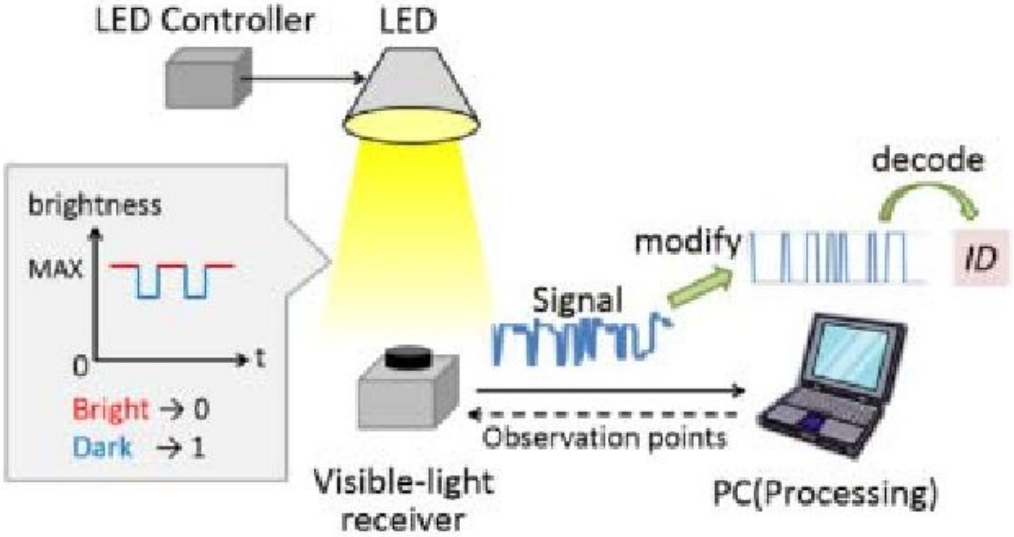
Visible Light Communication (VLC) prototype

Aastha Asthana (11840020)
Ashutosh Soni (11840270)
Gopal Ramesh Dahale (11840520)
Subhasmita Rout (11841110)

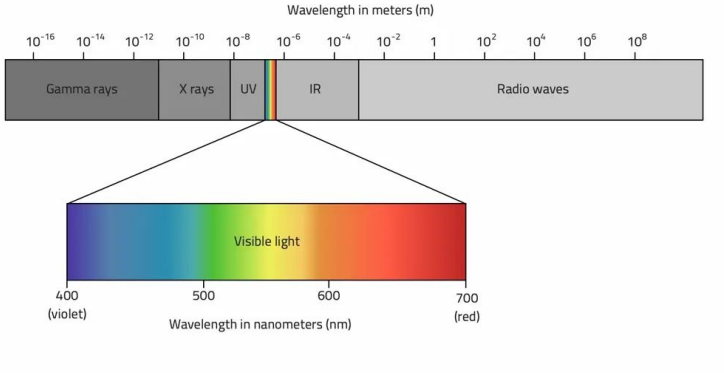
Objective

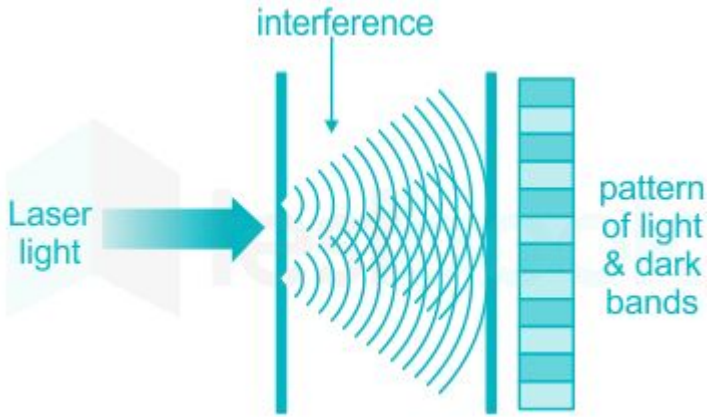
Transmission and receiving of data (by use of both Line of Sight and Non Line of Sight signals) adapting Visible light communication (LEDs)



Motivation

- Existing spectrum is cluttered as several technologies using it.
- Interference because bulk of wireless devices are electromagnetic.
- VLC overcomes this problem.
- Immunity to interference as VLC systems operate at optical frequencies and emit no electromagnetic interference.

