PART - 2

Part-1

What is iot?

IOT uses and benefits

World wide usege of IOT

IOT advantages and it's applications

What is RASPBERRY PI

Raspberry pi uses

Raspberry pi advantages and installation process

Disadvantages

Part -2
Agenda

Raspberry Pi accessories
Sense hat
Raspberry pi camera
Gert board

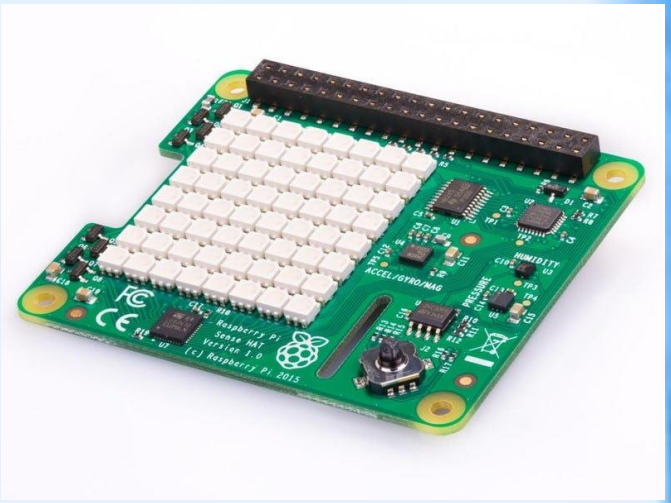
SENSE HAT TUTORIAL :
Displaying text
Displaying images
Setting orientation
Sensing the environment
Detecting movement

PI CAMERA INSTALLATION
IOT ARCHITECTURE
CLOUD COMPUTING
FOG COMPUTING
IOT TAXONOMY

RASPBERRY PI

ACCESSORIES

HAT [HARDWARE ATTACHED ON TOP]EXPANSION BOARDS :



Together with the mode B+ , inspired by the Arduino shield boards ,
The interface for hat boards was devised by the **RASPBERRY PI FOUNDATION...**

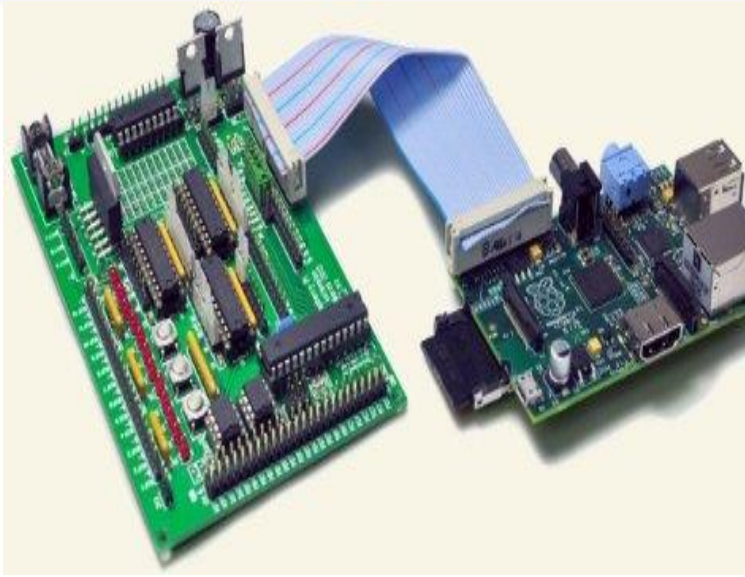
Here we have *temperature, humidity, pressure* sensors also having gyroscope &
Joystick

It has **8×8LED** matrix display is present

For games purpose , we can use joystick .

CAMERA :

The Raspberry Pi Camera v2 is a high quality **8 megapixel Sony IMX219** image sensor custom designed add-on board for Raspberry Pi, featuring a fixed focus lens.



