground	System Ground
2,3	CAM1_DN0, CAM1_DP0	MIPI Data Positive and MIPI Data Negative for data lane 0
4	Ground	System Ground
5,6	CAM1_DN1, CAM1_DP1	MIPI Data Positive and MIPI Data Negative for data lane 1
7	Ground	System Ground
8,9	CAM1_CN, CAM1_CP	These pins provide the clock pulses for MIPI data lanes
10	Ground	System Ground
11	CAM_GPIO	GPIO pin used optionally
12	CAM_CLK	Optional clock pin
13,14	SCL0, SDA0	Used for I2C communication
15	+3.3V	Power pin

3.3.2 PiCam Features

- 5MP colour camera module without microphone for Raspberry Pi
- Supports both Raspberry Pi Model A and Model B
- MIPI Camera serial interface
- Omnivision 5647 Camera Module
- Resolution: 2592 * 1944
- Supports: 1080p, 720p and 480p
- Light weight and portable (3g only)

3.3.3 How to use Camera module with Pi

The Pi camera module when purchased comes along with a ribbon cable, this cable has to be connected to the CSI (Camera Serial Interface) port of the Pi. This port can be found near the HDMI port just connect the cable to it as shown below.

Pic 28 ……..How to use Camera module with Pi

After interfacing the hardware, we have to configure the Pi to enable Camera. Use the command "sudo raspi-config" to open the configuration window. Then under interfacing options enable camera. Finally reboot the Pi and your camera module is ready to use. Then, you can make the Pi to take photos or record videos using simple python scripts.

3.3.4 Applications

- Surveillance projects
- Time-lapse video recording
- Image processing
- Machine learning
- Robotics

3.4 Motion Sensors

3.4.1 What is a Motion Sensor?

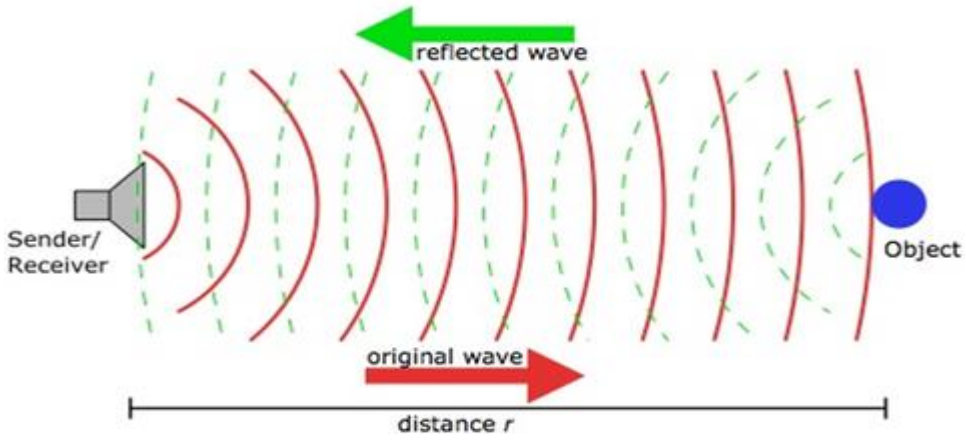
A motion sensor (or motion detector) is an electronic device that is designed to detect and measure movement. Motion sensors are used primarily in home and business security systems, but they can also be found in phones, paper towel dispensers, game consoles, and virtual reality systems. Unlike many other types of sensors (which can be handheld and isolated), motion sensors are typically embedded systems with three major components: a sensor unit, an embedded computer, and hardware (or the mechanical component). These three parts vary in size and configuration, as motion sensors can be customized to perform highly specific functions. For example, motion sensors can be used to activate floodlights, trigger audible alarms, activate switches, and even alert the police. **[15]**

3.4.2 Types of motion sensors

There are two types of motion sensors: active motion sensors and passive motion sensors.

3.4.2.1 Active motion sensors

Active sensors have both a transmitter and a receiver. This type of sensor detects motion by measuring changes in the amount of sound or radiation reflecting back into the receiver. When an object interrupts or alters the sensor's field, an electric pulse is sent to the embedded computer, which in turn interacts with the mechanical component. The most common type of active motion detector uses ultrasonic sensor technology; these motion sensors emit sound waves to detect the presence of objects. There are also microwave sensors (which emit microwave radiation), and tomographic sensors (which transmit and receive radio waves). **[15]**



pic 29……how the sensor works

3.4.2.2 Passive motion sensors

Unlike an active motion sensor, a passive motion sensor does not have a transmitter. Instead of measuring a constant reflection, the sensor detects motion based on a perceived increase of radiation in its environment. The most widely used type of passive motion sensor in home security systems is the passive infrared (PIR) sensor. The PIR sensor is designed to detect the infrared radiation emitted naturally from the human body. The receiver is contained in a filter that only allows infrared to pass through it. When a person walks into the PIR sensor's field of detection, the difference in radiation creates a positive charge within the receiver; this perceived change causes the sensing unit to send electrical data to the embedded computer and hardware component. **[15]**

Pic30 ……how pir sensor works

3.4.3 HC-SR04 Ultrasonic Sensor

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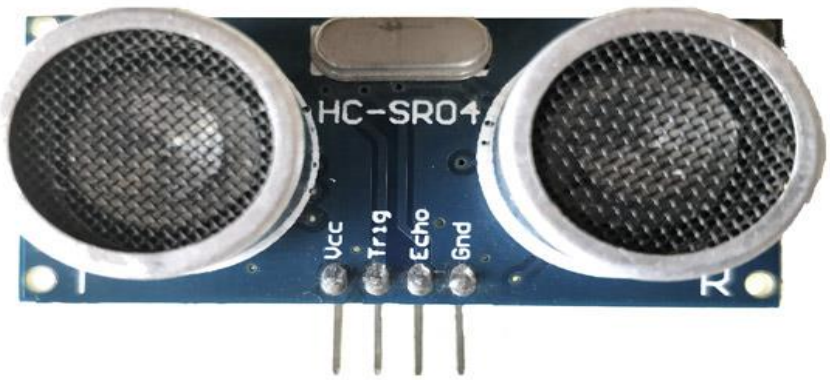
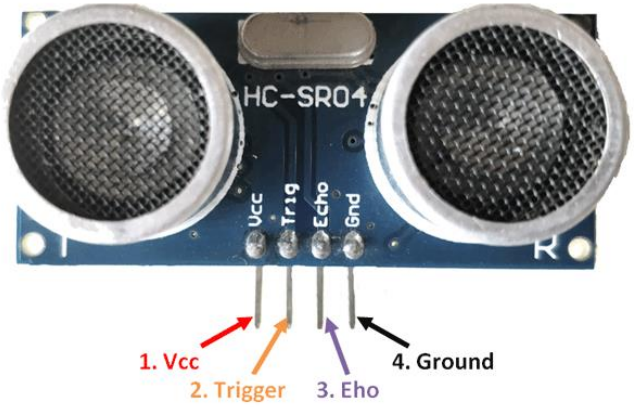


