Session 2

As you guys just installed ubuntu your system will be clean. We need to install basic requirements first.

Now regarding installation of basic necessities,i have sent a script file along with this doc. Script is a program that is written so as to automate everything that we are required to type on terminal. Eg: If we need to install software A and B ,we need to manually type sudo apt-get install A and after installation of A again type for B. Running a script containing the installation commands for both gets A and B installed automatically.Later you will be asked to write a script. Read over the comments of script to understand which all commands do what.There will be lot of software names google it if not understanding ask doubts.

You need a folder to run the script as that script mentions about that folder. So open terminal type git clone https://github.com/rsnk96/Ubuntu-Setup-Scripts.git . This will get that entire folder in your home.Now move the script file i sent inside this folder. Now run the script.

To run the script type **sudo ./<name of the script>** in terminal.

So sudo ./setup_linux.sh in your terminal and enter.

Exercise : Find out what is bash and zsh terminals and find out which one you are using after running the scripts.

If some of you guys have already installed ubuntu check through the comments of the scripts if dont have something. If any of you are using bash terminal better to convert to zsh but beware you should make changes accordingly to your previous work.

Installation of graphics drivers

This wasn't included in the scripts and simulation requires good gpu usage for its smooth working(Others don't worry gazebo is a light weight simulator which works with non-dedicated gpu users).

First you need to check whether you have graphics drivers.

1. Go to Software and Updates.
2. Go to additional drivers.
3. Now if you see graphics drivers there,then you can skip this step if not follow the instructions to download.

For nvidia users,follow this guide. I would prefer command line option so you will get better with using terminal.

https://www.linuxbabe.com/ubuntu/install-nvidia-driver-ubuntu-18-04

For amd and intel , follow this guide

https://www.howtogeek.com/242045/how-to-get-the-latest-nvidia-amd-or-intel-graphics-drivers-on-ubuntu/

Now our OS(Operating System) is ready. Now let's start with installation of requiredd softwares. First we need the virtual pixhawk with a 3D modelled drone with a simulation environment.

SITL installation

Follow the steps in this site with reading the instructions below :

Read everything and identify which all commands do what.

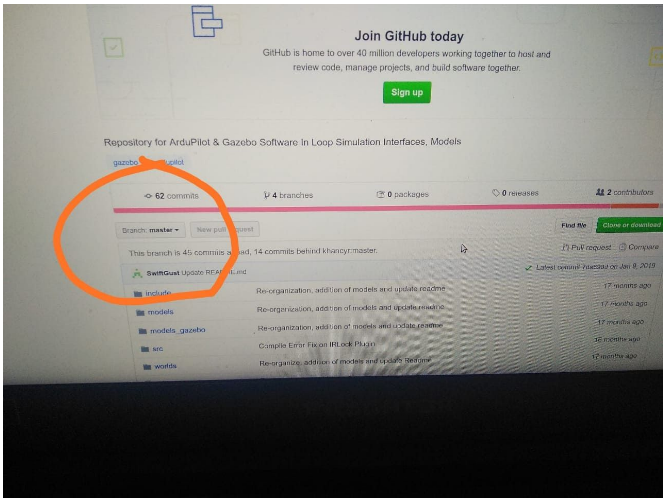
1. GUI tools not required.
2. Clone main ardupilot repo.
3. Instead of **.bashrc** part you need to use **.zshrc** because we ran Nikhil scripts and made our terminal zsh.
4. Do build using build.md(Waf)
5. Also you don't want setup with docker.

https://ardupilot.org/dev/docs/setting-up-sitl-on-linux.html

Gazebo with SITL integrated

Follow the steps in this site with reading the instructions below :
Read everything and identify which all commands do what.

1. In the plugin installation part they mentioned about two : khancyr and SwiftGust. Follow the SwiftGust part.Read their readme and follow their steps.Plugins are additional part of the softwares which give a software some extra features. Here gazebo simulation wants this plugin to make the drone in it react to the wills of FC.
2. You are required to install gazebo 9.So replace sudo apt-get install libgazebo8-dev With 9 instead of 8.
3. **Important :** Change the github branch you are in.



GitHub is home to over 40 million developers working together to host and review code, manage projects, and build software together.

Repository for ArduPilot & Gazebo Software In Loop Simulation Interfaces, Models

This branch is 45 commits a ead, 14 commits behind khancyr:master.

