

Simulation 1

로봇팔 세미나 - 김혜윤 -

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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

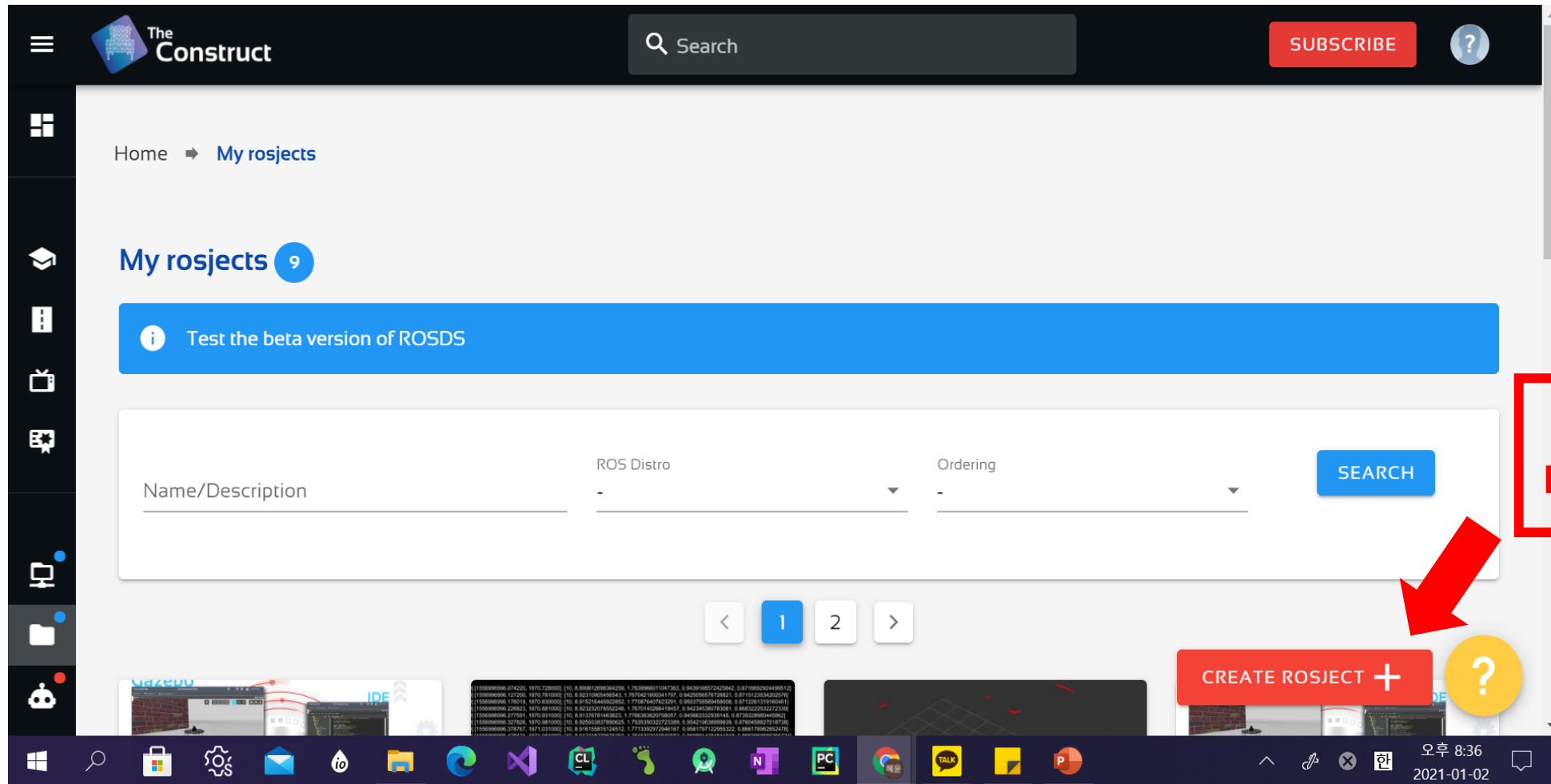
2. 가상머신(Virtual Machine)