... In terms of still images, the camera is capable of **3280 x 2464** pixel static images, and also supports **1080p30, 720p60 and 640x480p90 video.**

***GERT BOARDS :**

The GERT board is an ***add-on GPIO***

Expansion *board for the RASPBERRY PI COMPUTER .*

"It comes with a large variety of components ,including

buttons, LEDs, A/D and D/A converters , a motor

Controller & an Atmel AVR micro-controller "

ARDUINO :

2KILO BYTES OF RAM

SIMPLE MICRO CONTROLLERS

ARDUINO IDE IS EASIER THAN LINUX

IF U NEED A SIMPLE CONTROL OF WATERING YOUR GARDEN, ARDUINO WORKS PERFECTLY

ARDUINO MAKES HARDWARE PROJECTS SIMPLE

RASPBERRY PI

1 GB RAM

RASPBERRY PI IS ACTUALLY A SMALL COMPUTER

FOR RASPBERRY PI TO ACHIEVE SAME EFFECT, YOU 1ST NEED TO INSTALL THE SYSTEM AND NECESSARY LIBRARIES

LOT MORE WORK BUT THE EFFECT WILL BE SAME

RASPBERRY PI IS GOOD AT SOFTWARE APPLICATIONS

VS

PROGRAMS FOR OUTPUT IN SENSEHAT

SENSING ENVIRONMENT :

```
from sense_hat import sense Hat
import  time
From time import  asctime

Sense =sense Hat( )

While true:
Temp =  round (sense.get_temperature () *1.8+32
Humidity = round (sense.get_humidity(1)
Pressure =  round (sense.get_pressure (1)
Message = 'T =%d F  , H=%d , p=%d'  %(temp, humidity, pressure)
Sense.show_message (message, scroll_speed = (0.08) , text_colour=[200, 240,200], back_colour=[0, 0,0]
Time.sleep(4)
Log =open (' weather.txt ' , "a")
now =str(asctime())
Log . Write (now+ '      '+message+'|n' )
Print(message)
Log.close()
Time.sleep(5)
```

Displaying text

```
From sense_hat  import  sensehat
From time  import  sleep
From random  import  randint

Sense =sensehat ( )

r = randint ( 0  , 255 )
Sense.show_letter (“e”  , ( r, 0 , 0 ) )
Sleep  (  1 )

r=randint  ( 0,255 )
Sense.show_letter  (“d”  , (  0 , 0 , 0 ))
Sleep  ( 1 )

Sense.clear ( )
```

DISPLAYING IMAGE

```
From sense_hat  import  sensehat
Sense  = sense hat( )
r=  ( 255 , 0 ,  0 )
o= ( 255 ,127 ,0 )
y= ( 255  255 ,0 )
g= ( 0 , 255  , 0 )
b= ( 0 , 0 ,  255 )
i=  ( 75 , 0 , 130 )
v= ( 159,0,255 )
e= ( 0 , 0 , 0 )
Image = [ e, e, e, e, e , e, e, e, e, e, e, r, r, e, e, e, e,
r, r, o, o, r, r, o, o, y, y, o, o, r, o, y, y, g, g, y, y, o, y,
g, g, b, b, g, g, y, b, b, b, I, I, b, b, b, b, i,i, v, v, i,i, b]
Sense.set_pixels( image)
```

SETTING ORIENTATION

```
From sense_hat  import  senseHat

Import time

Sense =  senseHat ( )
Sense.show_letter  “J”)

Angles  =  [0 , 90 , 180 , 270 , 0 , 90 , 180 , 270 ]

For r  in angles

    Sense. Set_rotation ( r  )
    time. Sleep  ( 0.5  )
```

DETECTING THE MOVEMENT

```
From sense _hat  import  sense Hat

Sense = sensehat  (  )
While true  :
      Orientation  =sense.get orientation
       Pitch  =orientation  [  pitch  ]
       roll=orientation  [  ' roll ']
       Yaw  =orientation  [ 'yaw ']

Print  (  "print ={ 0  }  , roll  = {  1  }  ;

Yaw= { 2  } format  (  pitch  , yaw  , roll  )
```

PI CAMERA INSTALLATION PROCESS

1 . Open the camera port on raspberry Pi

On the raspberry pi B+ , 2 &3 , the camera port is between the Audio port and the HDML port

