VIT®

Vellore Institute of Technology

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Programme	:	**B.TECH**	Semester	:	**WIN-22-23**
Course	:	**Drone Applications, Components and Assembly**	Code	:	**CSE2040**
Faculty	:	**Dr Muthu Manikandad**	Slot	:	**L43+L44**

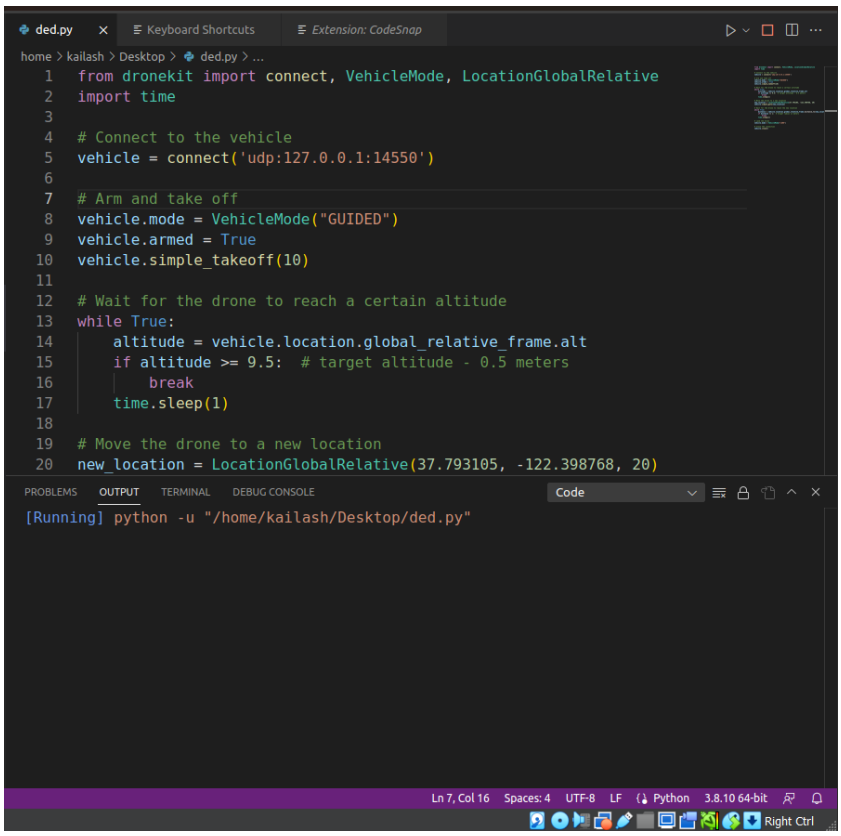
NAME: GEORGE MATHEW **REG_NO:** 20BRS1176

Ex. No. 5

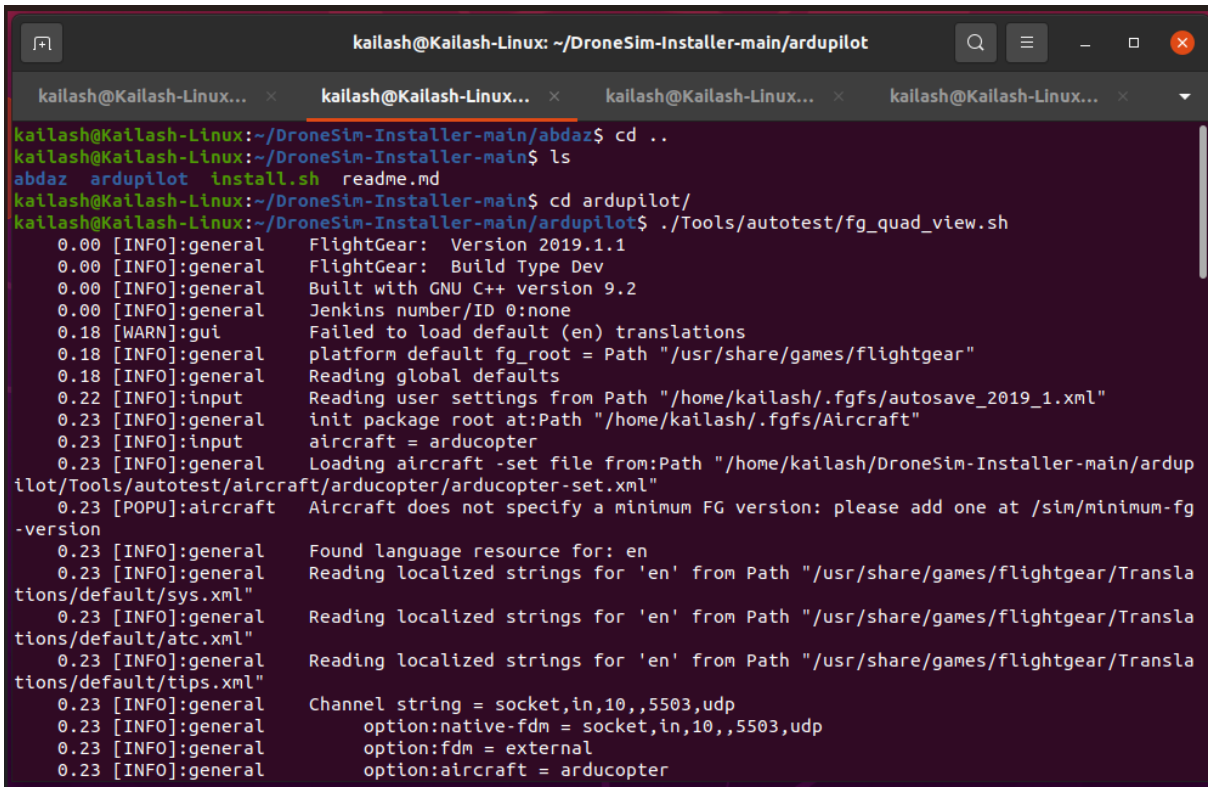
Date: 04.04.2023

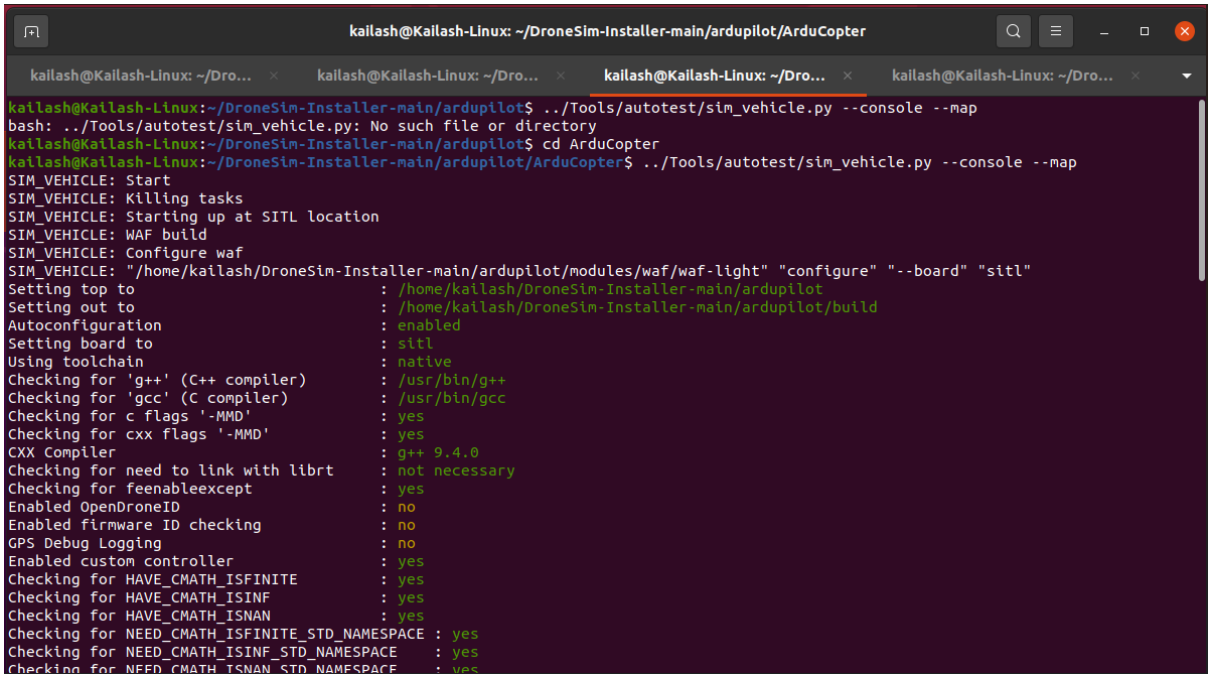
LAB-5:

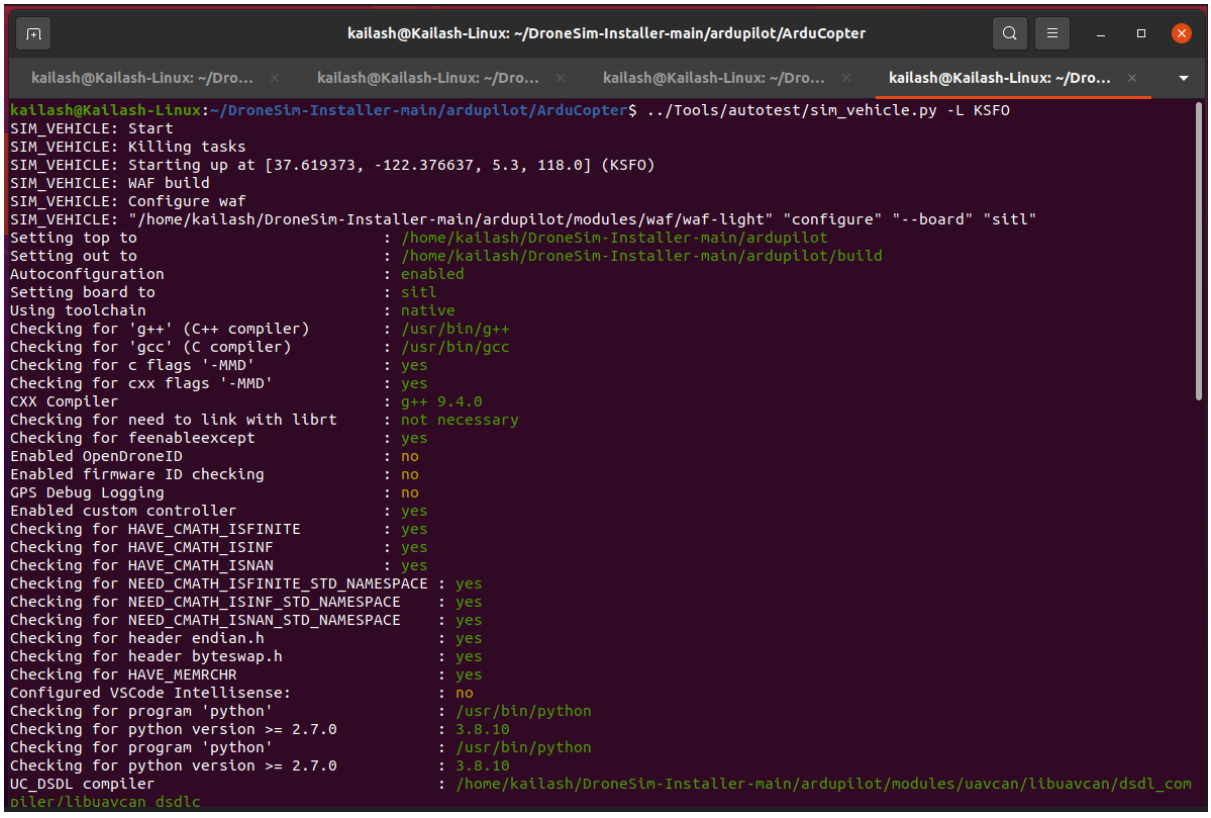
Question 1. Program to take off the drone and land in a new location:

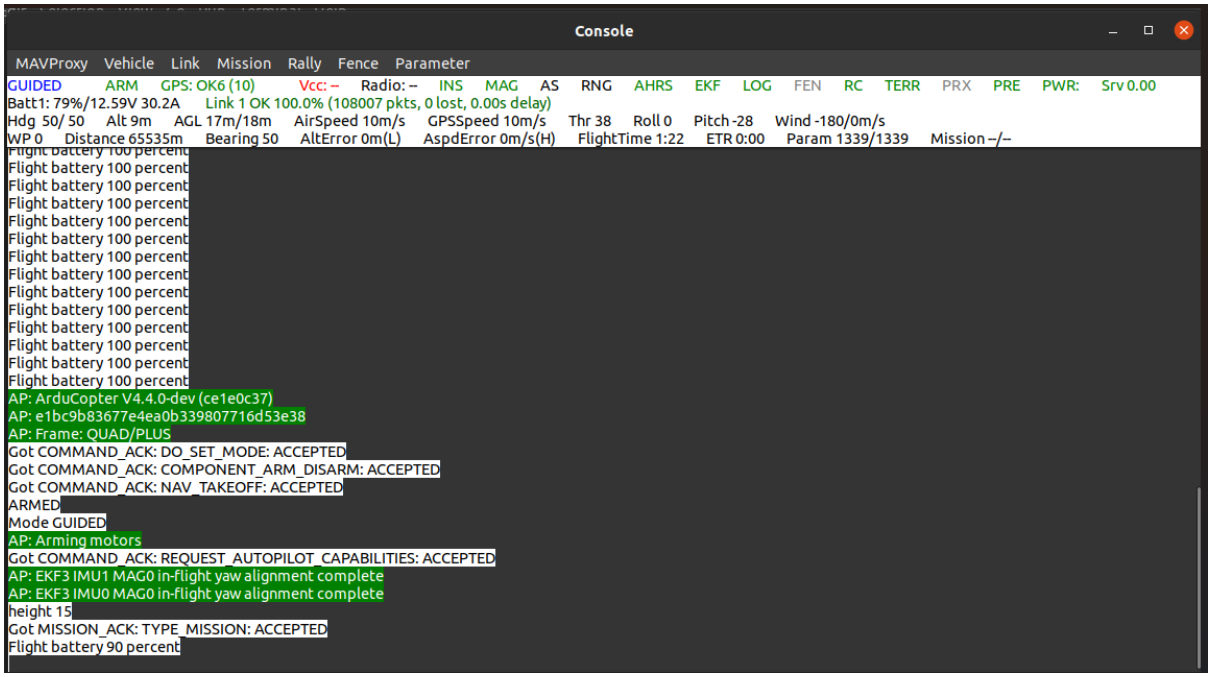


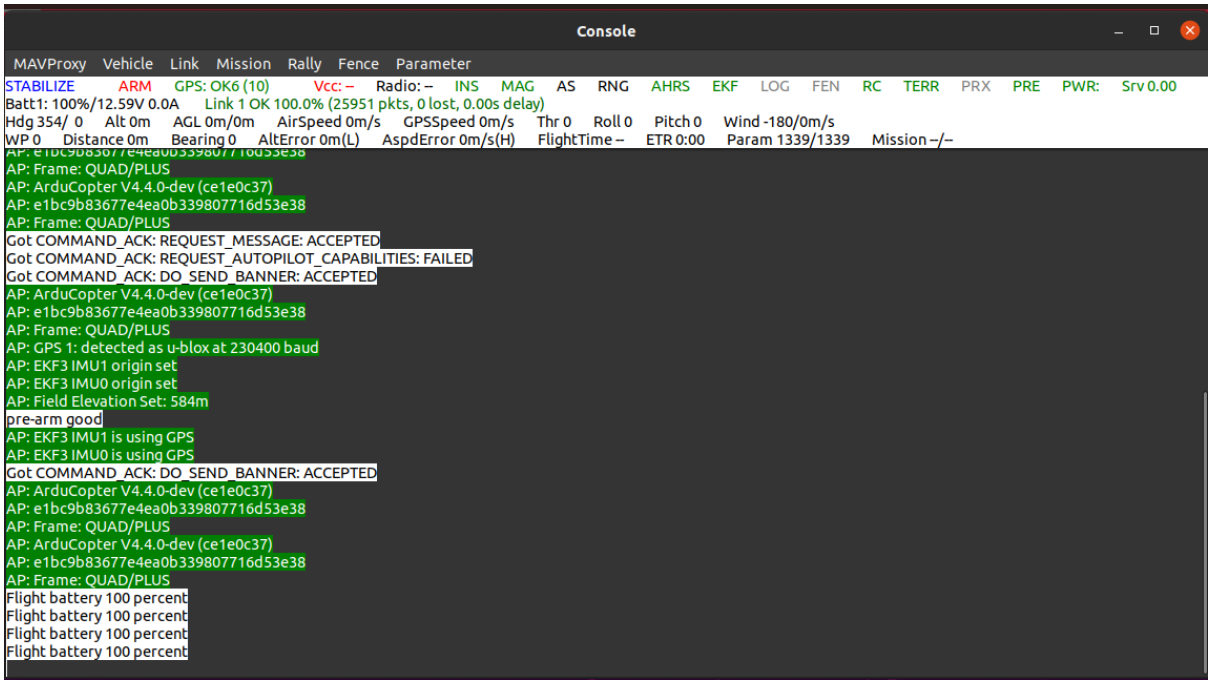
```
kailash@Kailash-Linux:~/DroneSim-Installer-main/abdaz$ mono MissionPlanner.exe
If your error is about Microsoft.DirectX.DirectInput, please install the latest
directx redist from here http://www.microsoft.com/en-us/download/details.aspx?id
=35


Debug under mono    MONO_LOG_LEVEL=debug mono MissionPlanner.exe
To fix any filename case issues under mono use    export MONO_IOMAP=drive:case
for pinvoke      MONO_LOG_LEVEL=debug MONO_LOG_MASK=dll mono MissionPlanner.exe
watch -n 1 ls -l /proc/$(pidof mono)/fd
watch -n 1 lsof -p $(pidof mono)
Data Dir /home/kailash/.local/share/Mission Planner/
Log Dir /home/kailash/.local/share/Mission Planner/logs
Running Dir /home/kailash/DroneSim-Installer-main/abdaz/
User Data Dir /home/kailash/.local/share/Mission Planner/
PlacesRecentDocuments Dir
PlacesDesktop Dir /home/kailash/Desktop
PlacesPersonal Dir /home/kailash
PlacesMyComputer Dir
Gtk-Message: 10:38:30.053: Failed to load module "canberra-gtk-module"
INFO MissionPlanner.Program - ****************** Logging Configured ***********
```