3. ROS Development Studio

- Web에서 Ubuntu, ROS 환경 사용가능
- 세미나 시뮬레이션만 할 경우 추천

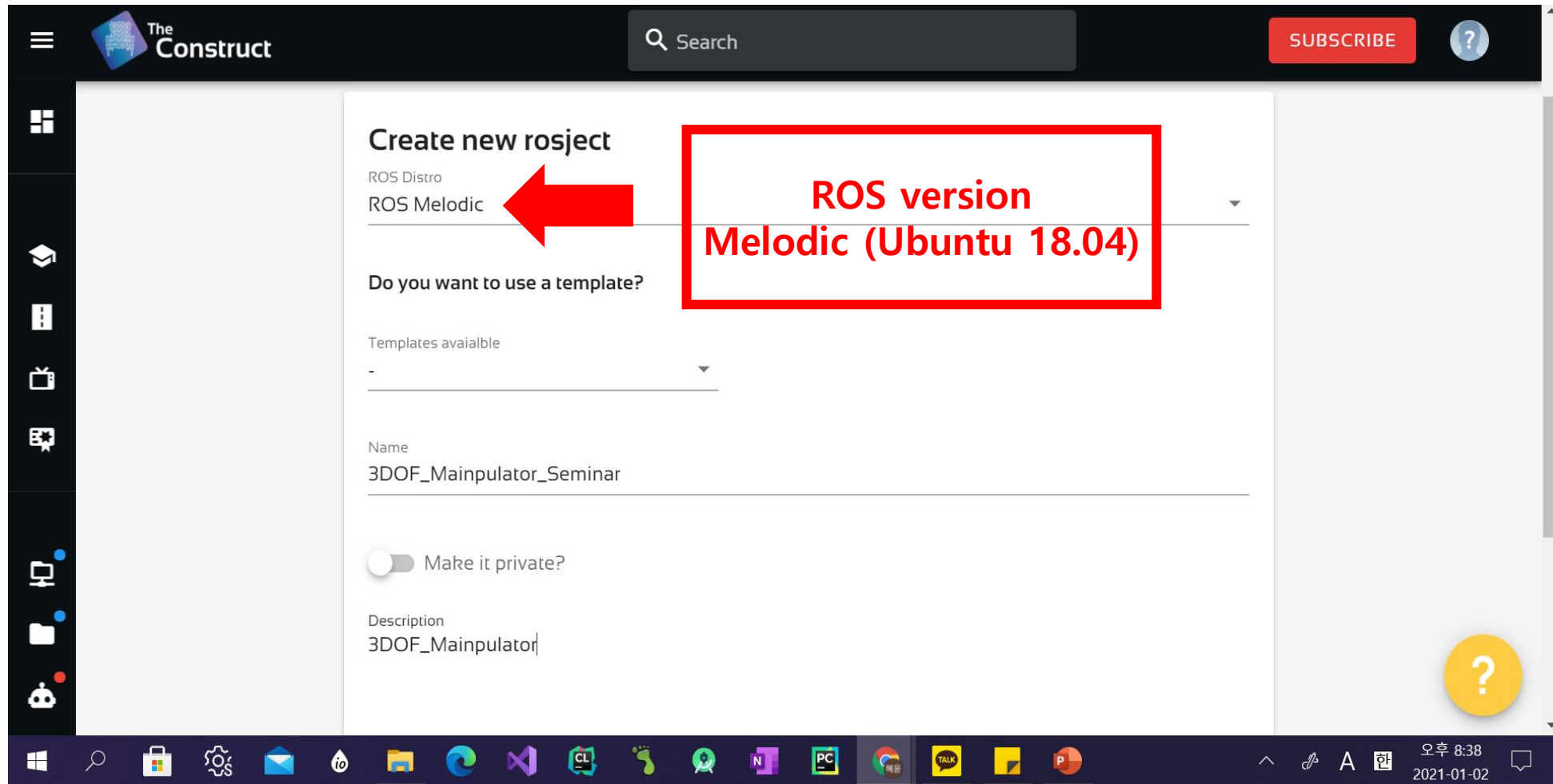
URDF

ROS Development Studio – Project 생성



**CREATE
ROSJECT 클릭**

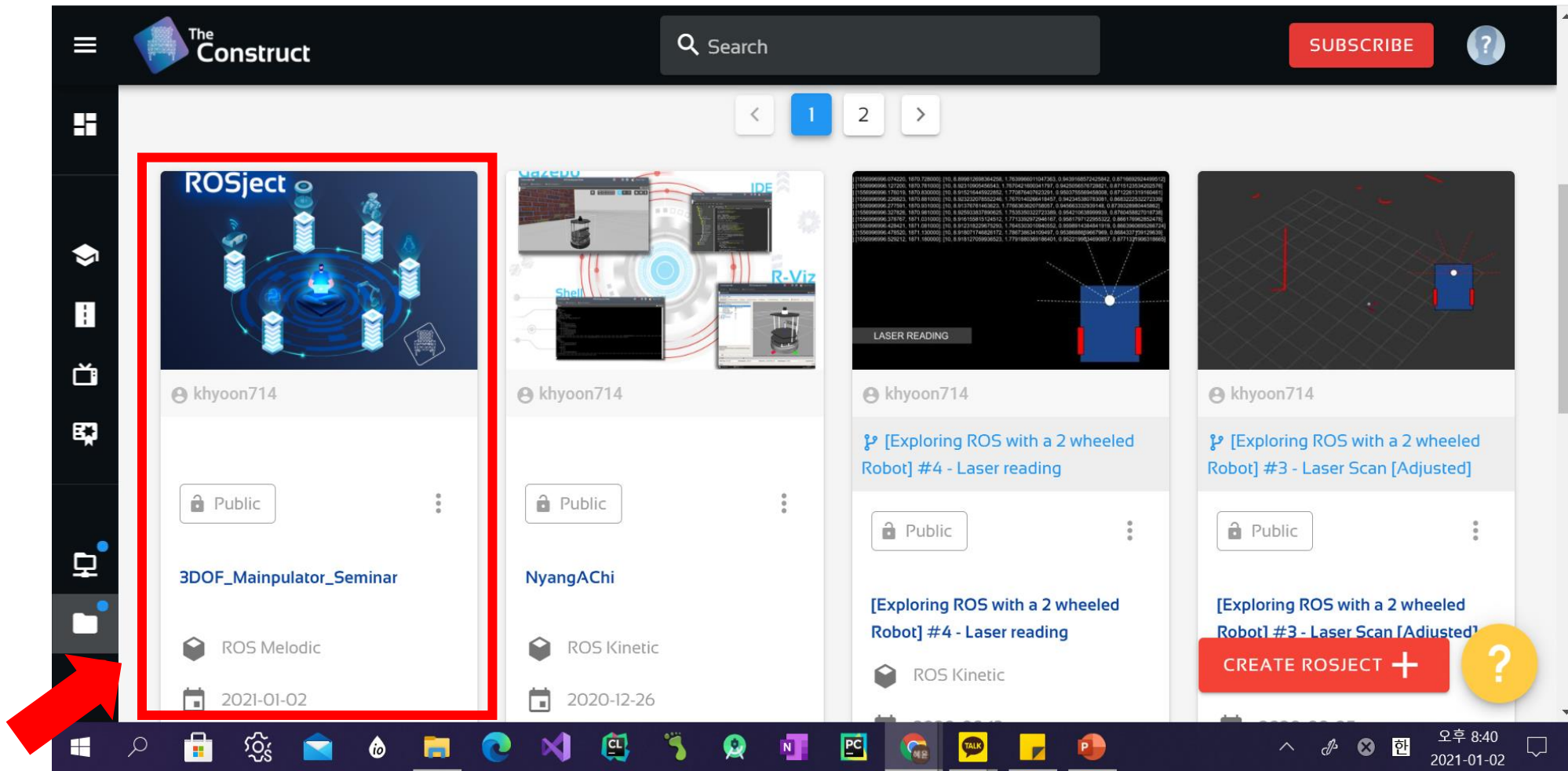
ROS Development Studio – Project 생성



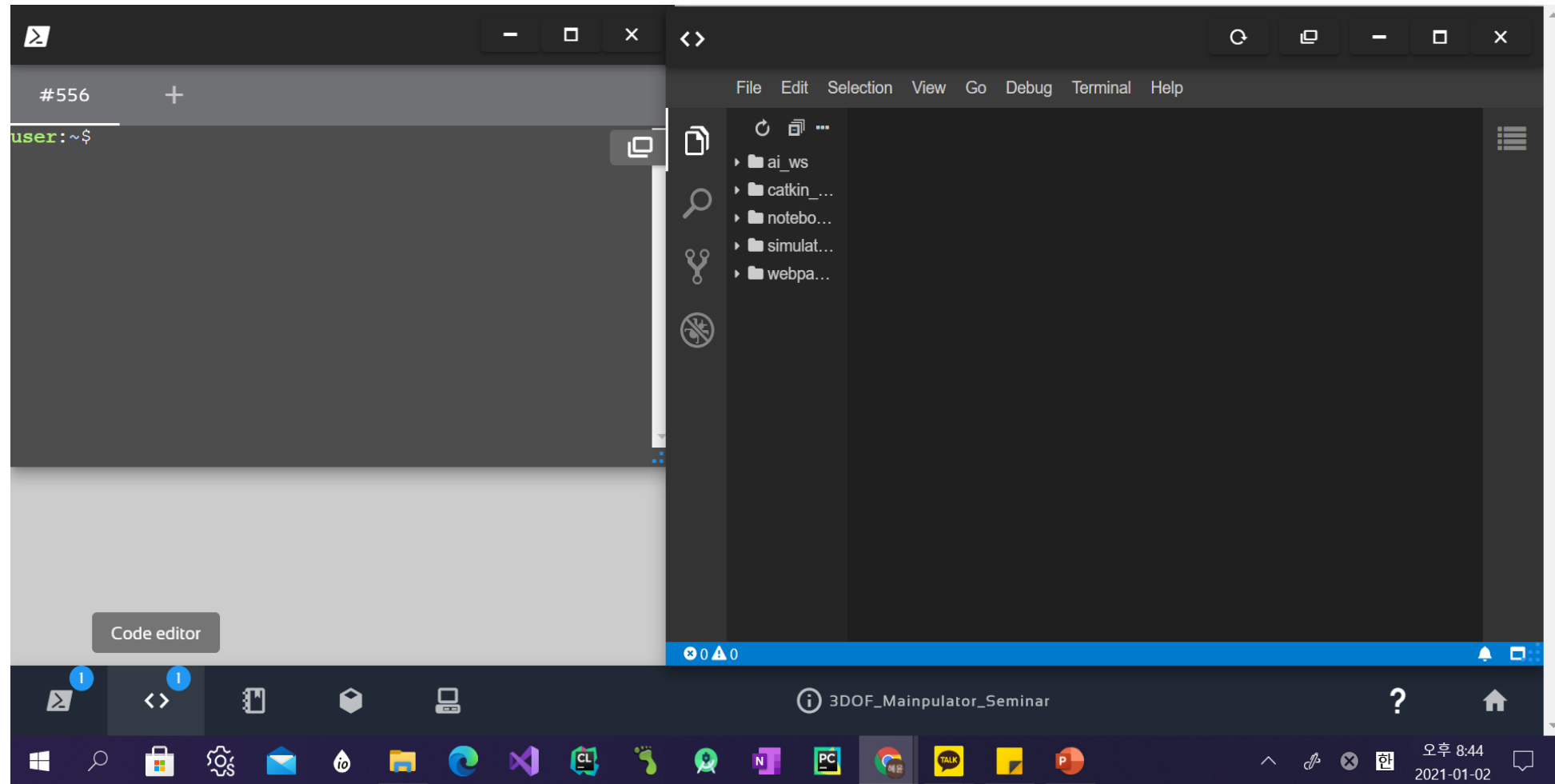
The screenshot shows the 'The Construct' ROS Development Studio interface. The top navigation bar includes a menu icon, the 'The Construct' logo, a search bar, a 'SUBSCRIBE' button, and a help icon. The main content area is titled 'Create new rosject'. It features a dropdown menu for 'ROS Distro' with 'ROS Melodic' selected, highlighted by a red arrow and a red box containing the text 'ROS version Melodic (Ubuntu 18.04)'. Below this is a checkbox for 'Do you want to use a template?' and a dropdown for 'Templates available'. The 'Name' field contains '3DOF_Mainpulator_Seminar'. There is a toggle switch for 'Make it private?' and a 'Description' field with the text '3DOF_Mainpulator'. The bottom of the screen shows a Windows taskbar with various application icons and a system clock indicating 8:38 PM on 2021-01-02.