2 . Insert the camera cable

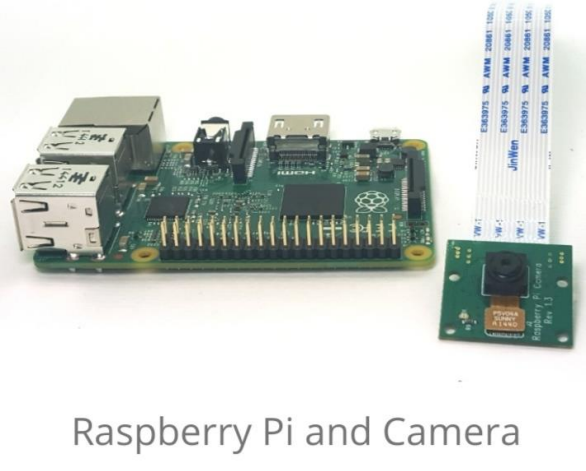
3 .Close the camera port

4 .verify The connection

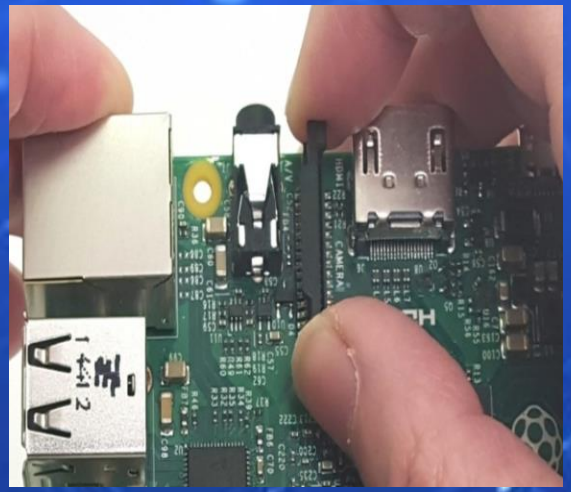
5 . Removing the cable from the camera itself..