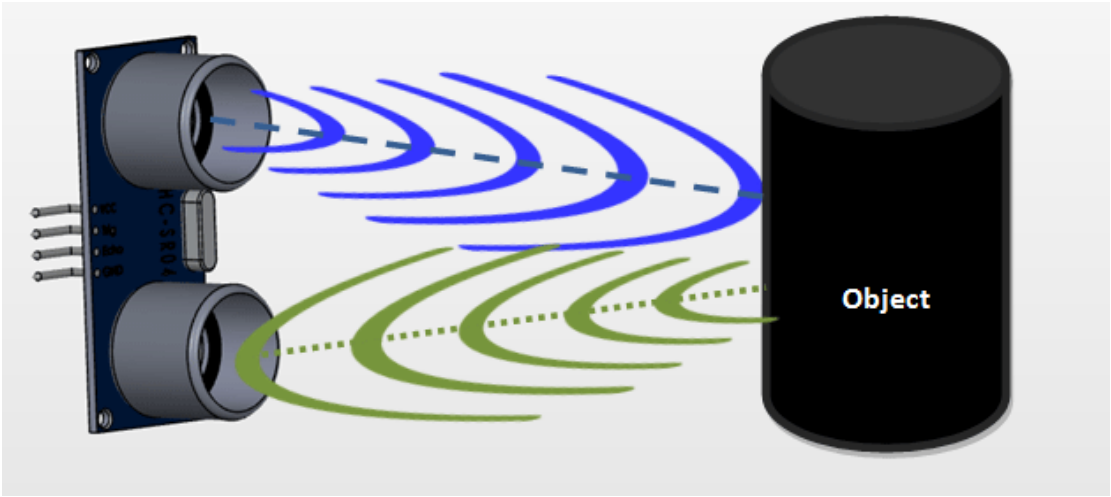
3.4.3.1 HC-SR04 Ultrasonic Sensor - Working

the HC-SR04 Ultrasonic (US) sensor is a 4 pin module, whose pin names are Vcc, Trigger, Echo and Ground respectively. This sensor is a very popular sensor used in many applications where measuring distance or sensing objects are required. The module has two eyes like projects in the front which forms the Ultrasonic transmitter and Receiver. The sensor works with the simple high school formula that



Distance = Speed × Time

The Ultrasonic transmitter transmits an ultrasonic wave, this wave travels in air and when it gets objected by any material it gets reflected back toward the sensor this reflected wave is observed by the Ultrasonic receiver module as shown in the picture below



Pic 31……. The Ultrasonic transmitter

Now, to calculate the distance using the above formulae, we should know the Speed and time. Since we are using the Ultrasonic wave we know the universal speed of US wave at room conditions which is 330m/s. The circuitry inbuilt on the module will calculate the time taken for the US wave to come back and turns on the echo pin high for that same particular amount of time, this way we can also know the time taken. Now simply calculate the distance using a microcontroller or microprocessor. **[16]**

3.4.3.2 Ultrasonic Sensor Pin Configuration

Pin Number	Pin Name	Description
1	Vcc	The Vcc pin powers the sensor, typically with +5V
2	Trigger	Trigger pin is an Input pin. This pin has to be kept high for 10us to initialize measurement by sending US wave.
3	Echo	Echo pin is an Output pin. This pin goes high for a period of time which will be equal to the time taken for the US wave to return back to the sensor.
4	Ground	This pin is connected to the Ground of the system.

3.4.3.3 HC-SR04 Sensor Features

- Operating voltage: +5V
- Theoretical Measuring Distance: 2cm to 450cm
- Practical Measuring Distance: 2cm to 80cm
- Accuracy: 3mm
- Measuring angle covered: <15°
- Operating Current: <15mA
- Operating Frequency: 40Hz

3.4.3.4 Applications

- Used to avoid and detect obstacles with robots like biped robot, obstacle avoider robot, path finding robot etc.
- Used to measure the distance within a wide range of 2cm to 400cm
- Can be used to map the objects surrounding the sensor by rotating it
- Depth of certain places like wells, pits etc can be measured since the waves can penetrate through water

3.5 Servo Motor

What is a Servo Motor?

A servo motor is an electrical device which can push or rotate an object with great precision. If you want to rotate and object at some specific angles or distance, then you use servo motor. It is just made up of simple motor which run through servo mechanism.

If motor is used is DC powered then it is called DC servo motor, and if it is AC powered motor then it is called AC servo motor. We can get a very high torque servo motor in a small and light weight packages. **[17]**

Pic 32……. Servo Motor

Doe to these features they are being used in many applications like toy car, RC helicopters and planes, Robotics, Machine etc.

Servo motors are rated in kg/cm (kilogram per centimeter) most hobby servo motors are rated at 3kg/cm or 6kg/cm or 12kg/cm. This kg/cm tells you how much weight your servo motor can lift at a particular distance. For example: A 6kg/cm Servo motor should be able to lift 6kg if the load is suspended 1cm away from the motors shaft, the greater the distance the lesser the weight carrying capacity.

The position of a servo motor is decided by electrical pulse and its circuitry is placed beside the motor.

