# IMAV 2017 Virtual Challenge Guide

## 1. Introduction

A simulation environment was created to represent the IMAV 2017 indoor challenge to speed up the development process of the drone Navigation, Guidance and Control algorithms developed by the teams. This guide provides some help on how to set up and use the tools.

## 2. Environment setup

### a) Operating System

The simulation requires a Linux environment (latest Ubuntu is recommended). It can be a virtual system on a Windows host system, but please note that the recommended virtualization environment is VMware, because Hyper-V and VirtualBox does not perform well enough for the 3D simulation and visualization.

### b) ROS, Gazebo, Repository

Run setup.sh by:

```
chmod +x setup.sh
./setup.sh
```

It will ask for your password because of the sudo.

### c) Notes

There is an OpenGL issue with VMware. If Gazebo crashes with the message:

```
VMware: vmw_ioctl_command error Invalid argument.
```

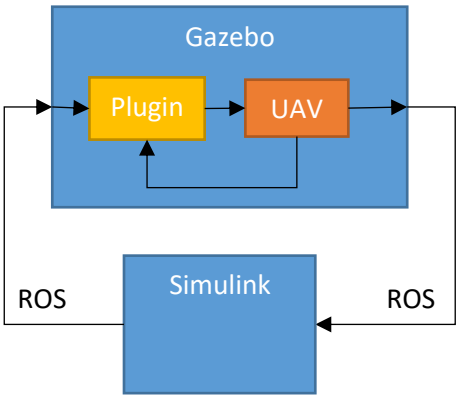
Then execute:

```
echo "export SVGA_VGPU10=0" >> ~/.bashrc
```

This changes the environment variable to use an earlier version of OpenGL. More info here.

## 3. Simulation

The simulation represents the indoor challenge at IMAV 2017. Gazebo handles the physics of the rigid body (UAV), while the attached plugins take care of the sensor readings and stabilization of the system. The IMU data is used directly from the simulation in the inner loop (without noise), and the forces and torques are exerted on the body mimicking the effect of the propellers.




The outer loop (involving Simulink) handles the high-level planning based on the image and sensor data acquired by the virtual instruments. This is done through ROS by subscribing the corresponding topics, and publishing the velocity commands.

### a) Launching the simulation

The simulation can be run by

```
roslaunch imav_2017 imav_indoor.launch
```

The robots can be spawned by:

```
cd ~catkin_ws/src/IMAV_2017_Virtual_Challenge/urdf
./spawnrobot.sh 1
```

You can spawn multiple drones by changing the ID (the argument of script).