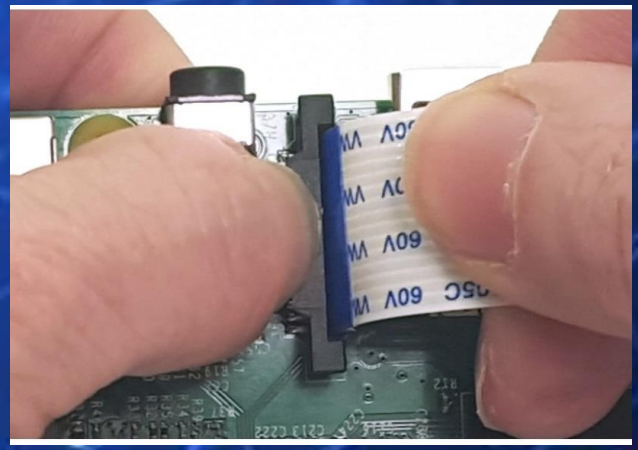
6. GoPiGo installation

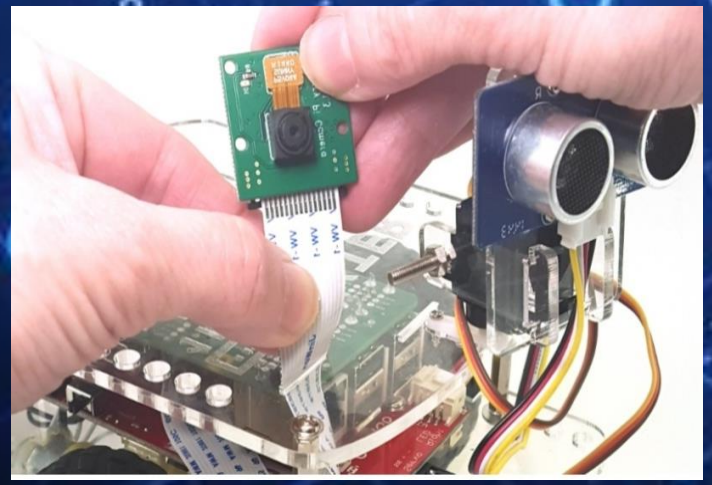
7. Grove pi + installation

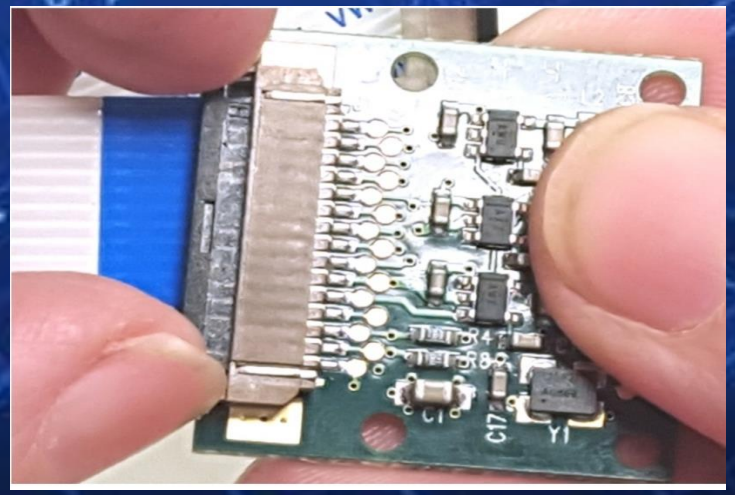


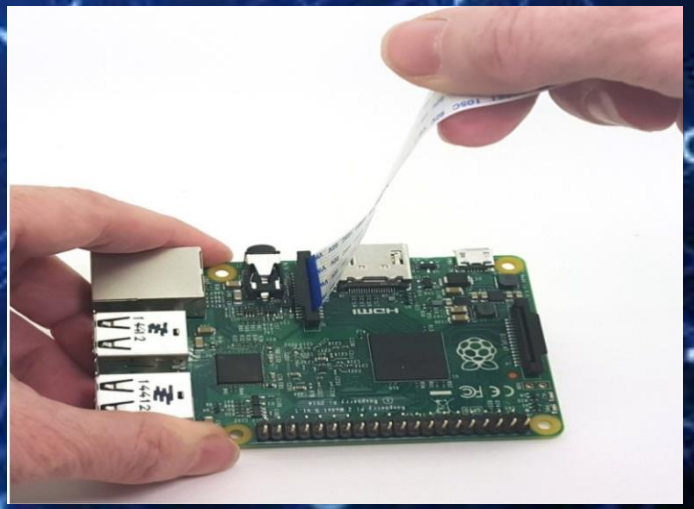
Raspberry Pi and Camera











5 LAYER ARCHITECTURE

1. Business layer :

Manages the whole IOT system, including applications, business and profit Models &user's privacy .

2. Application layer :

Responsible for delivering application specific services to the user .

3. Processing layer :

Stores , analysis huge amounts of data.
Employs databases , cloud computing & big data processing modules .

4. Transport layer :

5. Transfers the sensor data between the different layer through network such as wireless , LAN , Bluetooth, RFID & NFC .

5. Perception layer :

Sensors sense and gather information about the environment .
Sensors physical parameters or identifies other objects in the environment

CLOUD COMPUTING

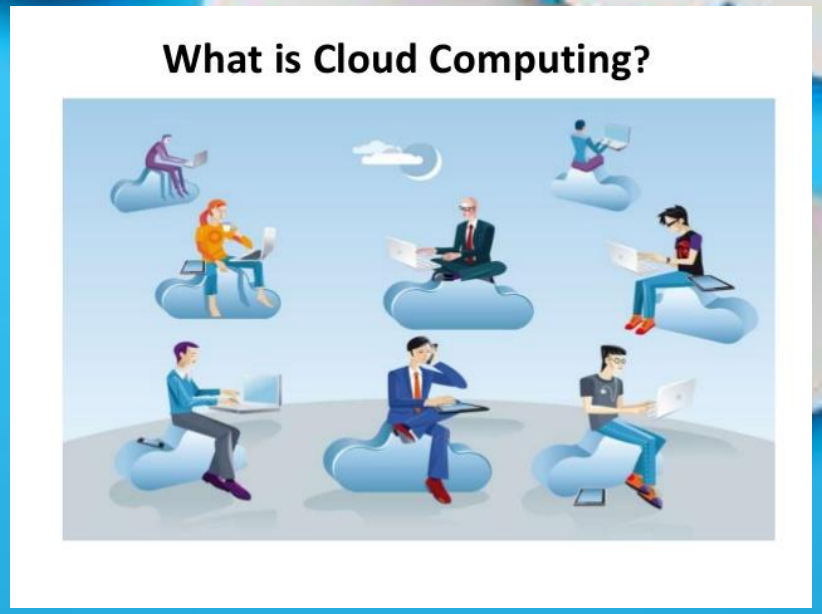
Cloud computing is the on-demand availability of computer system resources, especially data storage and computing power, without direct active management by the user. The term is generally used to describe data centers available to many users over the Internet.

