

Raspberry Pi 5 & RealSense D435

ROS Noetic in Docker – Full Workflow

Legend

- **Laptop** – local terminal on your laptop
- **SSH-Pi** – SSH session connected to the Raspberry Pi
- **Docker-Pi** – shell *inside* the Docker container `ros_project`
- **Pi-local** – physical console attached to the Pi (optional)

1. Prerequisites

- Raspberry Pi 5 running Ubuntu **24.04 LTS** (64-bit)
- Intel RealSense D435 connected via USB 3
- ROS Noetic inside a Docker container named `ros_project`
- Pi and laptop on the same LAN

2. Boot & SSH login

Laptop → SSH-Pi

1: LAPTOP → SSH-PI

```
ssh ubuntu@<PI_IP_ADDRESS>
# password: ubuntu (or your SSH key)
```

SSH-Pi → Docker-Pi

2: SSH-PI → DOCKER-PI

```
# start container without attaching to its primary STDIN
docker start ros_project

# open a separate shell inside it
docker exec -it ros_project bash
```

3. Configure ROS in the container

Docker-Pi

3: SOURCE OVERLAYS

```
# load ROS overlays
source /opt/ros/noetic/setup.bash
source ~/catkin_ws/devel/setup.bash
```

Add the two lines above to the container's `~/.bashrc`.

4. Install tmux and create a persistent session

Docker-Pi

4: INSTALL & START TMUX

```
# fix Intel repo and install tmux
curl -s https://librealsense.intel.com/Debian/librealsense.pgp | \
  gpg --dearmor -o /usr/share/keyrings/librealsense-archive-keyring.gpg
echo "deb_[signed-by=/usr/share/keyrings/librealsense-archive-keyring.gpg]\
_https://librealsense.intel.com/Debian_$(lsb_release_-cs)_main" | tee \
  /etc/apt/sources.list.d/librealsense.list
apt update
apt install -y tmux

# launch a tmux session named 'cam'
tmux new -s cam
```

Inside the new *cam* session:

5: RUN REALSENSE NODE

```
roslaunch realsense2_camera rs_camera.launch
```

Detach without stopping the camera: press `Ctrl-b` then `d`.

5. Record a rosbag

Docker-Pi – new tmux window

6: RECORD BAG

```
mkdir -p ~/bags && cd ~/bags

# record video, camera_info and TF
rosbag record /camera/color/image_raw \
  /camera/color/camera_info \
  /tf /tf_static \
  -O realsense_$(date +%Y%m%d_%H%M%S).bag
# press Ctrl-C to stop
```

6. Copy the .bag out of the container

SSH-Pi

7: EXTRACT BAG

```
CID=$(docker ps -qf name=ros_project)
docker cp "${CID}:/root/bags ./bags_from_container
```

Bag files are now in /home/ubuntu/bags_from_container/ on the Pi host.

7. Transfer the bag to the laptop

Laptop

8: DOWNLOAD BAG

```
scp ubuntu@<PI_IP_ADDRESS>:/home/ubuntu/bags_from_container/*.bag ./
```

8. Play the rosbag on the laptop

Laptop

9: REPLAY LOCALLY

```
# 1) start the ROS master
roscore # keep this window open

# 2) in a second terminal
rosbag play realsense_20250528_151718.bag
rqt_image_view /camera/color/image_raw
```

If the topic is compressed, choose /camera/color/image_raw/compressed in *rqt_image_view*.

9. Best practices & troubleshooting

- Never run `exit` in the shell started with `docker start -ai`; instead use `docker exec + tmux`.
- Ensure stable power for the Pi ($\geq 5\text{ V}$ / 5 A) to avoid undervoltage.
- Check free space before long recordings with `df -h`.
- For very long sessions use
`rosbag record . . . --split --duration=120` (new file every 2 min).

Following these steps you can reboot the Pi, start everything from scratch, record a RealSense stream in Docker, and replay it on your laptop – all without interrupting the camera feed.