Programming Raspberry Pi with Python

SSN

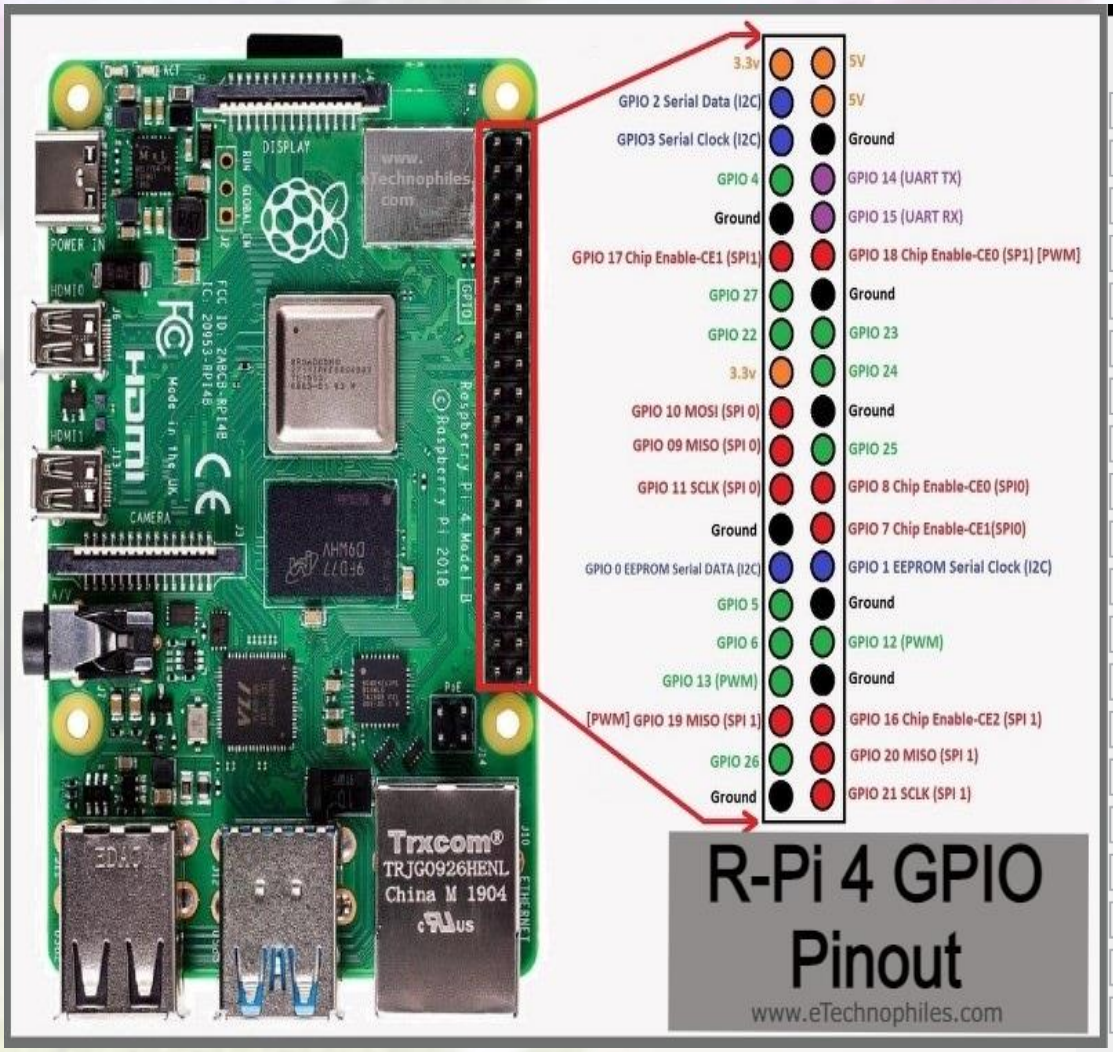
Presentation Outline

- Controlling LED with Raspberry Pi
- Interfacing an LED and Switch with Raspberry Pi
- Interfacing a Light Sensor (LDR) with Raspberry Pi
- Summary

Introduction

- The general purpose input/output capability provided by the GPIO pins on Raspberry Pi makes it useful device for IoT
- We can interface a wide variety of sensors and actuators with Raspberry Pi using GPIO pins, SPI, I2C and Serial interfaces
- Input from sensors connected to Raspberry Pi can be processed and various actions can be taken
- Ex- sending data to server, sending an email, actuating a relay switch etc.