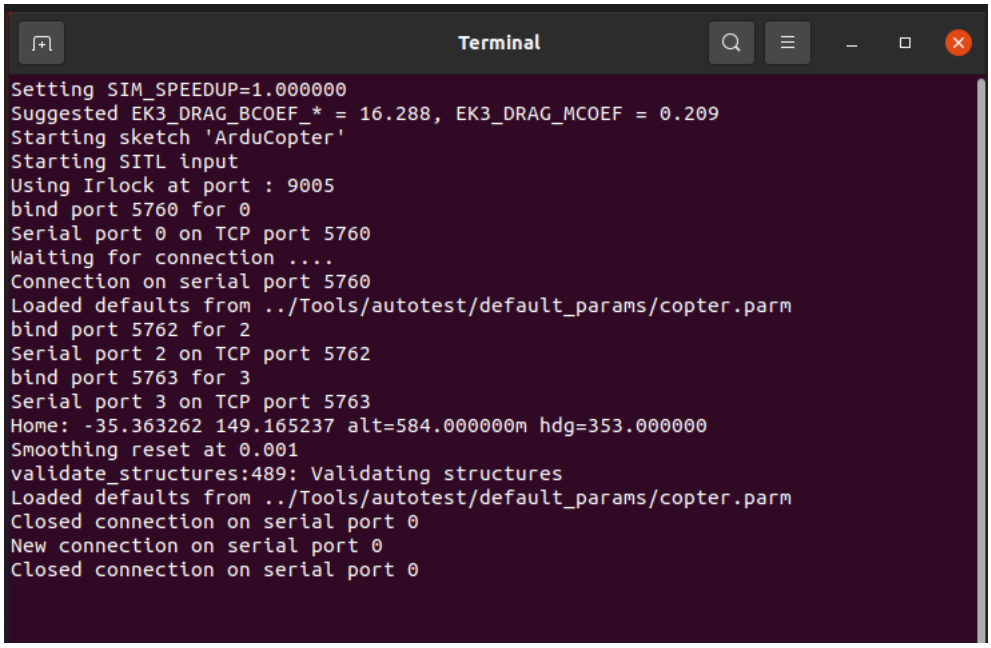



kailash@Kailash-Linux: ~/DroneSim-Installer-main/ardupilot/ArduCopter
kailash@Kailash-Linux: ~/Dro...
kailash@Kailash-Linux: ~/Dro...
kailash@Kailash-Linux: ~/Dro...
kailash@Kailash-Linux: ~/Dro...
kailash@Kailash-Linux:~/DroneSim-Installer-main/ardupilot$ ../Tools/autotest/sim_vehicle.py --console --map
bash: ../Tools/autotest/sim_vehicle.py: No such file or directory
kailash@Kailash-Linux:~/DroneSim-Installer-main/ardupilot$ cd ArduCopter
kailash@Kailash-Linux:~/DroneSim-Installer-main/ardupilot/ArduCopter$ ../Tools/autotest/sim_vehicle.py --console --map
SIM_VEHICLE: Start
SIM_VEHICLE: Killing tasks
SIM_VEHICLE: Starting up at SITL location
SIM_VEHICLE: WAF build
SIM_VEHICLE: Configure waf
SIM_VEHICLE: "/home/kailash/DroneSim-Installer-main/ardupilot/modules/waf/waf-light" "configure" "--board" "sitl"
Setting top to : /home/kailash/DroneSim-Installer-main/ardupilot
Setting out to : /home/kailash/DroneSim-Installer-main/ardupilot/build
Autoconfiguration : enabled
Setting board to : sitl
Using toolchain : native
Checking for 'g++' (C++ compiler) : /usr/bin/g++
Checking for 'gcc' (C compiler) : /usr/bin/gcc
Checking for c flags '-MMD' : yes
Checking for cxx flags '-MMD' : yes
CXX Compiler : g++ 9.4.0
Checking for need to link with librt : not necessary
Checking for feenableexcept : yes
Enabled OpenDroneID : no
Enabled firmware ID checking : no
GPS Debug Logging : no
Enabled custom controller : yes
Checking for HAVE_CMATH_ISFINITE : yes
Checking for HAVE_CMATH_ISINF : yes
Checking for HAVE_CMATH_ISNAN : yes
Checking for NEED_CMATH_ISFINITE_STD_NAMESPACE : yes
Checking for NEED_CMATH_ISINF_STD_NAMESPACE : yes


kailash@Kailash-Linux: ~/DroneSim-Installer-main/ardupilot/ArduCopter
kailash@Kailash-Linux: ~/Dro...
kailash@Kailash-Linux: ~/Dro...
kailash@Kailash-Linux: ~/Dro...
kailash@Kailash-Linux: ~/Dro...
kailash@Kailash-Linux:~/DroneSim-Installer-main/ardupilot/ArduCopter$ ../Tools/autotest/sim_vehicle.py -L KSFO
SIM_VEHICLE: Start
SIM_VEHICLE: Killing tasks
SIM_VEHICLE: Starting up at [37.619373, -122.376637, 5.3, 118.0] (KSFO)
SIM_VEHICLE: WAF build
SIM_VEHICLE: Configure waf
SIM_VEHICLE: "/home/kailash/DroneSim-Installer-main/ardupilot/modules/waf/waf-light" "configure" "--board" "sitl"
Setting top to : /home/kailash/DroneSim-Installer-main/ardupilot
Setting out to : /home/kailash/DroneSim-Installer-main/ardupilot/build
Autoconfiguration : enabled
Setting board to : sitl
Using toolchain : native
Checking for 'g++' (C++ compiler) : /usr/bin/g++
Checking for 'gcc' (C compiler) : /usr/bin/gcc
Checking for c flags '-MMD' : yes
Checking for cxx flags '-MMD' : yes
CXX Compiler : g++ 9.4.0
Checking for need to link with librt : not necessary
Checking for feenableexcept : yes
Enabled OpenDroneID : no
Enabled firmware ID checking : no
GPS Debug Logging : no
Enabled custom controller : yes
Checking for HAVE_CMATH_ISFINITE : yes
Checking for HAVE_CMATH_ISINF : yes
Checking for HAVE_CMATH_ISNAN : yes
Checking for NEED_CMATH_ISFINITE_STD_NAMESPACE : yes
Checking for NEED_CMATH_ISINF_STD_NAMESPACE : yes
Checking for NEED_CMATH_ISNAN_STD_NAMESPACE : yes
Checking for header endian.h : yes
Checking for header byteswap.h : yes
Checking for HAVE_MEMRCHR : yes
Configured VSCode Intellisense: : no
Checking for program 'python' : /usr/bin/python
Checking for python version >= 2.7.0 : 3.8.10
Checking for program 'python' : /usr/bin/python
Checking for python version >= 2.7.0 : 3.8.10
UC_DSDL compiler : /home/kailash/DroneSim-Installer-main/ardupilot/modules/uavcan/libuavcan/dsdl_compiler/libuavcan_dsdlc

