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Virtual Vigilance System

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***Abstract*:- There are various remote accessing devices in the industry .But we cannot access these devices remotely on the hardware side .So to solve this problem ; difficulty to access the raspberry pi remotely we use python sockets which enables us to connect the server to the client. The video from the client is sent to the Microsoft cloud virtual machine server code .Raspberry pi and raspberry pi camera are used to remotely monitor and send the data to Microsoft cloud virtual machine and access the live video. Then the video is sent to the raspberry pi can be remotely accessed and also, we can access the video any time on the cloud which can be also accessed by using any personal computer so the data is safe and secured and can be accessed anywhere. The Microsoft cloud is a secured interface so the data security problem can also be solved also the virtual machine works as a secondary computer that can store data in the cloud interface. We don't need to maintain hardware that stores the data accepted from the raspberry pi.**

Keywords- Raspberry Pi, Raspberry Pi Camera Cloud computing

1 . INTRODUCTION

This paper analyses important for virtual vigilance system. 'Virtual Vigilance System' means any person can watch movements of remote people through the virtual machine. This system is now generally accepted and well developed. Moreover, difficulties encountered in deployment of virtual models and connections in this system to reach the requirements demonstrate the importance of preparation,patience,and goodwill in developing new regulations.

This paper focuses primarily on the factors in the development of small camera model.1) Remote access.2)live video streaming.3)public access.4)security policy. Attention to these factors greatly enhanced acceptances of the regulations by the Microsoft Office . Microsoft office provides different services e.g. database,virtual machine,storage resources,power bi. In this Vigilance system we are using one of the best preferable services known as 'Virtual Machine'.as shown in fig7 .This Virtual Machine part is mainly known as cloud computing system. This cloud computing mainly uses different ports and protocols as shown in fig 9.In this system different components are used ,all these components information and figures are given as follows.

1.1. Raspberry Pi

The Raspberry Pi is a low cost, small and portable size of computer board. It can be used to plug-in to computer monitor or television, keyboard, mouse, pen-drive etc. Raspberry Pi has built in software such as Scratch which enables users to program and design animation, game or interesting video. In addition, programmers can also develop scripts or programs using Python language; it is the main core language in Raspbian operating system . Raspberry Pi B is an evolution of Model B. Python language has been used in this work to write the script for client/server communication. Moreover, there are improvements such as adding more GPIO header PIN, more USB ports, lower power consumption etc. It is recommended to use model B+ for school learning because it offers more flexibility than model A especially for embedded projects and requires low power as well as providing more USB ports compared to Model B.

1.2 Cloud Computing System:

In the cloud computing part we have used a virtual machine of azure cloud service . Using virtual gives us the advantage of accessing it from any computer.

In this project we have used 'Azure service'. Azure is a cloud computing service created by Microsoft, for building, testing, deploying, and managing applications and services through Microsoft-managed data centers. It provides software as a service(SaaS), Platform as a service(PaaS) and Infrastructure as a service(IaaS). and supports many different programming languages, tools, and frameworks, including both Microsoft-specific and third-party software and systems. Virtual machine, infrastructure as a service(IaaS) allowing users to launch general-purpose.App services, Platform as a service(PaaS) environment letting developers easily publish and manage websites.Azure Web Sites allows developers to build sites using ASP-NET, PHP,Node.js, or Python and can be deployed using FTP,Git,Mercurial, Team Foundation Server uploaded through the user portal.

- Client-Server Communication using wifi:

In this experiment, client-server communication is explored by transferring files wirelessly to the server using Wi-Fi communication. Raspberry Pi supports wireless communication by allowing connection to wireless adapters . For the wireless communication of Raspberry Pi to any router:

- Then make another file named as SSH.conf

2 METHODOLOGY

As our system is a virtual vigilance system, we need to keep a continuous watch on particular operations , in our case we need to keep a watch on the work done .

We are using a raspberry pi camera and raspberry pi 3B. The camera module sends the picture /videos through the CSI port to the raspberry pi. This is client data; which needs to be sent to

