2015

TENET TECHNETRONICS

# Interfacing stepper motor with Raspberry

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## Introduction:

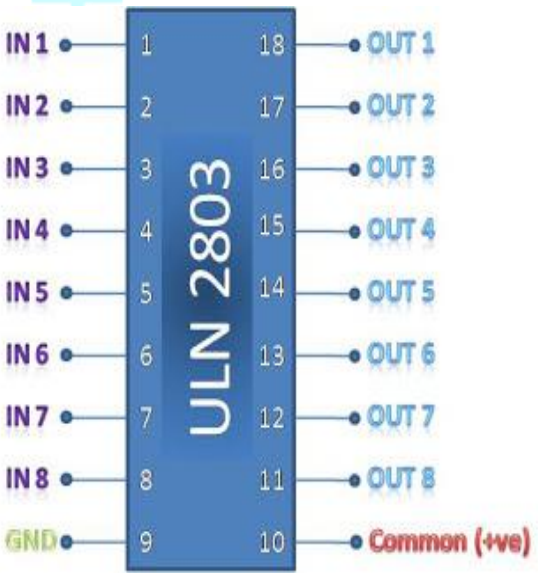
Raspberry Pi is a credit card sized computer that plugs into a computer monitor or TV,and uses standard keyboard and mouse. It's capable of doing everything you'd expect a desktop computer to do, from browsing the internet and playing high-definition video, to making spreadsheets, word-processing, and playing games. Here we are going to do interface with stepper motor with Raspberry pi using motor driver IC ULN2803

**Hardware Requirements:**

1. Raspberry Pi board.
2. Stepper Motor.
3. Power supply breakout board
4. Jumper wires
5. ULN2803 IC(motor driver IC)

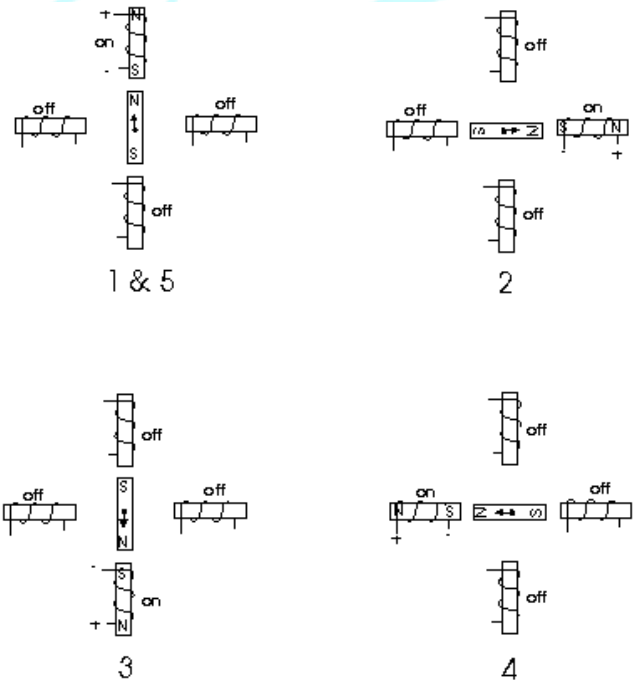
## ULN2803 motor driver IC:

The ULN2803 motor driver is a high–voltage, high–current Darlington drivers comprised of eight NPN Darlington pairs. All units feature integral clamp diodes for switching inductive loads.As you can see, ULN2803 motor driver has eight input pins and eight output pins. As we are using stepper motor which has four pins, we need only four input and output pins of ULN2803.