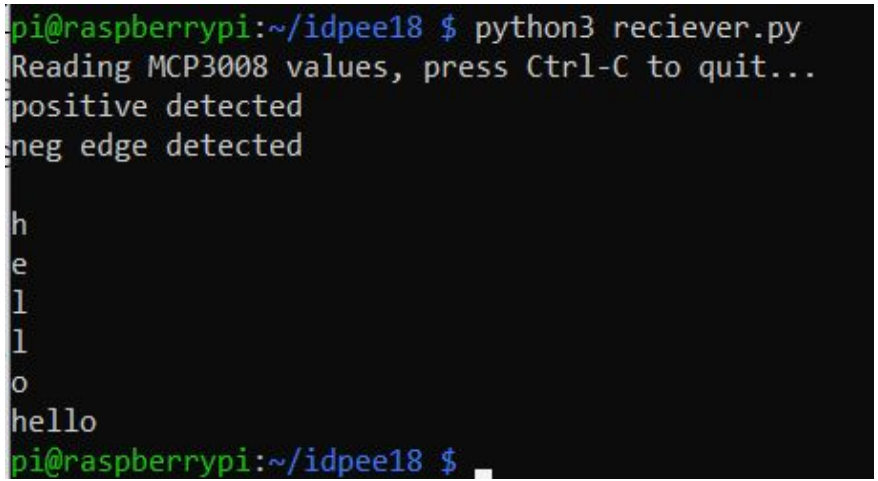


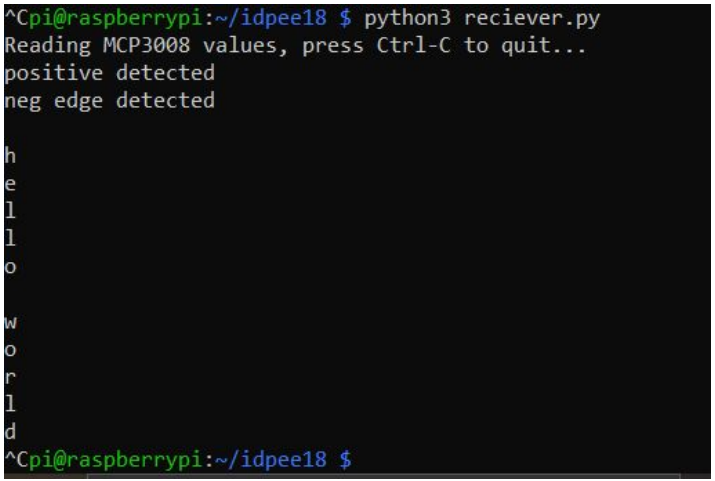


Progress

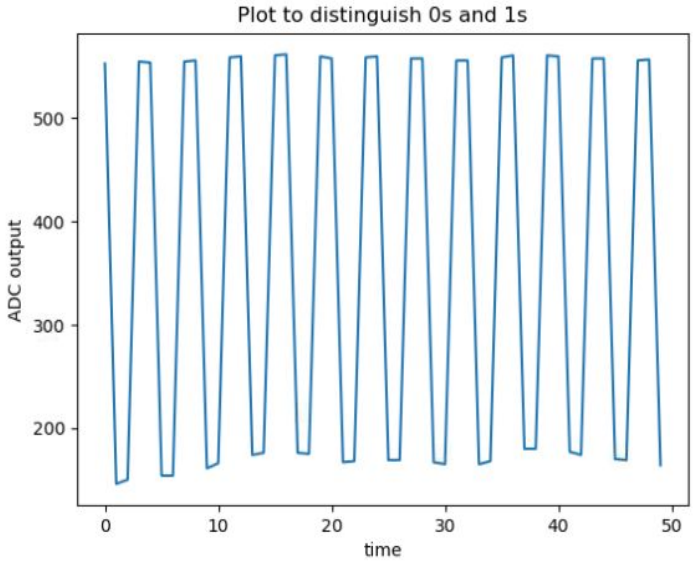
- ➔ Basic setup for VLC using Arduino and Raspberry Pi.
- ➔ Able to send small chunks of text messages one way.
- ➔ Each character is sent and received bit by bit.
- ➔ Added synchronization between transmitter and receiver.
- ➔ Object detection using color tracking method by Raspberry pi for Non line of sight signals.
- ➔ Movement of servo motor by Rpi to ease movement of camera.