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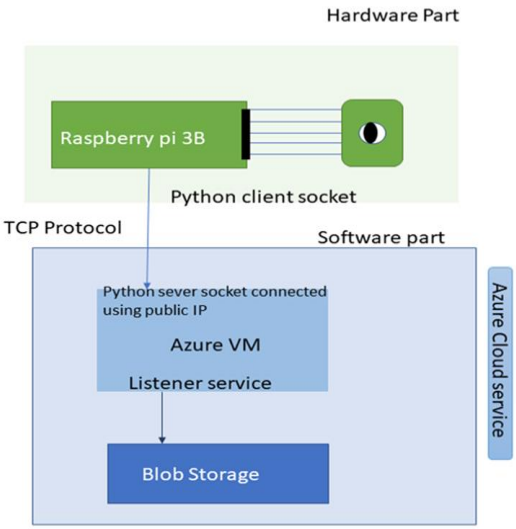
the server side i.e., the monitoring monitor using python sockets(remote desktop that has virtual machine)
As raspberry pi cannot send data remotely after connecting it to the raspberry pi camera module using VNC (virtual network computing) so to overcome this problem we used python sockets to send the image/video data from the hardware kit(Raspberry pi 3b)to the azure cloud server using TCP protocol.
In the azure server we are deploying a virtual machine (linux)that has a 2GB RAM ,temporary storage 4GB.We send the data on the virtual machine on the VM public IP address
In the virtual machine we receive the data as the client and the server have the same IP address (socket programming).After storing the data the videos are stored in blob storage using the listener service.
Python sockets are used to connect to a server socket on the local computer using local host as the host name in the server address tuple. After the client-side socket has connected to the server-side socket data can be sent to the server using the send string[flags] method.
After getting the data on the server side it is sent on the azure VM using the TCP protocol.So the image/video can be sent . Then the video is sent to the blob storage for accessing it for further reference.



3.COMPONENTS

3.1 Hardware List

- Raspberry Pi B: Small and portable board that can perform as a computer. It acts as a file server in this work.
- Raspberry Pi Camera :
- SD card (16Gb): Raspbian OS in SD card

3.2 Software List

- Raspbian OS: It is the official image for RaspberryPi, software development for this OS includes python language.
- BalenaEtcher : To write Raspbian OS image files on SD card.
- PUTTY: It is used as an SSH client for Raspberry Pi.
- Windows 10: It is used as a server model to gain remote access to file servers. It can store, copy and delete files on the server.

4. HARDWARE

4.1 Make a file with name - “wpa_supplicant.conf ” in the SD card and then write the following code :

ctrl_intreface=DIR=/var/run/wpa_supplicant
GROUP=netdev

update_config=1

country=<IN> #insert the 2 letter ISO 3166-1 country code

network={

ssid =”<>” # Name of the wireless LAN

psk=”<>” #Password of the wireless LAN

}

Fig.1 RaspberryPi connection with different component

Fig 1. shows raspberry Pi connected with different components such as power source, mouse , pendrive and raspberry pi camera.

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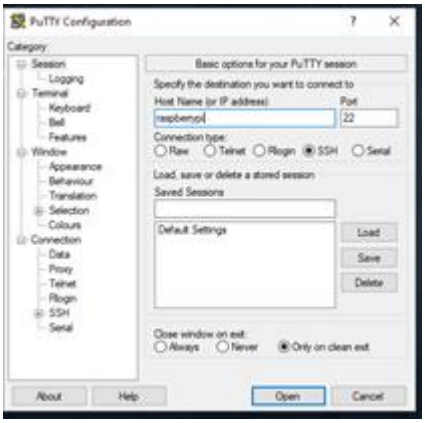

Fig2.Configuring the Putty with raspberry pi

Fig 2. shows that configuration of Raspberry Pi ,i.e. its categories hostname or an IP address and the port number

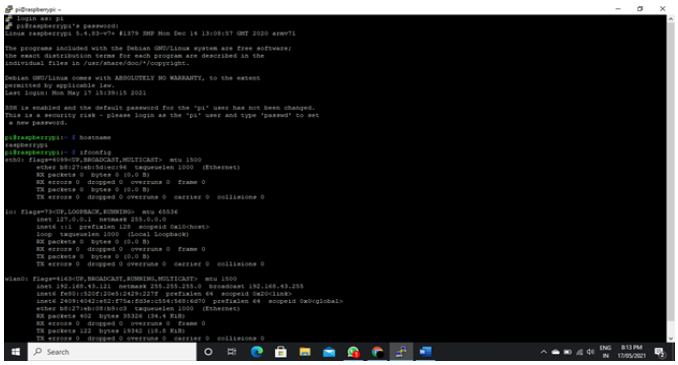

Fig3. Putty Terminal to run Raspberry Pi Commands

In this terminal , we are going to run a few commands to work on Raspberry Pi. And also to understand the configuration of the Raspberry Pi.

