Drone simulation

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Installing Ubuntu,ROS

- Started off with installing Ubuntu 20.04 in our systems as we needed Linux to use ROS.
- We need an operating system to run our model for which we use ROS.
- ROS is basically an open source framework that helps people build and reuse code between robotics applications.
- Installed noetic version of ROS.

Setting up mavros

- MavROS is a ROS package that provides communication driver for various autopilots with MAVLink communication protocol.
- We next installed MavROS in our system.

Setting up PX4 and Autopilot

- An autopilot is required to transmit our command to the system. PX4 is a suitable source for that.
- PX4 is an open source flight control software for drones and other unmanned vehicles. It provides the required set of tools for drone developers to share technologies to create proper solutions for drone applications.
- We used iris model inbuilt drone.

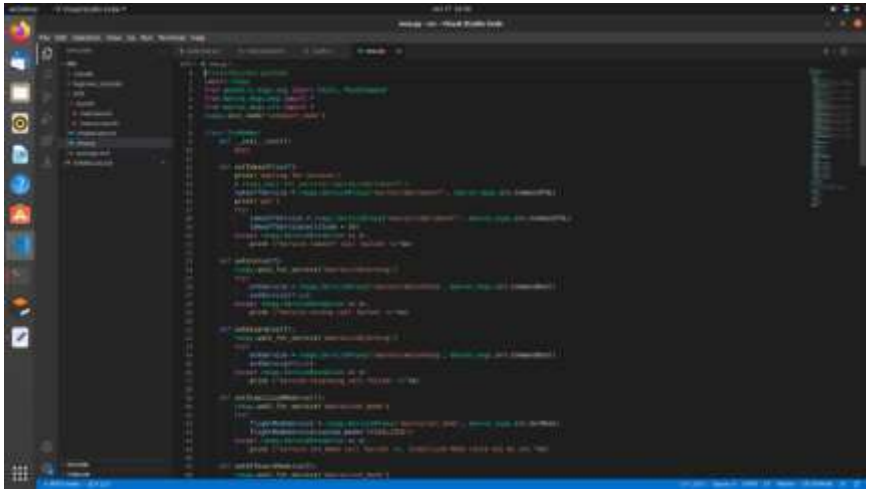
Gazebo

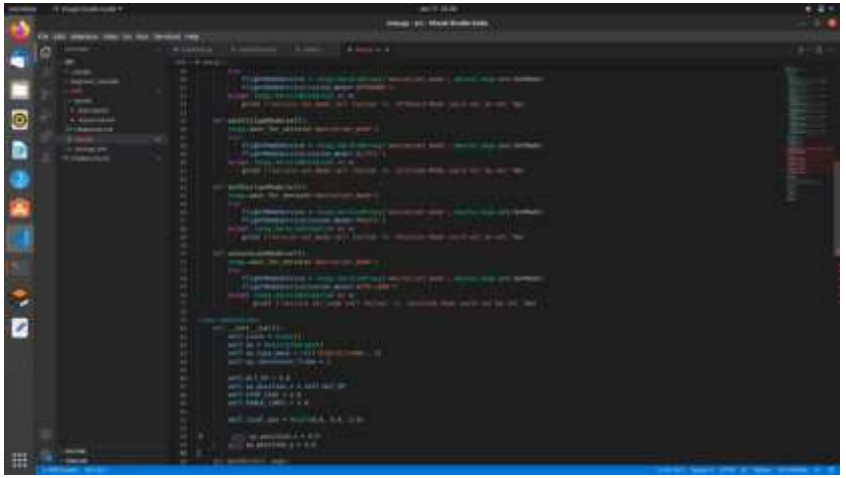
- Installed Gazebo9-3D dynamic simulator.
- It is a high class simulator that allows simulation of real-life environment. It allows us to include practical forces such as gravity and friction.