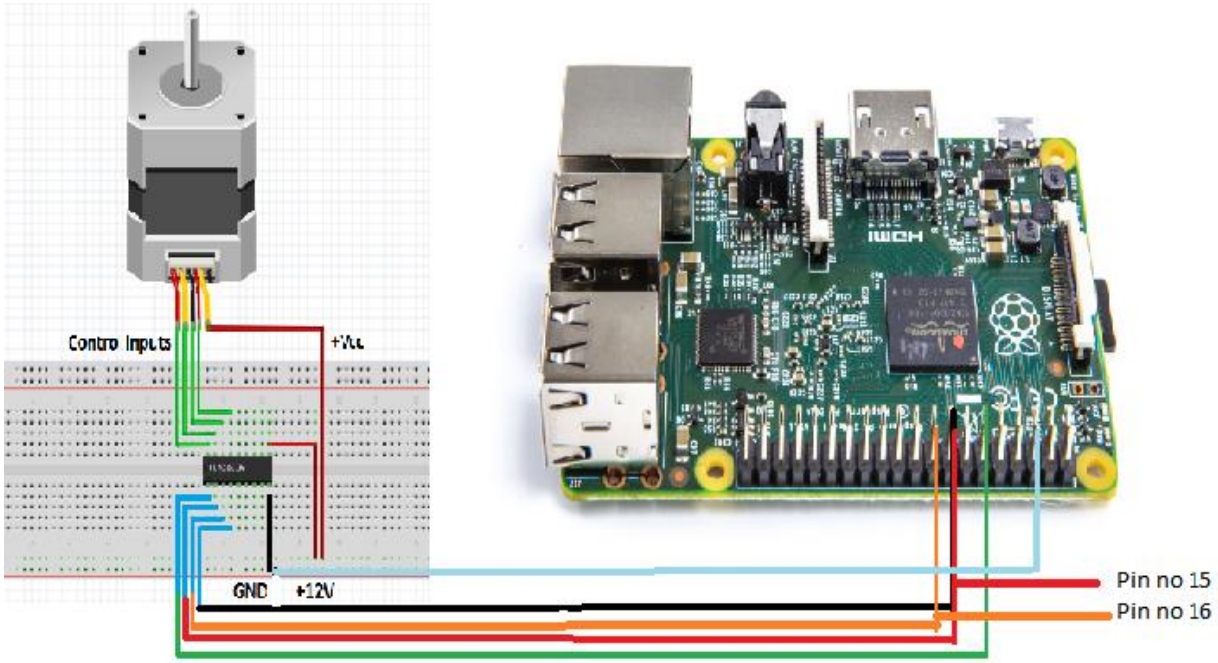


## Stepper motor:

Stepper motors consist of a permanent magnetic rotating shaft, called the rotor, and electromagnets on the stationary portion that surrounds the motor, called the stator. Figure 17 illustrates one complete rotation of a stepper motor. At position 17, we can see that the rotor is beginning at the upper electromagnet, which is currently active (has voltage applied to it). To move the rotor clockwise (CW), the upper electromagnet is deactivated and the right electromagnet is activated, causing the rotor to move 90 degrees CW, aligning itself with the active magnet. This process is repeated in the same manner at the south and west electromagnets until we once again reach the starting position.



## Circuit diagram:




## Connection explanation:

- ULN2803 1st pin is connected to 11$^{th}$ pin of Raspberry Pi.
- ULN2803 2$^{nd}$ pin is connected to 16$^{th}$ pin of Raspberry Pi.
- ULN2803 3$^{rd}$ pin is connected to 18$^{th}$ pin of Raspberry Pi.
- ULN2803 4$^{th}$ pin is connected to 15$^{th}$ pin of Raspberry Pi.
- ULN2803 18,17,16,15 pins are connected to Stepper motor
- Stepper motor is powered from 12V power supply breakout board.