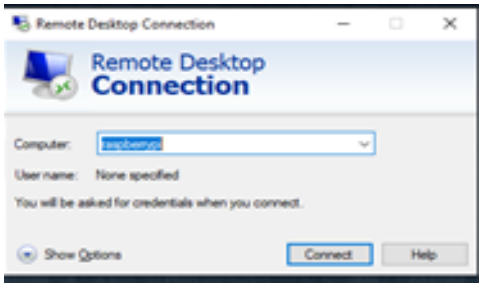

Fig4. Remote Desktop connection to Raspberry Pi OS

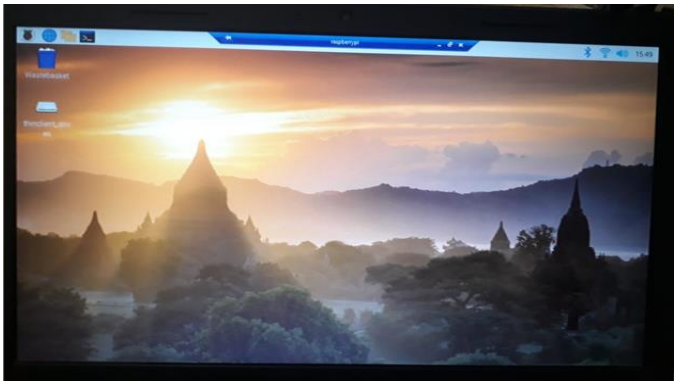

Fig5. Raspberry Pi OS Window(Raspberry Pi Desktop)

5. SOFTWARE

1)Creation of virtual machine account in Microsoft Azure

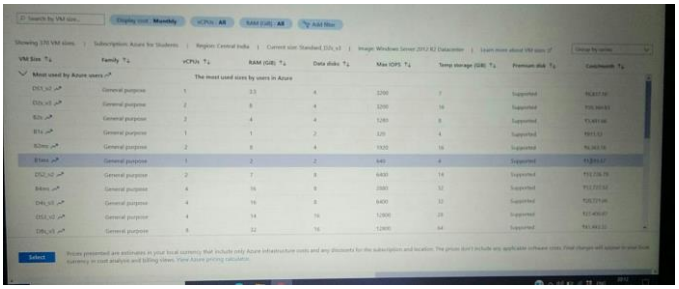

Fig 6 Selecting the package which contains the disk size ,no.of virtual machines can be accessed at same time ,temporary storage.

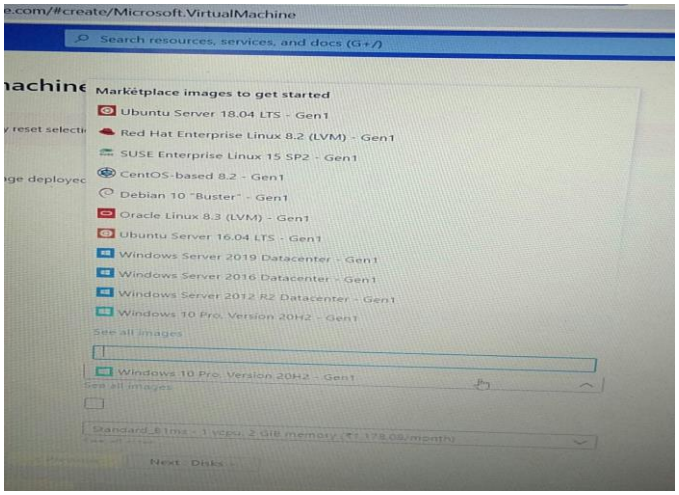

Fig 7.selecting the OS on which we can operate

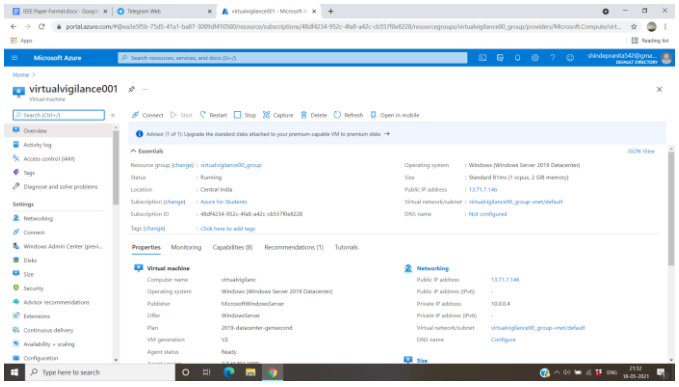

Fig 8.virtual machine setup

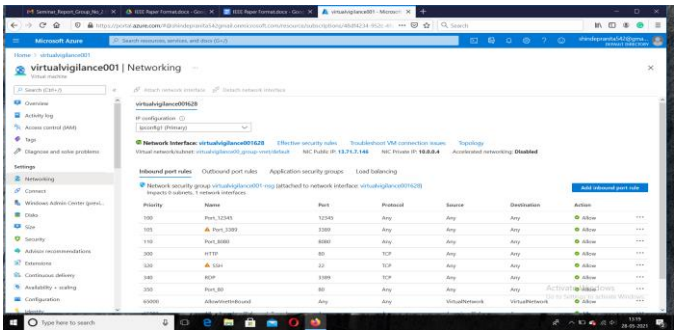

Fig 9.Networking window in Virtual machine with ports and protocol. e.g. rdp is a port.

