

# **Robot Arm**

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**Smart Methods**

Robot Operating System (ROS)

## Summary

*First we set up a robot arm in ROS (Robot Operating System), follow these steps:*

1. Begin by downloading VirtualBox, a virtualization program that enables us to run Ubuntu on our computer inside a virtual machine.
2. Install Ubuntu 18.04: Once we have VirtualBox installed, download and install Ubuntu 18.04 as the operating system for our virtual machine.
3. Open the Terminal: After booting into Ubuntu, we open the Terminal application, which allows us to execute commands.
4. Add ROS repository: Add the ROS repository to the package manager's list of software sources by running the following command in the Terminal:

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

5. Add ROS key: Import the ROS key to verify the authenticity of the packages by executing this command:

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

**6. Update packages:** Update the package manager's list of available packages by running the following command:

```
sudo apt-get update
```

**7. Install ROS Kinetic:** Install the ROS Kinetic Desktop Full package by executing this command:

```
sudo apt-get install ros-kinetic-desktop-full
```

**8. Configure environment:** Set up the ROS environment variables by adding the following line to the end of the ~/.bashrc file:

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

**9. Install additional dependencies:** Install additional dependencies required for ROS by executing these commands:

```
sudo apt install python-rosdep python-rosinstall python-  
rosinstall-generator python-wstool build-essential  
sudo apt install python-rosdep  
sudo rosdep init  
rosdep update
```

**10. Install catkin:** Install the catkin package, which is used for building ROS packages, by running the following command:

```
sudo apt-get install ros-noetic-catkin
```

**11.Create a workspace:** Create a catkin workspace by executing these commands:

```
mkdir -p ~/catkin_ws/src  
cd ~/catkin_ws/  
catkin_make
```

**12.Clone the robot arm package:** Navigate to the src directory of the workspace and clone the robot arm package from the GitHub repository:

```
cd ~/catkin_ws/src  
git clone https://github.com/smart-methods/arduino\_robot\_arm.git
```

**13.Install package dependencies:** Install the dependencies for the robot arm package using the following command:

```
cd ~/catkin_ws  
rosdep install --from-paths src --ignore-src -r -y
```

**14.Install MoveIt and Gazebo packages:** Install MoveIt and Gazebo packages, which provide motion planning and simulation capabilities, by running these commands:

```
sudo apt-get install ros-kinetic-moveit  
sudo apt-get install ros-kinetic-joint-state-publisher ros-kinetic-joint-state-publisher-gui  
sudo apt-get install ros-kinetic-gazebo-ros-control joint-state-publisher  
sudo apt-get install ros-kinetic-ros-controllers ros-kinetic-ros-control
```

**15.**Modify bashrc file: Open the ~/.bashrc file in a text editor using the following command:

```
sudo nano ~/.bashrc
```

**16.**Add workspace sourcing: At the end of the bashrc file, add the following line to source the workspace:

```
source /home/Lujain/catkin_ws/devel/setup.bash
```

**17.**Save and exit: Press Ctrl + O to save the file and Ctrl + X to exit the text editor.

**18.**Update bashrc: Update the bashrc file by sourcing it using the following command:

```
source ~/.bashrc
```

**19.**Launch the robot arm: Finally, launch the robot arm by running the following command:

```
roslaunch robot_arm_pkg check_motors.launch
```

***By following these steps, we will set up the necessary environment and launch the robot arm in ROS for further exploration and control. That will appear as follows:***