SwiftGust Update REA E.md — Latest commit 7da699d on Jan 9, 2019

include	Re-organization, addition of models and update readme	17 months ago
models	Re-organization, addition of models and update readme	17 months ago
models_gazebo	Re-organization, addition of models and update readme	17 months ago
src	Compile Error Fix on IRLock Plugin	16 months ago
worlds	Re-organize, addition of models and update Readme	17 months ago

If you using gazebo 9 then you have to change it to gazebo9 branch from main.
Git clone the repo then by git clone https://github.com/SwiftGust/ardupilot_gazebo.git .
Then cd ardupilot_gazebo

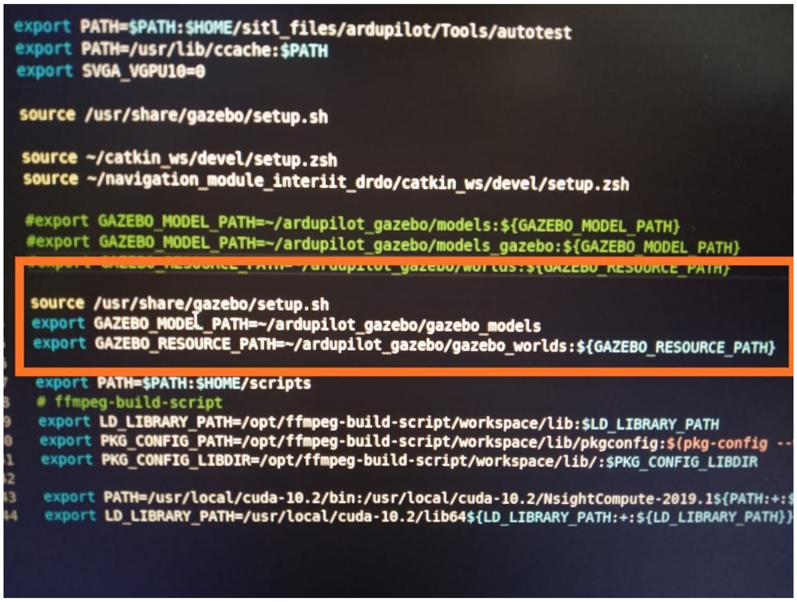
```
git checkout  gazebo9
mkdir build
 cd build
 cmake ..
make  -j4
 sudo make install
```

4. Don't want multi uav now.

5. After completing SwiftGust installation return to your original page where there is instructions to launch them. There in Start the Simulator instead of gazebo --verbose worlds/iris_arducopter_runway.world run gazebo --verbose worlds/iris_ardupilot.world

https://ardupilot.org/dev/docs/using-gazebo-simulator-with-sitl.html

If error comes in gazebo window after running opening an empty world while trying to run gazebo_sitl , then be sure you have these three lines in your .zshrc file.



```
export PATH=$PATH:$HOME/sitl_files/ardupilot/Tools/autotest
export PATH=/usr/lib/ccache:$PATH
export SVGA_VGPU10=0

source /usr/share/gazebo/setup.sh

source ~/catkin_ws/devel/setup.zsh
source ~/navigation_module_interiit_drdo/catkin_ws/devel/setup.zsh

#export GAZEBO_MODEL_PATH=~/ardupilot_gazebo/models:${GAZEBO_MODEL_PATH}
#export GAZEBO_MODEL_PATH=~/ardupilot_gazebo/models_gazebo:${GAZEBO_MODEL_PATH}
#export GAZEBO_RESOURCE_PATH=~/ardupilot_gazebo/worlds:${GAZEBO_RESOURCE_PATH}

source /usr/share/gazebo/setup.sh
export GAZEBO_MODEL_PATH=~/ardupilot_gazebo/gazebo_models
export GAZEBO_RESOURCE_PATH=~/ardupilot_gazebo/gazebo_worlds:${GAZEBO_RESOURCE_PATH}
export PATH=$PATH:$HOME/scripts
# ffmpeg-build-script
export LD_LIBRARY_PATH=/opt/ffmpeg-build-script/workspace/lib:$LD_LIBRARY_PATH
export PKG_CONFIG_PATH=/opt/ffmpeg-build-script/workspace/lib/pkgconfig:$(pkg-config --
export PKG_CONFIG_LIBDIR=/opt/ffmpeg-build-script/workspace/lib/:$PKG_CONFIG_LIBDIR

export PATH=/usr/local/cuda-10.2/bin:/usr/local/cuda-10.2/NsightCompute-2019.1${PATH:+:$
export LD_LIBRARY_PATH=/usr/local/cuda-10.2/lib64${LD_LIBRARY_PATH:+:${LD_LIBRARY_PATH}}
```

And source them using source ~/.zshrc after writing these. Then run the command gazebo --verbose iris_ardupilot.world.

Task : After getting SITL and Gazebo window with a drone in it, type help in SITL window.You will see various options and commands in SITL.Try to control drone with those.But how can we control our drone with commands in SITL terminal. Answer is Mavproxy converts our commands into mavlink messages which are readable for FC.But we are using mavros for this purpose.

Install QGC(Qground Control).

Open the software . cd <directory it is in>(prob downloads) then type ./QGroundControl.AppImage.

You will see some drone is connected to it.This is because your SITL gives all data to QGC.

Now try to arm and takeoff with QGC and observe gazebo.

If you can see all the outputs i have mentioned you are successful with the installation part. Now we got a drone in our virtual environment.We now need to control it with a program.So we need Mavros next.