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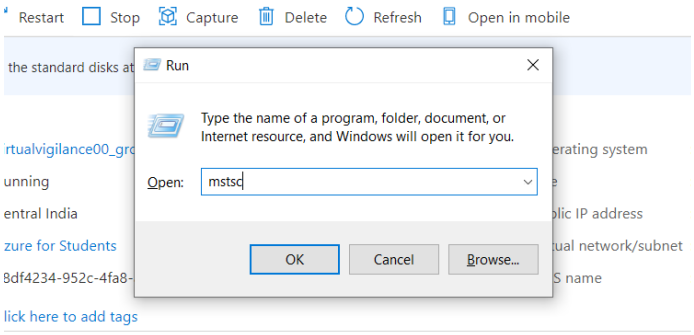

Fig 10 Run the virtual machine by using WINDOWS+R to run the virtual machine

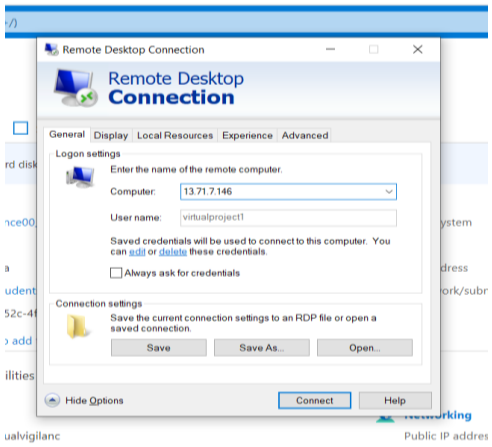

Fig 11.Put the Public IP address the field and the virtual machine name and password

Fig.12 The virtual machine window.

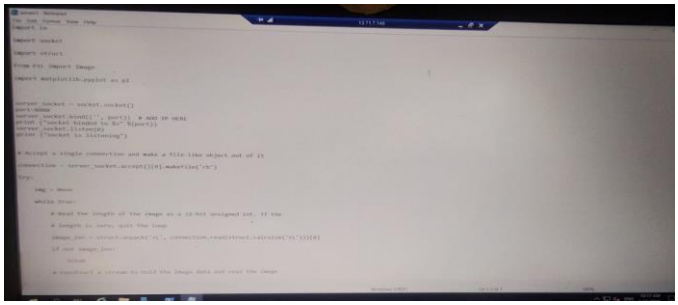

Fig 13 Create a python code file (.py)which is the server code .

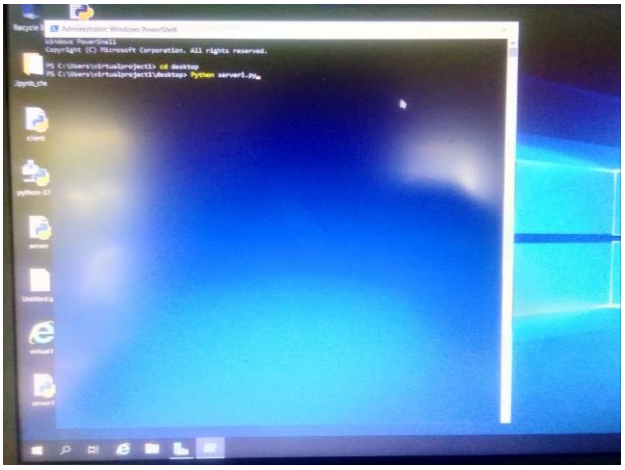

Fig14 .Run the code in powershell and run the client code on raspberry pi at the same time .