Results

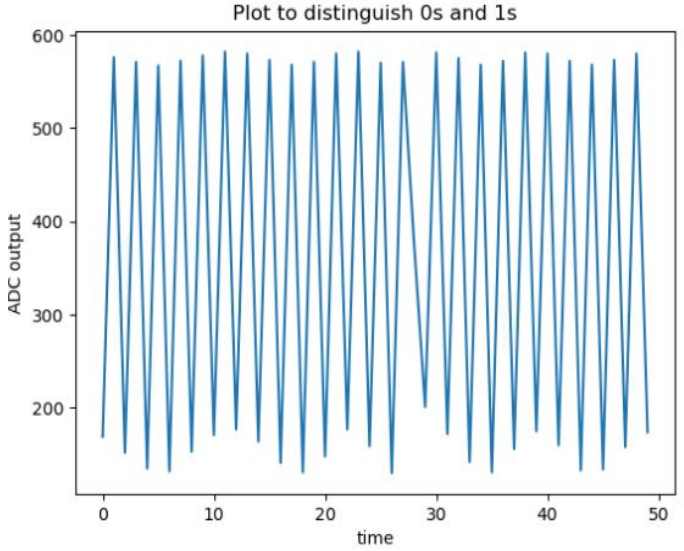

pi@raspberrypi:~/idpee18 $ python3 reciever.py
Reading MCP3008 values, press Ctrl-C to quit...
positive detected
neg edge detected
h
e
l
l
o
hello
pi@raspberrypi:~/idpee18 $


^Cpi@raspberrypi:~/idpee18 $ python3 reciever.py
Reading MCP3008 values, press Ctrl-C to quit...
positive detected
neg edge detected
h
e
l
l
o
w
o
r
l
d
^Cpi@raspberrypi:~/idpee18 $

Determining threshold for bit classification - mark bit as 0 or 1.



