Step-by-Step Guide to Install ROS and Run Your Python Package

# 1. Prerequisites

Ensure you have a compatible operating system (preferably Ubuntu 18.04 or 20.04).

Ensure you have Python 3.6 or later installed.

Ensure you have access to the internet.

# 2. Install ROS

Open a terminal window.

Setup your sources list:

```sh

sudo sh -c 'echo "deb http://packages.ros.org/ros/ubuntu $(lsb\_release -sc) main" > /etc/apt/sources.list.d/ros-latest.list'

```

Set up your keys:

```sh

sudo apt-key adv --keyserver 'hkp://keyserver.ubuntu.com:80' --recv-key C1CF6E31E6BADE8868B172B4F42ED6FBAB17C654

```

Update your package list:

```sh

sudo apt update

```

Install ROS:

```sh

sudo apt install ros-melodic-desktop-full

```

Initialize rosdep:

```sh

sudo rosdep init

rosdep update

```

Add ROS environment variables to your bash session:

```sh

echo "source /opt/ros/melodic/setup.bash" >> ~/.bashrc

source ~/.bashrc

```

Install dependencies for building ROS packages:

```sh

sudo apt install python-rosinstall python-rosinstall-generator python-wstool build-essential

```

# 3. Setup Your Catkin Workspace

Create and navigate to your catkin workspace:

```sh

mkdir -p ~/catkin\_ws/src

cd ~/catkin\_ws/

```

Initialize the workspace:

```sh

catkin\_make

```

Source the workspace:

```sh

source devel/setup.bash

```

# 4. Create Your Package

Navigate to the src directory of your catkin workspace:

```sh

cd ~/catkin\_ws/src

```

Create your package:

```sh

catkin\_create\_pkg robot\_behavior rospy std\_msgs sensor\_msgs geometry\_msgs nav\_msgs cv\_bridge

```

Navigate to your package directory:

```sh

cd robot\_behavior

```

# 5. Add Your Python Scripts

Create a scripts directory:

```sh

mkdir scripts

```

Add your Python scripts (robot\_behavior.py, ultrasonic\_sensor.py, yolo\_detector.py) to the scripts directory.

Make the scripts executable:

```sh

chmod +x scripts/\*.py

```

# 6. Create the CMakeLists.txt File

Navigate to your package directory:

```sh

cd ~/catkin\_ws/src/robot\_behavior

```

Open CMakeLists.txt and replace its contents with:

```

cmake\_minimum\_required(VERSION 2.8.3)

project(robot\_behavior)

find\_package(catkin REQUIRED COMPONENTS

rospy

std\_msgs

sensor\_msgs

geometry\_msgs

nav\_msgs

cv\_bridge

)

catkin\_package()

include\_directories(

${catkin\_INCLUDE\_DIRS}

)

catkin\_install\_python(PROGRAMS

scripts/robot\_behavior.py

scripts/ultrasonic\_sensor.py

scripts/yolo\_detector.py

DESTINATION ${CATKIN\_PACKAGE\_BIN\_DESTINATION}

)

```

# 7. Create the package.xml File

Navigate to your package directory:

```sh

cd ~/catkin\_ws/src/robot\_behavior

```

Open package.xml and replace its contents with:

```xml

<?xml version="1.0"?>

<package format="2">

<name>robot\_behavior</name>

<version>0.0.0</version>

<description>The robot\_behavior package</description>

<maintainer email="your\_email@example.com">Your Name</maintainer>

<license>BSD</license>

<buildtool\_depend>catkin</buildtool\_depend>

<build\_depend>rospy</build\_depend>

<build\_depend>std\_msgs</build\_depend>

<build\_depend>sensor\_msgs</build\_depend>

<build\_depend>geometry\_msgs</build\_depend>

<build\_depend>nav\_msgs</build\_depend>

<build\_depend>cv\_bridge</build\_depend>

<exec\_depend>rospy</exec\_depend>

<exec\_depend>std\_msgs</exec\_depend>

<exec\_depend>sensor\_msgs</exec\_depend>

<exec\_depend>geometry\_msgs</exec\_depend>

<exec\_depend>nav\_msgs</exec\_depend>

<exec\_depend>cv\_bridge</exec\_depend>

<exec\_depend>opencv</exec\_depend>

<export>

</export>

</package>

```

# 8. Create the Launch File

Create a launch directory in your package:

```sh

mkdir launch

```

Create a launch file (robot\_behavior.launch) in the launch directory with the following content:

```xml

<launch>

<node name="ultrasonic\_sensor" pkg="robot\_behavior" type="ultrasonic\_sensor.py" output="screen" />

<node name="yolo\_detector" pkg="robot\_behavior" type="yolo\_detector.py" output="screen" />

<node name="robot\_behavior" pkg="robot\_behavior" type="robot\_behavior.py" output="screen" />

</launch>

```

# 9. Install Required Python Libraries

Install the required Python libraries:

```sh

pip install rospy std\_msgs sensor\_msgs geometry\_msgs nav\_msgs cv\_bridge opencv-python RPi.GPIO

```

# 10. Build Your Package

Navigate to your catkin workspace:

```sh

cd ~/catkin\_ws

```

Build your workspace:

```sh

catkin\_make

```

Source the setup file:

```sh

source devel/setup.bash

```

# 11. Run Your Package

Launch your package using roslaunch:

```sh

roslaunch robot\_behavior robot\_behavior.launch

```