

Industrial Automation and security

IOT PROJECT

Content List

- Introduction to project
- Components used
- Introduction to IOT
- Hardware
- Software

Introduction

Now a days IOT is widely used in various field such as Industrial automation,

security systems, intrusion detection, remote controlling and home automation etc. In industries IOT is termed as IIOT which refers to industrial internet of things.

So this project is totally based on the iot. This project can be classified into two parts –hardware and software. In this project the hardware part is used as automation system and security system. And software part is a Django app which is deployed on the virtual private server. The security system sends security messages to the server. Hence this project is design to enhance the industrial security.

Components used(hardware)

- Raspberry-pi Board
- Pi-camera
- General purpose PCB board
- Buttons
- Connecting wires
- Led
- Relay

Components used(software)

- Python Programming Language
- Django – framework
- Rest API's of App
- Virtual private server (VPS)
- Video-transmitting server
- Database - SQLite

Internet of things (IoT)

Internet of things is neither a technology nor an individual platform.

It is the combination of technologies – Hardware, Software and cloud platform toward smart solution.

- Layers of IoT

- IoT has three layers

1. Sensing layer

2. Networking layer

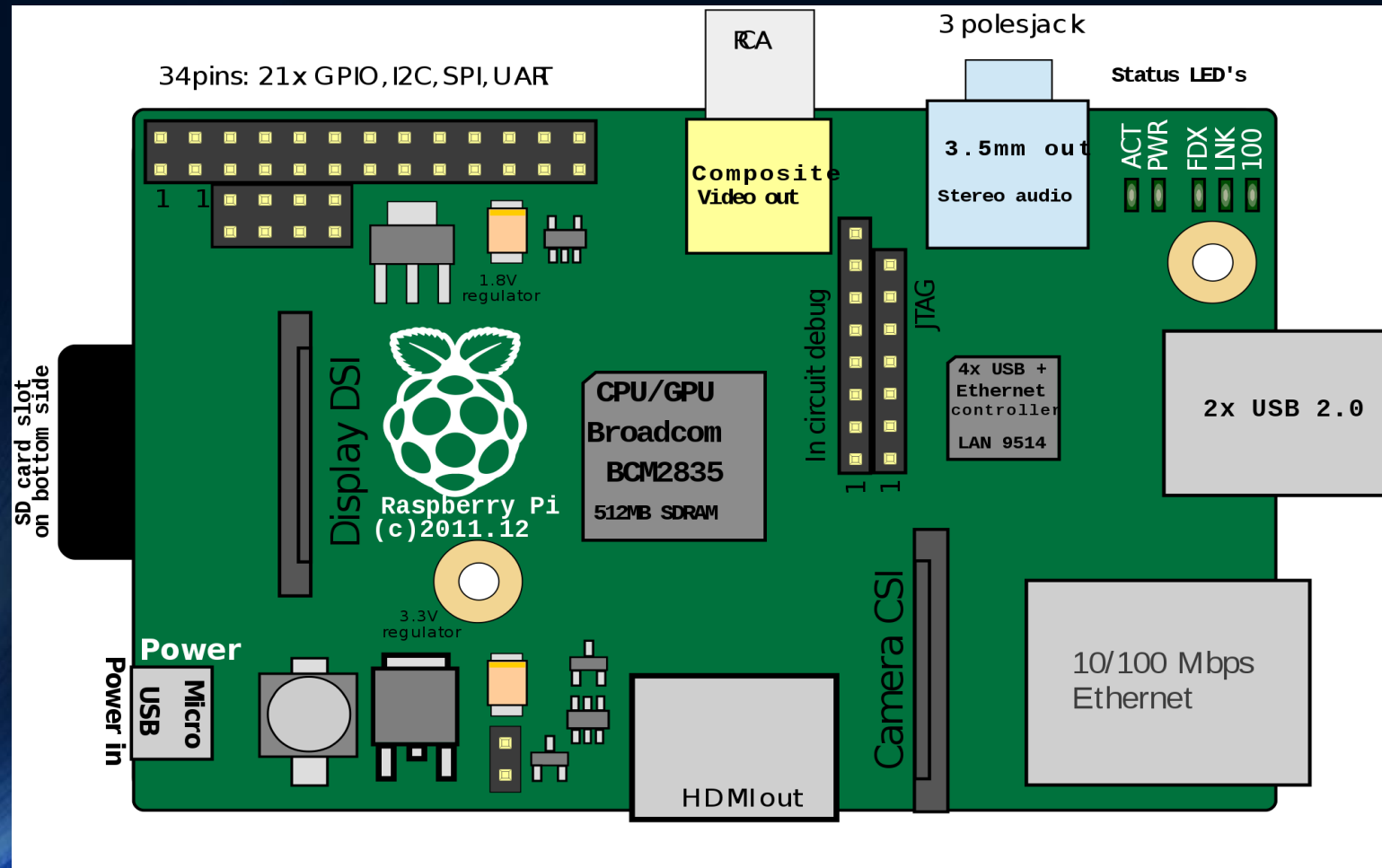
3. Communication layer

Introduction to raspberry-pi board

Raspberry-pi is a microcontroller device. The functionality of this board can be controlled or changed by user to achieve a particular task.


This microcontroller can be controlled by programming languages. And it offers to use more than one programming languages like- Python, C, C++, and Java etc.

Raspberry-pi board



GPIO Pins

- General Purpose Input/Output(GPIO)
- Pins can be configured to be input/output
- Reading from various environmental sensors
- Ex: IR, video, temperature, 3-axis orientation, acceleration
- Writing output to dc motors, LEDs for status.



	Pin No.		
3.3V	1	2	5V
GPIO2	3	4	5V
GPIO3	5	6	GND
GPIO4	7	8	GPIO14
GND	9	10	GPIO15
GPIO17	11	12	GPIO18
GPIO27	13	14	GND
GPIO22	15	16	GPIO23
3.3V	17	18	GPIO24
GPIO10	19	20	GND
GPIO9	21	22	GPIO25
GPIO11	23	24	GPIO8
GND	25	26	GPIO7
DNC	27	28	DNC
GPIO5	29	30	GND
GPIO6	31	32	GPIO12
GPIO13	33	34	GND
GPIO19	35	36	GPIO16
GPIO26	37	38	GPIO20
GND	39	40	GPIO21

Light Emmiting Diode(LED)

- Current flows from the anode to cathode.