I can do the things Which doesn't require any immediate action

Cloud centric architecture keeps the cloud at the centre

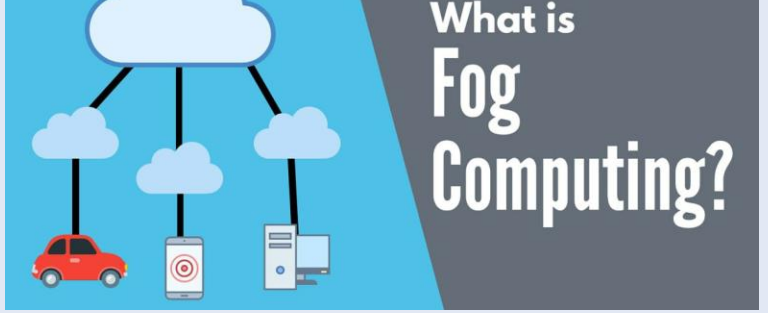
,

applications above it and network of small things below it...



Transport Layer	Uploading pre-processed and secured data to the Cloud
Security Layer	Encryption/decryption, privacy, and integrity measures
Temporary Storage Layer	Data distribution, replication, and de-duplication
	Storage space virtualization and storage devices (NAS, FC, ISCSI, etc)
Pre-processing Layer	Data analysis, data filtering, reconstruction, and trimming
Monitoring Layer	Activities monitoring, power monitoring, resource monitoring, response monitoring, and service monitoring
Physical and Virtualization Layer	Virtual sensors and virtual sensor networks
	Things and physical sensors, wireless sensor networks

FOG COMPUTING



Fog architecture presents a layered approach, which inserts monitoring, processing storage and layers between the physical and transport layer .

PERCEPTION LAYER

PRE-PROCESSING LAYER

Communication layer

MIDDLE WARE LAYER

APPLICATIONS LAYER

PERCEPTION LAYER :

1. Environmental sensors
2. Medical sensors
3. Infrared sensors
4. Mobile sensors
5. Neural seniors
6. RFID

PRE-PROCESSING LAYER

Mobility :

Smart devices are mobile , &changing network conditions makes communication Difficult ..

Reliable &real time actuation :

Latency Sensitive applications need real time responses..

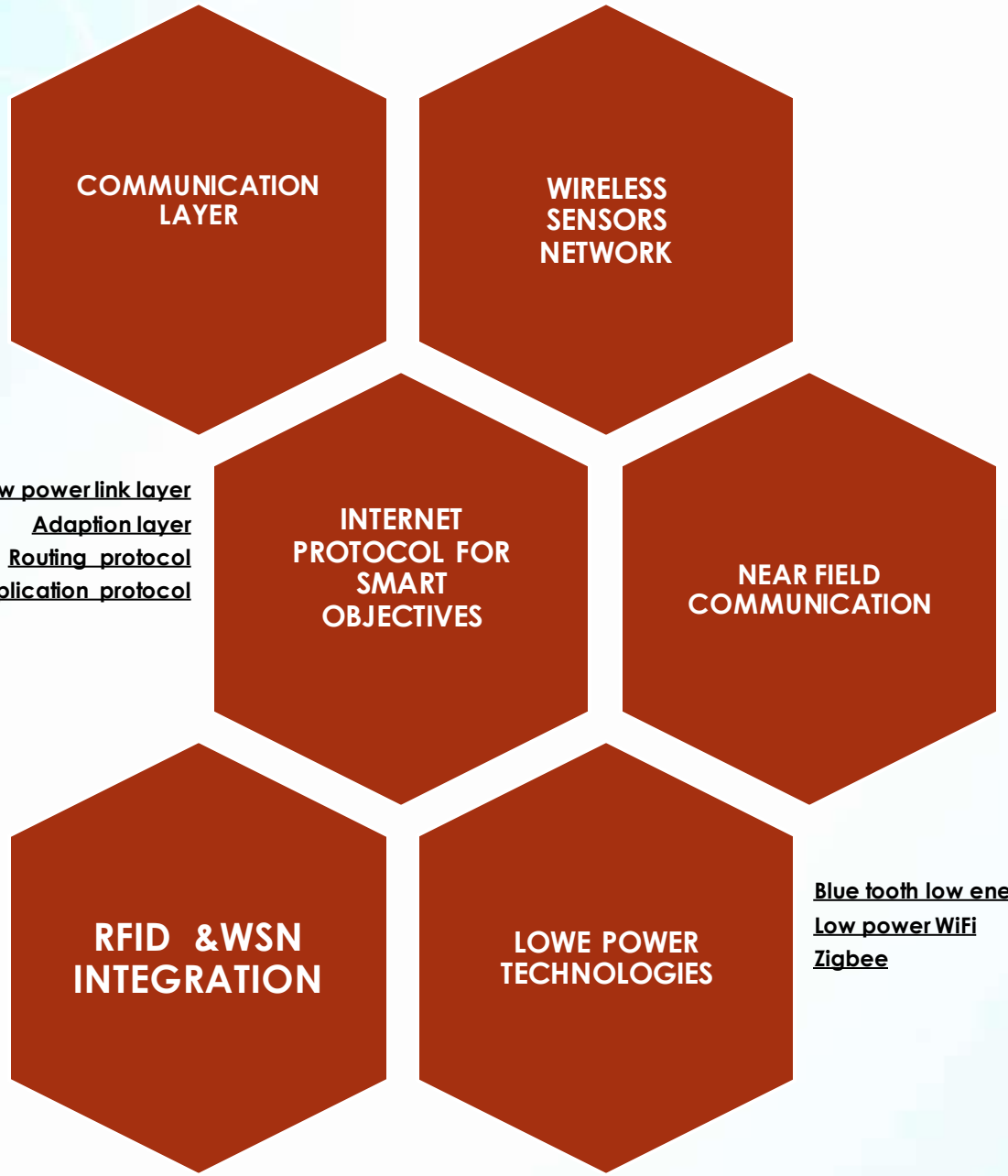
Scalability :