## Coding in Raspberry Pi:

**Step 1:** Raspberry pi home screen like this. Open LXTERMINAL which is available on left corner of the screen.

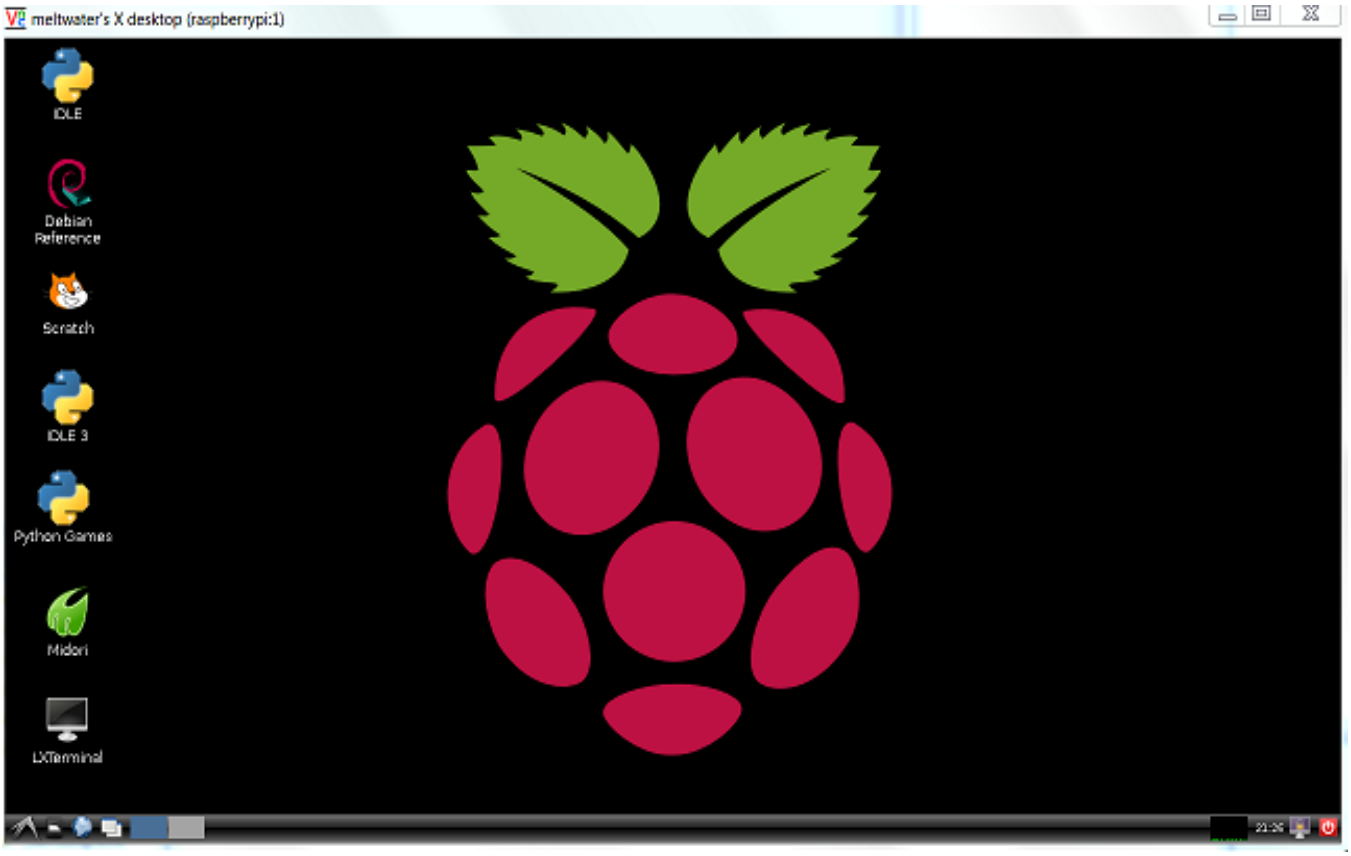



Figure 1

**Step 2:** Create a new file by using **sudo nano filename.py** command.