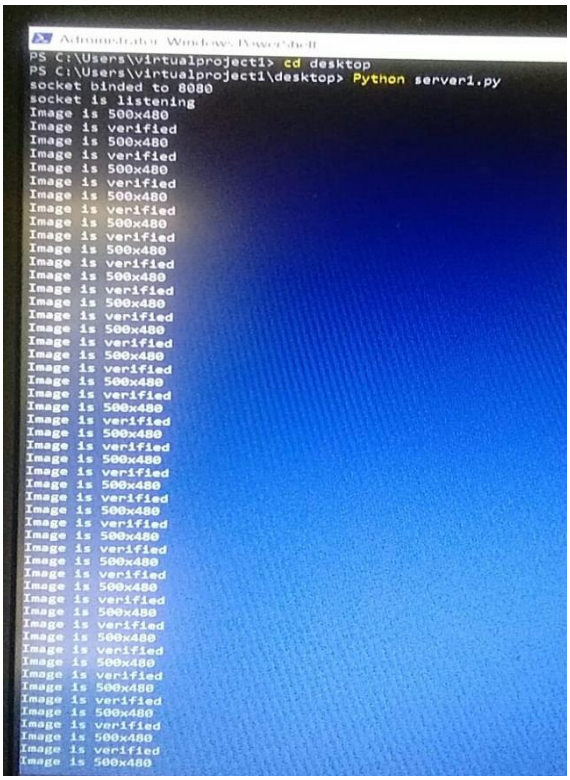

Fig 15. The socket is listening and also images get at the powershell .

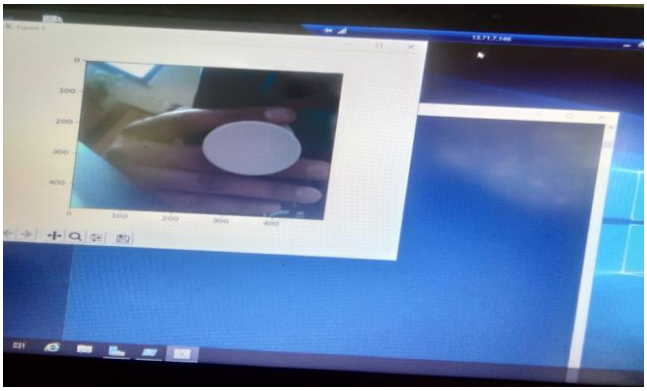

Fig.16 .Get the live video stream from the raspberry pi camera to the virtual machine.

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server code :

```
import io
import socket
import struct
from PIL import Image
import matplotlib.pyplot as pl
server_socket = socket.socket()
port=8080
server_socket.bind(('13.71.7.146', port))  # ADD IP HERE
print ("socket binded to %s" %(port))
server_socket.listen(0)
print ("socket is listening")
connection=server_socket.accept()[0].makefile('rb')
try:
    img = None
    while True:
    image_len = struct.unpack('<L',
connection.read(struct.calcsize('<L')))[0]
  if not image_len:
          break
          image_stream = io.BytesIO()
 image_stream.write(connection.read(image_len))
       image_stream.seek(0)
       image = Image.open(image_stream)
       if img is None:
          img = pl.imshow(image)
       else:
          img.set_data(image)
       pl.pause(0.01)
       pl.draw()
       print('Image is %dx%d' % image.size)
       image.verify()
       print('Image is verified')
finally:
    connection.close()
    server_socket.close()
```

client code:

```
import io
import socket
import struct
import time
import picamera
client_socket = socket.socket()
port=8080
client_socket.connect(('localhost', port))
connection = client_socket.makefile('wb')
try:
    camera = picamera.PiCamera()
    camera.vflip = True
    camera.resolution = (500, 480)
    camera.start_preview()
    time.sleep(2)
    start = time.time()
    stream = io.BytesIO()
    for foo in camera.capture_continuous(stream, 'jpeg'):
     connection.write(struct.pack('<L', stream.tell()))
      connection.flush()
      stream.seek(0)
      connection.write(stream.read())
        if time.time() - start > 60:
         break
      stream.seek(0)
      stream.truncate()
     connection.write(struct.pack('<L', 0))
finally:
    connection.close()
    client_socket.close()
```

6.CONCLUSION

Raspberry pi is useful for the application of remote surveillance using raspberry pi camera.The raspberry pi camera can't be accessed remotely so we are using a client server python library that is python socket .Using this library we can access the raspberry pi remotely .The video can be sent to the virtual machine that is azure virtual machine which can be accessed remotely and the whole process gets wireless . Azure is the most preferable service provided by Microsoft. Azure service is easy to handle. Video streaming with this Azure cloud service is one

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of the easiest services. This cloud service 'Azure' also gives different platforms such as SQL Database,Power Bi,Blob storage.Blob storage is used for storing the resulting data.This whole cloud computing system helps the user to see the live video remotely from anywhere.In this way IOT and Cloud Computing System help in live streaming with remote access.

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