# Instructions for UAV simulation installation

Lea Matlekovic (matlekovic@imada.sdu.dk)

October 2022

## 1 Summary

We would like to install the Gazebo simulation environment to simulate the UAV flight. For that, we are going to use PX4 controller and QGroundControl (QGC) Station. Our goal is to control a UAV in two different ways. The first one is by using our keyboard and the second one is by setting the mission waypoints in QGC.

## 2 Requirements

Before we start, we need to have Linux Ubuntu 18.04. installed and running. In case you don't already have it, there are many ways of installing it. You could dual boot it on your computer, i.e. install it in parallel with your current OS, you could install Linux environment for Windows using WSL and xlaunch, you could temporary run it in a Docker container as described in a previous lecture, or install it in a virtual machine (VM). Recommended VM is VMware. Don't forget to allocate enough resources to your VM if you decide to choose that option. Bare in mind that running Linux in a Docker container results in the loss of all of your progress when the container is stopped.

## 3 Installation

First, install git since we will need it to clone the packages from GitHub:
`$sudo apt-get install git`
Then, clone the repository containing PX4 controller and autopilot software and install it using .sh script:
`$git clone https://github.com/PX4/PX4-Autopilot.git --recursive`
`$bash ./PX4-Autopilot/Tools/setup/ubuntu.sh`
After the autopilot is installed, reboot your computer:
`$sudo reboot now`
After you computer is on again, install the QGC. Download the installer by going to:

`https://github.com/mavlink/qgroundcontrol/releases/download/v4.0.11/QGroundControl.AppImage` in your browser. Make sure the installer is in your Download folder. Before we proceed, enter the following in your command prompt:

```
$sudo usermod -a -G dialout $USER
$sudo apt-get remove modemmanager -y
$sudo apt install gstreamer1.0-plugins-bad gstreamer1.0-libav gstreamer1.0-gl
-y
```

Reboot your computer using:

```
$sudo reboot now
```

Install (and run) QGC. Do the following:

```
$cd Downloads
$chmod +x ./QGroundControl.AppImage
$./QGroundControl.AppImage
```

Now you should be able to see QGC user interface showing a map. However, there is a message on the top right corner "Waiting for Vehicle Connection". Let's connect it.

Leave the terminal and QGC opened and open another terminal. Here, we will install Gazebo simulator with all the firmware needed to establish the communication with our UAV. Type into a new terminal:

```
$cd /path/to/PX4-Autopilot
```

Where /path/to/ depends on where you saved your PX4-autopilot.

Next:

```
$make px4_sitl gazebo
```

After the command is processed and everything is installed, you should be able to see your UAV ready to fly. To try it out! On the same terminal pass the command:

```
pxh> commander takeoff
```

# 4 To do

Try to change the vehicle starting point and fly in Odense.
Try to change the vehicle type.
Try to change the world around the vehicle.
Try to control it with a Virtual Joystick.
HINT! Use the links below to figure out how to do it.

# 5 References

[1] PX4-autopilot/Gazebo, JMAVSim and NuttX (Pixhawk) Targets
[2] QGC installation
[3] Gazebo Simulation installation
[4] ROS & PX4