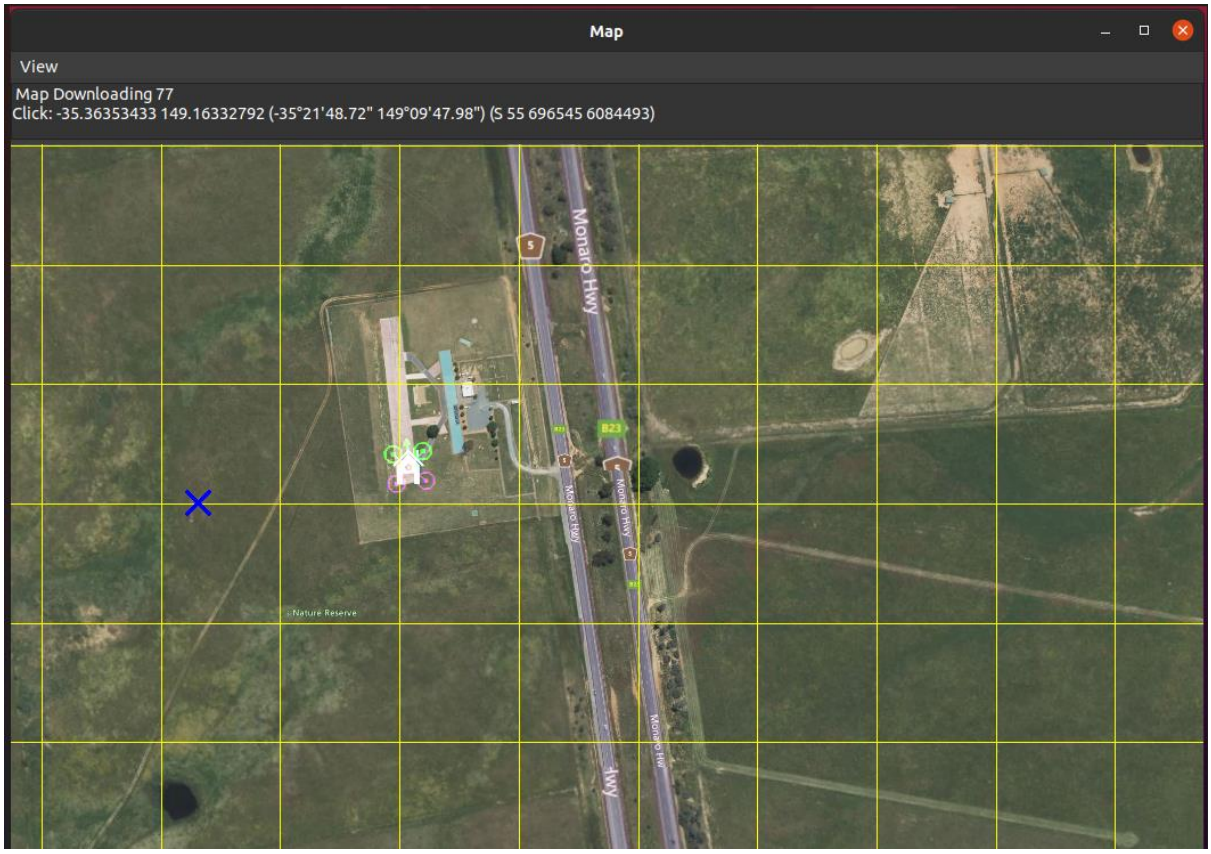

Console
MAVProxy Vehicle Link Mission Rally Fence Parameter
GUIDED ARM GPS: OK6 (10) Vcc: -- Radio: -- INS MAG AS RNG AHRS EKF LOG FEN RC TERR PRX PRE PWR: Srv 0.00
Batt1: 79%/12.59V 30.2A Link 1 OK 100.0% (108007 pkts, 0 lost, 0.00s delay)
Hdg 50/ 50 Alt 9m AGL 17m/18m AirSpeed 10m/s GPSSpeed 10m/s Thr 38 Roll 0 Pitch -28 Wind -180/0m/s
WP 0 Distance 65535m Bearing 50 AltError 0m(L) AspdError 0m/s(H) FlightTime 1:22 ETR 0:00 Param 1339/1339 Mission --/--
Flight battery 100 percent
Flight battery 100 percent
Flight battery 100 percent
Flight battery 100 percent
Flight battery 100 percent
Flight battery 100 percent
Flight battery 100 percent
Flight battery 100 percent
Flight battery 100 percent
Flight battery 100 percent
Flight battery 100 percent
Flight battery 100 percent
Flight battery 100 percent
AP: ArduCopter V4.4.0-dev (ce1e0c37)
AP: e1bc9b83677e4ea0b339807716d53e38
AP: Frame: QUAD/PLUS
Got COMMAND_ACK: DO_SET_MODE: ACCEPTED
Got COMMAND_ACK: COMPONENT_ARM_DISARM: ACCEPTED
Got COMMAND_ACK: NAV_TAKEOFF: ACCEPTED
ARMED
Mode GUIDED
AP: Arming motors
Got COMMAND_ACK: REQUEST_AUTOPILOT_CAPABILITIES: ACCEPTED
AP: EKF3 IMU1 MAG0 in-flight yaw alignment complete
AP: EKF3 IMU0 MAG0 in-flight yaw alignment complete
height 15
Got MISSION_ACK: TYPE_MISSION: ACCEPTED
Flight battery 90 percent

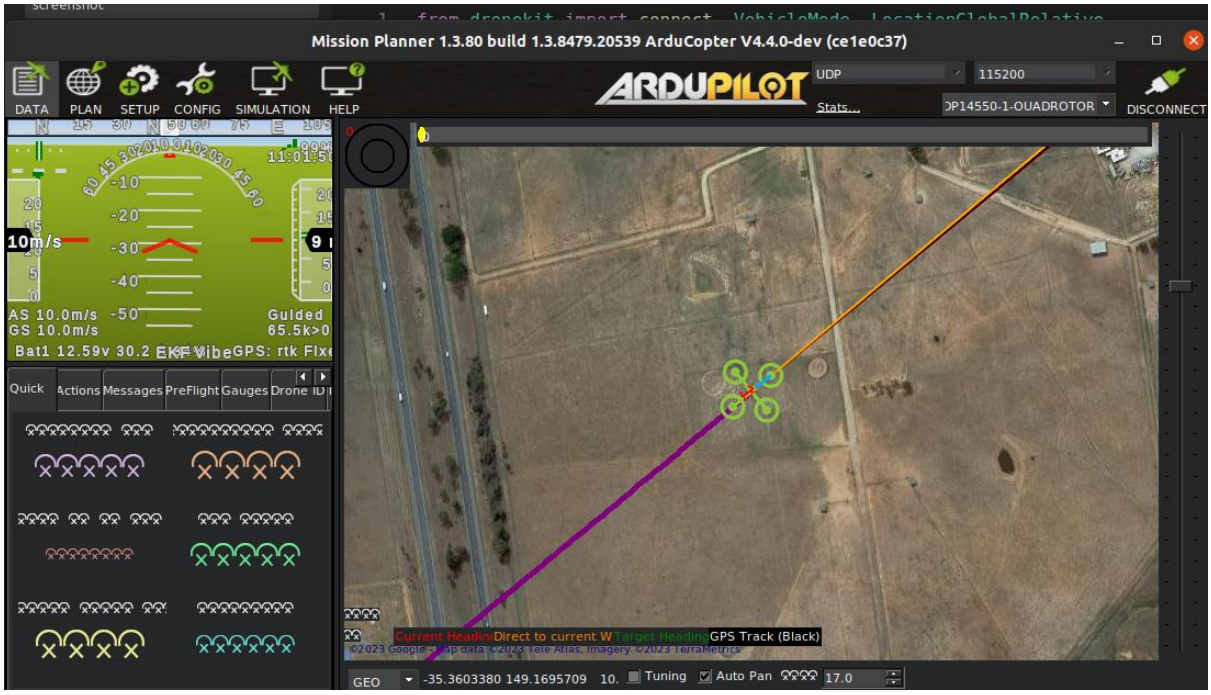

Console
MAVProxy Vehicle Link Mission Rally Fence Parameter
STABILIZE ARM GPS: OK6 (10) Vcc: -- Radio: -- INS MAG AS RNG AHRS EKF LOG FEN RC TERR PRX PRE PWR: Srv 0.00
Batt1: 100%/12.59V 0.0A Link 1 OK 100.0% (25951 pkts, 0 lost, 0.00s delay)
Hdg 354/ 0 Alt 0m AGL 0m/0m AirSpeed 0m/s GPSSpeed 0m/s Thr 0 Roll 0 Pitch 0 Wind -180/0m/s
WP 0 Distance 0m Bearing 0 AltError 0m(L) AspdError 0m/s(H) FlightTime -- ETR 0:00 Param 1339/1339 Mission --/--
AP: e1bc9b83677e4ea0b339807716d53e38
AP: Frame: QUAD/PLUS
AP: ArduCopter V4.4.0-dev (ce1e0c37)
AP: e1bc9b83677e4ea0b339807716d53e38
AP: Frame: QUAD/PLUS
Got COMMAND_ACK: REQUEST_MESSAGE: ACCEPTED
Got COMMAND_ACK: REQUEST_AUTOPILOT_CAPABILITIES: FAILED
Got COMMAND_ACK: DO_SEND_BANNER: ACCEPTED
AP: ArduCopter V4.4.0-dev (ce1e0c37)
AP: e1bc9b83677e4ea0b339807716d53e38
AP: Frame: QUAD/PLUS
AP: GPS 1: detected as u-blox at 230400 baud
AP: EKF3 IMU1 origin set
AP: EKF3 IMU0 origin set
AP: Field Elevation Set: 584m
pre-arm good
AP: EKF3 IMU1 is using GPS
AP: EKF3 IMU0 is using GPS
Got COMMAND_ACK: DO_SEND_BANNER: ACCEPTED
AP: ArduCopter V4.4.0-dev (ce1e0c37)
AP: e1bc9b83677e4ea0b339807716d53e38
AP: Frame: QUAD/PLUS
AP: ArduCopter V4.4.0-dev (ce1e0c37)
AP: e1bc9b83677e4ea0b339807716d53e38
AP: Frame: QUAD/PLUS
Flight battery 100 percent
Flight battery 100 percent
Flight battery 100 percent
Flight battery 100 percent