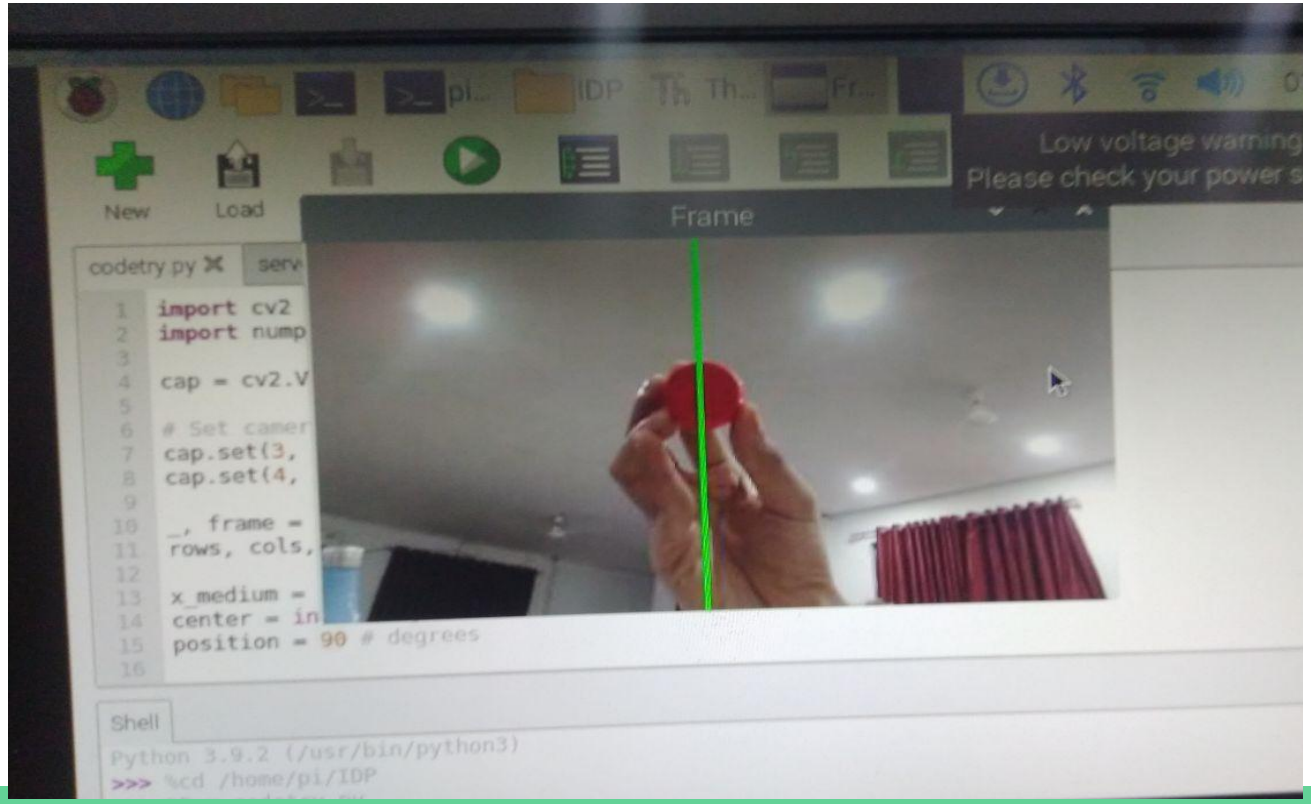
time_period = 100ms



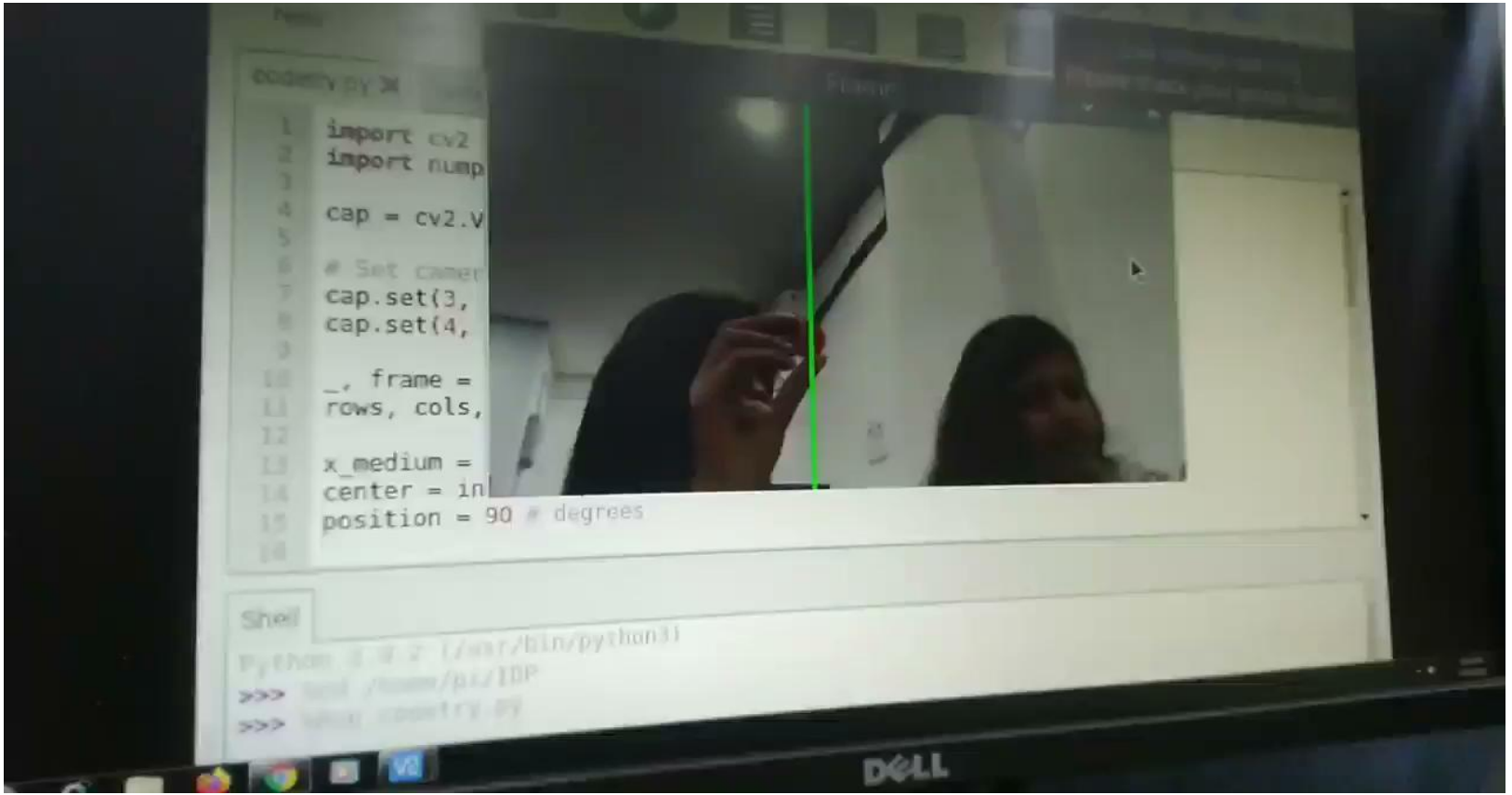
time_period = 50ms

Object detection by tracking real time coordinates:

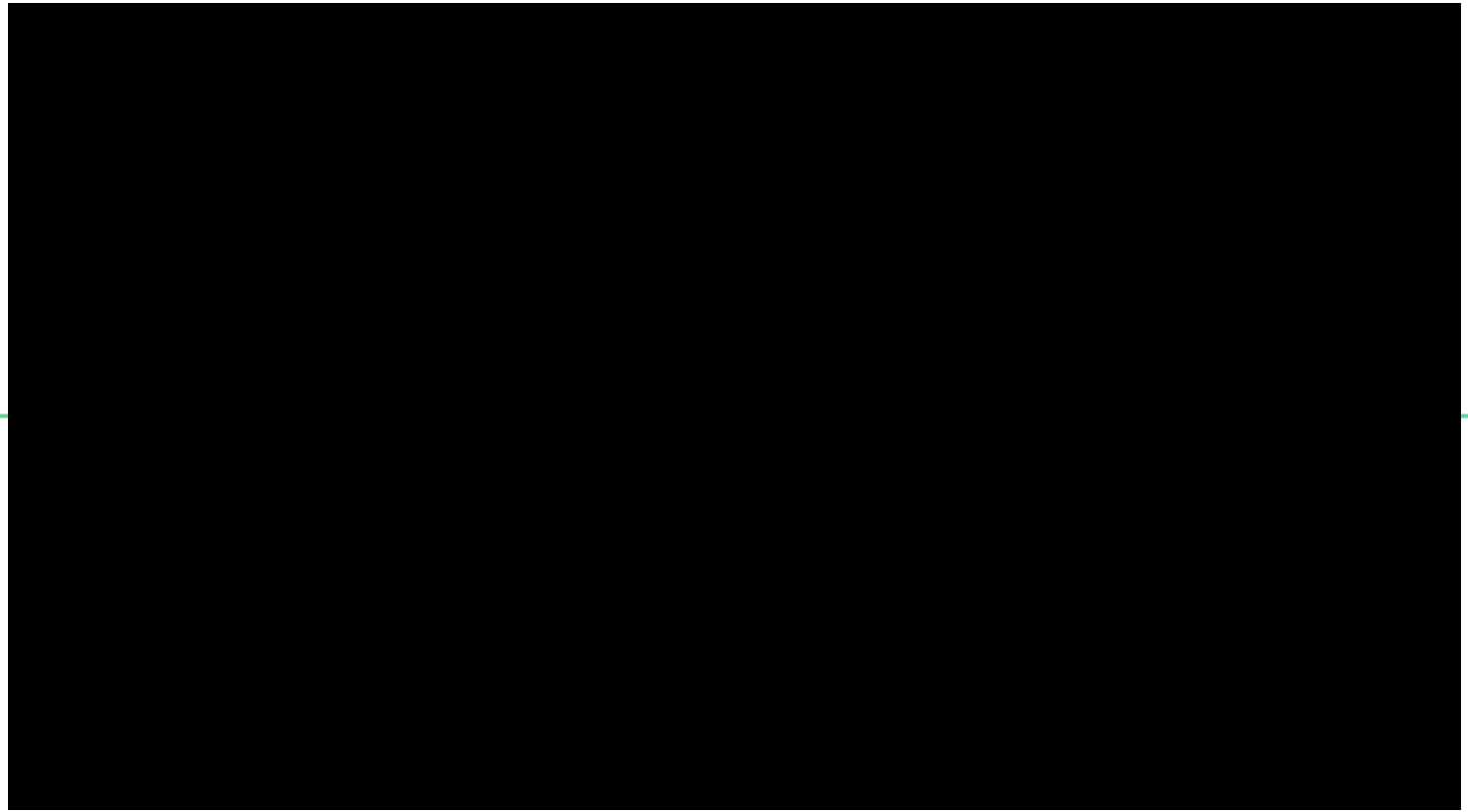
By the use of logitech webcam and Raspberry Pi module, we generated a frame access of camera and used HSV color space to detect the red colour.