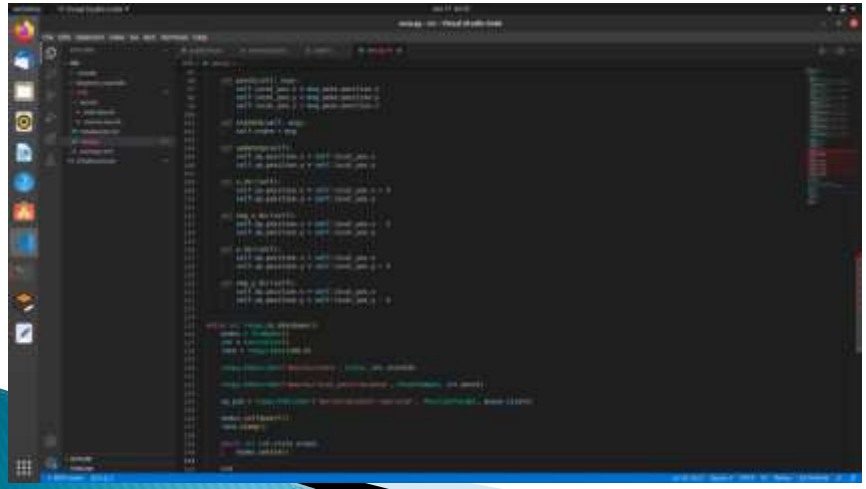
Writing scripts

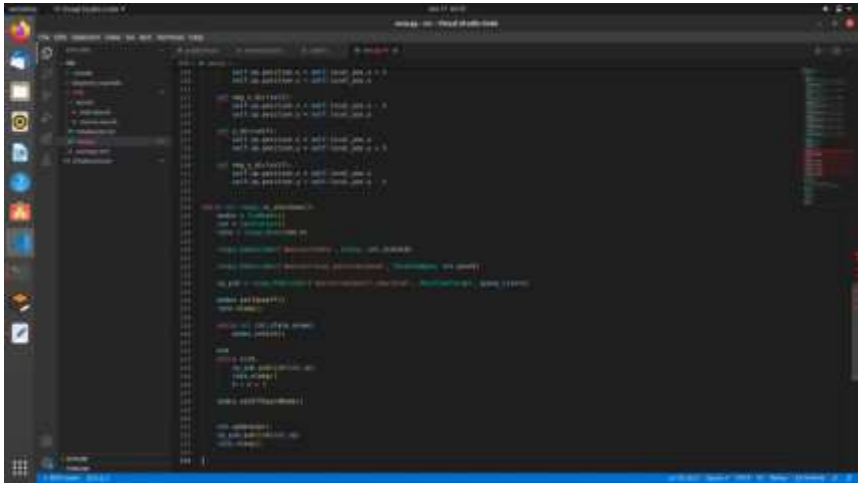
- We needed a script for takeoff of our drone. Also, a launch file was needed for the obvious purpose.
- We created a python script in VS Code for this execution.