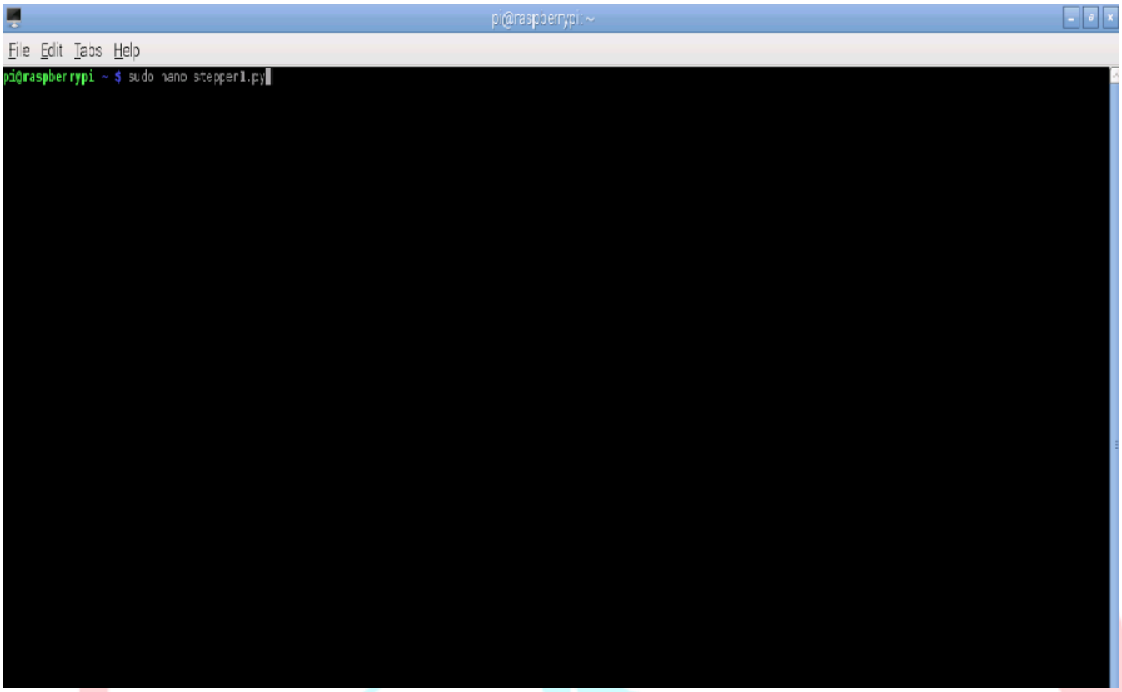



Figure2

**Step 3:** Hitting ENTER key will take you in the new window where you can type your code.

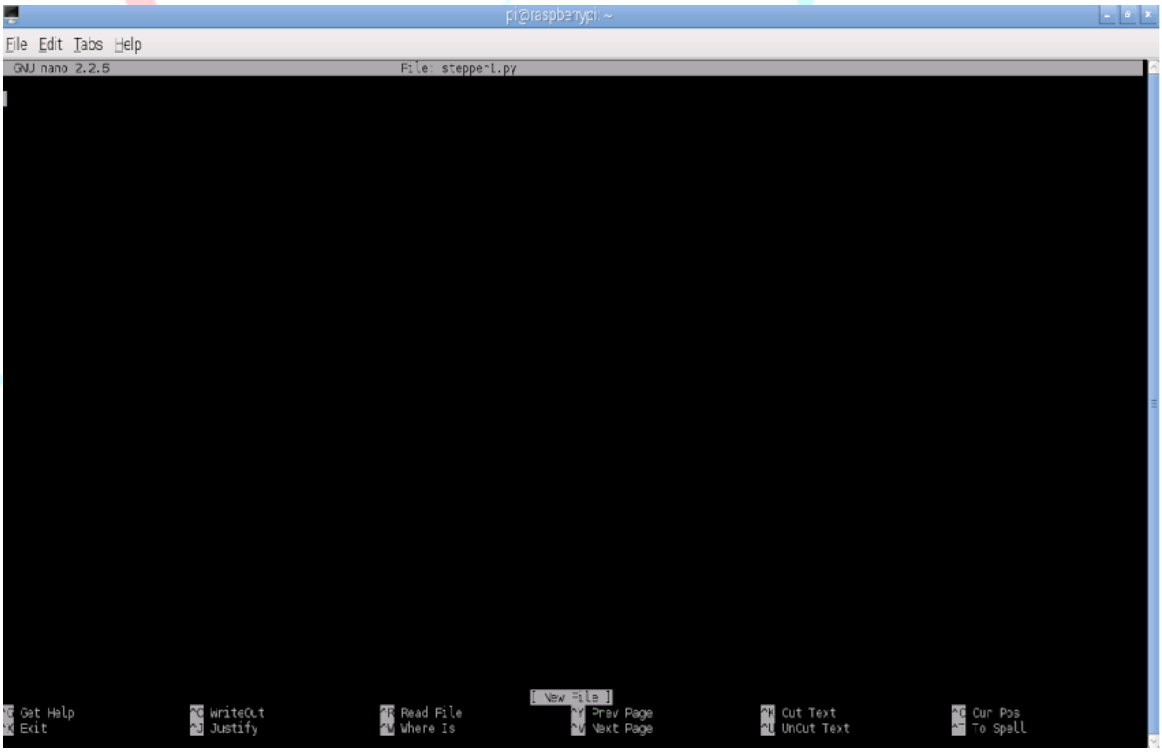



Figure 3