Pic33…Mitsubishi , 50W To 1KW AC Servo Motor, 240V

3.5.1 Servo Mechanism

It consists of three parts:

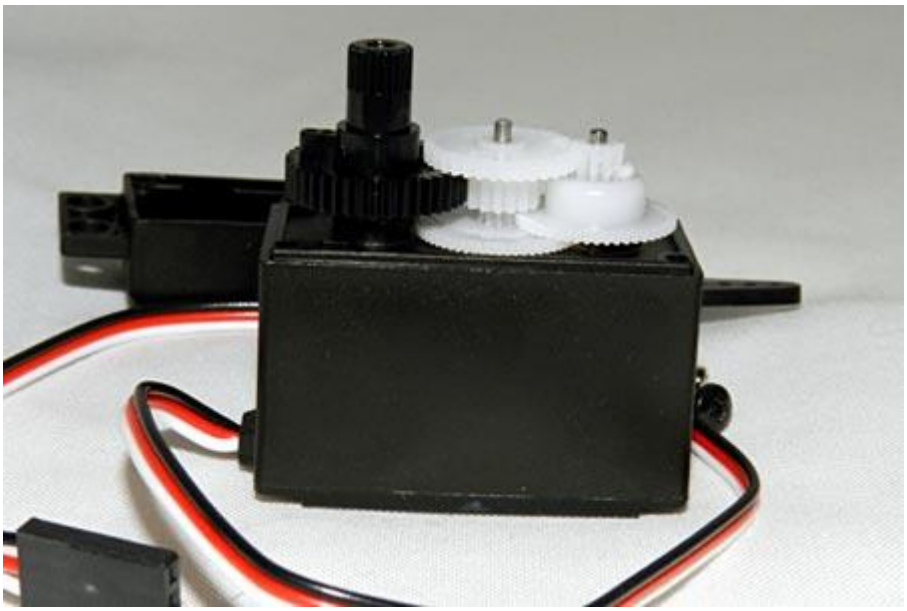
1. Controlled device
2. Output sensor
3. Feedback system

It is a closed loop system where it uses positive feedback system to control motion and final position of the shaft. Here the device is controlled by a feedback signal generated by comparing output signal and reference input signal.

Here reference input signal is compared to reference output signal and the third signal is produces by feedback system. And this third signal acts as input signal to control device. This signal is present as long as feedback signal is generated or there is difference between reference input signal and reference output signal. So the main task of servomechanism is to maintain output of a system at desired value at presence of noises.

Principle of working :

Servo motor works on the PWM (Pulse Width Modulation) principle, which means its angle of rotation is controlled by the duration of pulse applied to its control PIN. Basically servo motor is made up of DC motor which is controlled by a variable resistor (potentiometer) and some gears.



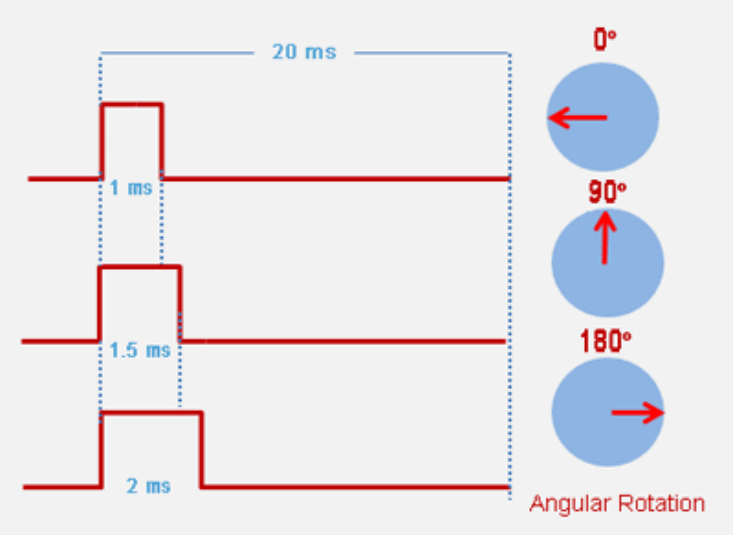
The gears in a typical standard-size servo are made of plastic and convert the fast, low-power motion of the motor (on the right) to the output shaft (on the left).

3.5.2 Controlling Servo Motor:

All motors have three wires coming out of them. Out of which two will be used for Supply (positive and negative) and one will be used for the signal that is to be sent from the MCU.

Servo motor is controlled by PWM (Pulse with Modulation) which is provided by the control wires.

There is a minimum pulse, a maximum pulse and a repetition rate. Servo motor can turn 90 degree from either direction form its neutral position. The servo motor expects to see a pulse every 20 milliseconds (ms) and the length of the pulse will determine how far the motor turns. For example, a 1.5ms pulse will make the motor turn to the 90° position, such as if pulse is shorter than 1.5ms shaft moves to 0° and if it is longer than 1.5ms than it will turn the servo to 180°.



Pic 34 Controlling Servo Motor

Servo motor works on PWM (Pulse width modulation) principle, means its angle of rotation is controlled by the duration of applied pulse to its Control PIN. Basically servo motor is made up of DC motor which is controlled by a variable resistor (potentiometer) and some gears. High speed force of DC motor is converted into torque by Gears. We know that WORK= FORCE X DISTANCE, in DC motor Force is less and distance (speed) is high and in Servo, force is High and distance is less. Potentiometer is connected to the output shaft of the Servo, to calculate the angle and stop the DC motor on required angle.

Servo motor can be rotated from 0 to 180 degree, but it can go up to 210 degree, depending on the manufacturing. This degree of rotation can be controlled by applying the Electrical Pulse of proper width, to its Control pin. Servo checks the pulse in every 20 milliseconds. Pulse of 1 ms (1 millisecond) width can rotate servo to 0 degree, 1.5ms can rotate to 90 degree (neutral position) and 2 ms pulse can rotate it to 180 degree.

All servo motors work directly with your +5V supply rails but we have to be careful on the amount of current the motor would consume, if you are planning to use more than two servo motors a proper servo shield should be designed. **[17]**

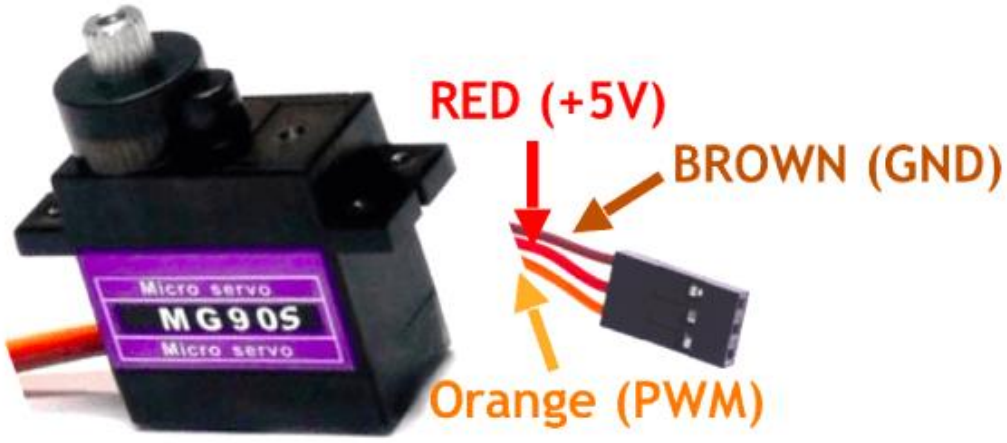
3.5.3 MG90S – Metal Gear Micro Servo Motor