Take off script in python

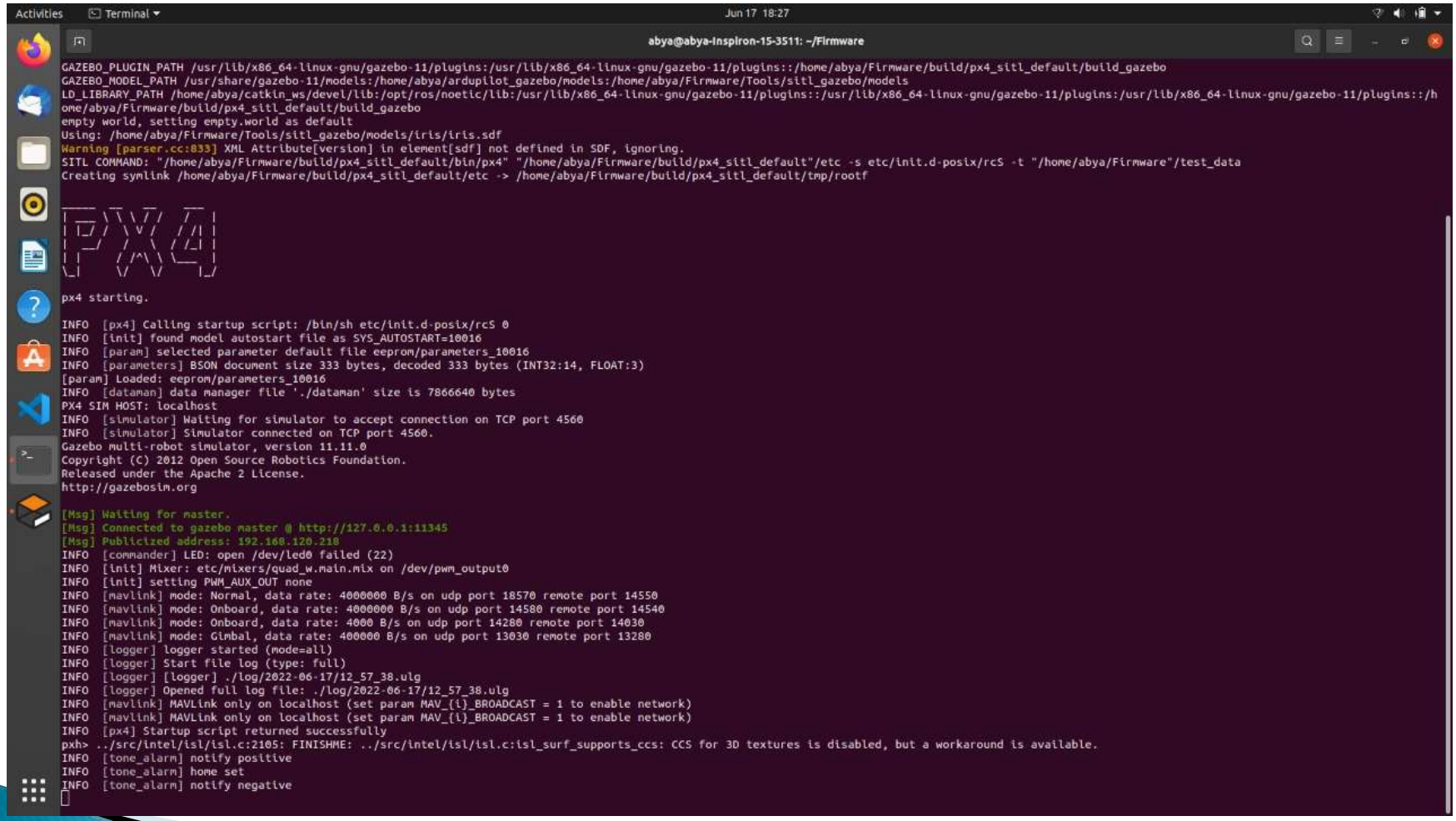




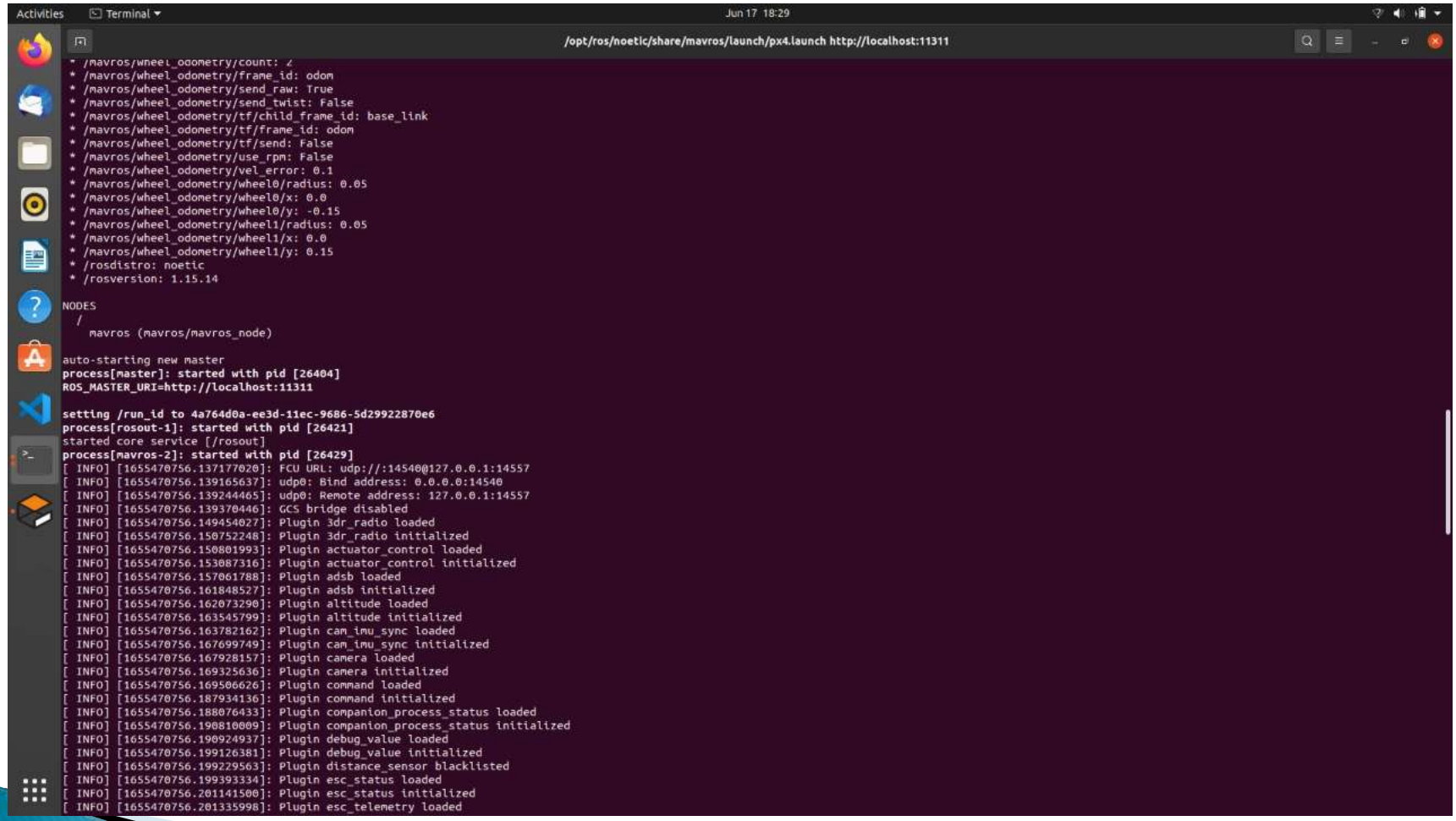




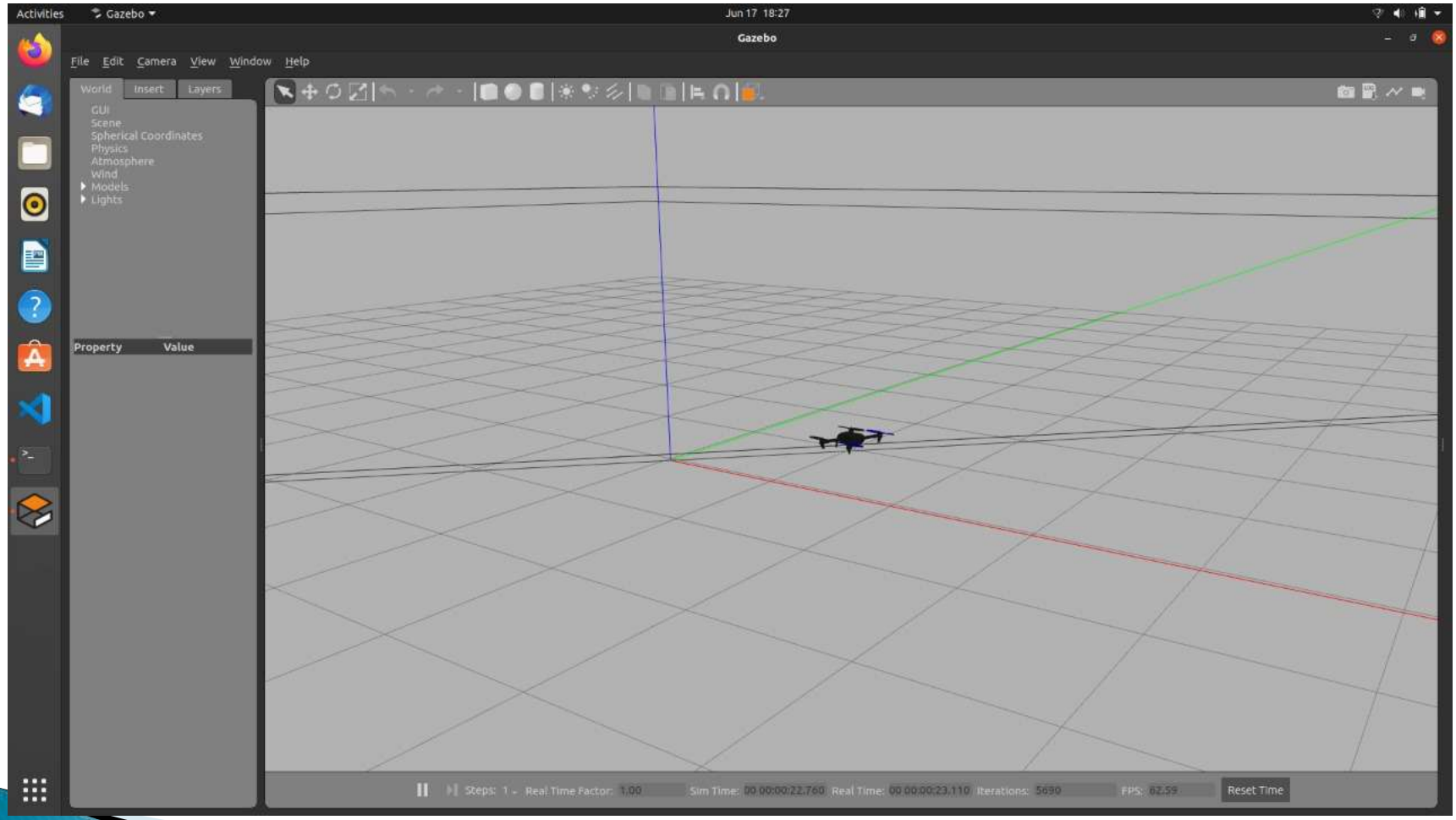
Starting PX4



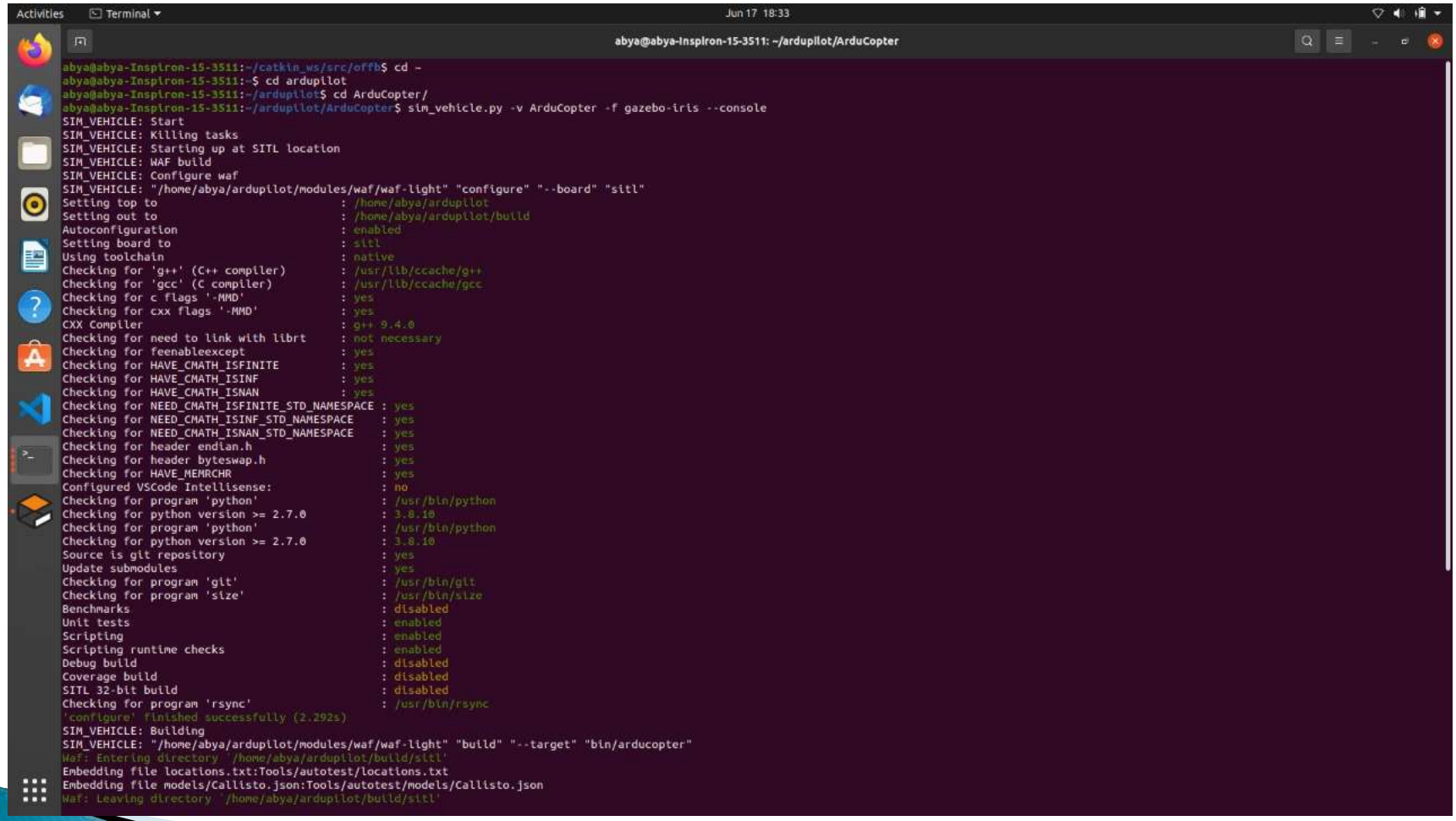
Starting mavros



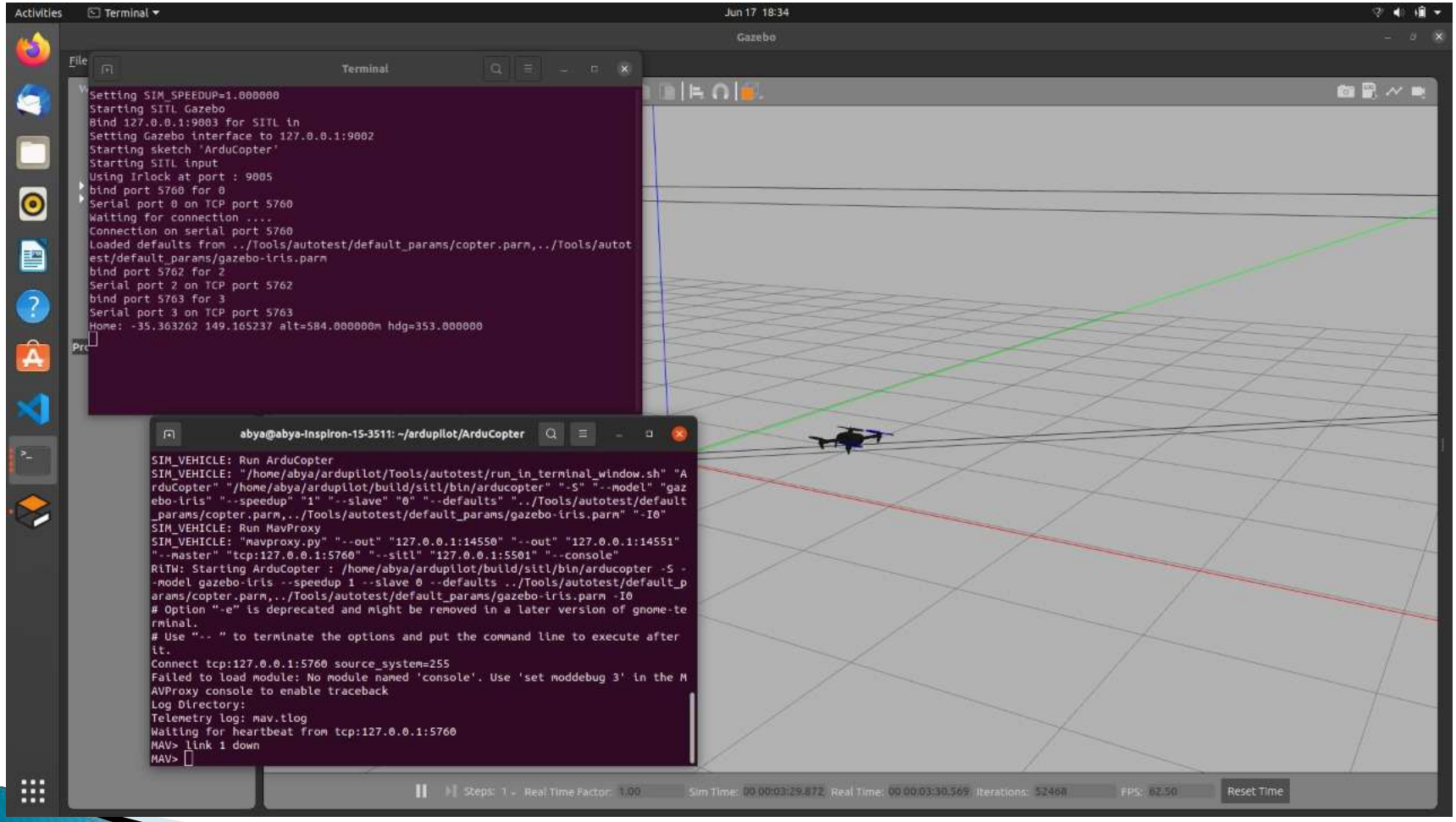
Simulation of drone



Launching sim_vehicle

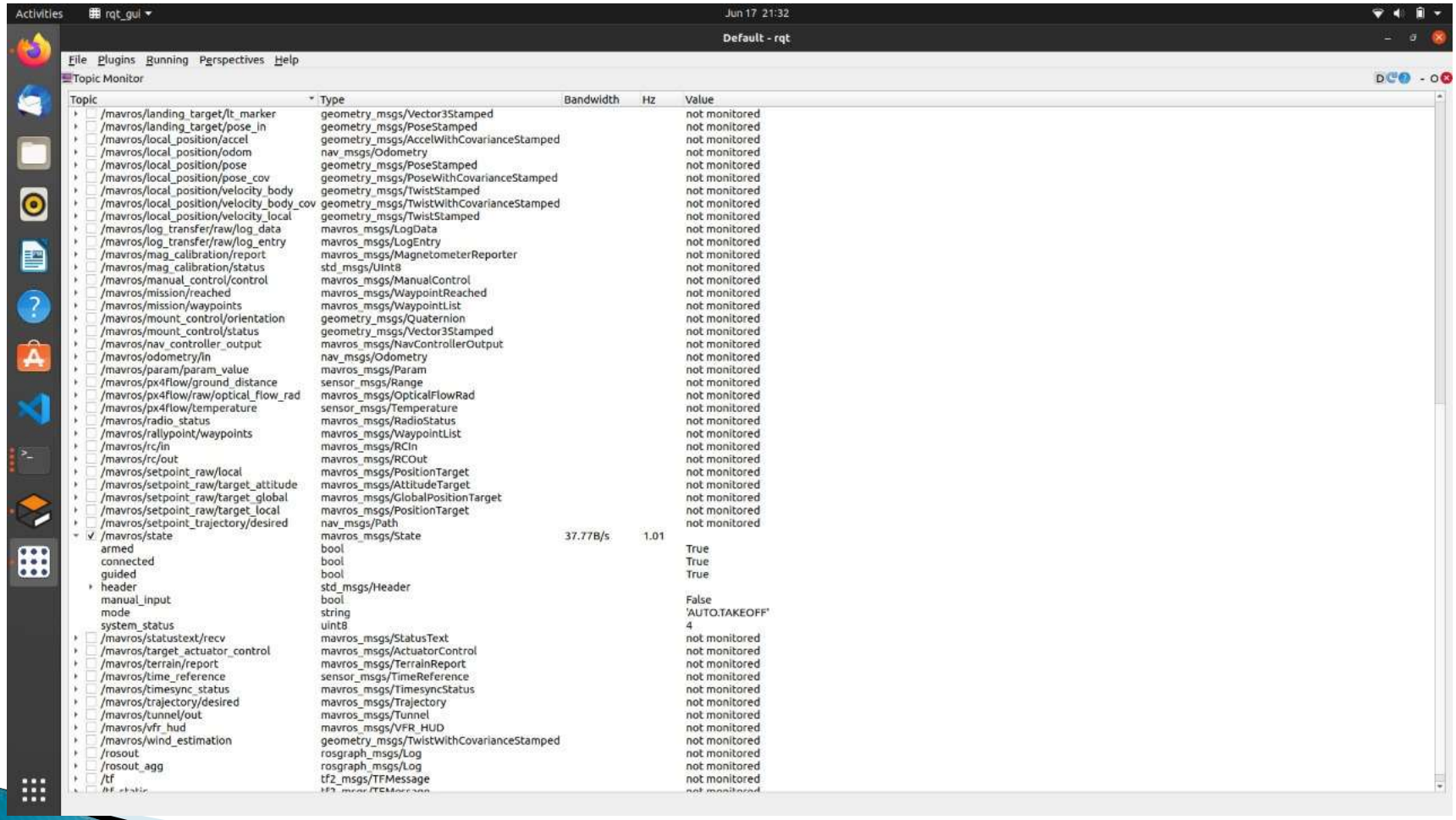


Running launch files and scripts



WhatsApp Video 2022-06-17 at 6.47.07 PM.mp4

All the commands are working in the right manner



Topic	Type	Bandwidth	Hz	Value
/mavros/landing_target/lt_marker	geometry_msgs/Vector3Stamped			not monitored
/mavros/landing_target/pose_in	geometry_msgs/PoseStamped			not monitored