Raspberry Pi4 Pinouts



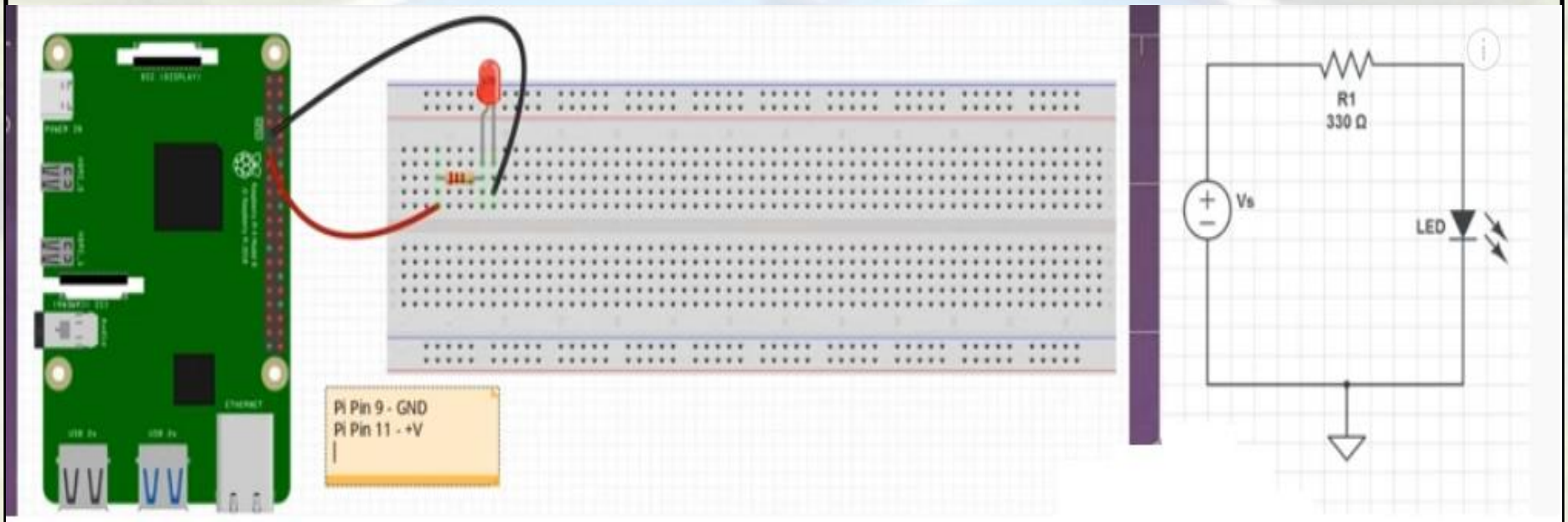
PIN	NAME		NAME	PIN
01	3.3V DC Power		5V DC Power	02
03	GPIO02 (SDA1,I²C)		5V DC Power	04
05	GPIO03 (SDL1,I²C)		Ground	06
07	GPIO04 (GPCLK0)		GPIO14 (TXD0, UART)	08
09	Ground		GPIO15 (RXD0, UART)	10
11	GPIO17		GPIO18(PWM0)	12
13	GPIO27		Ground	14
15	GPIO22		GPIO23	16
17	3.3V DC Power		GPIO24	18
19	GPIO10 (SP10_MOSI)		Ground	20
21	GPIO09 (SP10_MISO)		GPIO25	22
23	GPIO11 (SP10_CLK)		GPIO08 (SPI0_CE0_N)	24
25	Ground		GPIO07 (SPI0_CE1_N)	26
27	GPIO00 (SDA0, I²C)		GPIO07 (SCL0, I²C)	28
29	GPIO05		Ground	30
31	GPIO06		GPIO12 (PWM0)	32
33	GPIO13 (PWM1)		Ground	34
35	GPIO19		GPIO16	36
37	GPIO26		GPIO20	38
39	Ground		GPIO21	40