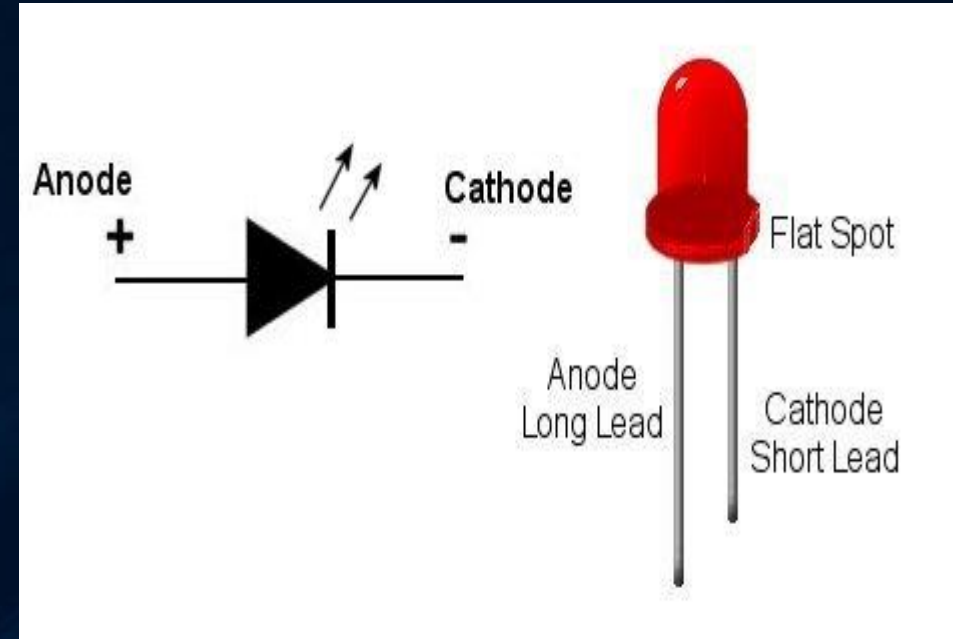
Anode: longer pin

Cathode: shorter pin

- Use a multimeter to test the polarity

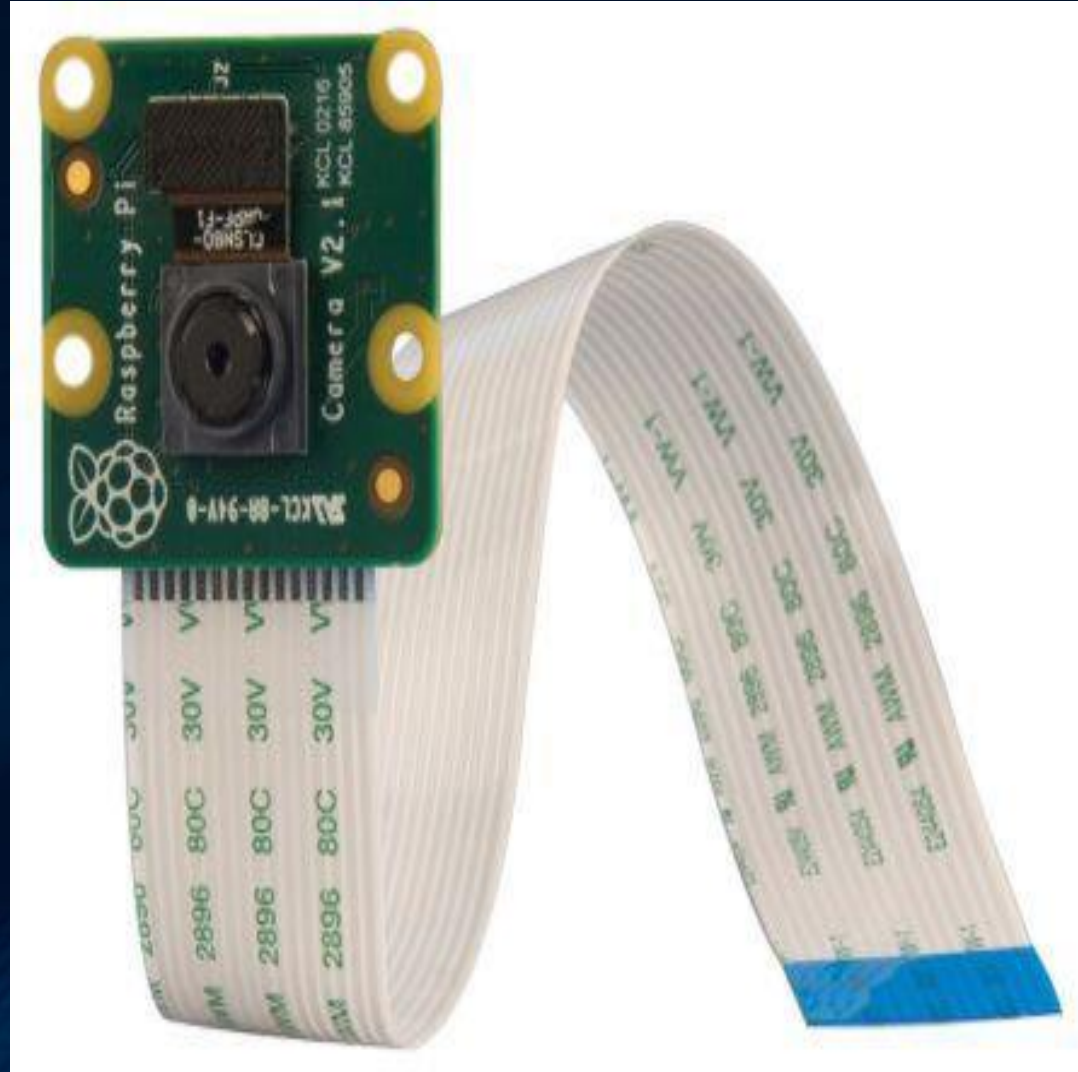
Check resistance

In both directions.