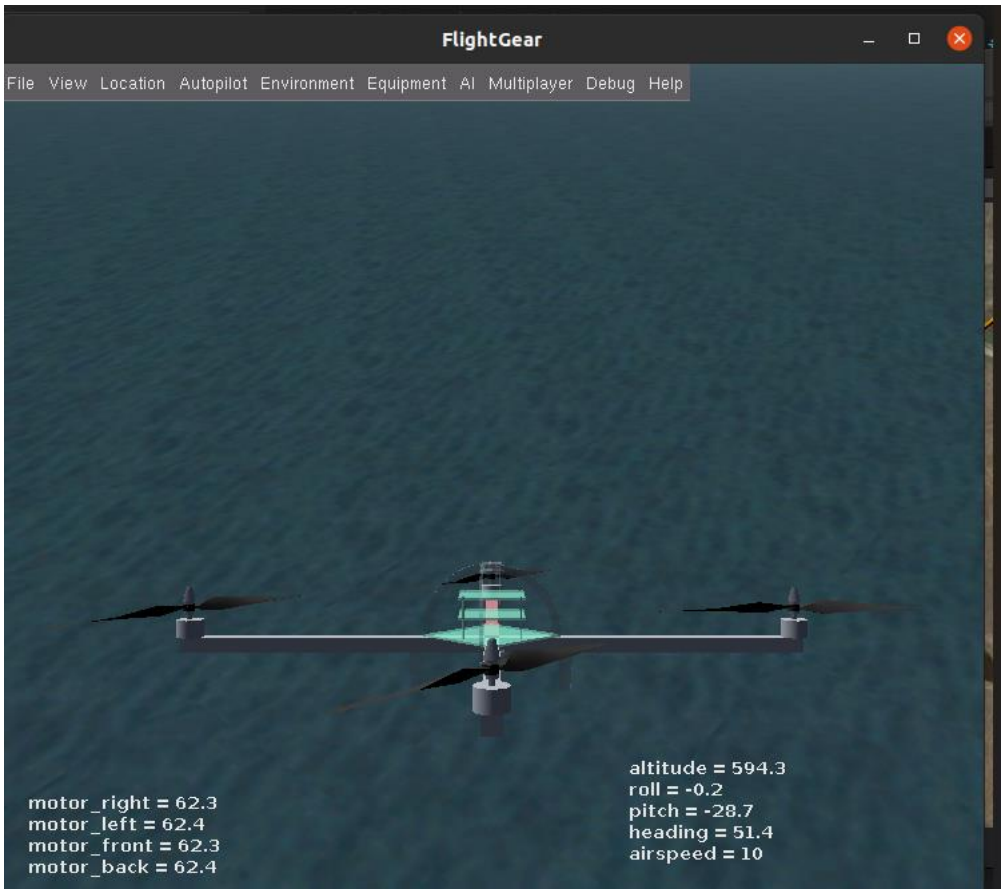

Terminal
Setting SIM_SPEEDUP=1.000000
Suggested EK3_DRAG_BCOEF_* = 16.288, EK3_DRAG_MCOEF = 0.209
Starting sketch 'ArduCopter'
Starting SITL input
Using Irlock at port : 9005
bind port 5760 for 0
Serial port 0 on TCP port 5760
Waiting for connection ....
Connection on serial port 5760
Loaded defaults from ../Tools/autotest/default_params/copter.parm
bind port 5762 for 2
Serial port 2 on TCP port 5762
bind port 5763 for 3
Serial port 3 on TCP port 5763
Home: -35.363262 149.165237 alt=584.000000m hdg=353.000000
Smoothing reset at 0.001
validate_structures:489: Validating structures
Loaded defaults from ../Tools/autotest/default_params/copter.parm
Closed connection on serial port 0
New connection on serial port 0
Closed connection on serial port 0

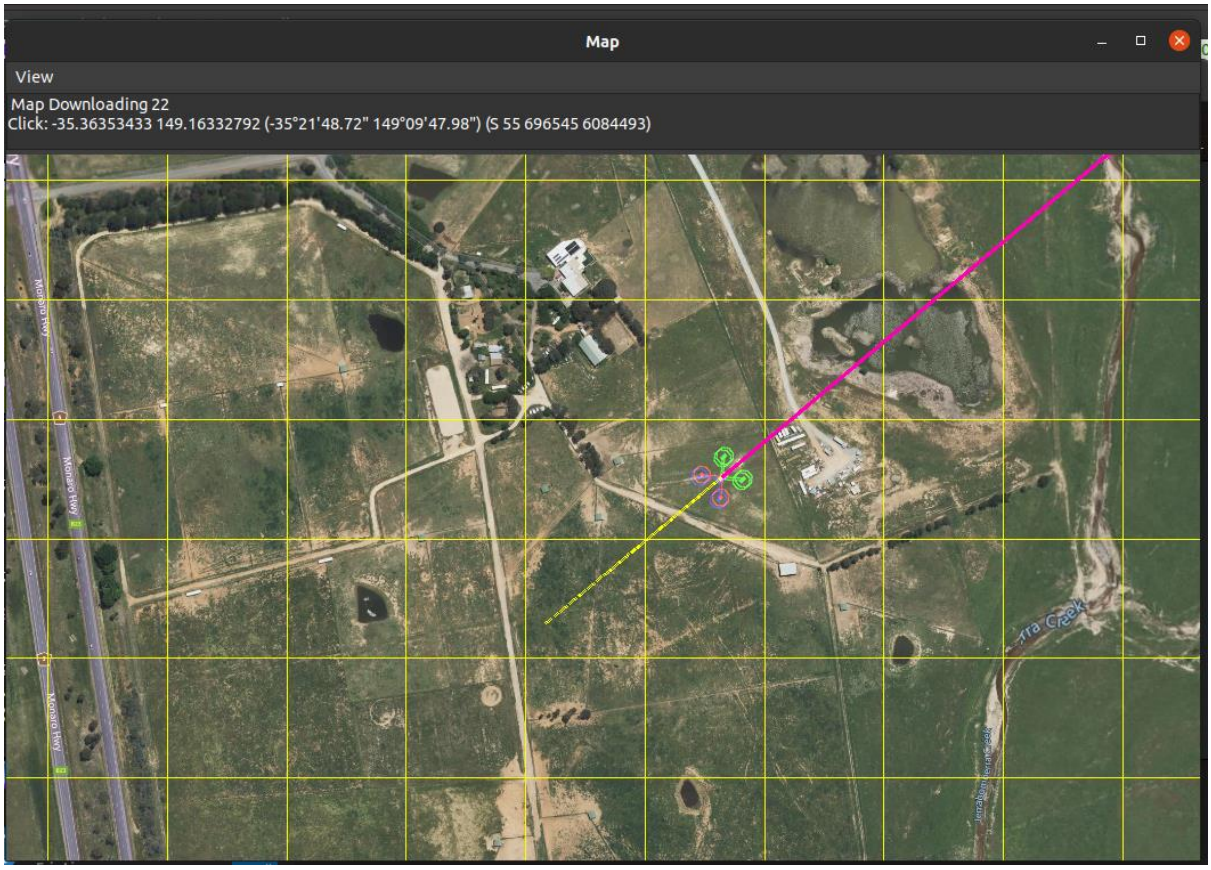

Mission Planner 1.3.80 build 1.3.8479.20539 ArduCopter V4.4.0-dev (ce1e0c37)
DATA
PLAN
SETUP
CONFIG
SIMULATION
HELP
ARDUPILOT
UDP
115200
Stats...
DISCONNECT
DISARMED
AS 0.0m/s
GS 0.0m/s
Ready to Arm
Bat1 12.59v 0.0
GPS: rtk Fixe
Quick
Actions
Messages
PreFlight
Gauges
Drone
GPS Track (Black)
GEO
-35.3632622 149.1652375
Tuning
Auto Pan
17.0