•

MG90S is a micro servo motor with metal gear. This small and lightweight servo comes with high output power, thus ideal for RC Airplane, Quadcopter or Robotic Arms. **[18]**

3.5.3.1 MG90S Wiring Description

Wire Number	Wire Colour	Description
1	Brown	Ground wire connected to the ground of system
2	Red	Powers the motor typically +5V is used
3	Orange	PWM signal is given in through this wire to drive the motor



3.5.3.2 TowerPro MG-90S Features

- Operating Voltage: 4.8V to 6V (Typically 5V)
- Stall Torque: 1.8 kg/cm (4.8V)
- Max Stall Torque: 2.2 kg/cm (6V)
- Operating speed is 0.1s/60° (4.8V)
- Gear Type: Metal
- Rotation : 0°-180°
- Weight of motor : 13.4gm
- Package includes gear horns and screws

3.6 LED

What is an LED?

In the simplest terms, a light-emitting diode (LED) is a semiconductor device that emits light when an electric current is passed through it. Light is produced when the particles that carry the current (known as electrons and holes) combine together within the semiconductor material.

Since light is generated within the solid semiconductor material, LEDs are described as solid-state devices. The term solid-state lighting, which also encompasses organic LEDs (OLEDs), distinguishes this lighting technology from other sources that use heated filaments (incandescent and tungsten halogen lamps) or gas discharge (fluorescent lamps). **[19]**

Different colors

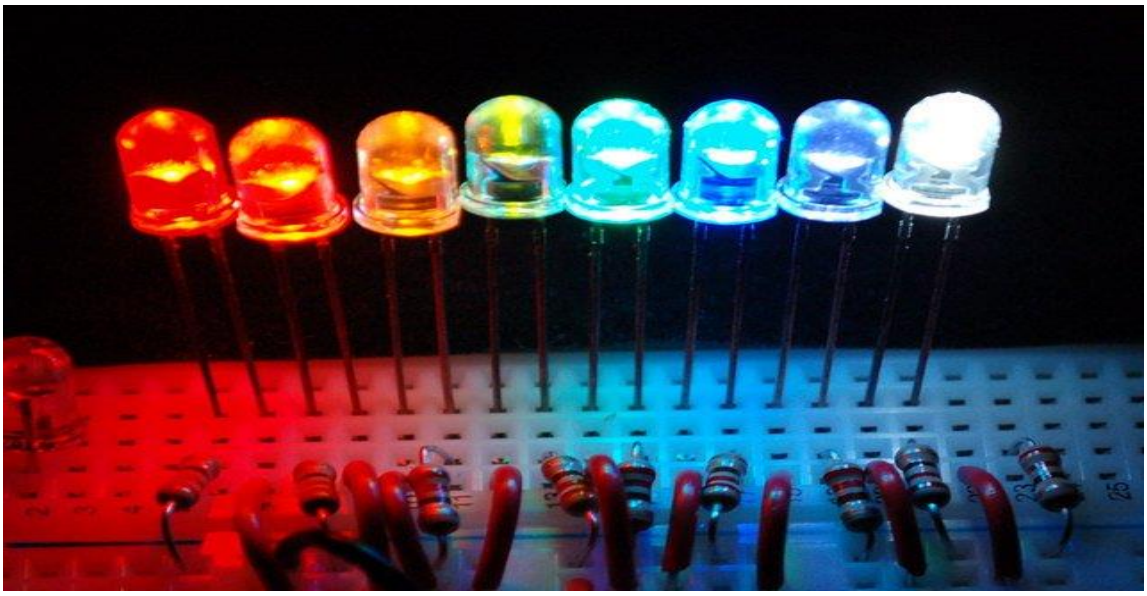
Inside the semiconductor material of the LED, the electrons and holes are contained within energy bands. The separation of the bands (i.e. the bandgap) determines the energy of the photons (light particles) that are emitted by the LED.

The photon energy determines the wavelength of the emitted light, and hence its color.

Different semiconductor materials with different bandgaps produce different colors of light. The precise wavelength (color) can be tuned by altering the composition of the light-emitting, or active, region.

LEDs are comprised of compound semiconductor materials, which are made up of elements from group III and group V of the periodic table (these are known as III-V materials). Examples of III-V materials commonly used to make LEDs are gallium arsenide (GaAs) and gallium phosphate (GaP).

Until the mid-90s LEDs had a limited range of colors, and in particular commercial blue and white LEDs did not exist. The development of LEDs based on the gallium nitride (GaN) material system completed the palette of colors and opened up many new applications. **[19]**



Application

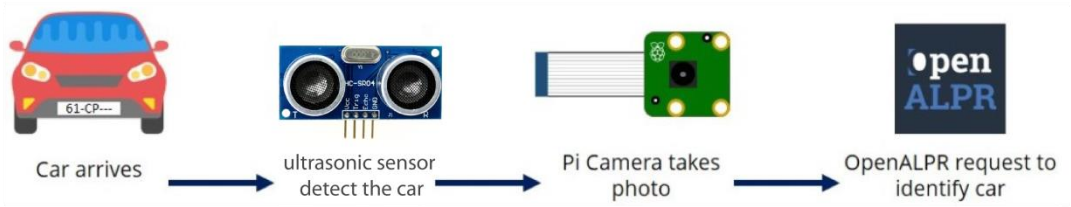
4 Application

4.1 Overview

So the main purpose of this project is to create an automatic barrier using ANPR

This project is divided into two parts.