/mavros/local_position/accel	geometry_msgs/AccelWithCovarianceStamped			not monitored
/mavros/local_position/odom	nav_msgs/Odometry			not monitored
/mavros/local_position/pose	geometry_msgs/PoseStamped			not monitored
/mavros/local_position/pose_cov	geometry_msgs/PoseWithCovarianceStamped			not monitored
/mavros/local_position/velocity_body	geometry_msgs/TwistStamped			not monitored
/mavros/local_position/velocity_body_cov	geometry_msgs/TwistWithCovarianceStamped			not monitored
/mavros/local_position/velocity_local	geometry_msgs/TwistStamped			not monitored
/mavros/log_transfer/raw/log_data	mavros_msgs/LogData			not monitored
/mavros/log_transfer/raw/log_entry	mavros_msgs/LogEntry			not monitored
/mavros/mag_calibration/report	mavros_msgs/MagnetometerReporter			not monitored
/mavros/mag_calibration/status	std_msgs/UInt8			not monitored
/mavros/manual_control/control	mavros_msgs/ManualControl			not monitored
/mavros/mission/reached	mavros_msgs/WaypointReached			not monitored
/mavros/mission/waypoints	mavros_msgs/WaypointList			not monitored
/mavros/mount_control/orientation	geometry_msgs/Quaternion			not monitored
/mavros/mount_control/status	geometry_msgs/Vector3Stamped			not monitored
/mavros/nav_controller_output	mavros_msgs/NavControllerOutput			not monitored
/mavros/odometry/in	nav_msgs/Odometry			not monitored
/mavros/param/param_value	mavros_msgs/Param			not monitored
/mavros/px4flow/ground_distance	sensor_msgs/Range			not monitored