FlightGear
File View Location Autopilot Environment Equipment AI Multiplayer Debug Help
motor_right = 0
motor_left = 0
motor_front = 0
motor_back = 0
altitude = 584.8
roll = 0
pitch = 0
heading = -7
airspeed = 0

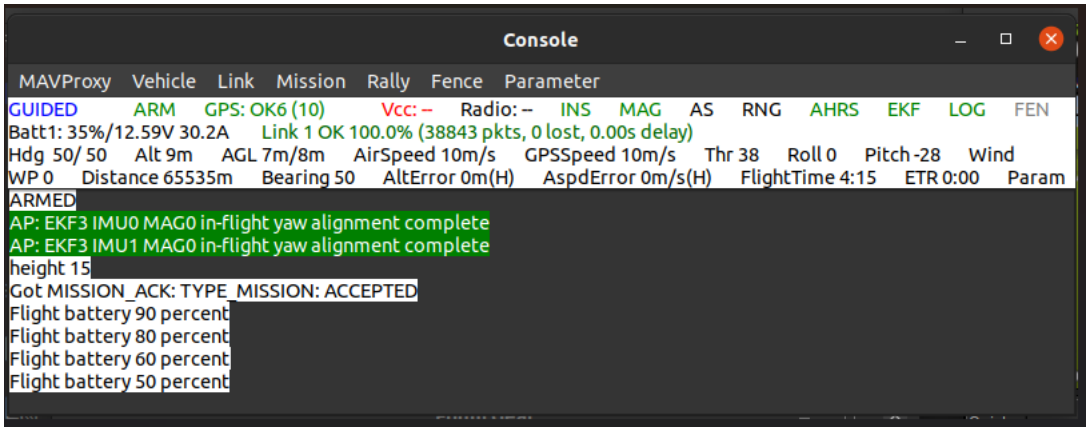

Map
View
Map Downloading 77
Click: -35.36353433 149.16332792 (-35°21'48.72" 149°09'47.98") (S 55 696545 6084493)
Monaro Hwy
B23
Nature Reserve

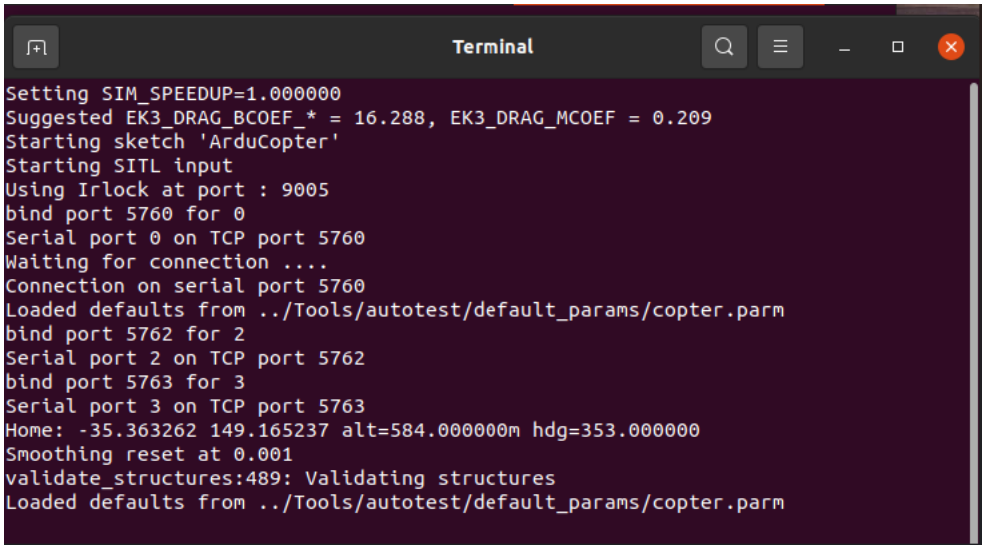

Mission Planner 1.3.80 build 1.3.8479.20539 ArduCopter V4.4.0-dev (ce1e0c37)
DATA
PLAN
SETUP
CONFIG
SIMULATION
HELP
ARDUPILOT
UDP
115200
Stats...
DISCONNECT
10m/s
AS 10.0m/s
GS 10.0m/s
Guided
Bat1 12.59v 30.2
GPS: rtk Fixe
Quick
Actions
Messages
PreFlight
Gauges
Drone
Current Heading
Direct to current W
Target Heading
GPS Track (Black)
GEO
-35.3603380 149.1695709
Tuning
Auto Pan
17.0

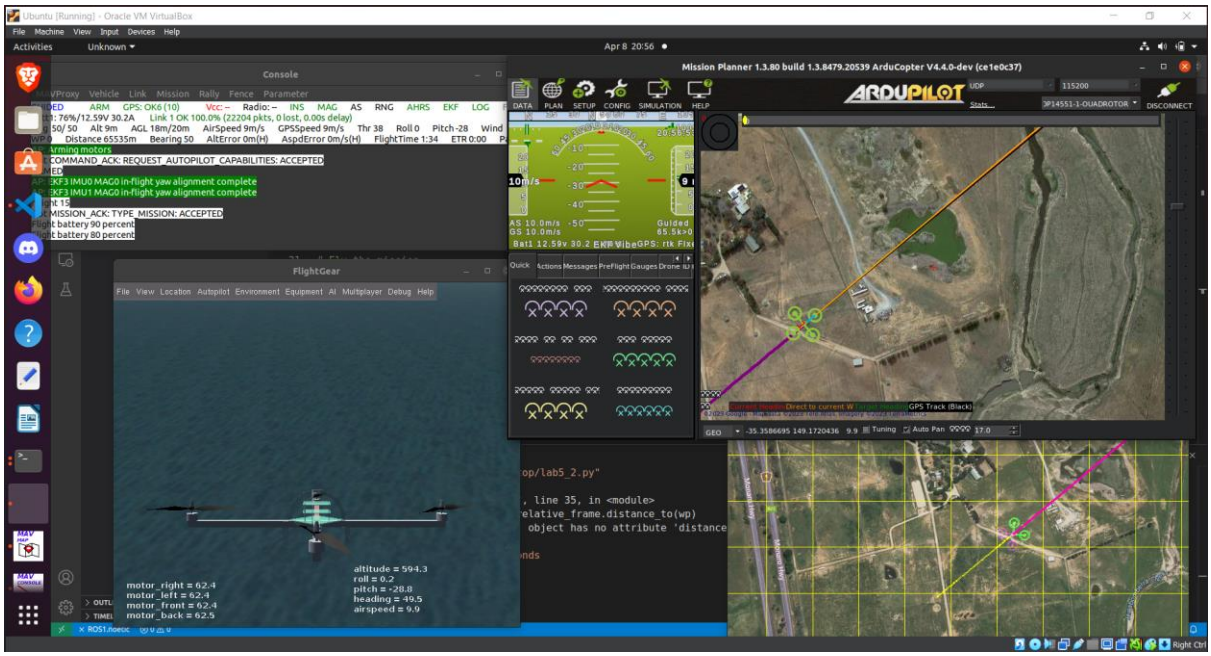

FlightGear
File View Location Autopilot Environment Equipment AI Multiplayer Debug Help
motor_right = 62.3
motor_left = 62.4
motor_front = 62.3
motor_back = 62.4
altitude = 594.3
roll = -0.2
pitch = -28.7
heading = 51.4
airspeed = 10


Map
View
Map Downloading 22
Click: -35.36353433 149.16332792 (-35°21'48.72" 149°09'47.98") (S 55 696545 6084493)
Monaro Hwy
Monaro Hwy
Monaro Hwy
Monaro Hwy
Jerrabomberra Creek

