Chapter 1
Introduction

1.1 Introduction

In this project, a location detecting system has been developed with the help of GPS. For this purpose, Raspberry Pi is used where the main processing will be done. And by means of a gps module, present location will be detected and showed in google maps.

In this project implementation, VNC (Virtual Network Computing) has been chosen to connect the Raspberry Pi as server with the other devices as viewer or client. These viewer or client can be anything like Arduino, PC (Desktop/Laptop/MacPC), Raspberry Pi or Any Cellphone (Android/iOS based) even via Chrome internet browser.

1.2 VNC (Virtual Network Computing)

VNC is a graphical desktop sharing system that allows you to remotely control the desktop interface of one computer (running VNC Server) from another computer or mobile device (running VNC Viewer). VNC Viewer transmits the keyboard and either mouse or touch events to VNC Server, and receives updates to the screen in return.

1.3 UART (Universal Asynchronous Receiver/Transmitter)

UART stands for Universal Asynchronous Receiver/Transmitter. It’s not a communication protocol like SPI and I2C, but a physical circuit in a microcontroller, or a stand-alone IC. A UART’s main purpose is to transmit and receive serial data.

One of the best things about UART is that it only uses two wires to transmit data between devices. UARTs transmit data asynchronously, which means there is no clock signal to synchronize the output of bits from the transmitting UART to the sampling of bits by the receiving UART. Instead of a clock signal, the transmitting UART adds start and stop bits to the data packet being transferred. These bits define the beginning and end of the data packet so the receiving UART knows when to start reading the bits.

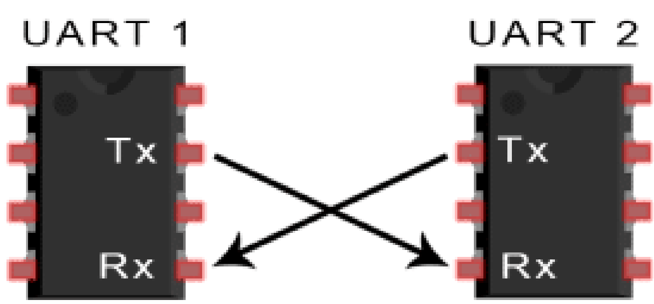

Figure: UART communication

When the receiving UART detects a start bit, it starts to read the incoming bits at a specific frequency known as the *baud rate*. Baud rate is a measure of the speed of data transfer, expressed in bits per second (bps). Both UARTs must operate at about the same baud rate.

Chapter 2
Design of the Remote Motor Controller

2.1 Introduction

In this project, there are several components included, as each of them have their specific function and task. Based on the characteristics of circuit reliability, function ability, and costs these components have been selected.

2.2 Methodology

The Methodology consists of the following stages:

- First the requirements of the project will be carefully analyzed to design the proposed position detection by GPS. Based on it, the specifications of the necessary components of the hardware and software will be finalized.
- Next the circuit will be designed.. Python 3 language is used for programming.
- Then the circuit will be implemented and tested in the laboratory.
- If necessary, then edit the programming code and re-test the circuit.

2.3 Description of the Main Components of the system

The main components are:

(i) Raspberry Pi 3 of model B+
(ii) Ublox NEO-6m GPS Module
(iii) AMS1117 3.3V Regulator Module

A short description of each of the components is discussed in this chapter.

2.3.1 Raspberry Pi 3 B+

The Raspberry Pi 3 Model B is the most popular Raspberry Pi computer made, and the Pi Foundation knows you can always make a good thing better! And what could make the Pi 3 better? How about a faster processor, 5 GHz Wi-Fi, and updated Ethernet chip with PoE capability? Yes, that's exactly what can be done![1]

The Raspberry Pi 3 Model B+ is the latest product in the Raspberry Pi 3 range, boasting an updated 64-bit quad-core processor running at 1.4 GHz with built-in metal heatsink, dual-band 2.4 GHz and 5 GHz wireless LAN, Bluetooth 4.2/BLE, faster (300 mbps) Ethernet, and Power-over-Ethernet (PoE) support (with separate PoE HAT).[1]

The specifications of Raspberry Pi 3 Model B+ are:[2]

