Simulation 1

로봇팔 세미나 - 김혜윤 -

Contents

ROS란?

ROS (Robot Operating System)

1. Open-Source
2. Meta-Operating System
3. Node 재사용 (코드 재사용)
4. 프로세스 독립 실행
5. 언어 독립성

환경설정

Ubuntu 설치

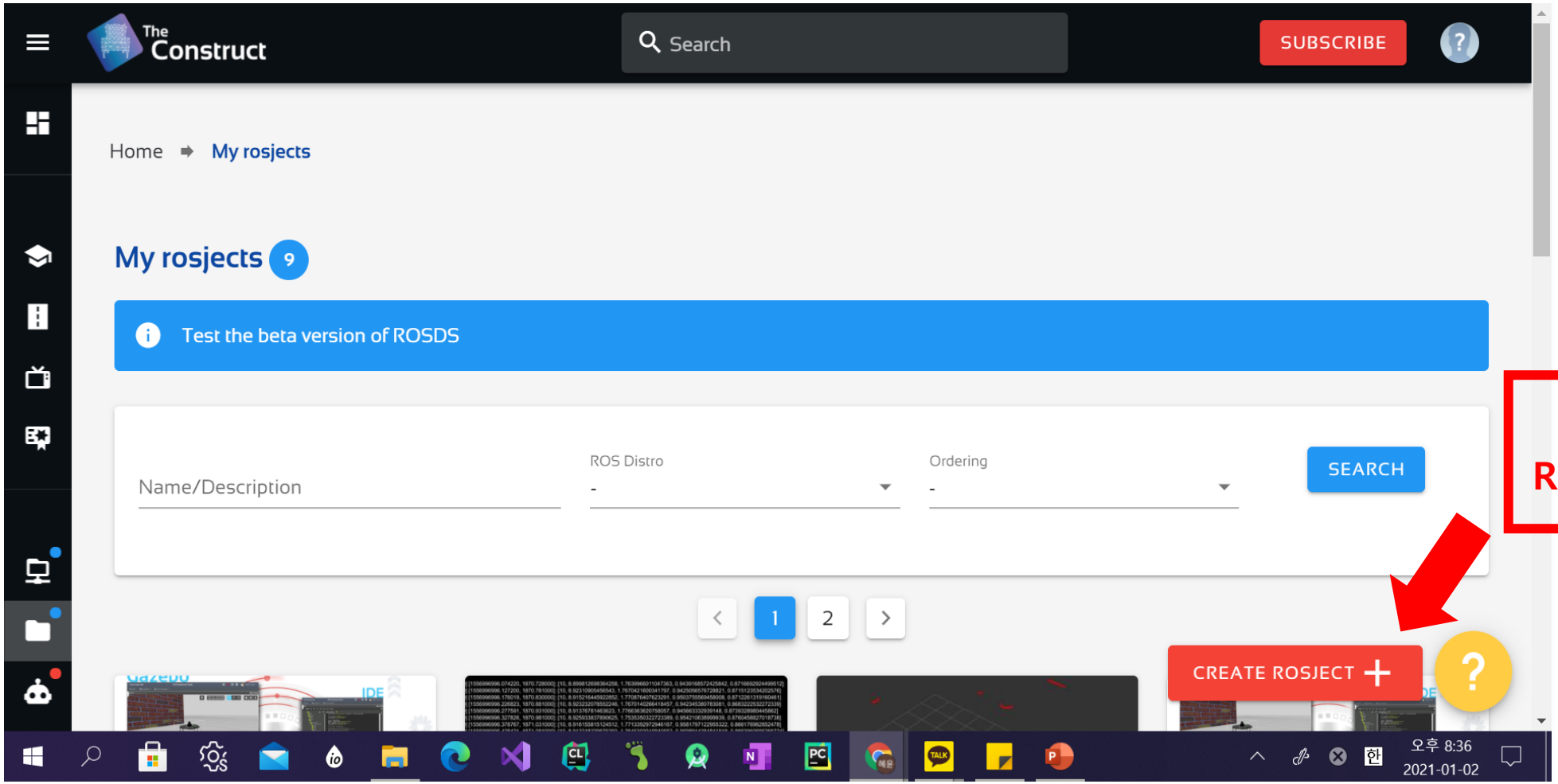
1. 노트북에 설치
   - OS가 없는 SSD나 USB에 설치하는 것을 추천
   - OS가 있는 메모리에 설치할 경우 기존의 OS와 충돌 가능

2. 가상머신(Virtual Machine)

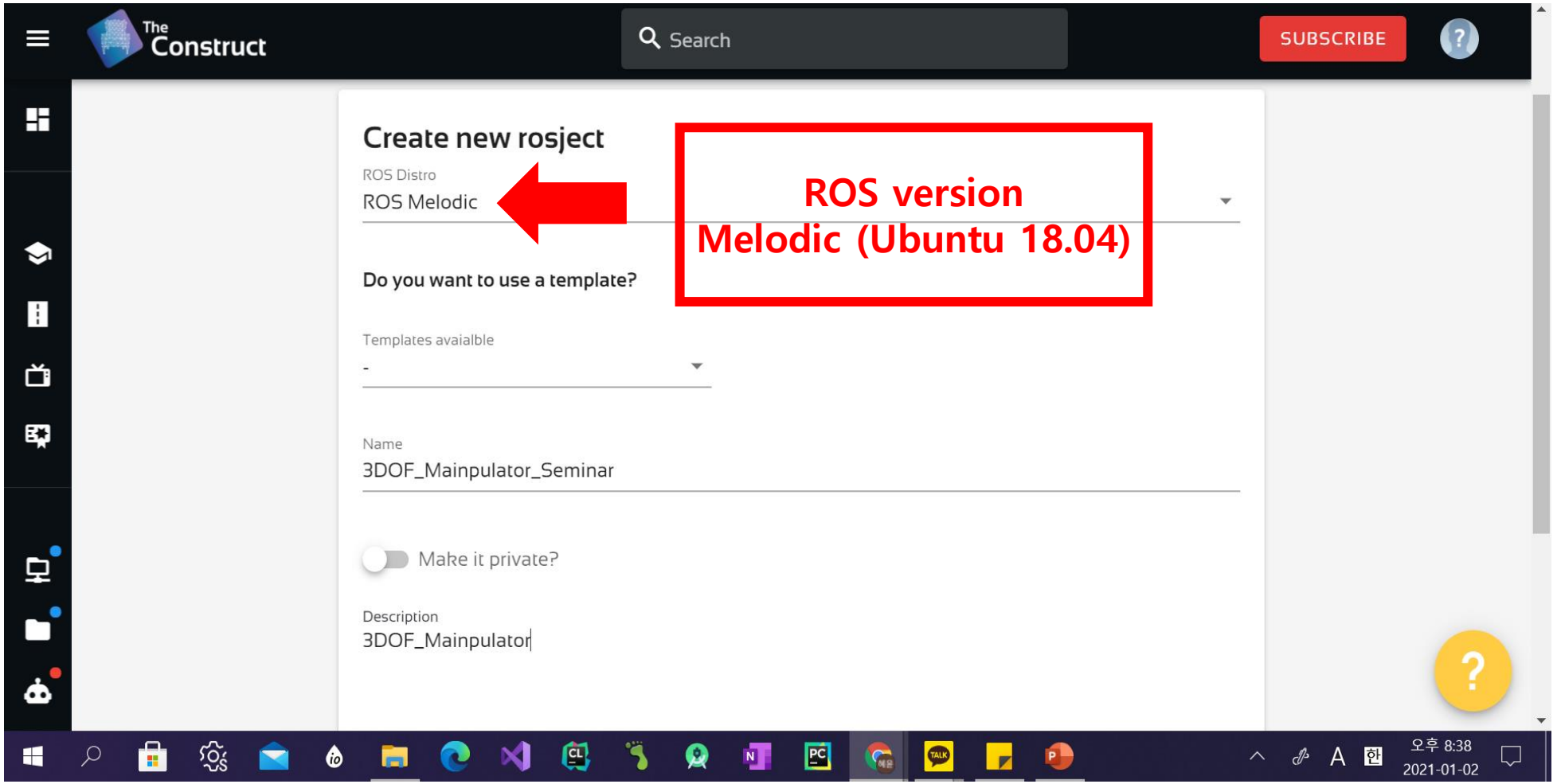
3. ROS Development Studio
   - Web에서 Ubuntu, ROS 환경 사용가능
   - 세미나 시뮬레이션만 할 경우 추천