**Step 4:** Type your code in the prescribed window.

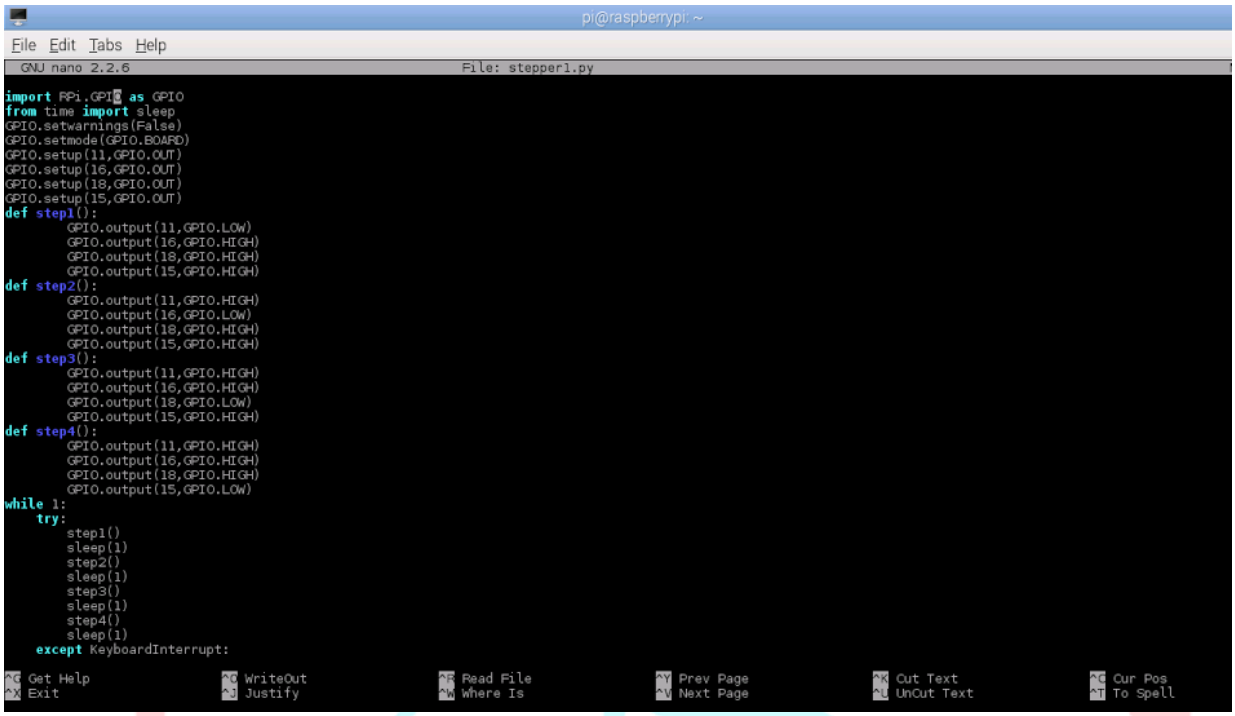



Figure4

After entering your code press the CTRLX to save your code. And it will prompt you that save mod at the bottom of the window. Press Y and hit enter key