Raspberry Pi4 Pinouts

Function	BCM	Physical Pins pin#	pin#	BCM	Function
3.3 Volts		1	2		5 Volts
GPIO/SDA1 (I2C)	2	3	4		5 Volts
GPIO/SCL1 (I2C)	3	5	6		TX UART/GPIO
GPIO/GCLK	4	7	8	14	RX UART/GPIO
GND		9	10	15	GPIO
GPIO	17	11	12	18	GPIO
GPIO	27	13	14		GND
GPIO	22	15	16	23	GPIO
3.3 Volts		17	18	24	GPIO
MOSI (SPI)	10	19	20		GND
MISO(SPI)	9	21	22	25	GPIO
SCLK(SPI)	11	23	24	28	CEO_N (SPI)
GND		25	26	7	CE1_N (SPI)
RESERVED		27	28		RESERVED
GPIO	5	29	30		GND
GPIO	6	31	32	12	GPIO
GPIO	13	33	34		GND
GPIO	19	35	36	16	GPIO
GPIO	26	37	38	20	GPIO
GND		39	40	21	GPIO

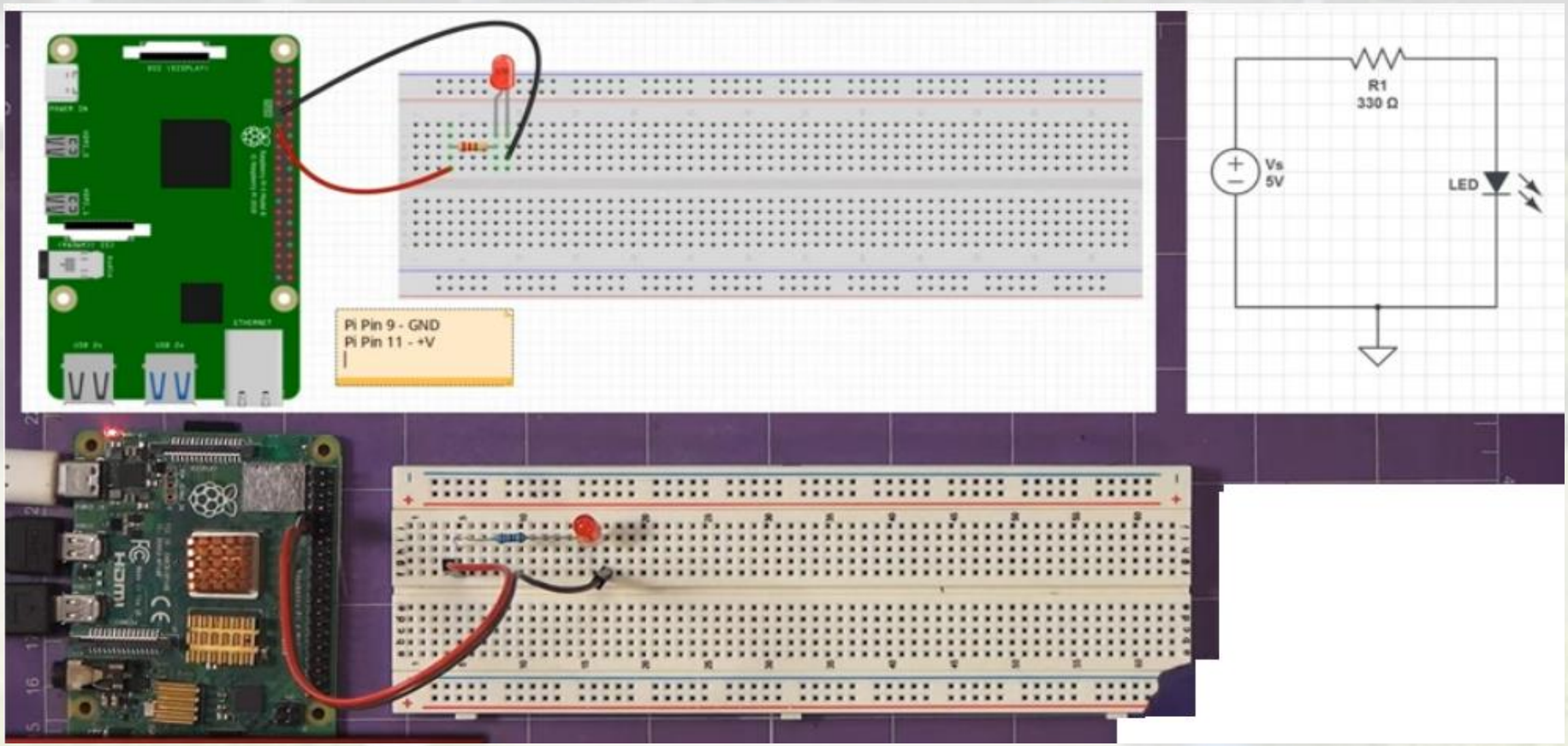
Controlling LED with Raspberry Pi

- The schematic diagram of connecting an LED to Raspberry Pi is shown below
- Pin 11 (+Vcc) and 9 (GND) is used to connect and blink the LED

