MKSSS's
CUMMINS COLLEGE OF ENGINEERING FOR WOMEN
DEPARTMENT OF COMPUTER ENGINEERING

Internet of things Laboratory
Assignment 7

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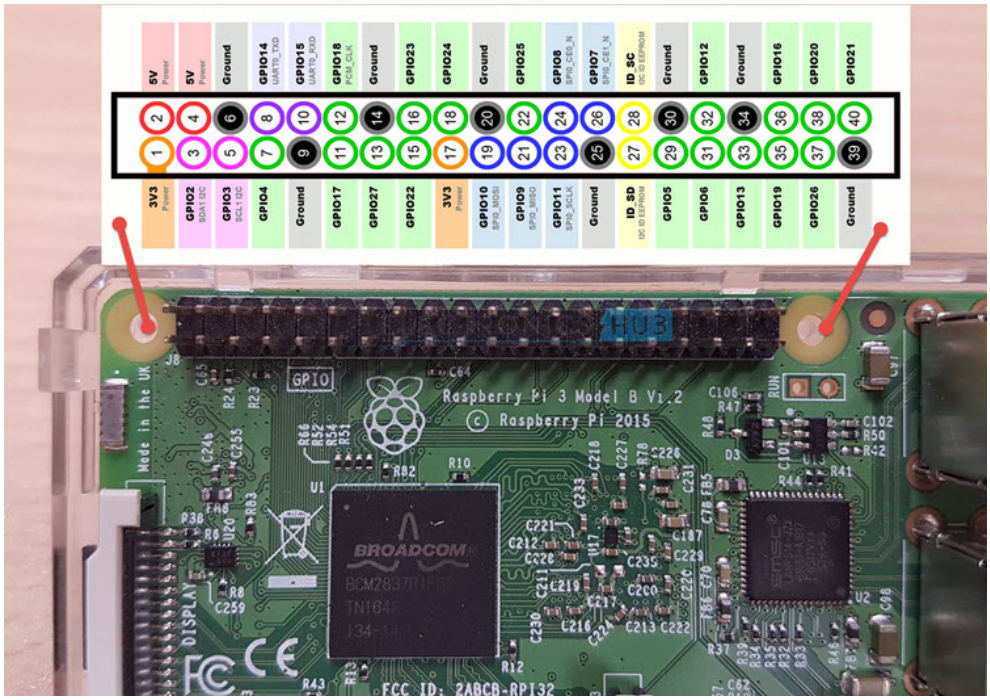
Problem Statement: Blinking LED with Raspberry Pi

Theory:

A Raspberry Pi is a credit card-sized computer originally designed for education, inspired by the 1981 BBC Micro. Creator Eben Upton's goal was to create a low-cost device that would improve programming skills and hardware understanding at the pre-university level. But thanks to its small size and accessible price, it was quickly adopted by tinkerers, makers, and electronics enthusiasts for projects that require more than a basic microcontroller (such as Arduino devices). The Raspberry Pi is slower than a modern laptop or desktop but is still a complete Linux computer and can provide all the expected abilities that imply, at a low-power consumption level. The Raspberry Pi is open hardware, with the exception of the primary chip on the Raspberry Pi, the Broadcomm SoC (System on a Chip), which runs many of the main components of the board–CPU, graphics, memory, the USB controller, etc. Many of the projects made with a Raspberry Pi are open and well-documented as well and are things you can build and modify yourself.



Principle

The principle of operation is very simple. The GPIO pin is made HIGH for a second and is made LOW for the next second. This process is kept in a loop so that we get the effect of the Blinking LED.

Write answers to the following questions:

1. Differentiate between Raspberry Pi and Arduino.

Raspberry Pi	Arduino
Raspberry Pi is a Single Board Computer or SBC	Arduino is a Microcontroller based development board
It is based on Broadcom SoC, an ARM Cortex-A Series Microprocessor	It is based on Atmel Microcontrollers. Arduino UNO uses ATmega328P Microcontroller

A Debian based Linux Distribution called Raspberry Pi OS is needed to boot the Raspberry Pi	As it is a Microcontroller, there is no need for an operating system
Raspberry Pi SBC can perform multiple tasks simultaneously due to its powerful processor and Linux based OS	Arduino is usually used for running a single task (or a very small no. of simple tasks) repeatedly, over and over again
Raspberry Pi SBC has several GPIO Pins (the famous 40-pin Raspberry Pi GPIO), using which you can connect different sensors, IO Devices, etc.	In Arduino terminology, these pins are called Digital IO (to connect LEDs and Buttons) and Analog IN (to connect analog devices)
Raspberry Pi has the hardware for Bluetooth and Wi-Fi onboard	There is no wireless connectivity in the case of Arduino (at least onboard)
While Raspberry Pi is based on a microprocessor.	Arduino is based on a microcontroller.
While Raspberry Pi has a lower I/O current drive strength.	It has a higher I/O current drive strength.
The main programming languages for developing applications in Raspberry Pi are Python, Scratch, Ruby, C, C++	Arduino can be programmed using C or C++ Programming Languages

2. Differentiate between Raspberry Pi and Beagle Bone Black.

RASPBERRY PI	BEAGLEBONE BLACK
It uses the Model B version.	It uses Rev A5 version.
It uses an ARM11 processor.	It uses an ARM Cortex-A8 processor.
For the functioning of raspberry pi, 512 MB SDRAM is used.	For the functioning of beagle bone black, 512 MB DDR3L is used.
It uses 700 MHz for processing.	It uses 1 GHz for its processing.
It has a dedicated SD Card socket for loading the operating system.	It uses 4GB (micro SD) for loading OS and data storage.

It requires a power supply of 700mA (3.5W).	It requires min power of 210mA (1.05W) for its functioning.
It has 12 GPIO pins.	It has 69 GPIO pins.
It has 8 Digital, 0 Analog pins.	It has 65 Digital, 7 Analog pins.
It has 65 Digital, 7 Analog pins.	It uses Analog output for audio.

3. What is BCM mode in Raspberry Pi?

BCM is abbreviated as Broadcom Mode. The CPU is made by Broadcom. So it is named that way. In BCM mode the GPIO pins are not sequential. BCM mode is used for GPIO indication. Refer to the pin layout of the raspberry pi. There you have unsequential GPIO allocation. That is BCM mode.

4. How Raspberry Pi board is different from BBB in programming?

The Beaglebone Black is open-source hardware that's like Raspberry Pi but more powerful. It's based on the TI Sitara AM335- a SOC application processor with an ARM Cortex A8 processor. It comes with 512 RAM, and unlike the Raspberry Pi, it includes onboard storage in the form of 4GB eMMC Flash.

5. Write a code for Blinking LED using Raspberry Pi.

```
#python code for blinking LED using Raspberry Pi

import RPi.GPIO as GPIO                          # Import Raspberry Pi GPIO library
from time import sleep                           #Import the sleep function from the time module
GPIO.setwarnings(False)                          # Ignore warning for now
GPIO.setmode(GPIO.BOARD)                         # Use physical pin numbering
GPIO.setup(8, GPIO.OUT, initial=GPIO.LOW) #Set pin 8 to be an output pin and set initial value to low (off)

while True:      # Run forever
  GPIO.output(8, GPIO.HIGH)     # Turn on
  sleep(1)                      # Sleep for 1 second
  GPIO.output(8, GPIO.LOW)     # Turn off
   sleep(1)                    # Sleep for 1 second
```