Multiple devices increases the latency ..

Imagine,

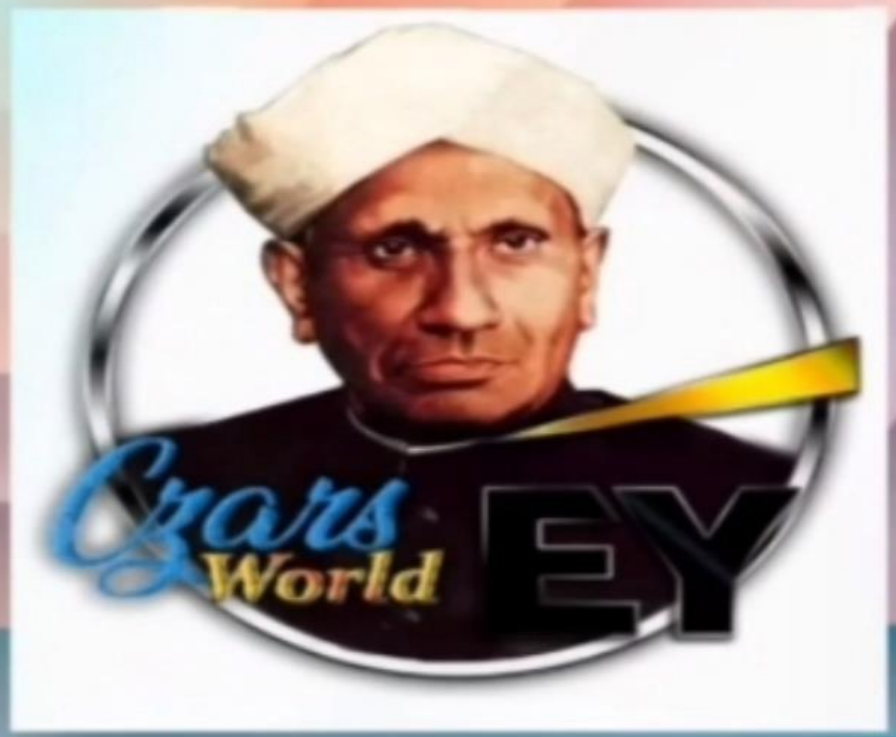
There is a need to construct a smart cities,

Here, we uses **SMART GATEWAYS**



Low power link layer
Adaption layer
Routing protocol
Application protocol

Blue tooth low enery
Low power WiFi
Zigbee



By

M KAVITHA

Sreyas Institute of engineering and technology