URDF

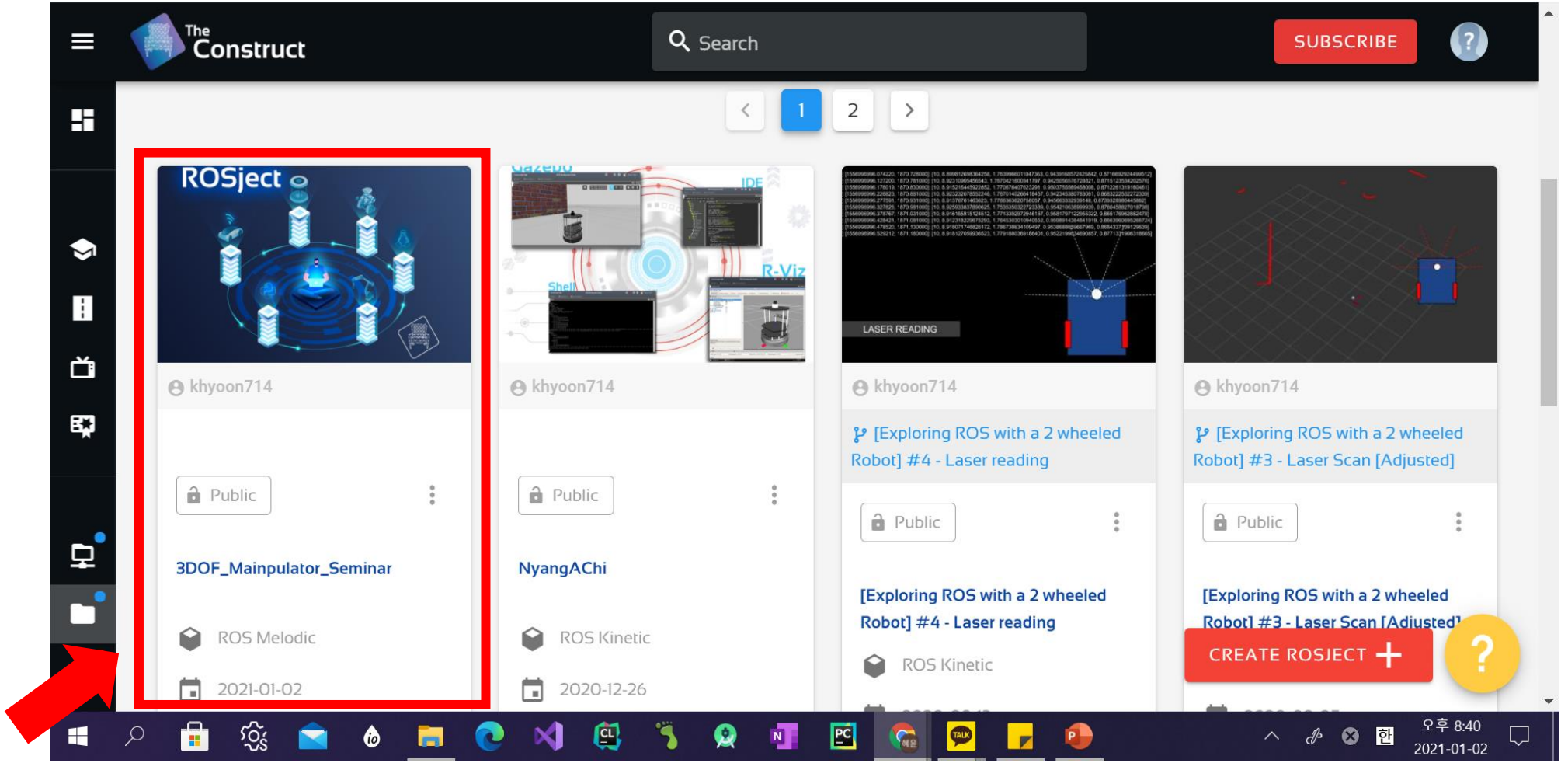
ROS Development Studio – Project 생성



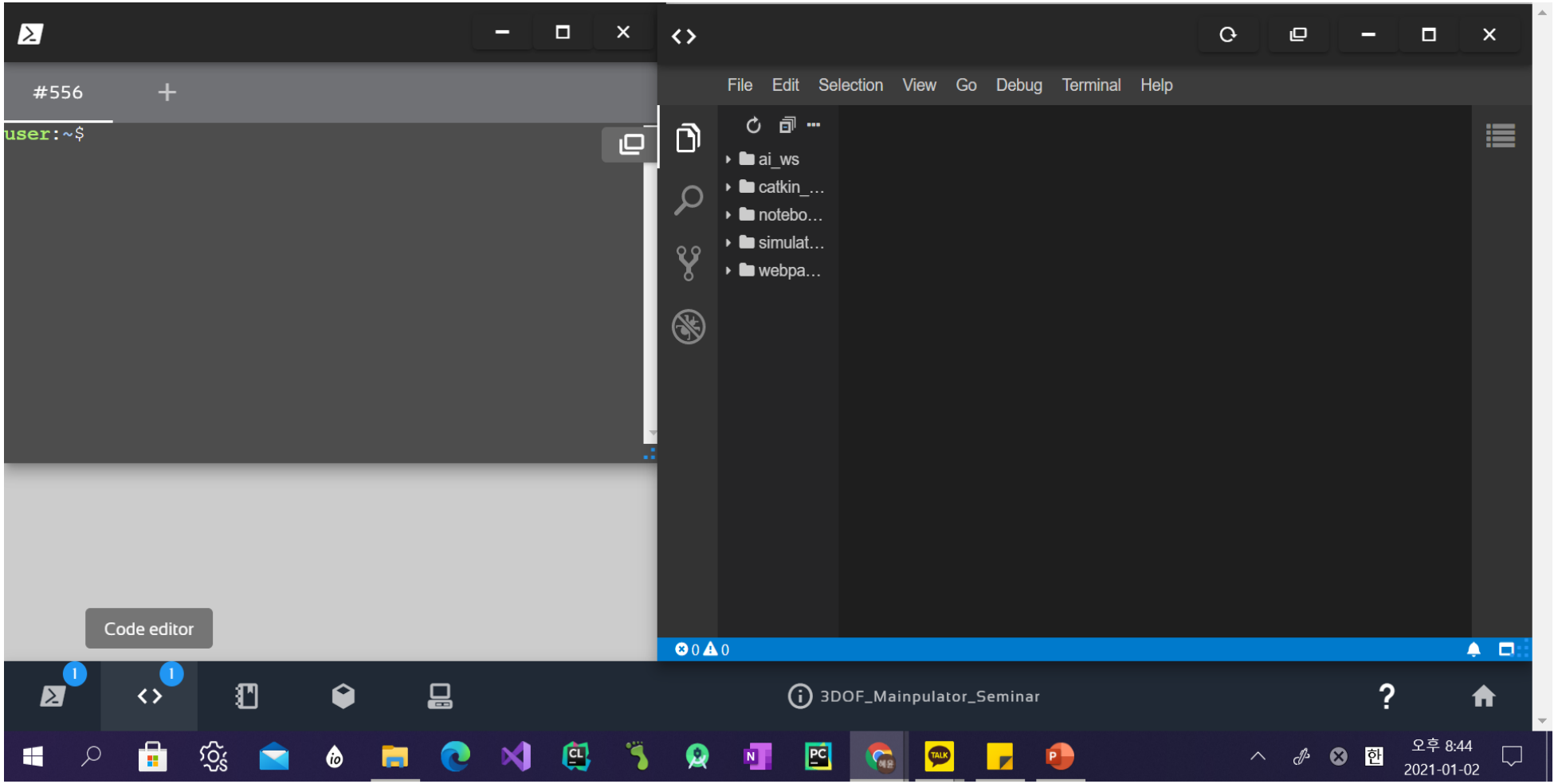
ROS Development Studio – Project 생성