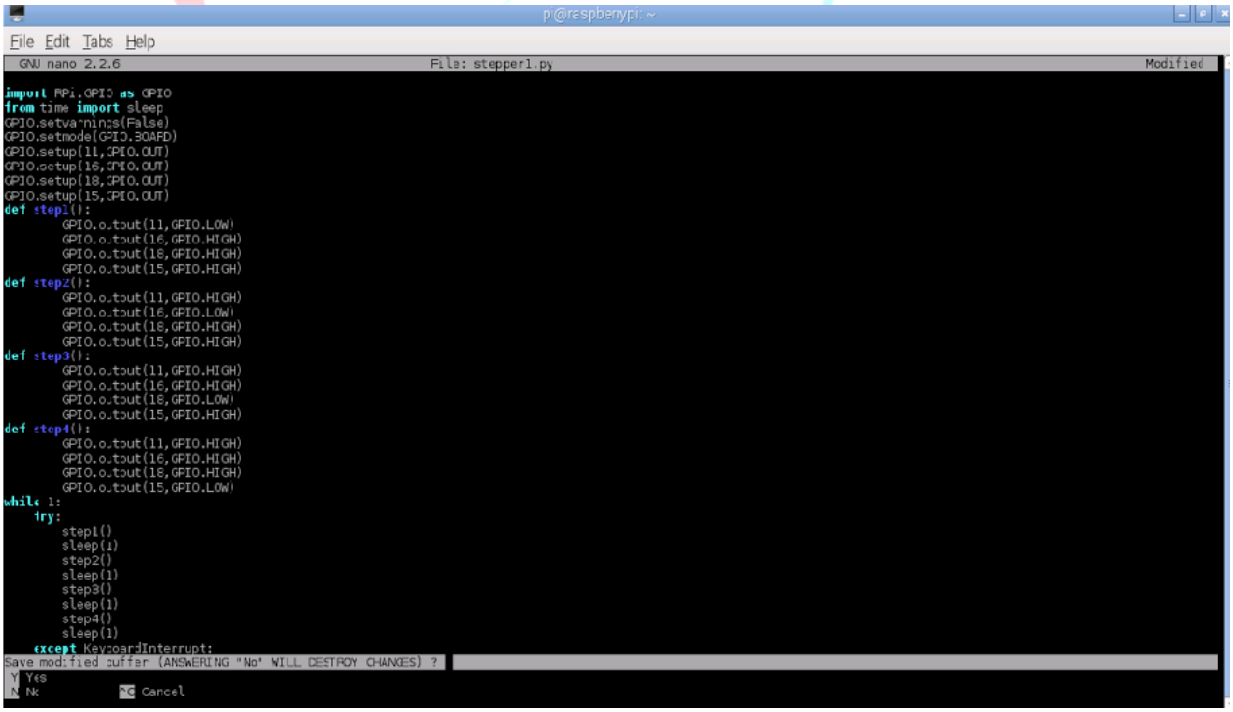



Figure5

**Step 5:** Run the code by using **sudo python filename.py** command. Hit enter key

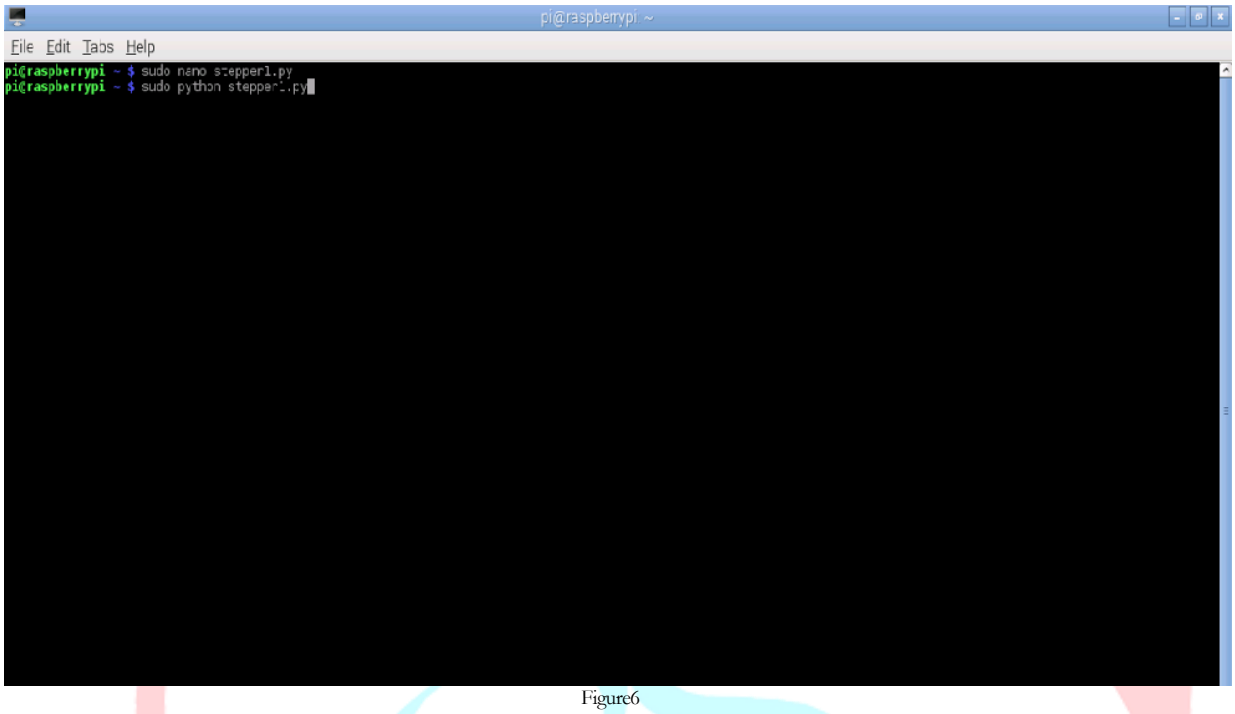



Figure6

**Step 6**: On hitting ENTER key, your program will start to run and find the window as given below. And the cursor blinking in the below of your command.