1. First, we'll identify a car using OpenALPR;



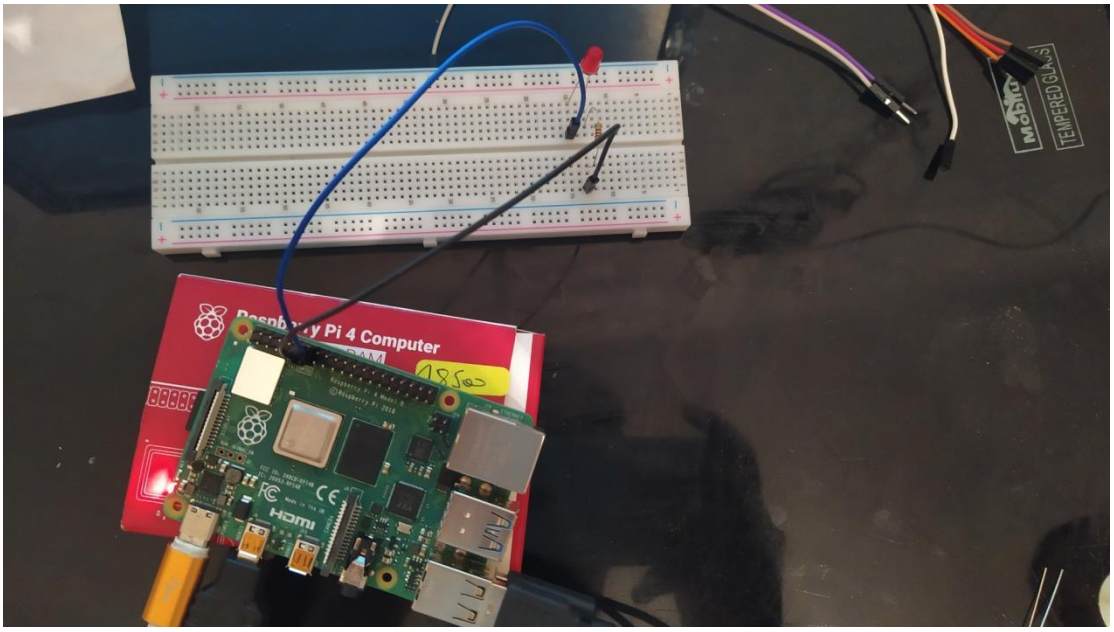
2. Then, we'll trigger an event based on the detected car (for example, open the barrier when it detects that your car arrived .

But…

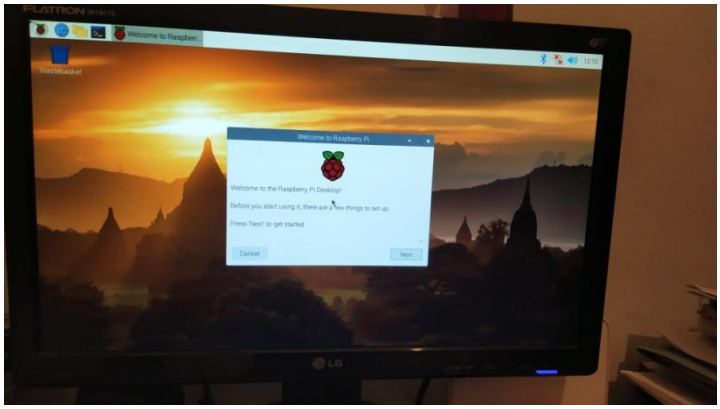
let's build a simple experiment to understand how raspberry pi works

so the simple experiment is to control a LED (on and off) with time:

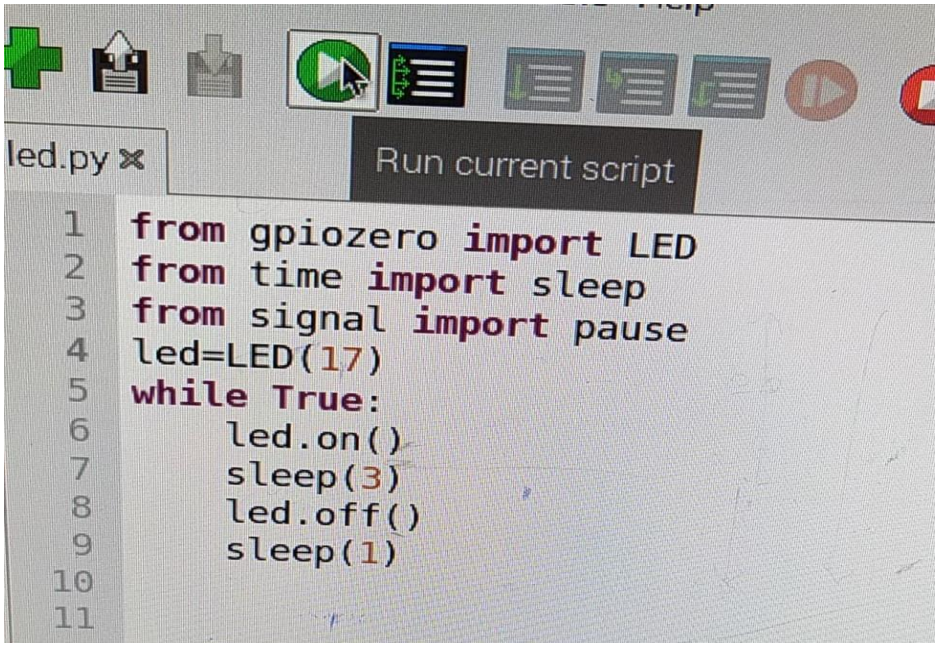
The montage



now let's go to the raspberry os desktop

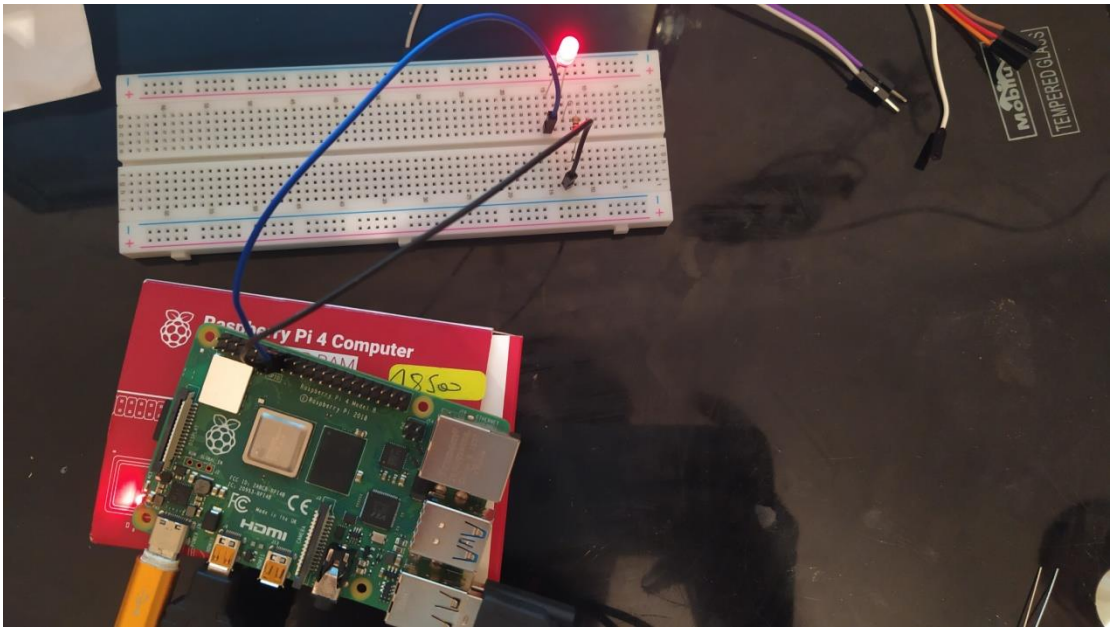


Open thonny and write this code



we will connect the pin 17 with the resistor then the LED the the pin 6 (gnd)

