RoboMaster 2023, 2024 University AI Challenge Competition Simulator Owner's Manual

Contents

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Abstract

The organizing committee provides a competition venue model, allowing participating teams to experience the event advance. Teams can use the model by simulator softwares(for example: gazebo). Besides, the organizing committee has developed a sample simulator based on the venue model. This simulator:

1. integrated with the ROS system, it is convenient to obtain the drone's pose, IMU data and image data through ROS nodes, while also controlling the drone by ROS node.
2. Real-time dynamic obstacle movement effect has been achieved.
3. When entering the zone from 8 to 0 boxes, sidewinds are generated.
4. The scoring logic of task boxes is not implemented.
5. The forward direction of the initial orientation of drone is the positive X-axis, the rightward directoin is the positive Y-axis, the downward direction is the positive Z-axis, and the initial position of drone is (0, 0, 0.8). The coordinate system in the simulator is inconsistent with that used in the actual competition.

Note: This simulator example is only for a preview of the competition content. The actual specifications and textures of the filed props should be referred to RoboMaster 2023-2024 University AI Challenge Classic Rules Manual V1.0.pdf.

URL of Competition Venue Model
wget https://sz-rm-rmua-dispatch-prod.oss-cnshenzhen.aliyuncs.com/9f9e486a3cde4342d106b613509f2f13 -O RMUA2024-model.zip

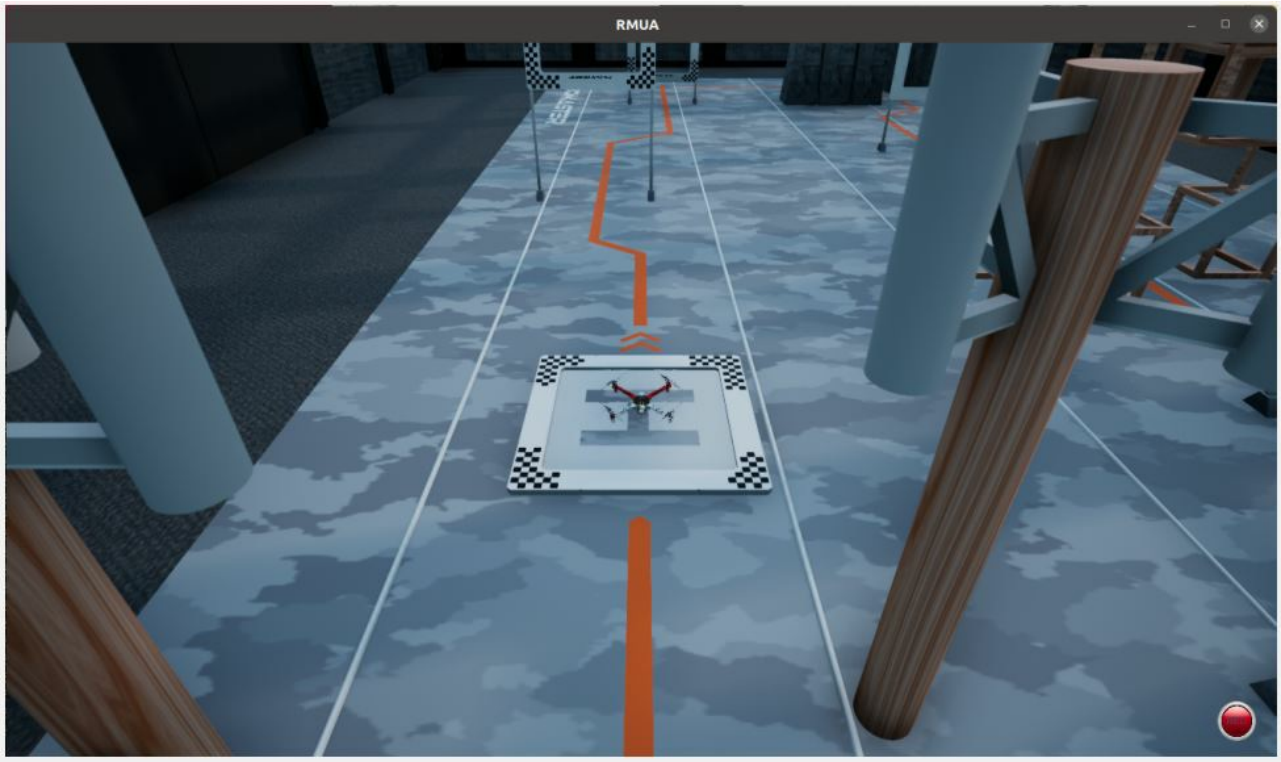
Instruction of Sample Simulator

1. Install ROS-Noetic

- sudo sh -c ‘echo “deb http://packages.ros.org/ros/ubuntu $(lsb_release -sc) main” > /etc/apt/sources.list.d/ros-latest.list’
- sudo apt install curl
- curl -s https://raw.githubusercontent.com/ros/rosdistro/master/ros.asc | sudo apt-key add –
- sudo apt update
- sudo apt install ros-noetic-desktop-full
- sudo apt install python3-catkin-tools