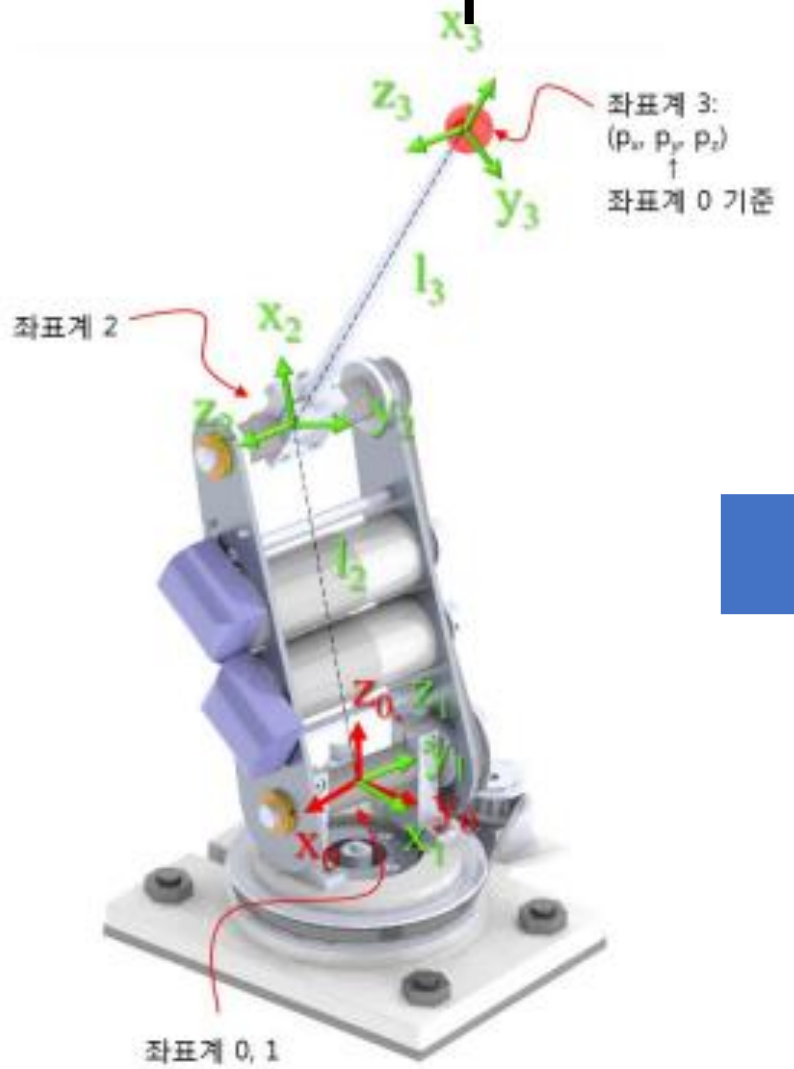
ROS Development Studio – Project 생성



ROS Development Studio – tool



ROS Development Studio – 구조도



