**Applications and Dependencies required to run the simulation**

**Installing Ardupilot**

**Clone ArduPilot**

cd ~

sudo apt install git

git clone https://github.com/ArduPilot/ardupilot.git

cd ardupilot

**Install dependencies:**

cd ardupilot

Tools/environment\_install/install-prereqs-ubuntu.sh -y

**reload profile**

. ~/.profile

**Checkout Latest Copter Build**

git checkout Copter-4.3.4

git submodule update --init –recursive

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

cd ~/ardupilot/ArduCopter

sim\_vehicle.py -w

**Installing Gazebo**

sudo sh -c 'echo "deb http://packages.osrfoundation.org/gazebo/ubuntu-stable `lsb\_release -cs` main" > /etc/apt/sources.list.d/gazebo-stable.list'

**Setup keys:**

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

**Reload software list:**

sudo apt update

### According to your OS

### **Ubuntu [18.04]**

sudo apt install gazebo9 libgazebo9-dev

### **Ubuntu [20.04]**

sudo apt-get install gazebo11 libgazebo11-dev

## **Install Gazebo plugin for APM (ArduPilot Master) :**

cd ~

git clone https://github.com/khancyr/ardupilot\_gazebo.git

cd ardupilot\_gazebo

**For only Ubuntu 18.04 OS only**

git checkout dev (This command not required in Ubuntu 20.04 OS)

Comman commands for both OS -

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

## **Download QGroundControl**

## **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/

../Tools/autotest/sim\_vehicle.py -f gazebo-iris --console –map

If everything is opening and working without error, all installations are correct.

Make the following changes -

1. In your Home directory of the computer go to .gazebo file

/home/**(your user name)/**.gazebo/models >> go and paste the **aruco\_visual\_marker\_0** file in the models folder**.**

2. Paste the **aruco.world** file in the worlds folder of ardupilot\_gazebo folder -

/home/**(your user name)**/ardupilot\_gazebo/worlds

3. Put the **MultiMatrix.npz** file in Downloads folder of your PC and don’t extract it. Put its path in the **night.py** file in the variable **calib\_data\_path.**

**calib\_data\_path = "/home/(your user name)/Downloads/MultiMatrix.npz"**

**Python Script to Autonomously land drone aruco marker**

Download the python script – **night.py** (It contains all the code to automate the drone for aruco marker detection)

How to see the final simulation

Step 0 -

Run **roscore** command

Step 1 -

**In one Terminal (Terminal 1), run Gazebo:**

gazebo --verbose ~/ardupilot\_gazebo/worlds/aruco.world

Step 2 -

**In another Terminal (Terminal 2), run SITL:**

cd ~/ardupilot/ArduCopter/

../Tools/autotest/sim\_vehicle.py -f gazebo-iris --console –map

Step 3 -

Run QGroundControl App for reference purposes.

On opening once it gets connected and shows **Ready To Fly** on top left.

Make sure to keep the mode in **Guided Mode.**

Step 4 -

**In another Terminal (Terminal 3), run the python script:**

Download the python script – **night.py** (It contains all the code to automate the drone for aruco marker detection)

My script was in Downloads folder

cd Downloads

python3 night.py

Now view the simulation in Gazebo.

Thank You

Best Regards

Pahul Singh Sawhney