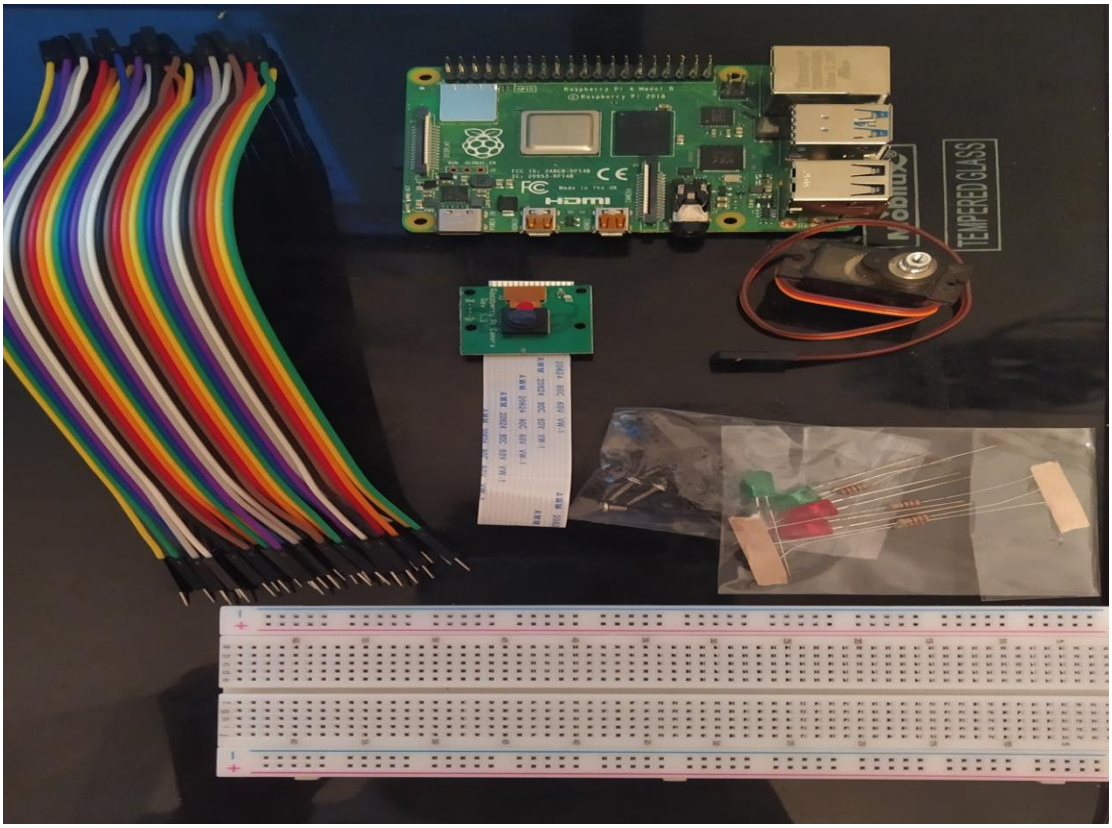
and click run



So the LED will be ON for 3 seconds and then will be Off for 1 second then repeat it all again (loop)