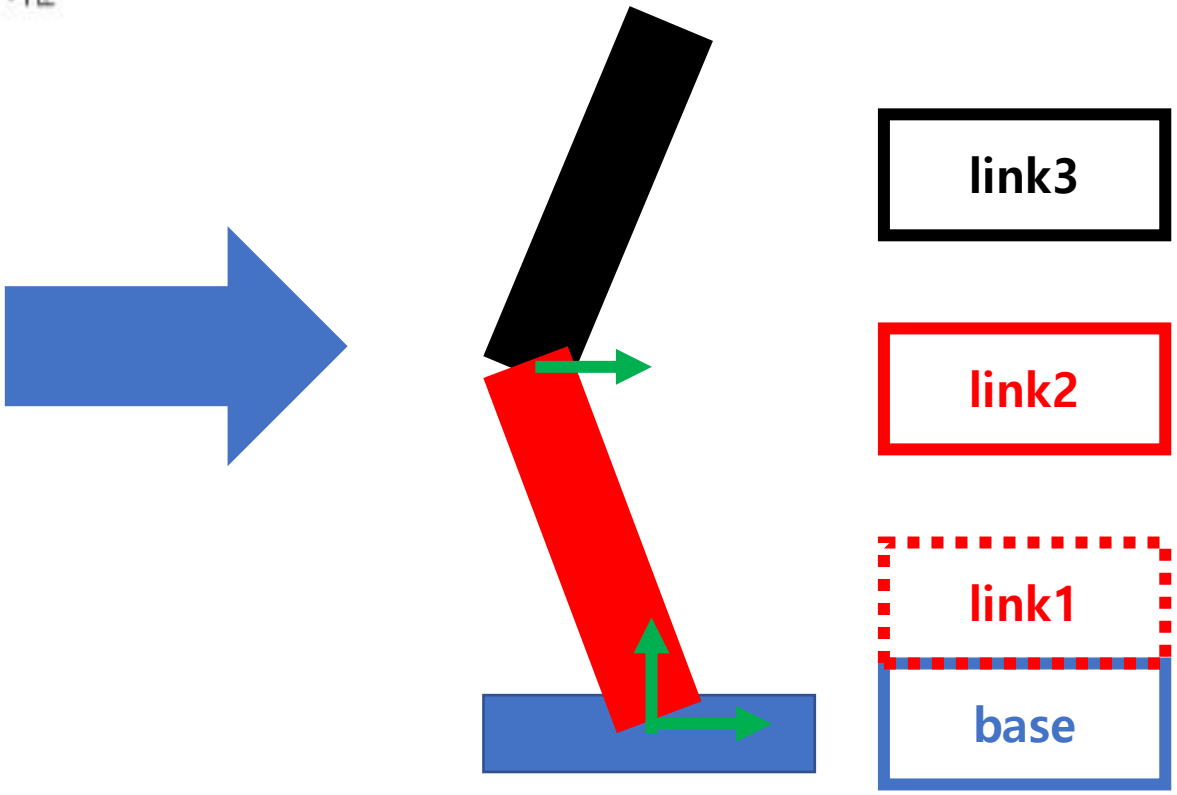
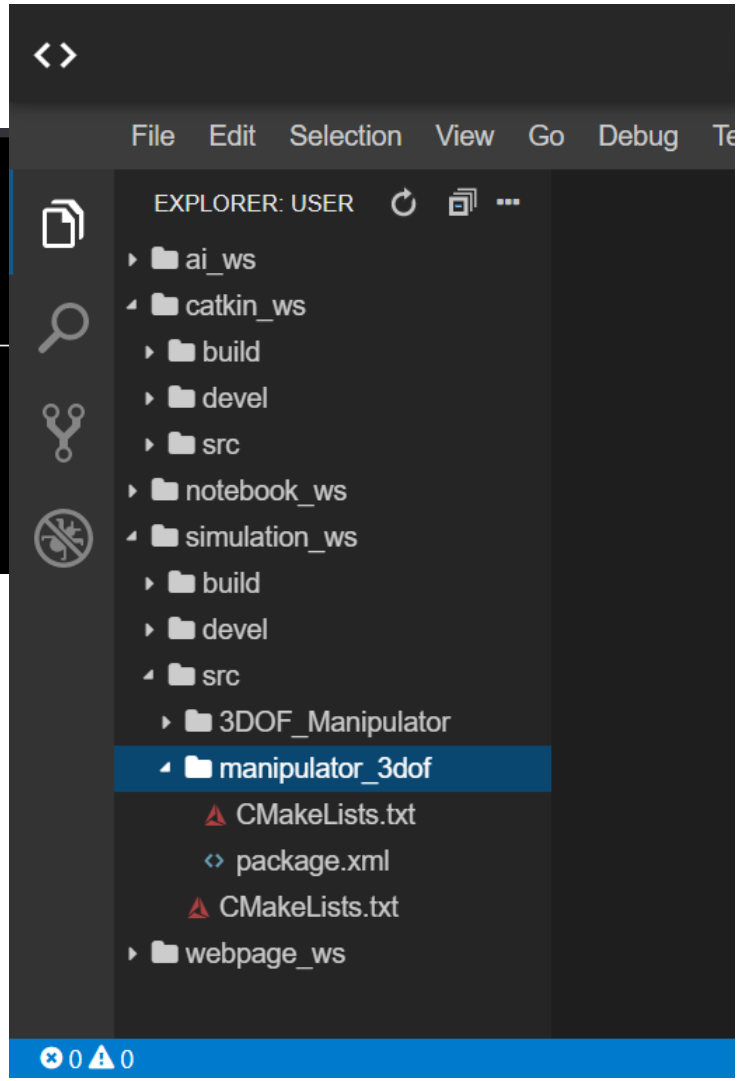


그림 출처: http://robot.hanbat.ac.kr/May11/teaching/lab/3%20DOF%20robot%20arm_rev2.pd