2. Usage

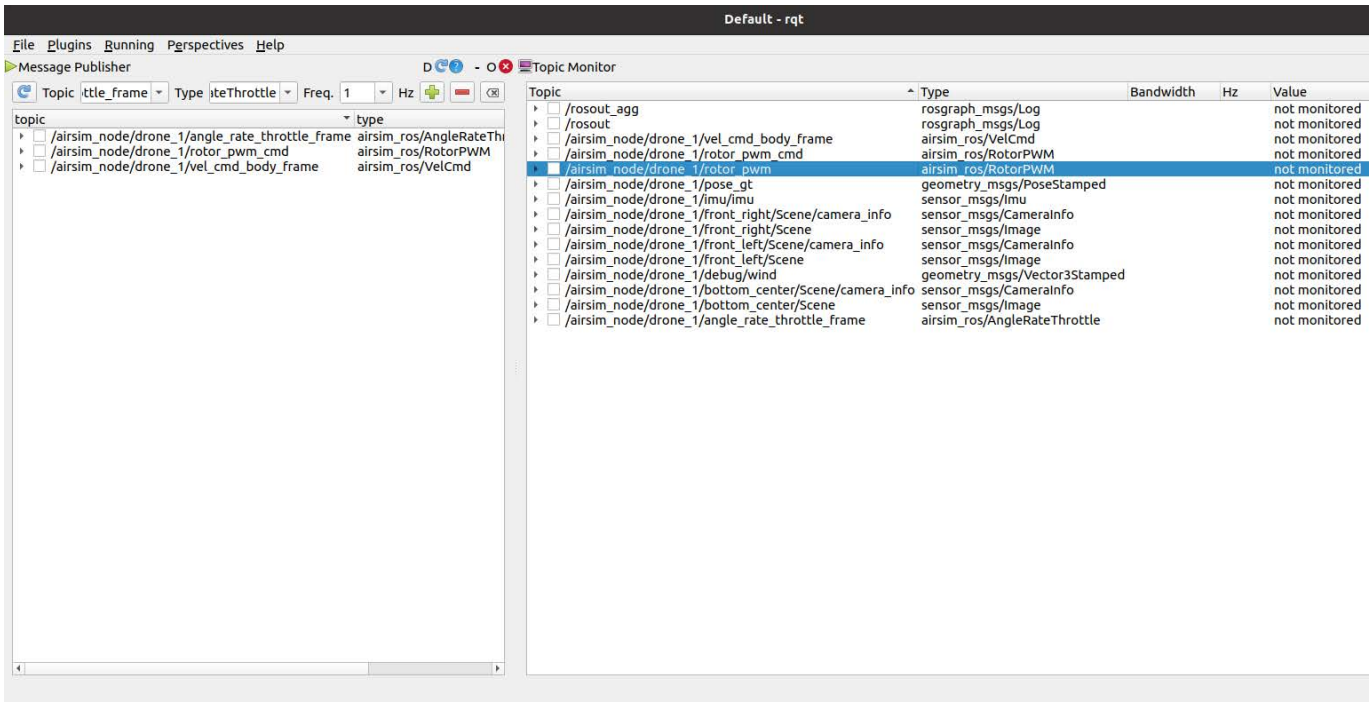
- mkdir ~/simulator && cd ~/simulator
- wget https://sz-rm-rmua-dispatch-prod.oss-cnshenzhen.aliyuncs.com/a5b9033cf7aeb347e43a08f07992cf22 -O uasim_student_240204_r1_shipping.zip
- unzip uasim_student_240204_r1_shipping.zip
- mkdir ~/Documents/AirSim
- cp settings.json ~/Documents/AirSim
- source /opt/ros/noetic/setup.bash
- roscore
- open a new ternimal
- ./Build/LinuxNoEditor/RMUA.sh



ROS data

- Load the custom data types

  source devel/setup.bash
- Use rqt to check data and control drone rqt



The topic for obtaining data

- Bottom Camera

  /airsim_node/drone_1/bottom_center/Scene
- Left Camera /airsim_node/drone_1/front_left/Scene
- Right Camera

  /airsim_node/drone_1/front_right/Scene
- IMU /airsim_node/drone_1/imu/imu
- Real Pose of Drone

  /airsim_node/drone_1/debug/pose_gt
- PWM Signal (0:right front, 1:left back, 2:left front, 3:right back)

  /airsim_node/drone_1/rotor_pwm

The topic fot controlling drone

- PWM controlling

  /airsim_node/drone_1/rotor_pwm_cmd
- Velocity Contrilling

  /airsim_node/drone_1/vel_cmd_body_frame
- Angle Rate Throttle Controlling

  /airsim_node/drone_1/angle_rate_throttle_frame

Note
The simulator provides a chessboard and a AprilGrid board to calibrate the drone's camera.
The number of inner dot of chessboard is 8*11, while the length of the squares is 20mm.

The AprilGrid has 6*6 big squares, whose length is 88mm, while the length of small squares is 26.4mm.

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References

- packages.ros.org/ros/ubuntu
- Welcome to tengine!
- raw.githubusercontent.com/ros/rosdistro/master/ros.asc
- User Manual