Now let's go back to the main project

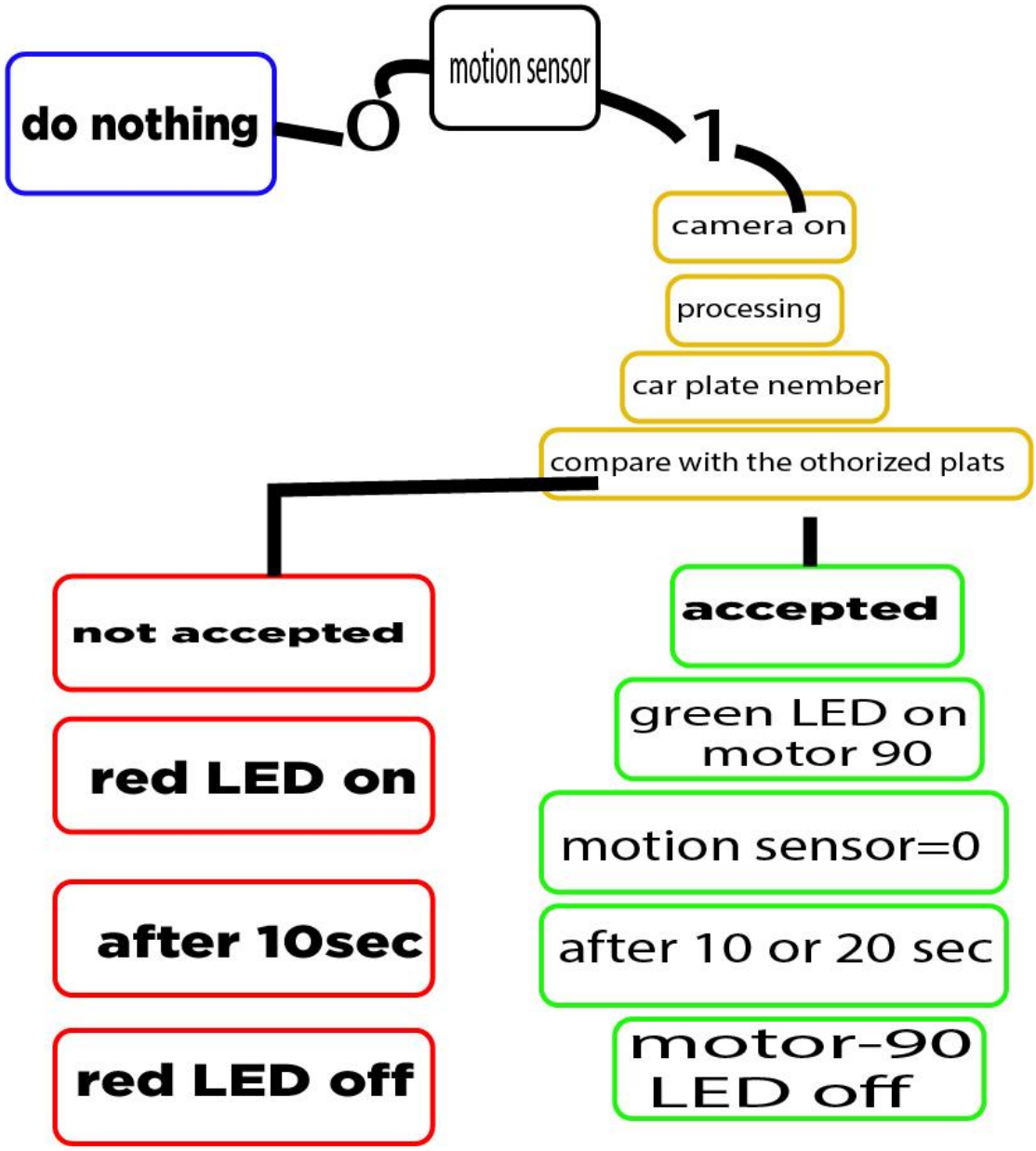
4.2 Parts Required



- Raspberry Pi 4 model b 4 gb of ram
- Raspberry Pi Camera V2 Module
- Servo Motor –MG90S
- Motion Sensor -HC-SR04 Ultrasonic Sensor
- 1 green LED-1 red LED
- Resistor (220 ohms should work)
- Breadboard
- Jumper wires

4.3 Algorithm

1. the motion sensor will detect the car
2. the camera will take a photo of the car
3. send the photo to openalpr for analyzing
4. openalpr will send back the number plat of the car
5. compare it with the authorized plates
6. if it matches
7. the green led will be on and the servo motor will open the barrier
8. after 10 seconds
9. the LED will be off and the servo motor will close the barrier
10. if it didn't match
11. the red LED will be on for 10 secnds .