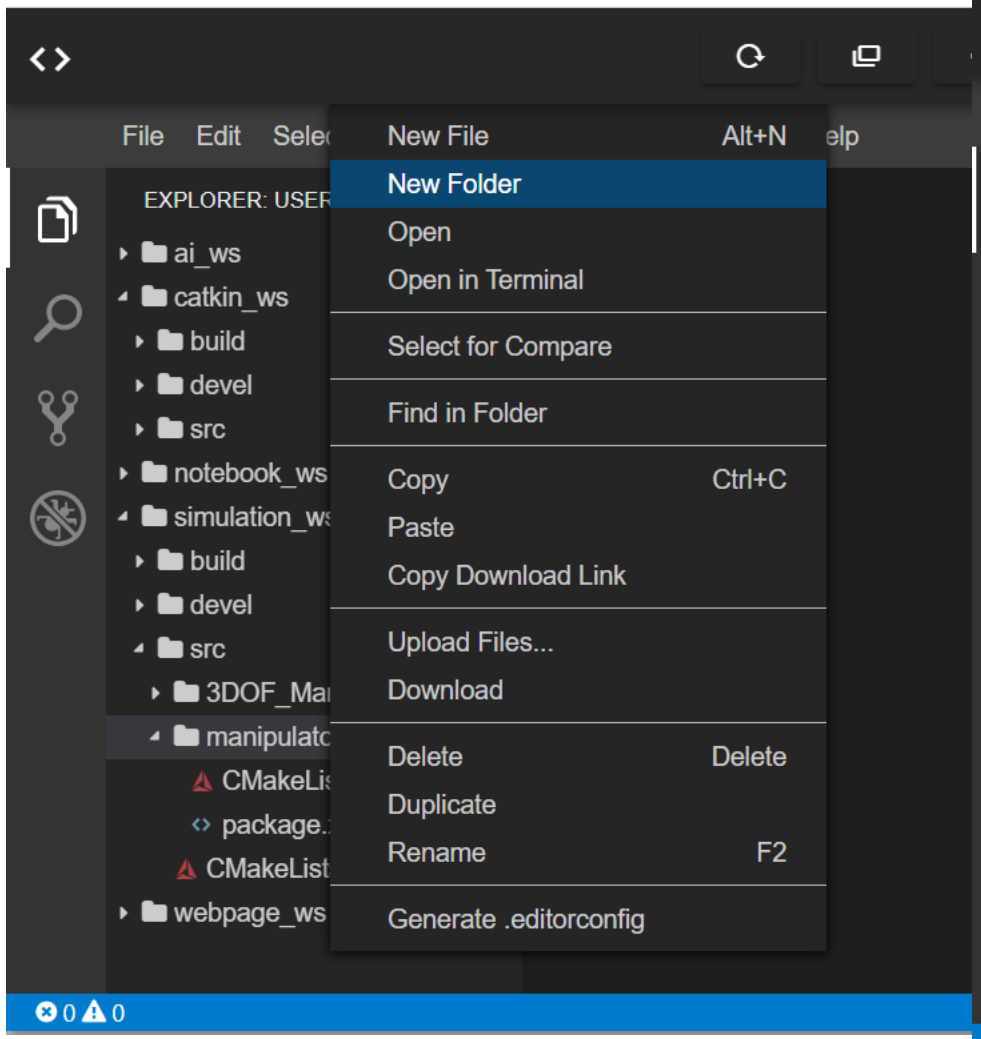
ROS Development Studio – 명령어

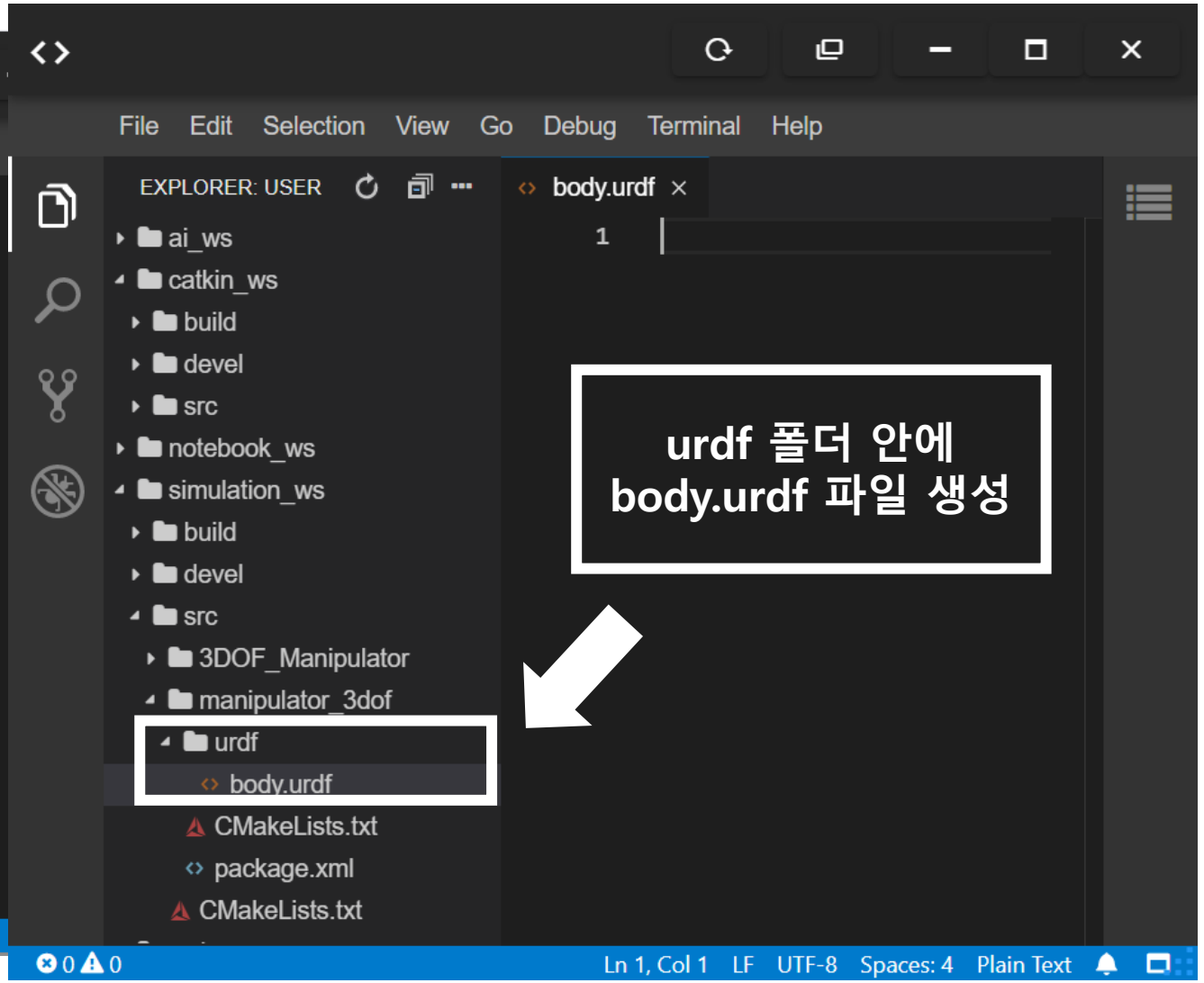
```
user:~$ cd simulation_ws/src/
user:~/simulation_ws/src$ catkin_create_pkg manipulator_3dof urdf
Created file manipulator_3dof/package.xml
Created file manipulator_3dof/CMakeLists.txt
Successfully created files in /home/user/simulation_ws/src/manipulator_
ase adjust the values in package.xml.
user:~/simulation_ws/src$ ls
3DOF_Manipulator  CMakeLists.txt  manipulator_3dof
user:~/simulation_ws/src$
```