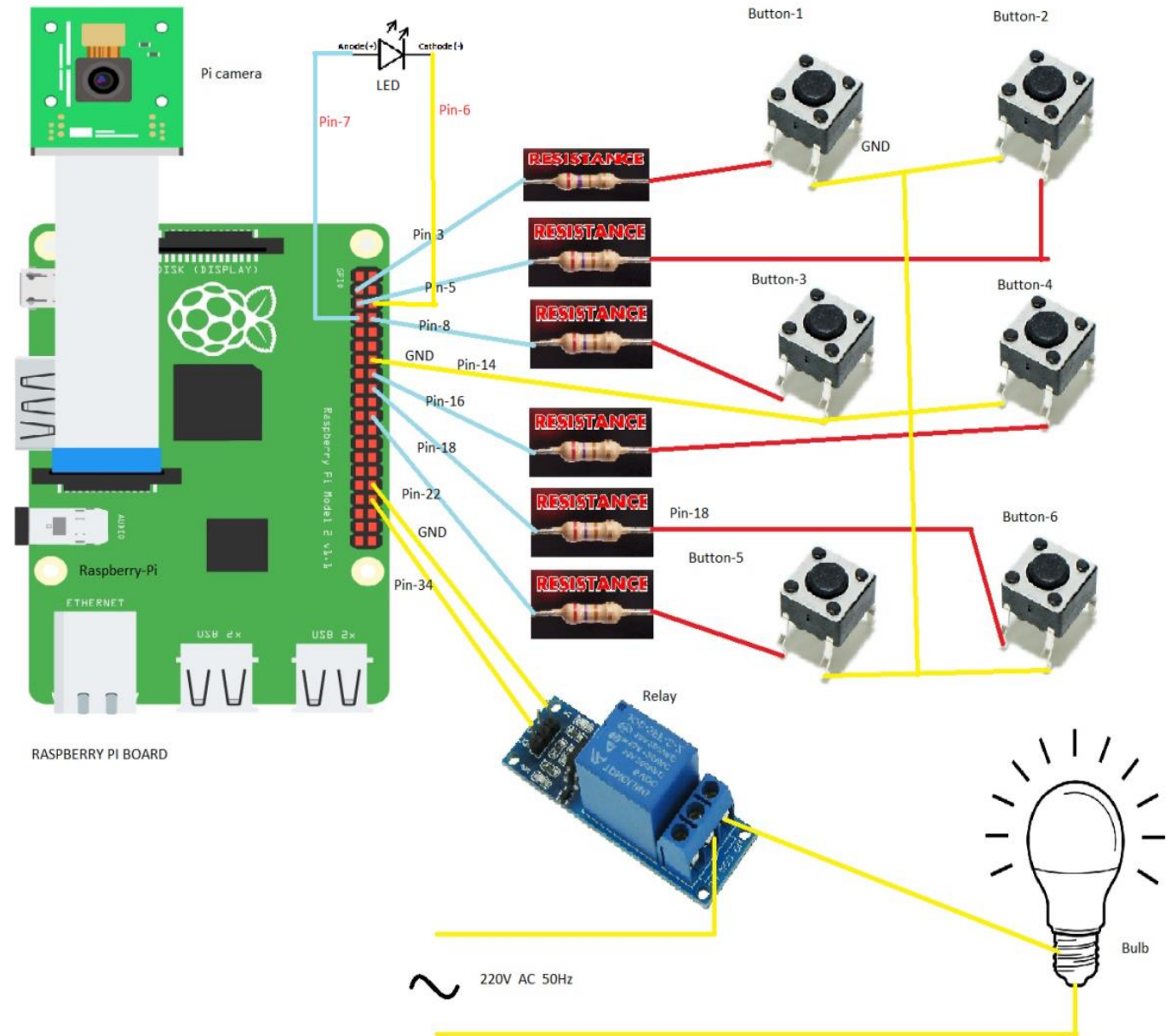


Video monitoring

- Camera module
 - 5 MP
 - easy to interface



Circuit diagram



Working

This circuit work as three different systems which are illustrated below –

1. **As a sensor (working of buttons):-** all six buttons are connected to pin no.s 1,2,3,4,5, and 6 . When a particular button is pressed then the corresponding pin becomes HIGH. On pressing a button an interrupt will activate and set of lines of program executes. By using the API's of the App this program send the data associated with particular button to the App.
2. **Video Transmitter :-** this circuit captures the 'n' number of pictures per second by using the py-cam and then transmit the captured pictures on the internet. The transmitted pictures is fetched by App and show these pictures. Due to high picture capturing speed its look like a video.

Working

3. **As an actuator :-** this circuit also works as an actuator means it can change the output signal of a particular pin according to the received command from the app. This output signal can be use to perform some desired physical actuations like – light controlling ,controlling machines remotely etc. Here we are using it to glow a LED

Software design

DJANGO APP

Web design

Web Application:-

1. Front-End : what we are seeing...

HTML

CSS → To Style Html Pages

JS → To add functionality to HTML page

Jquery, Bootstrap...

2. Back-End :

1. Language → Python, Java, Php

2. Framework → Struts, Spring, MVC, Django, Flask, Pyramid

3. Database also... Oracle, MySQL, SQLite...

Python

- Python is a general purpose high level Programming language.
- It can be used for
 - Console app
 - Desktop application
 - Web app
 - Mobile app
 - Machine learning
 - IOT applications

Features of python

1. Easy to learn and use
2. Expressive language
3. Interpreted language
4. Cross- platform language
5. Portable language
6. Free and open source
7. Object-oriented language
8. Extensible
9. Large standard library
10. GUI Programming support