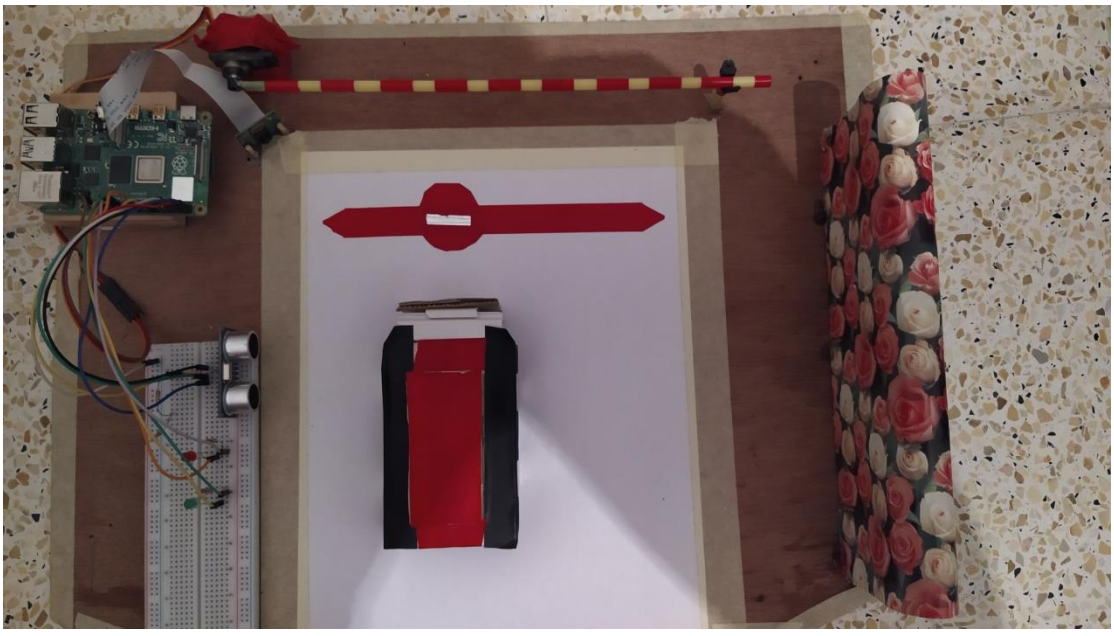


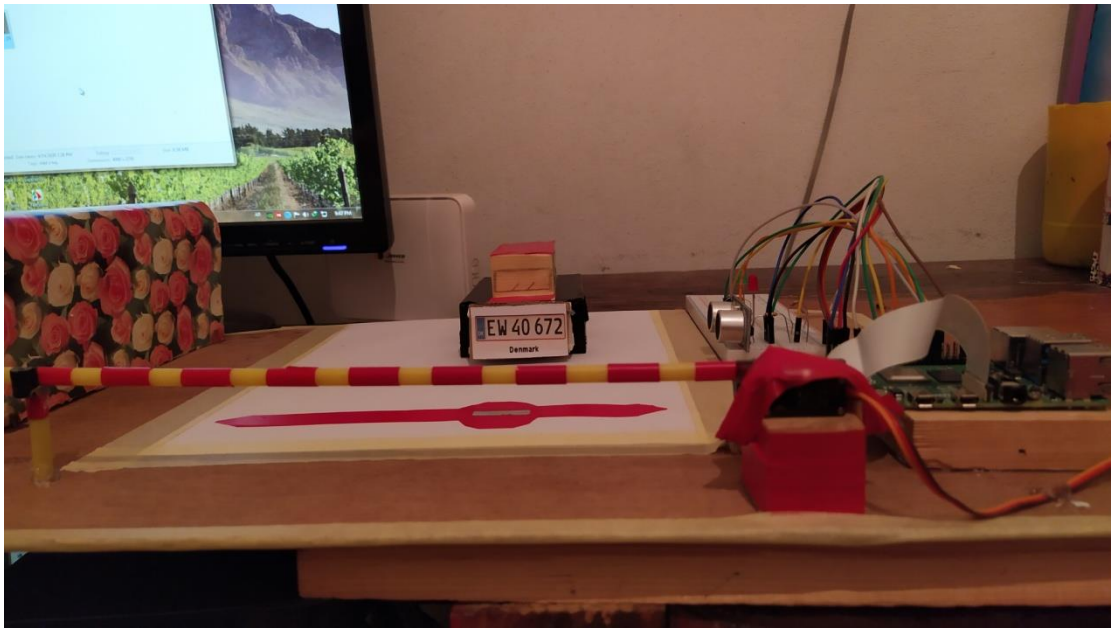
4.4 The code

```
import RPi.GPIO as GPIO
import time
from gpiozero import LED , Servo
from picamera import PiCamera
from datetime import datetime
import requests
import base64
import json



def sendimg(img_path) :
```

```
    IMAGE_PATH = img_path
    SECRET_KEY = 'sk_0647aab5b38e76bd0158683f'
    with open(IMAGE_PATH, 'rb') as image_file:
        img_base64 = base64.b64encode(image_file.read())
    url =
'https://api.openalpr.com/v3/recognize_bytes?recognize_vehicle
=1&country=eu&secret_key=%s' % (SECRET_KEY)
    r = requests.post(url, data = img_base64)
    res = json.dumps(r.json())
    dic = json.loads(res)
    return dic

camera = PiCamera()

while True :


    GPIO.setmode(GPIO.BCM)
    TRIG = 23
    ECHO = 24
    GPIO.setup(TRIG,GPIO.OUT)
    GPIO.setup(ECHO,GPIO.IN)
    GPIO.output(TRIG, False)
    time.sleep(2)
    GPIO.output(TRIG, True)
    time.sleep(0.00001)
    GPIO.output(TRIG, False)
    while GPIO.input(ECHO)==0:
        pulse_start = time.time()
    while GPIO.input(ECHO)==1:
        pulse_end = time.time()
    pulse_duration = pulse_end - pulse_start
    distance = pulse_duration * 17150
    distance = round(distance, 2)
    #print ("Distance:",distance,"cm")


    if distance < float(25) :
        test = True
        while test == True :
            timestamp = datetime.now().isoformat()
            camera.capture('/home/pi/%s.jpg' % timestamp)
            img_path = '/home/pi/%s.jpg' % timestamp
            rapi = sendimg(img_path)
            carPlate = ['ESDM8011','812AUE','CGI964']
            if len(rapi['results']) == 0 :
                print ('NO CAR')
                ledr=LED(6)
                ledr.on()
                time.sleep(10)
                ledr.off()
                ledr.close()
                test = False

            elif  rapi['results'][0]['plate'] in carPlate :
```

```
                print('AUTHORIZED CAR')
                ledg=LED(5)
                ledg.on()


                servo = Servo(25)
                servo.max()
                time.sleep(10)
                ledg.off()
                servo.min()
                time.sleep(2)
                test = False
                servo.close()
                ledg.close()



            else :
                print (rapi['results'][0]['plate'])
                print('UNAUTHORIZED CAR')
                ledr=LED(6)
                ledr.on()
                time.sleep(10)
                ledr.off()
                ledr.close()
                test = False
    else:
        continue
GPIO.cleanup()
```





5 Conclusion

In this memory i have presented a complete process for building a

security system to fix the problem of the intruders to the university, so only authorized cars will enter and will not need the security agent any more.

I used in this project a motion sensor to detect a moving car and to give an order to a camera to take a photo and send it to an ANPR web service, to extract the number plat of the car ,then will be used to decide if the car allowed to enter or not .

With this project, the safety of our students will not be a big problem

In the end ,I want to say that this project made me learn how to manage and find a solution to an existing problem ,I learned about the raspberry pi and how to use it I also learned what is ANPR and what is ultrasonic sensor and how to use it with a servo motors.

in the future I will try to develop and upgrade this system to use it in a lot big projects and to fix any problem in it .

May God guide me and you to do more.

Thank you

ملخص

نضرا للمشاكل المتعلقة بالأمن في الجامعات الجزائرية ونضرا لأهمية الأمن في ضمان السير الحسن للدراسة بالجامعة بالإضافة للتقدم التكنولوجي وتطور تقنيات معالجة الصور حاولنا أن نعد مشروع للحد أو التقليل من المشاكل الأمنية في الجامعة.

في هذه المذكرة حاولنا علاج مشكلة الأمن في جامعة عباس لغرور خنشلة وذلك عبر إنشاء باب اتوماتيكي يفتح للسيارات المسموح لها بالعبور فقط.

يعتمد هاذا الباب على تقنية معالجة الصور حيث انه يتم التقاط حركة السيارة عبر مستشعر بعد ذلك يتم تصوير لوحة السيارة ثم يتم استخراج أرقام اللوحة ومقارنتها مع اللوحات المسموح لها بالعبور إذا وجد تطابق يفتح الباب وتمر السيارة وبعد ذلك يغلق مرة أخرى.

تم الانتهاء من هاذا العمل عبر إنشاء مشروع مصغر فيه تطبيق للفكرة المدروسة في هذه المذكرة.

Résumé

En raison de problèmes de sécurité dans les universités algériennes et en raison de l'importance de la sécurité pour assurer le bon fonctionnement des études universitaires, en plus des progrès technologiques et du développement des techniques de traitement d'image, nous avons essayé de préparer un projet pour réduire les problèmes de sécurité dans l'université.

Dans ce mémoire, nous avons tenté de résoudre le problème de sécurité à l'Université ABBES LAGHROUR Khenchela, en créant une barrière automatique qui ne s'ouvre que pour les voitures autorisées à traverser.

Cette barrière est basée sur une technologie de traitement d'image, car le mouvement de la voiture est capturé par un capteur. Après cela, la plaque de voiture est photographiée, puis les numéros de plaque sont extraits et comparés aux plaques autorisées à traverser. Si une correspondance est trouvée, la porte s'ouvre et la voiture passe puis se referme.

Ce travail a été complété par la création d'un mini-projet dans lequel l'idée envisagée dans ce mémoire sera mise en œuvre.

Abstract

Due to Security-related problems in Algerian universities and due to the importance of security in ensuring the proper functioning of university studies, in addition to technological progress and the development of image processing techniques, we tried to prepare a project to reduce or stop security problems in the university.

In this research, we tried to solve the security problem at ABBES LAGHROUR Khenchela University, by creating an automatic barrier that opens only for cars that are allowed to enter.

This barrier is based on image processing technology, as the car's movement is captured through a sensor. After that, the car plate photo is taken, then the plate numbers are extracted and compared with the plates allowed to cross. If a match is found, the door opens and the car passes and then closes again.

This work was completed through the creation of a mini-project in which the idea considered in this research will be implemented.

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