- **cd : 폴더 이동**
- **catkin_create_pkg <package name> depend : depend에 의존하는 package 생성**
- **ls : 현재 경로의 파일, 폴더 보여줌**

ROS Development Studio –urdf 파일 생성





ROS Development Studio – origin

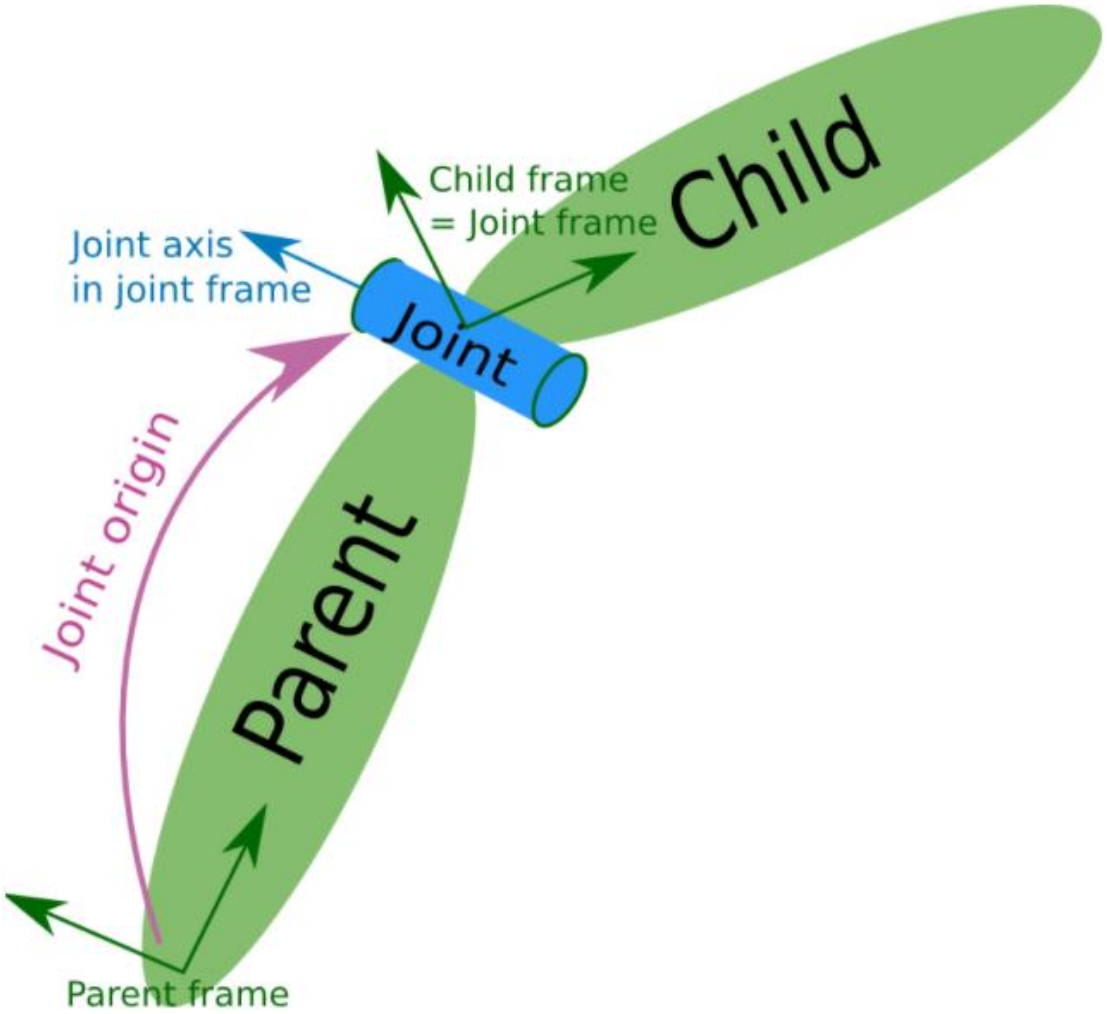


그림 출처: http://wiki.ros.org/urdf/XML/joint

ROS Development Studio – urdf

```
<?xml version='1.0' ?>
<robot name='mainpulator_body'>

    <material name="Black">
        <color rgba="0.0 0.0 0.0 1.0"/>
    </material>
    <material name="White">
        <color rgba="1.0 1.0 1.0 1.0"/>
    </material>

    <link name='base'>
        <visual>
            <origin xyz='0 0 0.25' rpy='0 0 0'/>
            <geometry>
                <box size='1 1 0.5'/>
            </geometry>
            <material name='Black'/>
        </visual>
    </link>
```

ROS Development Studio – urdf

```
21      <joint name='base_to_link_1' type='revolute'>
22          <parent link='base'/>
23          <child link='link_1'/>
24          <limit effort='100' lower='-3.14' upper='3.14' velocity='1'/>
25          <origin xyz='0 0 0.5' rpy='0 0 0'/>
26          <axis xyz='0 0 1'/>
27      </joint>
28
29      <link name='link_1'>
30          <visual>
31              <origin xyz='0 0 2.5' rpy='0 0 0'/>
32              <geometry>
33                  <cylinder radius='0.3' length='5'/>
34              </geometry>
35              <material name='White'/>
36          </visual>
37      </link>
```

ROS Development Studio – urdf 확인

```
user:~/simulation_ws/src/manipulator_3dof$ check_urdf urdf/body.urdf
robot name is: mainpulator_body
---------- Successfully Parsed XML ---------------
root Link: base has 1 child(ren)
    child(1):  link_1
        child(1):  link_2
            child(1):  link_3
```