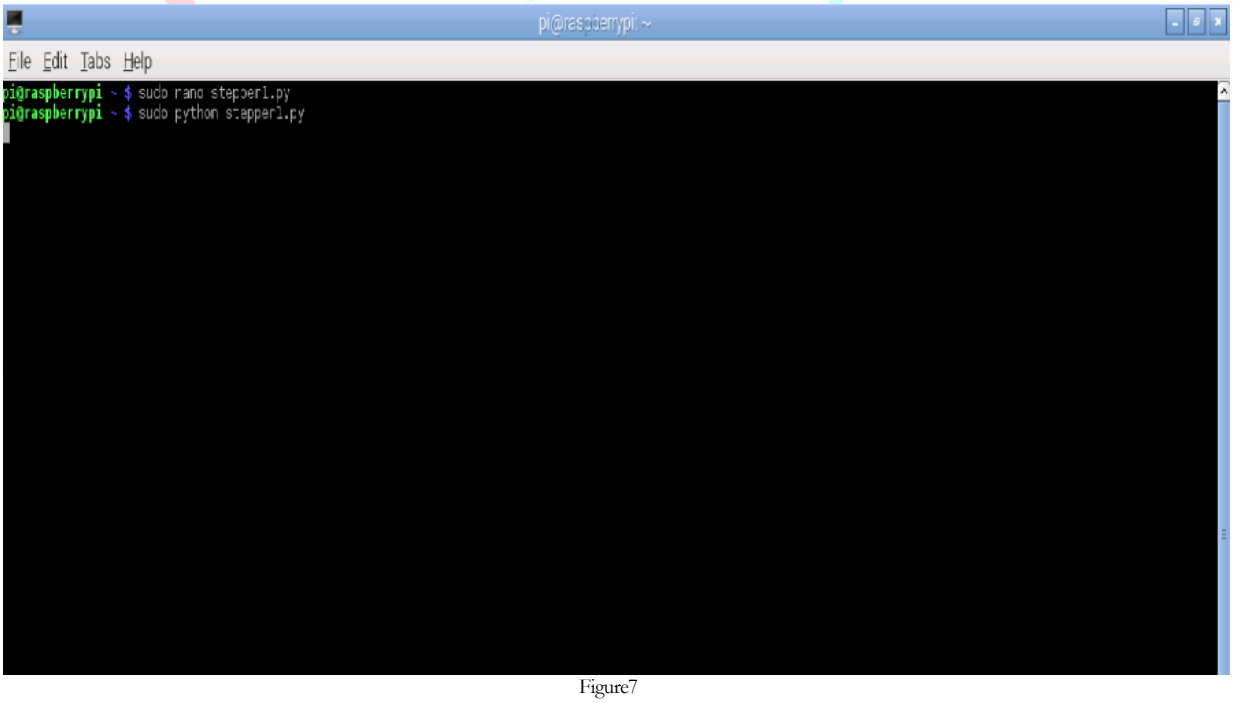



Figure7

**Step 7**: Program can be terminated by clicking