

Inter IIT Tech Meet 10.0

Installation

ROS

You can find these installation instructions [here](#).

Setup your sources.list

```
sudo sh -c 'echo "deb http://packages.ros.org/ros/ubuntu $(lsb_release -sc) main"
```

Set up your keys

```
sudo apt-key adv --keyserver 'hkp://keyserver.ubuntu.com:80' --recv-key C1CF6E31
```

Update packages and install ROS

```
sudo apt update
sudo apt install ros-melodic-desktop-full
```

Setup the environment

```
echo "source /opt/ros/melodic/setup.bash" >> ~/.bashrc
source ~/.bashrc
```

Dependencies

```
sudo apt install python-rosdep python-rosinstall python-rosinstall-generator py
```

Rosdep

```
sudo apt install python-rosdep
sudo rosdep init
rosdep update
```

Note : We recommend you to create a new catkin_ws since you have to install mavros from source which needs you to do `catkin build`.

Ardupilot

Installing Ardupilot and MAVProxy

Clone ArduPilot

In home directory:

```
cd ~
sudo apt install git
git clone https://github.com/ArduPilot/ardupilot.git
cd ardupilot
git checkout Copter-3.6
git submodule update --init --recursive
```

Install dependencies:

```
sudo apt install python-matplotlib python-serial python-wxgtk3.0 python-wxtools
```

Use pip (Python package installer) to install mavproxy:

```
sudo pip install future pymavlink MAVProxy
```

Open `~/.bashrc` for editing:

```
gedit ~/.bashrc
```

Add these lines to end of `~/.bashrc` (the file open in the text editor):

```
export PATH=$PATH:$HOME/ardupilot/Tools/autotest
export PATH=/usr/lib/ccache:$PATH
```

Save and close the text editor.

Reload ~/.bashrc :

```
. ~/.bashrc
```

Run SITL (Software In The Loop) once to set params:

```
cd ~/ardupilot/ArduCopter
sim_vehicle.py -w
```

Gazebo and Plugins

Gazebo

Setup your computer to accept software from <http://packages.osrfoundation.org>:

```
sudo sh -c 'echo "deb http://packages.osrfoundation.org/gazebo/ubuntu-stable `ls
```



Setup keys:

```
wget http://packages.osrfoundation.org/gazebo.key -O - | sudo apt-key add -
```

Reload software list:

```
sudo apt update
```

Install Gazebo:

```
sudo apt install gazebo9 libgazebo9-dev
```

Install Gazebo plugin for APM (ArduPilot Master) :

```
cd ~
git clone https://github.com/khancyr/ardupilot_gazebo.git
cd ardupilot_gazebo
git checkout dev
```

build and install plugin

```
mkdir build
cd build
cmake ..
make -j4
sudo make install
```

```
echo 'source /usr/share/gazebo/setup.sh' >> ~/.bashrc
```

Set paths for models:

```
echo 'export GAZEBO_MODEL_PATH=~/.ardupilot_gazebo/models' >> ~/.bashrc
. ~/.bashrc
```

Run Simulator

In one Terminal (Terminal 1), run Gazebo:

```
gazebo --verbose ~/.ardupilot_gazebo/worlds/iris_arducopter_runway.world
```

In another Terminal (Terminal 2), run SITL:

```
cd ~/.ardupilot/ArduCopter/
sim_vehicle.py -v ArduCopter -f gazebo-iris --console
```

Install Mavros

please install mavros from source because we have changed the frame from LOCAL_NED to BODY_NED .

If you decide to use the already existing catkin_ws then be sure to remove the build and devel folders and do catkin build .

Link to install from source : [Link](#)

Modifying Mavros

After you install from source, please change the file `set_velocity.cpp` located at `catkin_ws/src/mavros/src/plugins/setpoint_velocity.cpp`.

New file : [Link](#)

Running Simulation

- Download the `interiit22` package from this repo and include it in your `catkin_ws`
- Do `catkin build` (assuming you have done `catkin build` while installing mavros)
- Go to the `glimbal_small_2d` folder of `ardupilot_gazebo/models` folder and change Line 164 in the `models.sdf` file.

```
<pointCloudCutoffMax>20.0</pointCloudCutoffMax>
```

We increased the range of Depth camera from 10m to 20m.

- `cd` to the folder containing simulation sh file

```
cd catkin_ws/src/interiit22
```

- make it executable

```
chmod u+x startsim.sh
```

- Open the terminal and launch the world file

```
./startsim.sh
```

- Now please wait until the MavProxy console shows that the GPS is correct and now open a new terminal and run the following command . This will takeoff the drone upto 15m height.

```
roslaunch interiit22 arm_and_takeoff.py --connect 127.0.0.1:14550
```

- Now open a new terminal and run the `move_drone.py`

```
roslaunch interiit22 move_drone.py
```

- Now you can open rviz and visualize the topic `/image_topic_2` . This is the main topic which draws the contours on the image
- Now start recording through rosbag

```
rosviz record -o bag_file_name /mavros/setpoint_velocity/cmd_vel_unstamped
```

- After the drone completely moves the world, press Ctrl+C to stop the recording
- Now play the recorded bag file

```
rosviz play bag_file_name.bag
```

- Now open a new terminal and run

```
rosviz interiit22 move_prius.py
```