11. Integrated

Django

Python web framework

Django is a high-level and has a MVC-MVT styled architecture.

Django web framework is written on quick and powerful Python language.

django

Django has a open-source collection of libraries for building a fully functioning web application.

Django

- Django is a open source web framework that follows the principle of “Don't Repeat Yourself”.
- Django framework is written on quick and powerful Python language.
- It follows MVC-MVT architectural patterns, which greatly helps in building clean and maintainable web applications.
- The framework name was after guitarist Django Reinhardt.

Server /VPS (Virtual Private Server)

The “standard” and most common type of hosting environment is one where you get access to a (usually) virtualized machine that has a basic OS installed on it and not much else. This give you the greatest control and flexibility, but it can be a bit more work to manage. This option also has the advantage of generally being the cheapest option. Because of its ubiquity and affordability, this is the type of deployment.

SQLite database

- **Database:** the container for all the data that you store.
- SQLite is an Open Source Database.
- SQLite supports standard relational database features like SQL syntax, transactions and prepared statements.
- In addition it requires only little memory at runtime (approx. 250 KByte).
- SQLite is a software library that implements a self-contained, serverless, zero-configuration, transactional SQL database engine.
- SQLite is the most widely deployed SQL database engine in the world.
- In SQLite the entire database is stored in a single file.
- Database Dictionary: provides a comprehensive list of structure and types of data in the database

Final Django App

HOSTED

LINK:-<https://iotmodel.herokuapp.com/>



IOT APP

Serial Sender

Documentation

Messages

Live Monitoring

Contact

About

Log Out

Serial Sender

Accounts

Enter command

Send

> ON+GPIO+1
OK

☒ Autoscroll

Clear output