Object tracking by use of axis:



Servo motor movement: 10 times from 0 to 180 degrees, then back to 90 and 0 degrees in 2 seconds.



Contribution of each team member

1. **Ashutosh** - VLC basics, code for packet fragmentation + header definition + transmission using LED (the fragmentation + header part will be taken up in further works).

2. **Gopal** - Basic synchronization of transmitter and receiver, Sampling at receiver end to extract transmitted bits received from solar panel.

3**. Aastha & Subhasmita -**

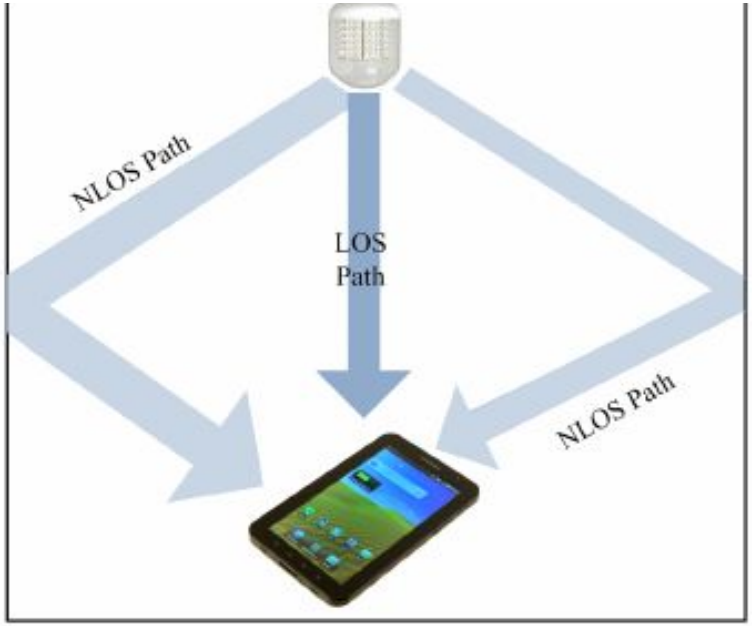
Object Detection (by color) through OpenCV using Logitech webcam and Raspberry Pi,

Movement of Servo Motor for webcam,

Ordering hardware components from Amazon.

What next?

- ➔ Enhancing current VLC setup for transmission of multimedia.
- ➔ Optimizing the throughput of transmission.
- ➔ Study effects of various compression algorithms on the throughput.
- ➔ Movement of servo along with Object.
- ➔ Creation of mirror array, that reflects the non LOS signals towards the receiver.



Purchased Hardware Components

- TECHDELIVERS® 12v dc Led SMD Bead Chip COB Cool White high Power Bulb DIY lamp Light (20 Watt, 4 Pieces)
- INVENTO 2Pcs 8 Ohm 0.5W Small MINI speaker 40x10mm Stereo Audio Speaker For DIY
- MCP3008 IC – 8-Channel 10-Bit ADC With SPI Interface IC
- Electronic Spices 6V 60mA WIRE ATTACHED Mini Power Solar Cells for Solar Panels - DIY Projects (80 x 40mm)
- Electronic Spices Solar for DIY Square shape 6V 100MA MINI SOLAR PANEL wire attached with solar (70x70x3mm)
- Abhith India MT3608 DC-DC Step Up Converter Booster Power Supply Module Boost Step-up Board MAX Output 28V 2A for Arduino
- Salcon Electronics Digital Amplifier Audio Board Stereo Class D, 5V, 12V, 24V high Power (PAM 8403)
- INVENTO 1Pcs 12 Bit 16 Channel PWM Servo Driver Shield IIC interface PCA9685 Module Controller Compatible

Questions

References

Tips for Presenting Your Wireframes

3 Steps to Better UI Wireframes

Wireframing for Beginners


Thank
You