Rviz

ROS Development Studio – launch/rviz.launch

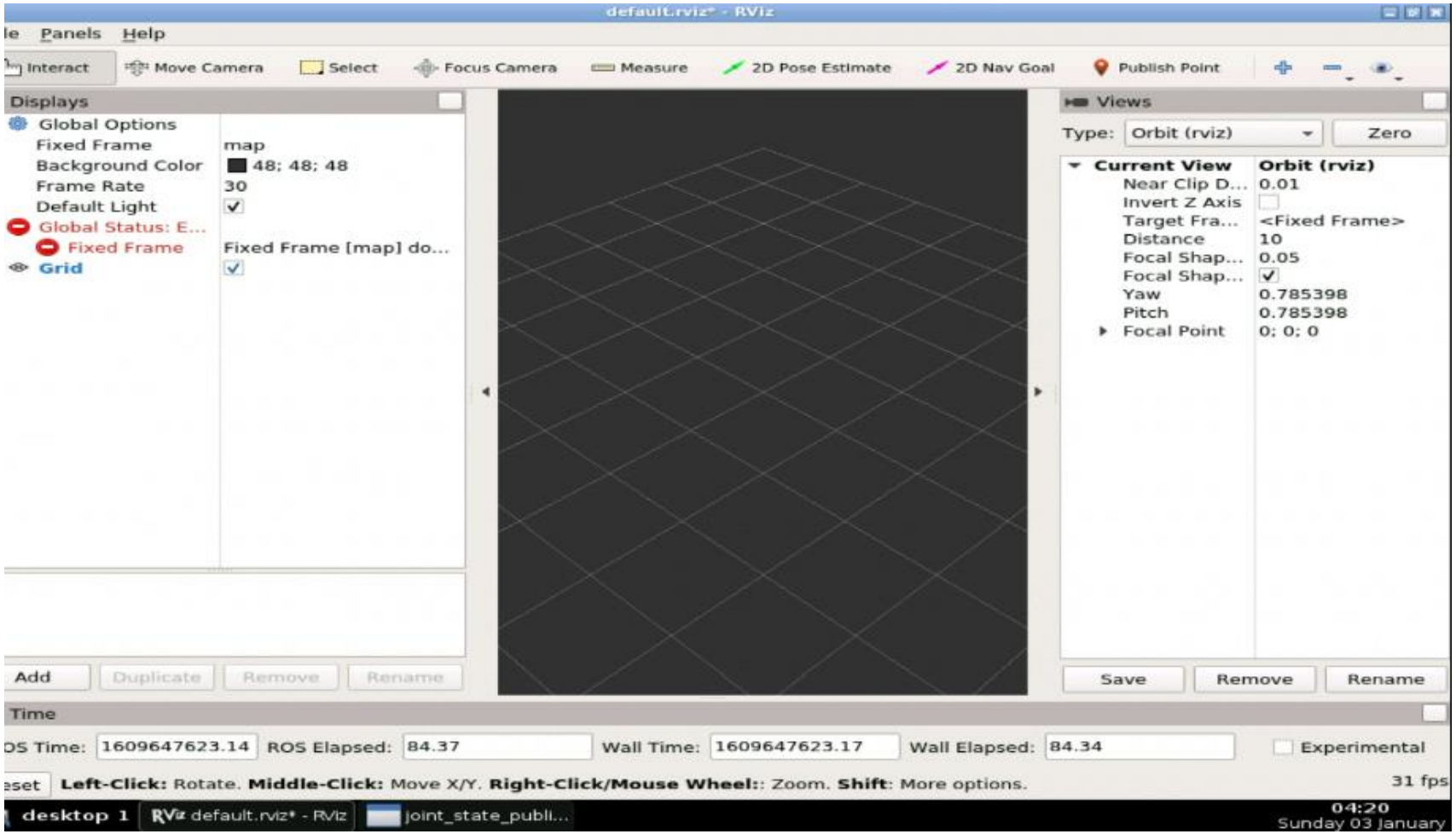
```
<launch>

  <param name="robot_description" textfile="$(find manipulator_3dof)/urdf/body.urdf"/>

  <!-- Combine joint values -->
  <node name="robot_state_publisher" pkg="robot_state_publisher" type="state_publisher"/>

  <!-- Show in Rviz   -->
  <node name="rviz" pkg="rviz" type="rviz" />

  <!-- send joint values -->
  <node name="joint_state_publisher" pkg="joint_state_publisher" type="joint_state_publisher">
    <param name="use_gui" value="True"/>
  </node>

</launch>
```