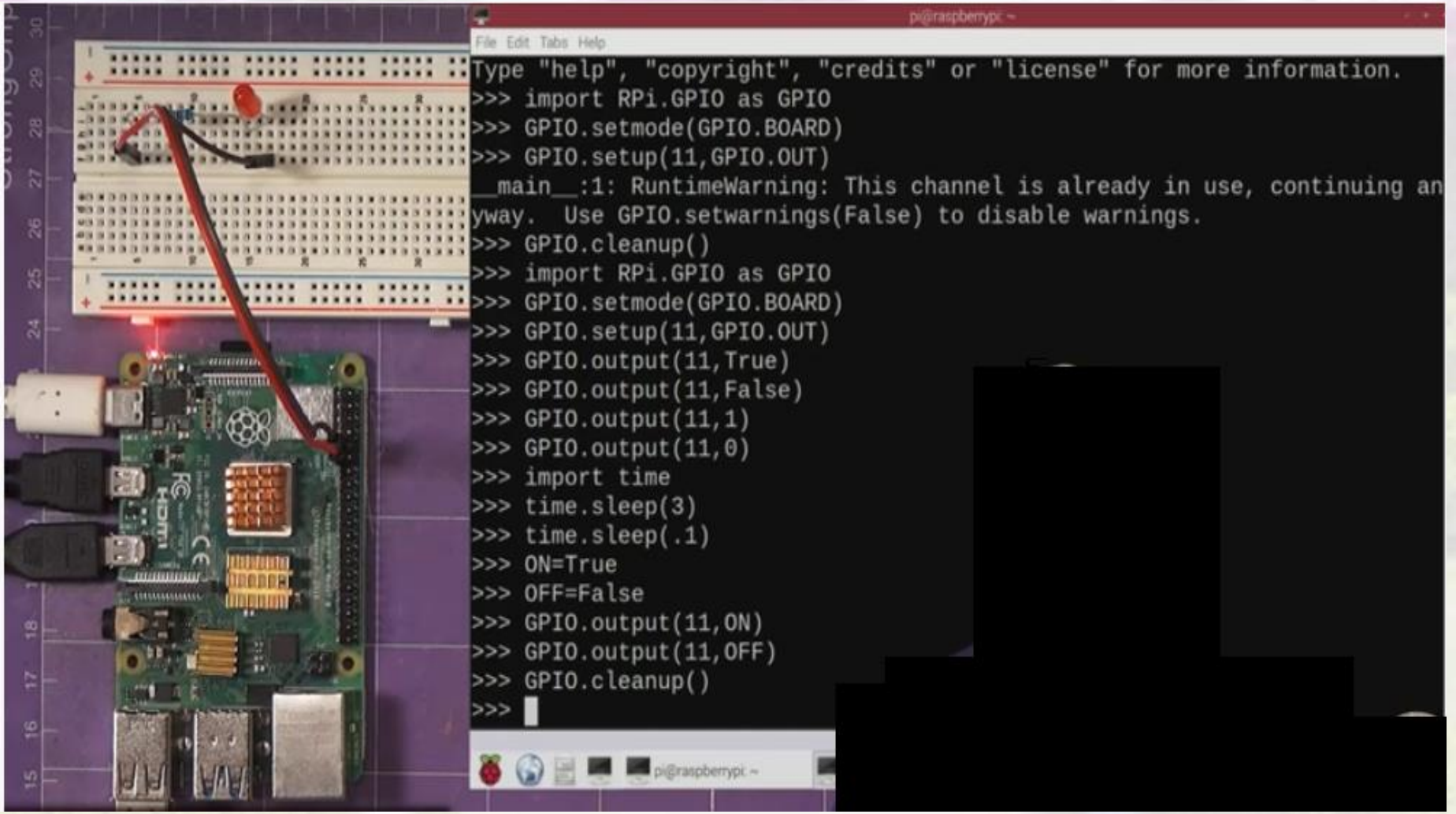


Controlling LED with Raspberry Pi

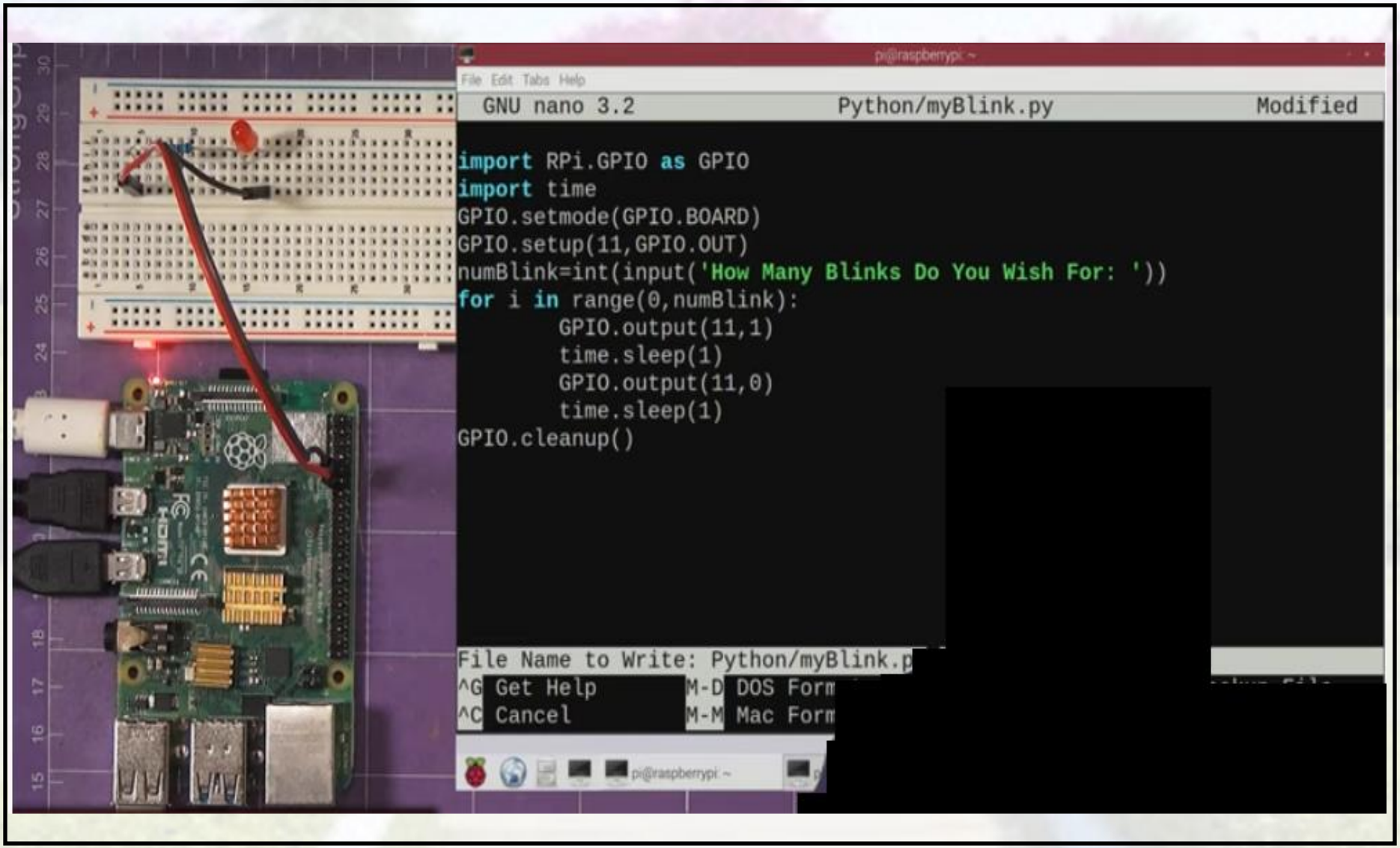
- The schematic and the physical diagram of connecting an LED to Raspberry Pi is shown below