CTRL+C button .Find the window below.

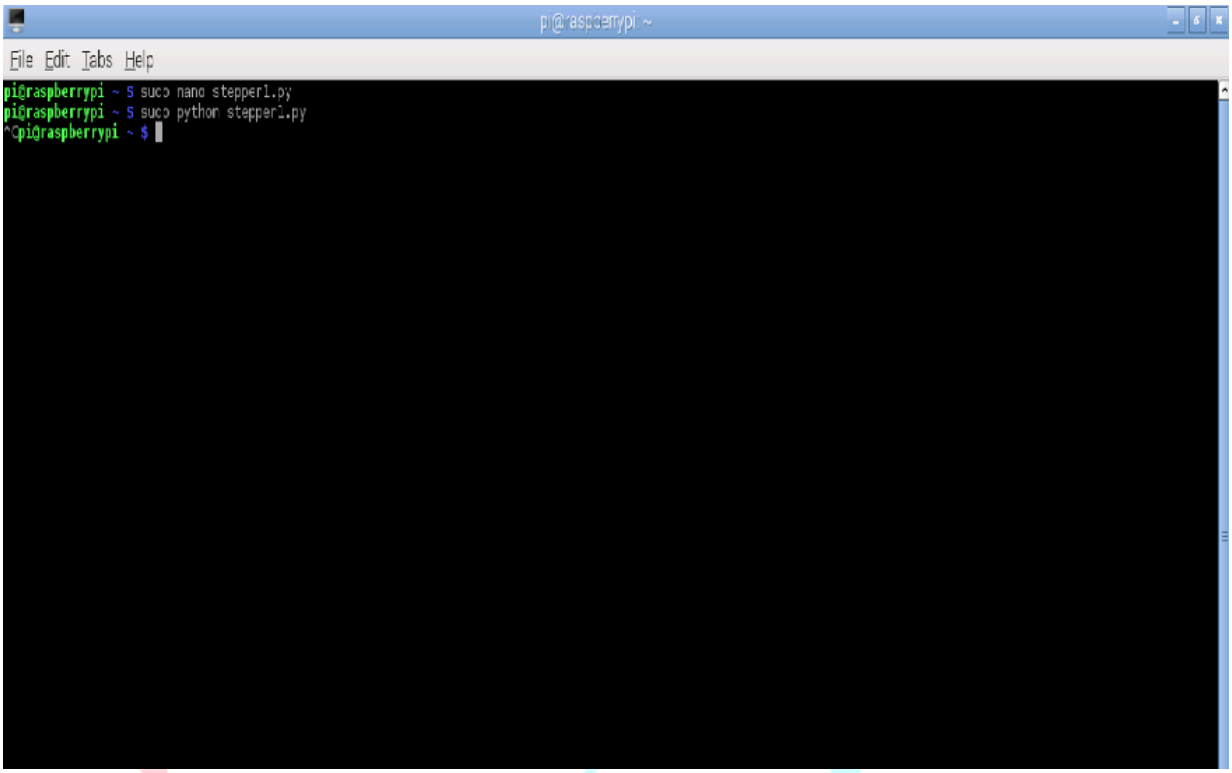



Figure8

**OUTPUT:**