- Broadcom BCM2837B0, Cortex-A53 (ARMv8) 64-bit SoC @ 1.4GHz
- 1GB LPDDR2 SDRAM

- 2.4GHz and 5GHz IEEE 802.11.b/g/n/ac wireless LAN, Bluetooth 4.2, BLE
- Gigabit Ethernet over USB 2.0 (maximum throughput 300 Mbps)
- Extended 40-pin GPIO header
- Full-size HDMI
- 4 USB 2.0 ports
- CSI camera port for connecting a Raspberry Pi camera
- DSI display port for connecting a Raspberry Pi touchscreen display
- 4-pole stereo output and composite video port
- Micro SD port for loading your operating system and storing data
- 5V/2.5A DC power input
- Power-over-Ethernet (PoE) support (requires separate PoE HAT)

Fig. 2.2: Raspberry Pi Model 3 B+

The pinout of Raspberry Pi Model 3 B+ is:

Raspberry Pi B+
B+ J8 GPIO Header

	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

Key

Power +	UART
GND	SPI
I²C	GPIO

Fig. 2.3: Pin-outs of Raspberry Pi Model 3 B+

2.4.2 Ublox NEO-6m GPS Module

The NEO-6M GPS module is a well-performing complete GPS receiver with a built-in 25 x 25 x 4mm ceramic antenna, which provides a strong satellite search capability. With the power and signal indicators, the status of the module can be monitored. For having the data backup battery, the module can save the data when the main power is shut down accidentally. Its 3mm mounting holes can ensure easy assembly on your aircraft, which thus can fly steadily at a fixed position, return to Home automatically, and automatic waypoint flying, etc. The NEO-6M GPS module is also compatible with other microcontroller boards.

- This module has an external antenna and built-in EEPROM.
- Interface: RS232 TTL
- Power supply: 3V to 5V
- Default baudrate: 9600 bps
- Works with standard NMEA sentences

The NEO-6M GPS module has four pins: VCC, RX, TX, and GND. The module communicates with the Arduino via serial communication using the TX and RX pins, so the wiring couldn’t be simpler:

Figure: Ublox NEO-6m GPS Module

NEO-6M GPS Module	Wiring to Arduino UNO
VCC	5V
RX	TX pin defined in the software serial
TX	RX pin defined in the software serial
GND	GND

2.4.3 AMS1117 3.3V Regulator Module

The AMS1117-3.3V voltage regulator module is great for microcontroller projects and for various electronic prototypes. This is a high-performance module which provides a quick solution for powering the circuit.

Specifications

- Onboard AMS1117-3.3 chip
- Input Voltage Range: 4.75 V to 12 V
- Onboard power indicator
- Board Size: 18.5 x 10.5 mm

Figure: AMS1117 3.3V Regulator Module

Chapter 3
System Output

3.1 Introduction

In this chapter, the details of the result found of this project have been described including the discussions; working principle, list of components used etc.

3.2 Pin Connections

In this section, short brief of the pin connections will be described. GPIO.BOARD mode has been used for the establishing the connection.

Pin connections are:
Pin 8: UART Tx
Pin 10: UART Rx
Pin 14: Ground
Pin 20: Ground

3.3 PC to Raspberry pi (using VNC in the same Network)

Raspberry Pi is the Server and PC is the Viewer here. VNC server and VNC Viewer has to be installed in the Raspberry Pi. In the current version Raspberry Pi Stretch OS, these are already installed. These just need to be update and upgrade. Also at PC, VNC Viewer has to be installed.. At Raspberry Pi, open the VNC Server. It will look like this after doing some configuration changes in putty:

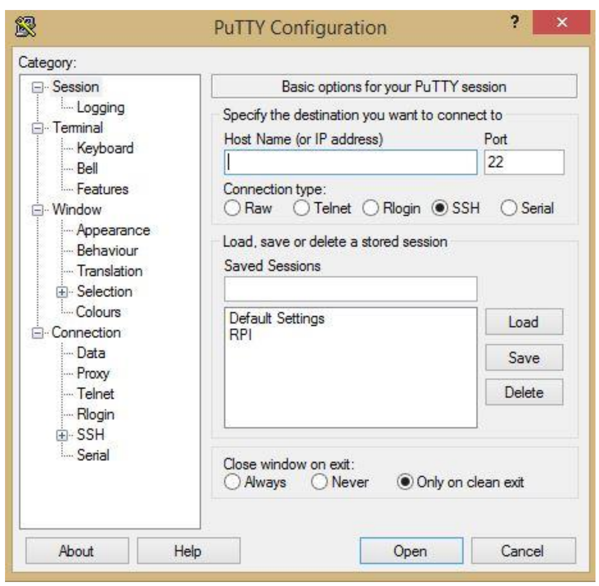

Fig : Putty interface

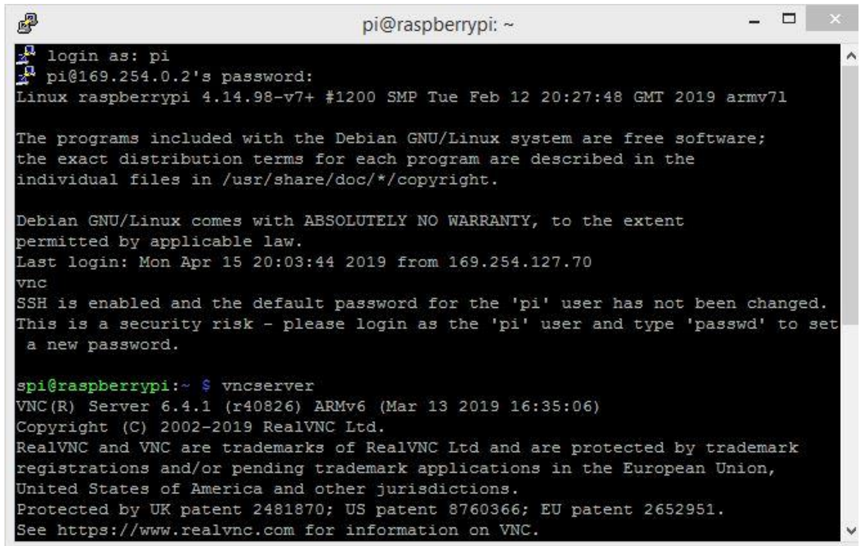

Fig : putty interface

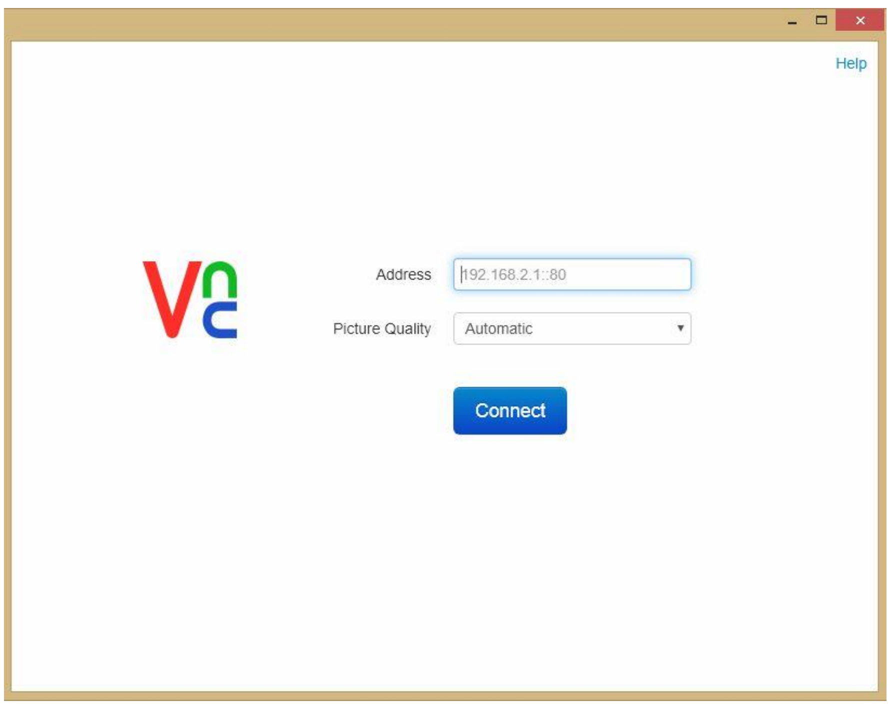

Fig : VNC Server interface

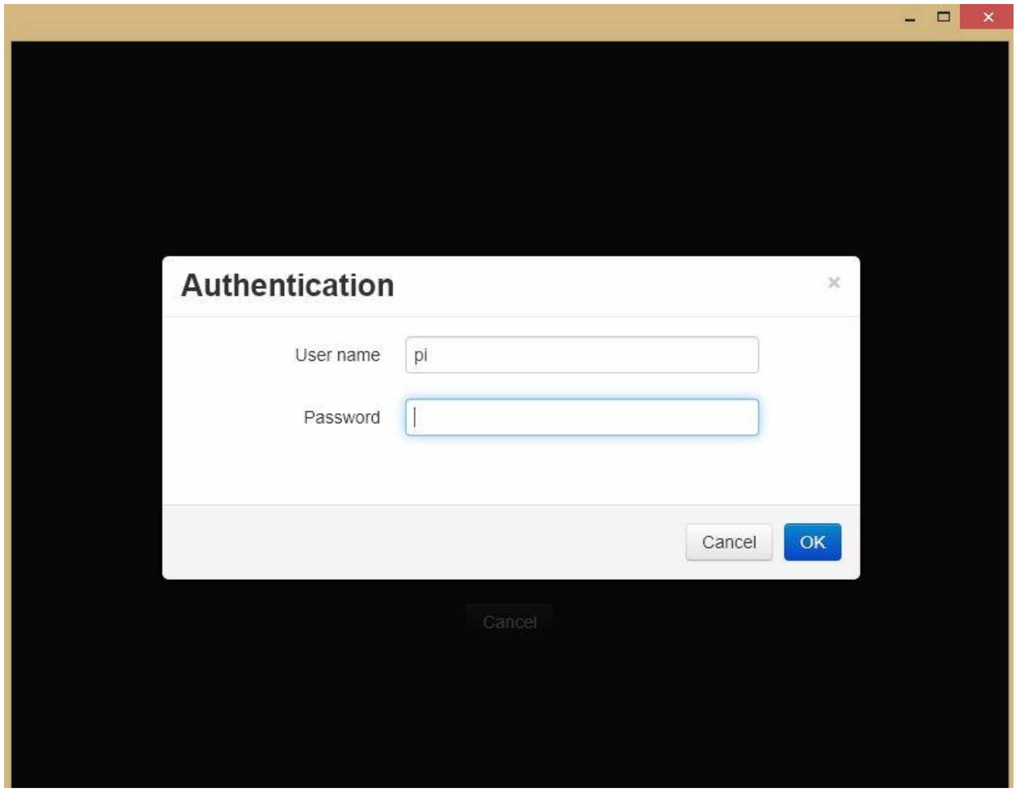

Fig 3.6: VNC Viewer interface

After entering VNC Server (Raspberry Pi) address e.g. 169.254.0.2 with proper username and password of that Raspberry Pi, the PC will be connected to the Raspberry Pi, and it will be accessed remotely. It will be look like this:

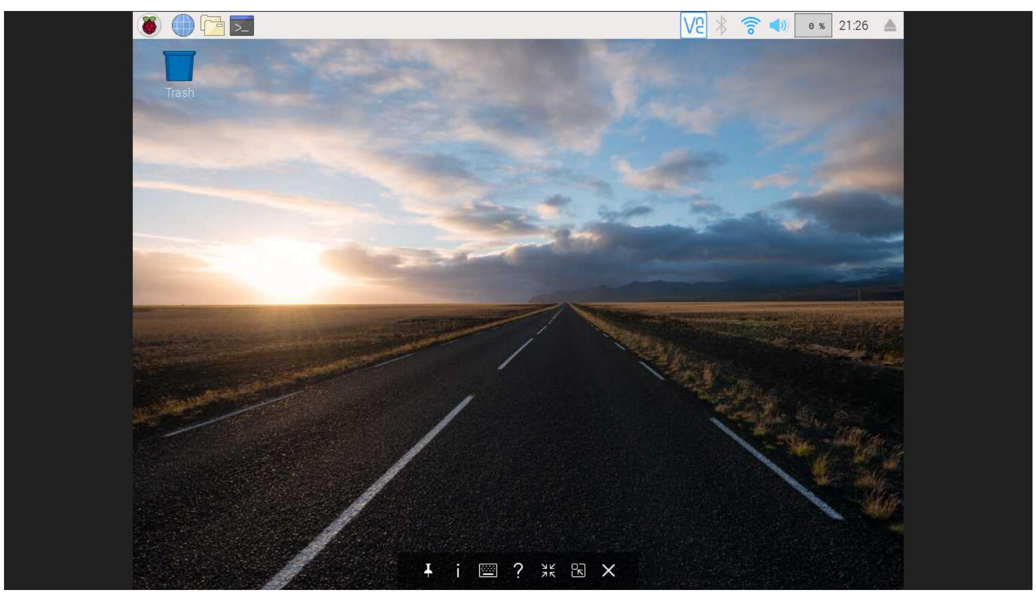

Fig 3.7: Remote access of the Raspberry Pi through PC in the same network

3.5 Calculations and Results

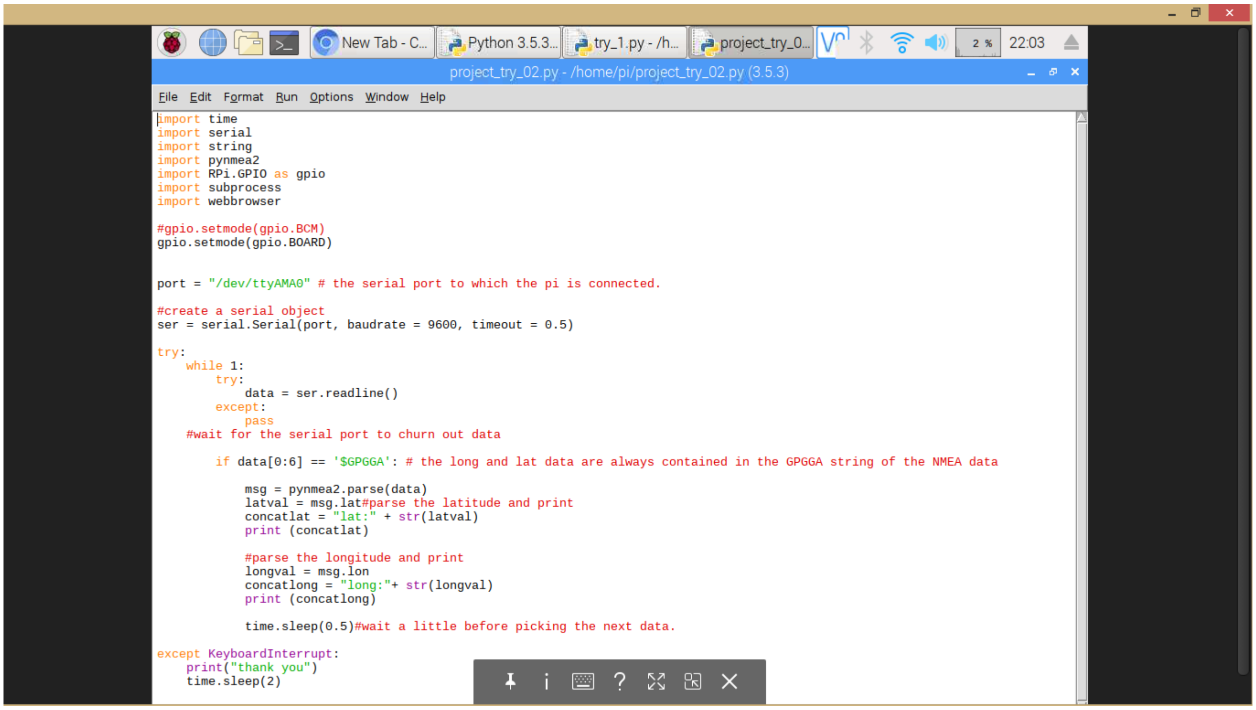

Figure: A snapshot of the script

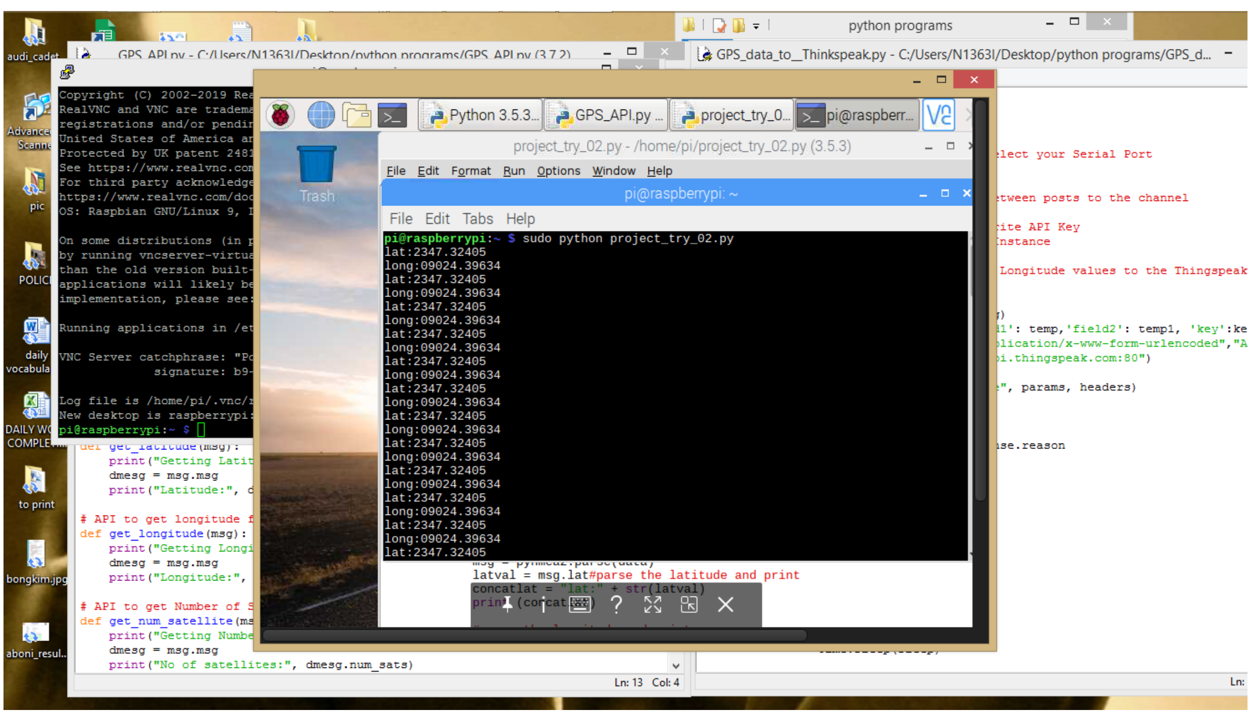

Figure: A snapshot of the output

3.6 Pictorial View of the Designed Project

The following picture shows the designed project in the pictorial view format.

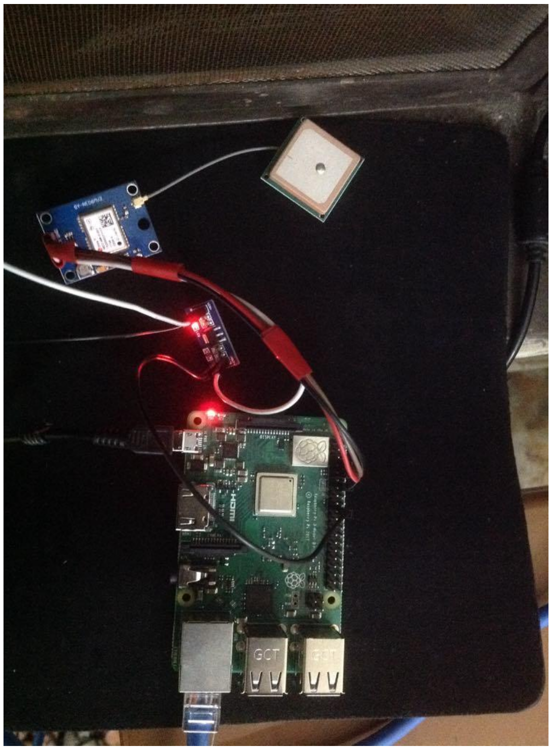

Fig. 3.9: Pictorial view of the designed project

Chapter 4
Conclusion

4.1 Conclusion

In this project, the Raspberry Pi has been accessed remotely by SSH. It is by using the VNC server and viewer. In this project only location could be detected by GPS module. But to show this location in the google maps could not be completed. Though the location values (latitude and longitude) was tried to push into a cloud server and by accessing those location points it was intended to show in the google maps. But the project could not be finished.