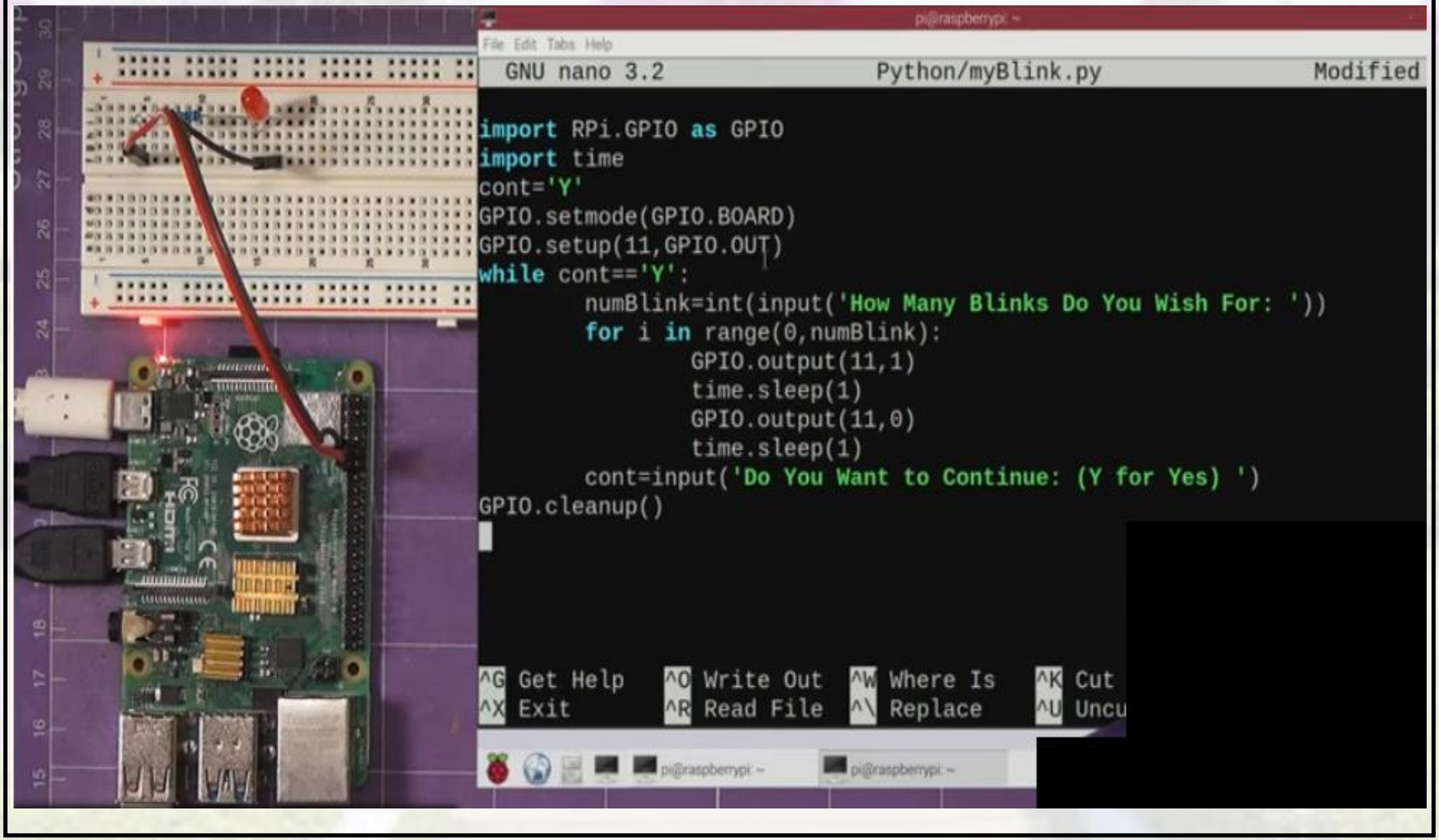
Controlling LED with Raspberry Pi



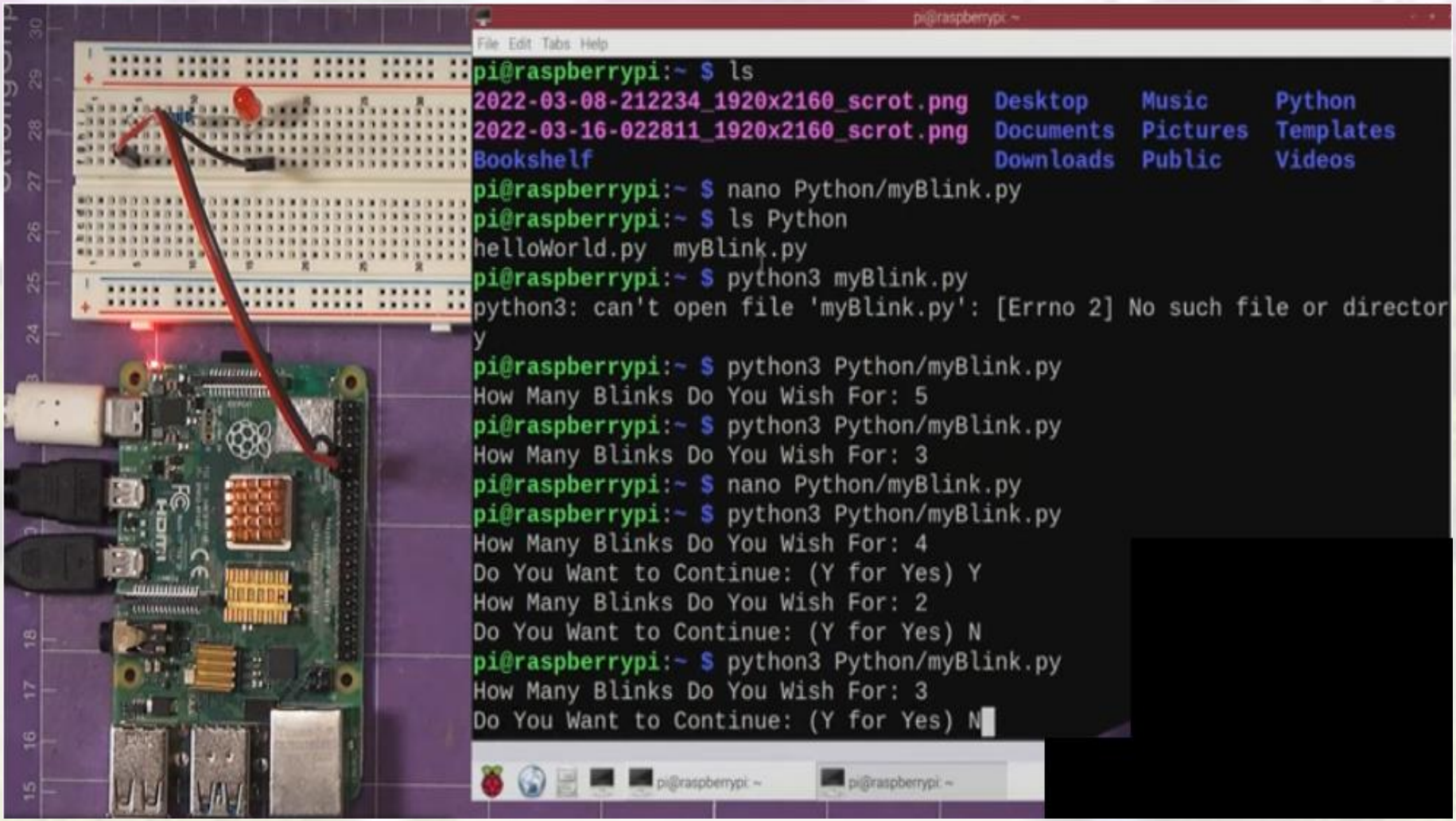
Controlling LED with Raspberry Pi



Controlling LED with Raspberry Pi



Controlling LED with Raspberry Pi



Controlling LED with Button Switch in Rpi - DEMO

Interfacing Ultrasonic Sensor with Rpi - DEMO

Session Summary

In this session we have learned,

- Controlling LED with Raspberry Pi
- Interfacing an LED and Switch with Raspberry Pi
- Interfacing a Light Sensor (LDR) with Raspberry Pi

Review Question

1. How is Raspberry Pi different from a Desktop computer?
2. What is the use of GPIO pins?
3. What is the use of SPI and I2C interface on Raspberry Pi?

References

1. Arhdeep Bahga and Madisetti, Internet of Things A hands-on approach, Universities Press (India) Private Limited, 2014.


Thanks