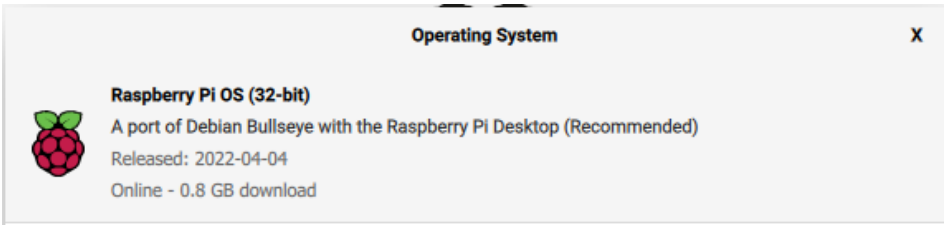
User Guide for the Autonomous Bomber project

Below is a step-by-step guide on how to run the project on a Raspberry Pi 4.

Required Equipment:

- Monitor
- HDMI to microHDMI cable
- Raspberry Pi power supply
- Mouse
- Keyboard
- MicroSD Card

1) Install the Raspberry Pi Imager (link) onto your computer and flash your MicroSD with the latest Raspberry Pi OS



2) Install MicroSD Card into the Raspberry Pi 4
3) Power up the Raspberry Pi 4 using the power supply. Attach microHDMI, keyboard, and mouse to Raspberry Pi 4.
4) Set up the Raspberry Pi. Use this link for assistance.
5) Connect the Raspberry Pi 4 to wifi.
6) Open the command line interface on the Pi and type “ifconfig”. Note the IP address for future use.
7) Install all dependencies using pip. Pip and Python will already be installed on the Pi with the latest Raspberry Pi OS.
    - socket (version 1.0.0)
    - pickle-mixin (version 1.0.2)
    - os (standard library)
    - keyboard (version 0.13.5)
    - time (standard library)
    - jsonlib (version 1.6.1)
    - scipy (version 1.8.0)
    - matplotlib (version 3.5.1)
    - dronekit (version 2.9.2)
    - pymavlink (version 2.4.29)
    - python-math (version 0.0.1)
    - psutil (version 5.9.0)

- copy (standard library)
- numpy (version 1.22.3)
- argparse (version 1.4.0)
- gpiozero (version 1.6.2)
- EXAMPLE: pip install scipy=1.8.0
- You don't need to pip install the standard libraries as they come with the Python installation

8) Install OpenCV from source using this link.
9) Install MavProxy onto the Pi using this link.
10) Git clone the repository into the home directory. Link to repository.
11) Shut down the Pi and mount to the payload.
12) Connect the camera using USB to the Pi
13) Connect the autopilot and Pi using a USB cable.
14) Power the Pi from the batteries.
15) Wait for a minute and attempt to SSH into the Pi.
16) Change directories to ECE592-Autonomous-Bomber/final-deliverables/TeamA22/src/rpi
17) Run python pi.py with all required command line arguments.
    - –connect udp:127.0.0.1:10000
    - –gcs_ip [GCS IP]
    - –gcs_port [GCS PORT]
    - –rpi_ip [RPI IP]
    - –rpi_port [RPI PORT]

Running the custom GCS on a Windows machine.

1) Open the command line interface on the computer and type "ipconfig". Note the IP address for future use.
2) Install all dependencies using pip. Python (3.8.5) and Pip must be installed on the machine before this step.
    - socket (version 1.0.0)
    - keyboard (version 0.13.5)
    - matplotlib (version 3.5.1)
    - jsonlib (version 1.6.1)
    - numpy (version 1.22.3)
    - pickle-mixin (version 1.0.2)
    - sys (standard library)
    - EXAMPLE: pip install matplotlib=3.5.1
    - You don't need to pip install the standard libraries as they come with the Python installation
3) Git clone the repository. Link to repository.
4) Change directories to ECE592-Autonomous-Bomber/final-deliverables/TeamA22/src/gcs

5) Run change the following lines of code to match the GCS IP address and Pi IP address

```
# Set RPI ip address and port
rpi_ip = "172.20.15.100"
rpi_port = 5555
# IP Address is the device running the SERVER
ip = "172.20.7.164"
port = 4444
```

6) Run python GCS-with-GSD.py