/mavros/px4flow/raw/optical_flow_rad	mavros_msgs/OpticalFlowRad			not monitored
/mavros/px4flow/temperature	sensor_msgs/Temperature			not monitored
/mavros/radio_status	mavros_msgs/RadioStatus			not monitored
/mavros/rallypoint/waypoints	mavros_msgs/WaypointList			not monitored
/mavros/rc/in	mavros_msgs/RCIn			not monitored
/mavros/rc/out	mavros_msgs/RCOut			not monitored
/mavros/setpoint_raw/local	mavros_msgs/PositionTarget			not monitored
/mavros/setpoint_raw/target_attitude	mavros_msgs/AttitudeTarget			not monitored
/mavros/setpoint_raw/target_global	mavros_msgs/GlobalPositionTarget			not monitored
/mavros/setpoint_raw/target_local	mavros_msgs/PositionTarget			not monitored
/mavros/setpoint_trajectory/desired	nav_msgs/Path			not monitored
✓ /mavros/state	mavros_msgs/State	37.77B/s	1.01	
armed	bool			True
connected	bool			True
guided	bool			True
header	std_msgs/Header			
manual_input	bool			False
mode	string			'AUTO.TAKEOFF'
system_status	uint8			4
/mavros/statustext/recv	mavros_msgs/StatusText			not monitored
/mavros/target_actuator_control	mavros_msgs/ActuatorControl			not monitored
/mavros/terrain/report	mavros_msgs/TerrainReport			not monitored
/mavros/time_reference	sensor_msgs/TimeReference			not monitored
/mavros/timesync_status	mavros_msgs/TimesyncStatus			not monitored
/mavros/trajectory/desired	mavros_msgs/Trajectory			not monitored
/mavros/tunnel/out	mavros_msgs/Tunnel			not monitored
/mavros/vfr_hud	mavros_msgs/VFR_HUD			not monitored
/mavros/wind_estimation	geometry_msgs/TwistWithCovarianceStamped			not monitored
/rosout	rosgraph_msgs/Log			not monitored
/rosout_agg	rosgraph_msgs/Log			not monitored
/tf	tf2_msgs/TFMessage			not monitored

- In the previous slide, it was visible that the drone is in right environment.
- Drone is being simulated in gazebo using mavros package
- It is armed and ready to take off
- All the necessary commands are working fine

Future improvements

- Guided and machine modes in noetic version of ROS.
- We came to know that our system was working in auto mode which is not compatible with take off command
- In future,we'll be exploring the different modes in noetic version of ROS.