ROS Development Studio – rviz

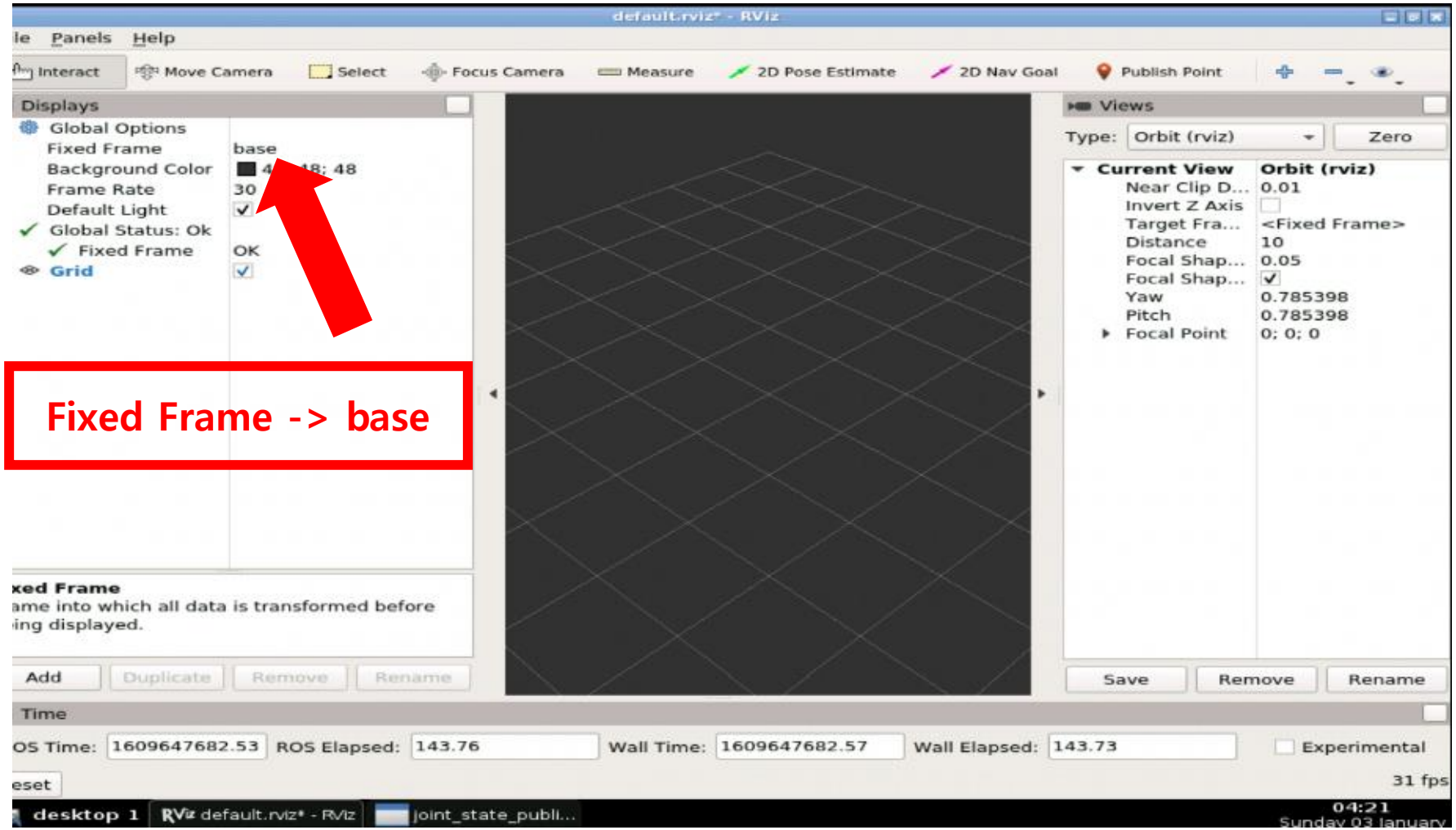
```
user:~/simulation_ws/src/manipulator_3dof$  cd ~/simulation_ws/
user:~/simulation_ws$ catkin_make
Base path: /home/user/simulation_ws
Source space: /home/user/simulation_ws/src
Build space: /home/user/simulation_ws/build
Devel space: /home/user/simulation_ws/devel
```

```
user:~/simulation_ws$ roslaunch manipulator_3dof rviz.launch
WARNING: Package name "3DOF_Manipulator" does not follow the nam
ing conventions. It should start with a lower case letter and on
ly contain lower case letters, digits, underscores, and dashes.
... logging to /home/user/.ros/log/cb4ed89e-4d7a-11eb-8e98-0242a
c1a0008/roslaunch-3_xterm-1594.log
Checking log directory for disk usage. This may take a while.
Press Ctrl-C to interrupt
Done checking log file disk usage. Usage is <1GB.
```

ROS Development Studio – rviz

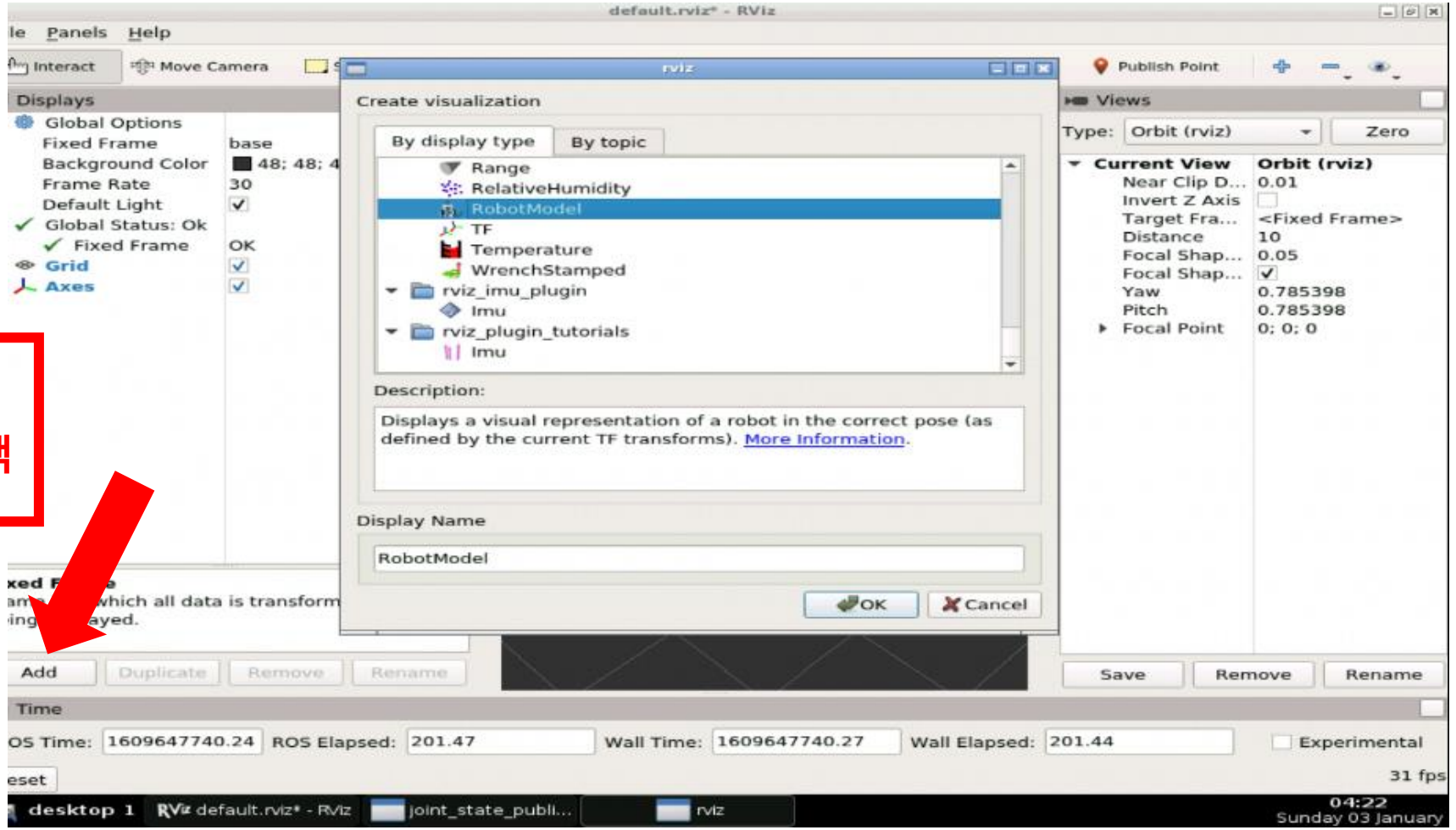


ROS Development Studio – rviz



ROS Development Studio – rviz

Add 클릭 후
RobotModel 선택



ROS Development Studio – rviz

Joint 각도 조절 가능