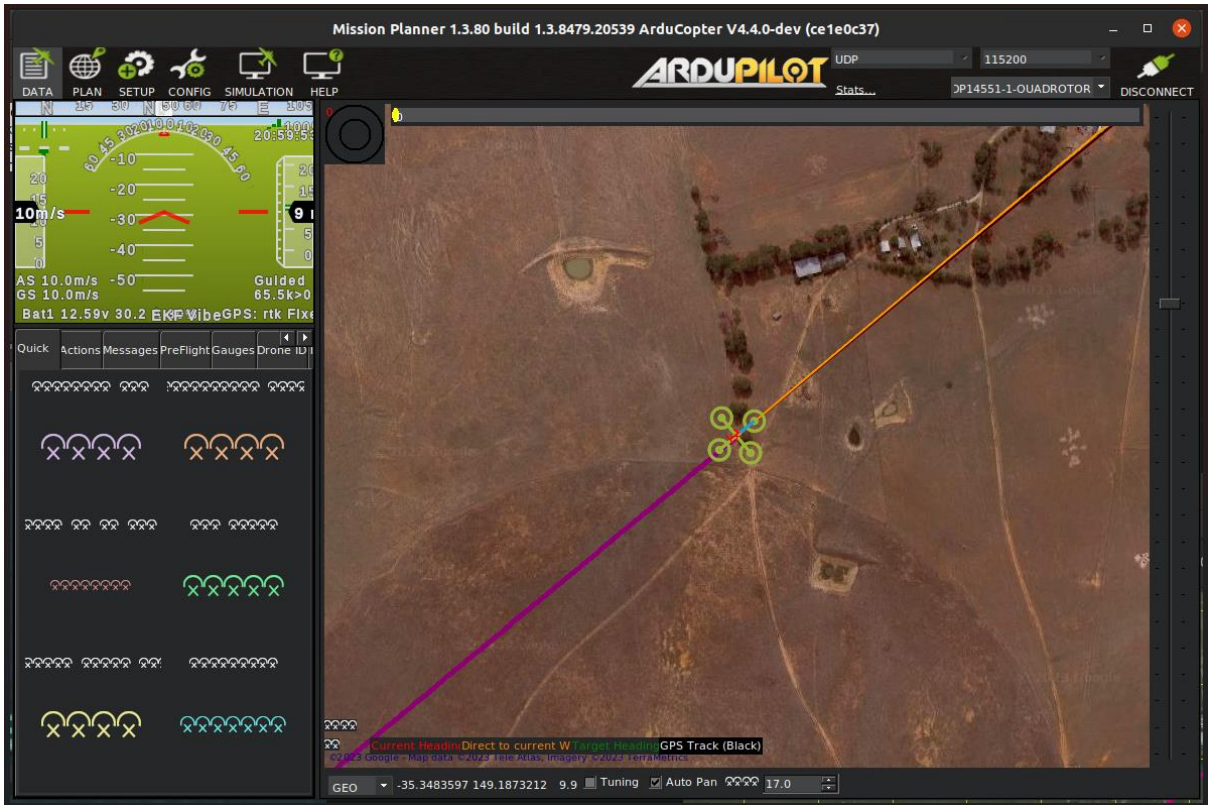
Question 2: Program to simulate a mission using series of waypoints

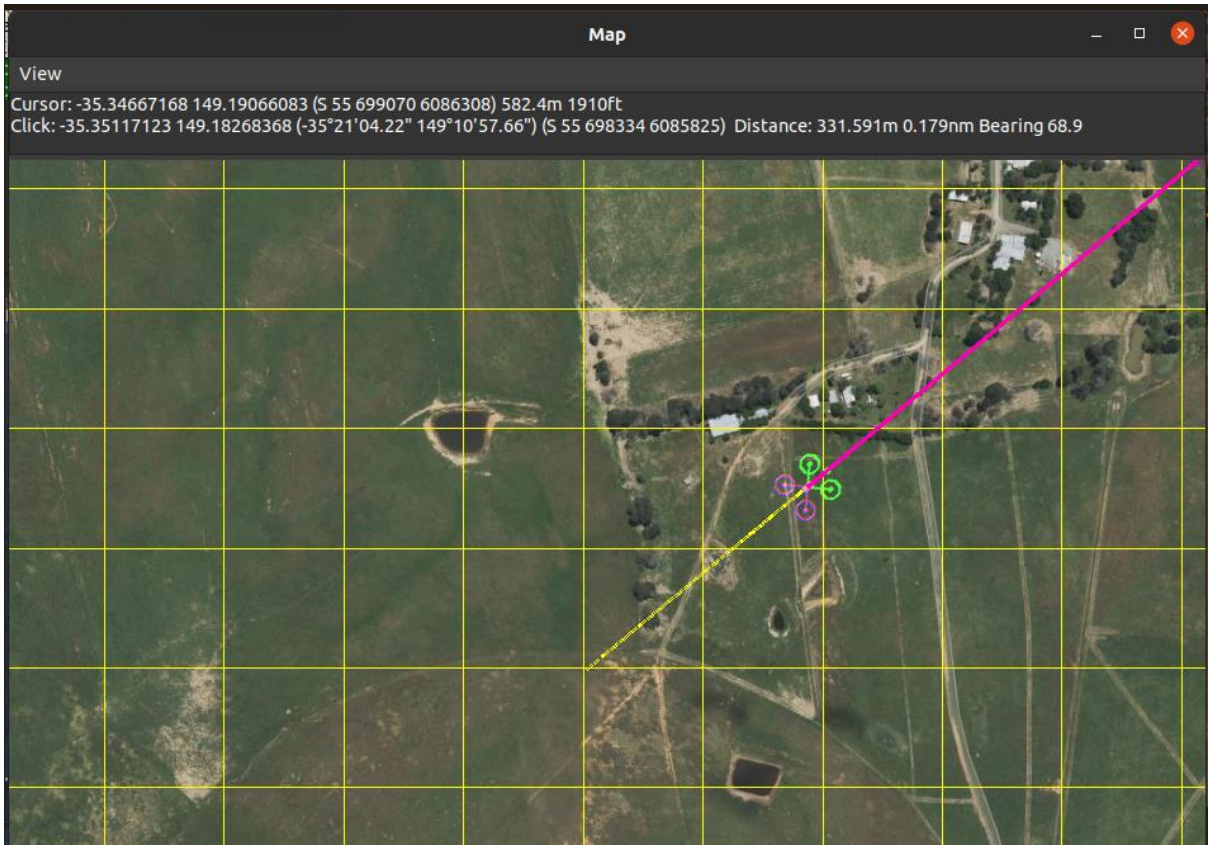




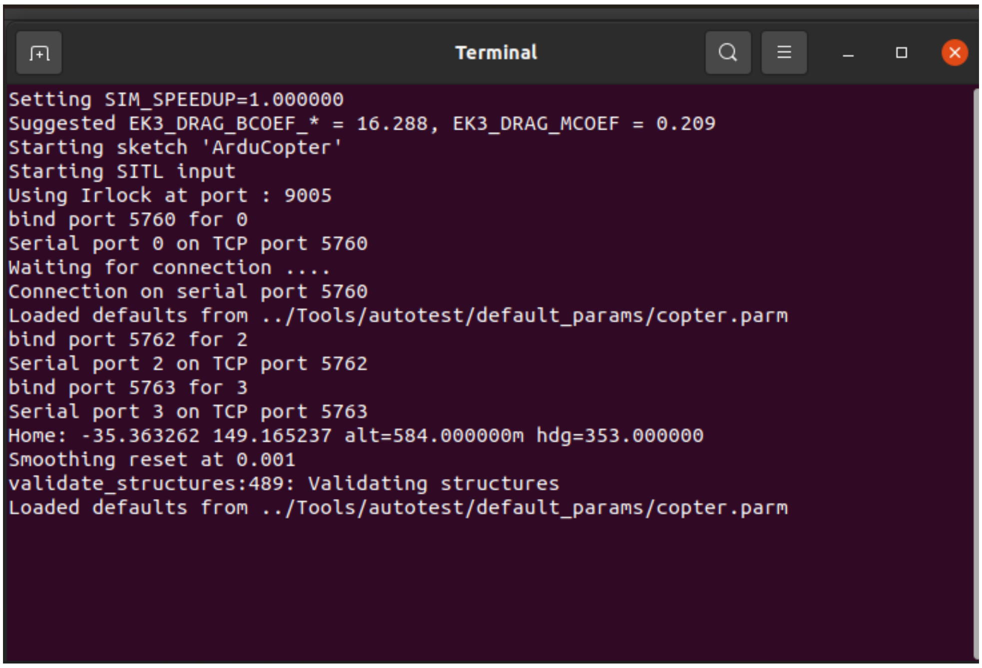


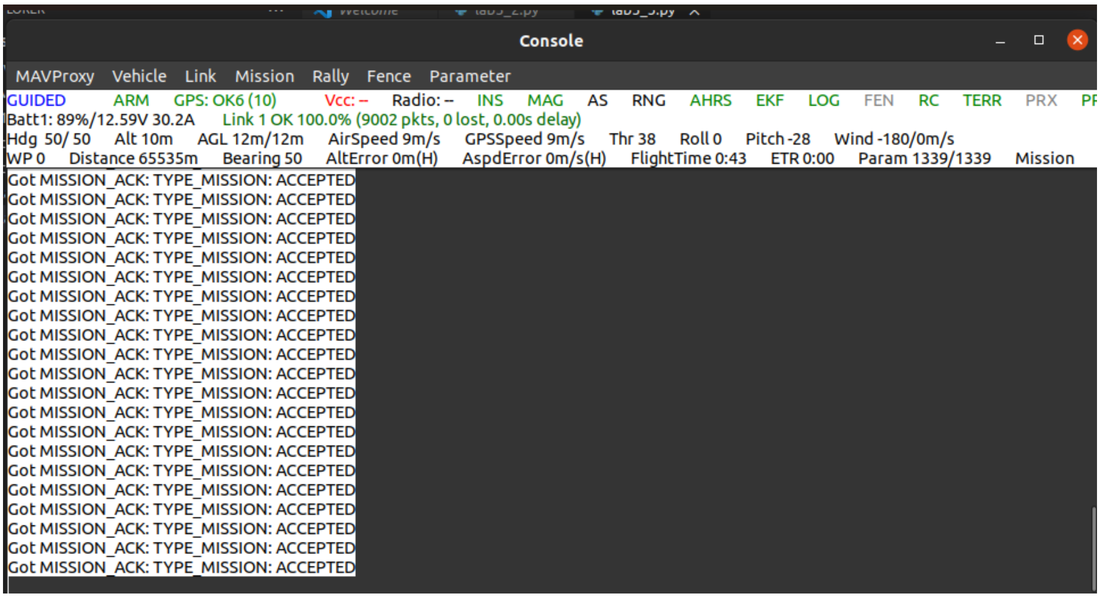

File View Location Autopilot Environment Equipment AI Multiplayer Debug Help
motor_right = 62.4
motor_left = 62.3
motor_front = 62.4
motor_back = 62.4
altitude = 593.8
roll = -0.2
pitch = -28.8
heading = 51.2
airspeed = 9.9


