Pi Documentation

Raspberry pi used for this research is Raspberry pi 4. The specifications are as follows:

RAM: 4 GB
Memory: 32 GB
USB ports: 4
HDMI ports: 2

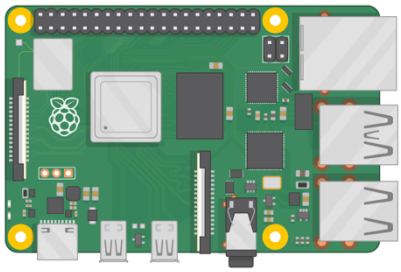

Figure 1 Raspberry pi 4

Initially we have to setup the raspberry pi with operating system and connections to make pi work. Setting up the raspberry pi steps can be found in the below link:
https://projects.raspberrypi.org/en/projects/raspberry-pi-setting-up

Note: To disable speech press caps lock + s

Connecting Raspberry pi to MAPIR Camera using HDMI Trigger cable:

HDMI Trigger Cable used to send a PWM pulse to the MAPIR Survey3 camera to perform various functions.

HDMI Connection - HDMI Micro Connector
Male Servo - White Wire - PWM Pulse Signal
Male Servo - Red Wire - +5V Power Out (Optional)
Male Servo - Black Wire - Ground -

Use:
1000us pulse as a neutral, do not do anything level.
1500us pulse to have the camera enter USB Media Transfer mode.
2000us pulse to trigger the shutter (take a photo).

Figure 2 HDMI Trigger cable

Codes:

Raspberrypi 4 have pre-installed IDEs for developing code. The scripts used for this are written in **python**. We have used **Thonny** IDE for developing code. We have used **crontab** to schedule the tasks that needs to be run daily.

To trigger MAPIR camera from raspberrypi we use PWM signals. For our below code examples we connected the white signal connector to pin 12 (GPIO18) and the black ground connector to pin 14.

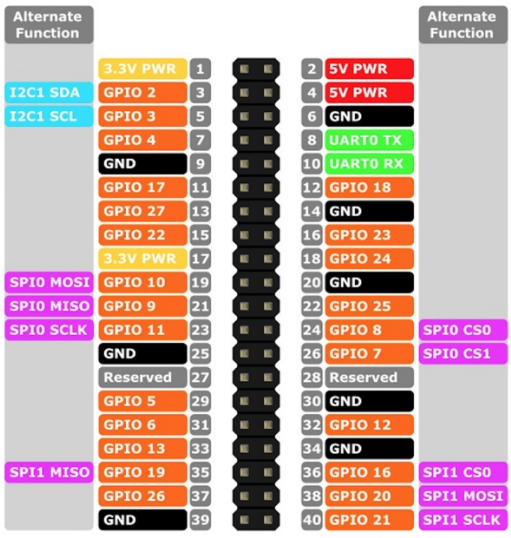

Figure 3 GPIO pins

The code for Triggering a Photo using PWM signals is as follows:

```
import RPi.GPIO as GPIO
import time
GPIO.setwarnings(False)
pin = 18  #set (BCM) GPIO pin to send GPIO.HIGH pulse
GPIO.setmode(GPIO.BCM)
GPIO.setup(pin, GPIO.OUT)
GPIO.output(pin, GPIO.HIGH)
time.sleep(0.002)
GPIO.cleanup()

time.sleep(0.1)
GPIO.setmode(GPIO.BCM)
GPIO.setup(pin, GPIO.OUT)
time.sleep(0.001)
GPIO.cleanup()
```

The code for Mounting SDcard to raspberrypi using pwm signals is as follows:

```
import RPi.GPIO as GPIO
import time
GPIO.setwarnings(False)
pin = 18  #set (BCM) GPIO pin to send GPIO.HIGH pulse
GPIO.setmode(GPIO.BCM)
GPIO.setup(pin, GPIO.OUT)
GPIO.output(pin, GPIO.HIGH)
time.sleep(0.0015)
GPIO.cleanup()
time.sleep(0.1)
GPIO.setmode(GPIO.BCM)
GPIO.setup(pin, GPIO.OUT)
time.sleep(0.001)
GPIO.cleanup()
```

Syncing images to google drive:
https://jarrodstech.net/project-raspberrypi-google-drive-sync/

Creating a cron job:
https://bc-robotics.com/tutorials/setting-cron-job-raspberry-pi/

About Raspberrypi pins:
https://pinout.xyz/pinout/pin37_gpio26