Mission Planner 1.3.80 build 1.3.8479.20539 ArduCopter V4.4.0-dev (ce1e0c37)
DATA
PLAN
SETUP
CONFIG
SIMULATION
HELP
ARDUPILOT
UDP
115200
Stats...
DISCONNECT
10m/s
AS 10.0m/s
GS 10.0m/s
Guided
Bat1 12.59v 30.2
GPS: rtk Fix
Quick
Actions
Messages
PreFlight
Gauges
Drone
GPS Track (Black)
GEO
-35.3483597 149.1873212
9.9
Tuning
Auto Pan
17.0

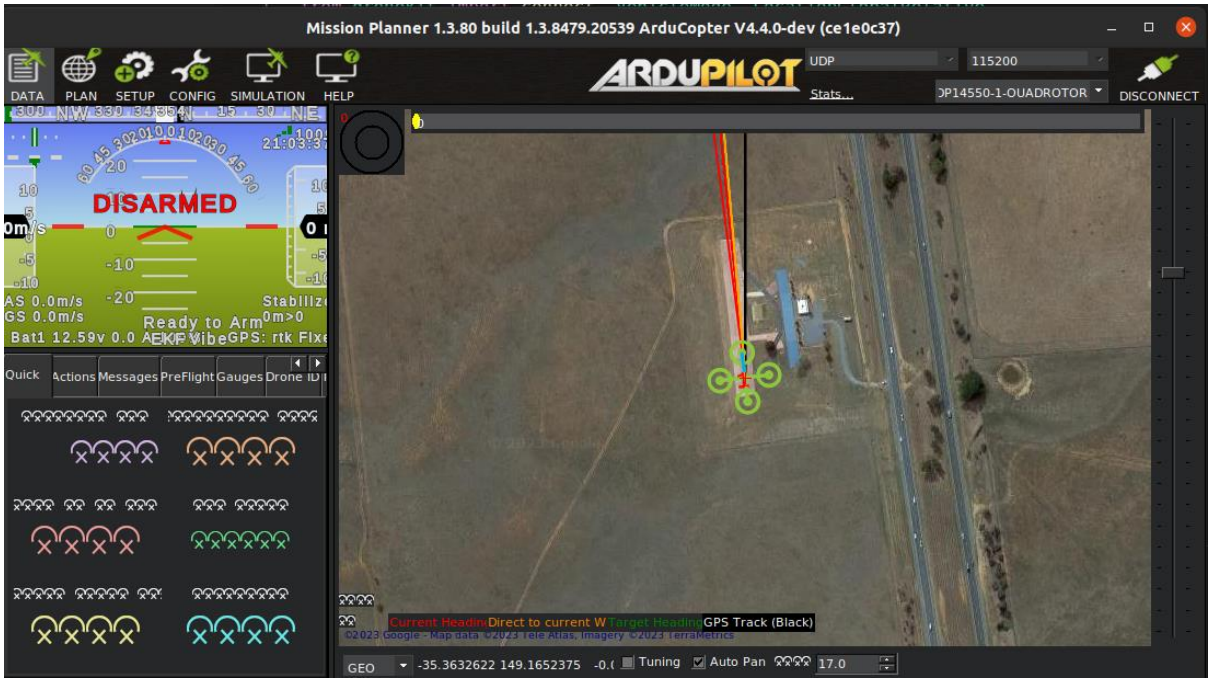

Map
View
Cursor: -35.34667168 149.19066083 (S 55 699070 6086308) 582.4m 1910ft
Click: -35.35117123 149.18268368 (-35°21'04.22" 149°10'57.66") (S 55 698334 6085825) Distance: 331.591m 0.179nm Bearing 68.9

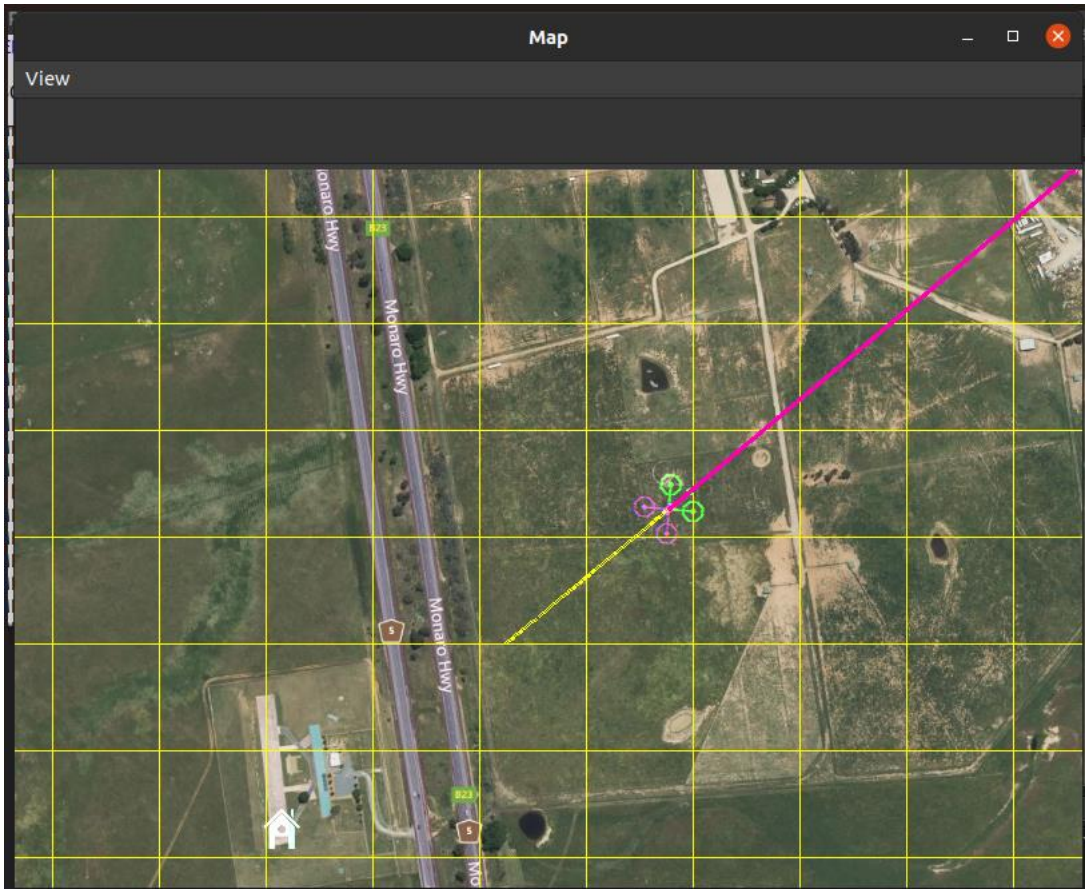
Question 3: Program to test the control algorithm using the PID algorithm






File View Location Autopilot Environment Equipment AI Multiplayer Debug Help
motor_right = 62.4
motor_left = 62.3
motor_front = 62.4
motor_back = 62.4
altitude = 593.8
roll = -0.2
pitch = -28.8
heading = 51.2
airspeed = 9.9


Mission Planner 1.3.80 build 1.3.8479.20539 ArduCopter V4.4.0-dev (ce1e0c37)
DATA
PLAN
SETUP
CONFIG
SIMULATION
HELP
ARDUPILOT
UDP
115200
Stats...
DISCONNECT
DISARMED
Ready to Arm
Quick
Actions
Messages
PreFlight
Gauges
Drone
Current Heading
Direct to current W
Target Heading
GPS Track (Black)
GEO
-35.3632622 149.1652375
Tuning
Auto Pan
17.0


Map
View
Monaro Hwy
Monaro Hwy
Monaro Hwy
B23
5
B23
5