ROS version
Melodic (Ubuntu 18.04)

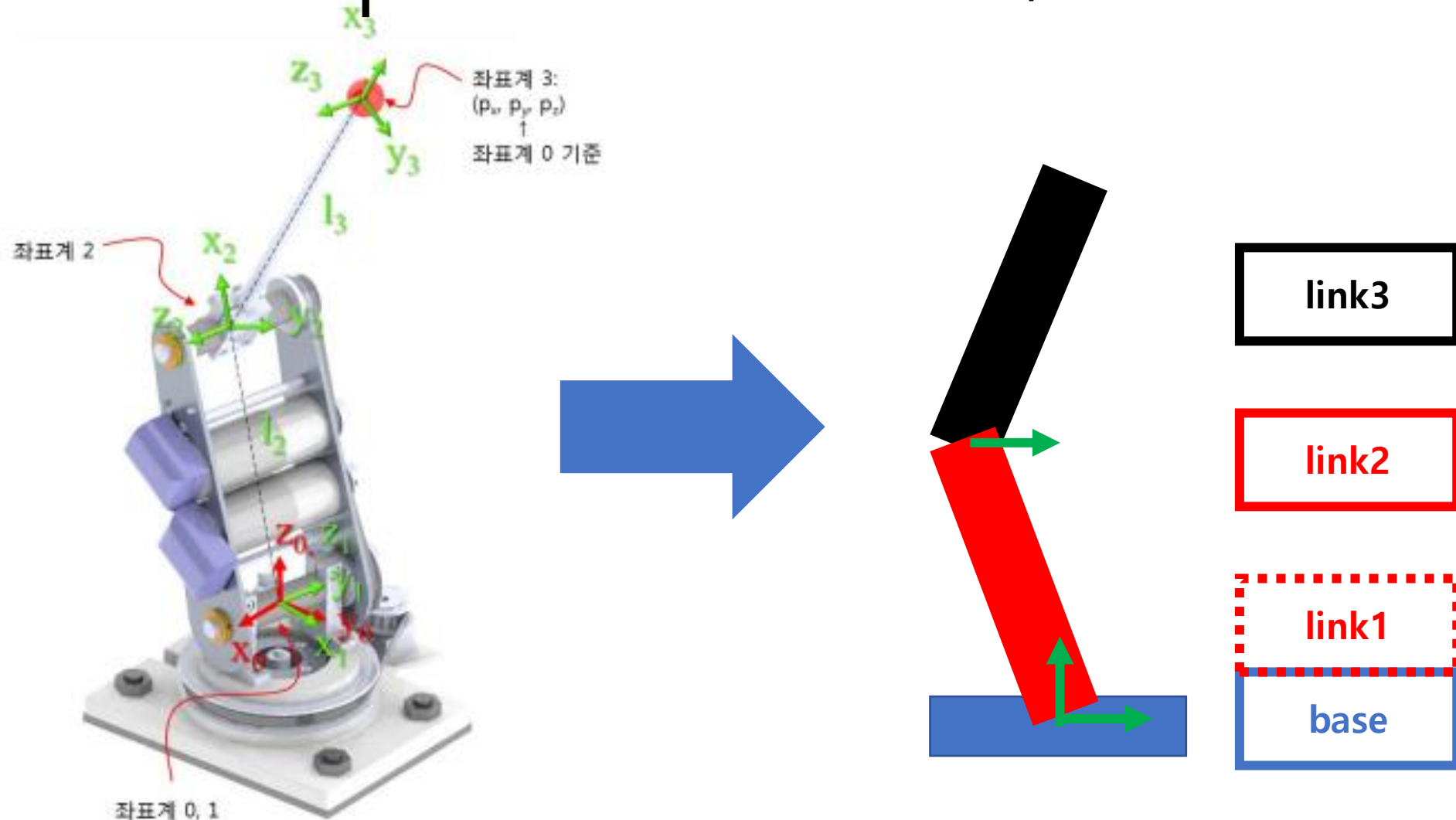
ROS Development Studio – Project 생성



ROS Development Studio – tool



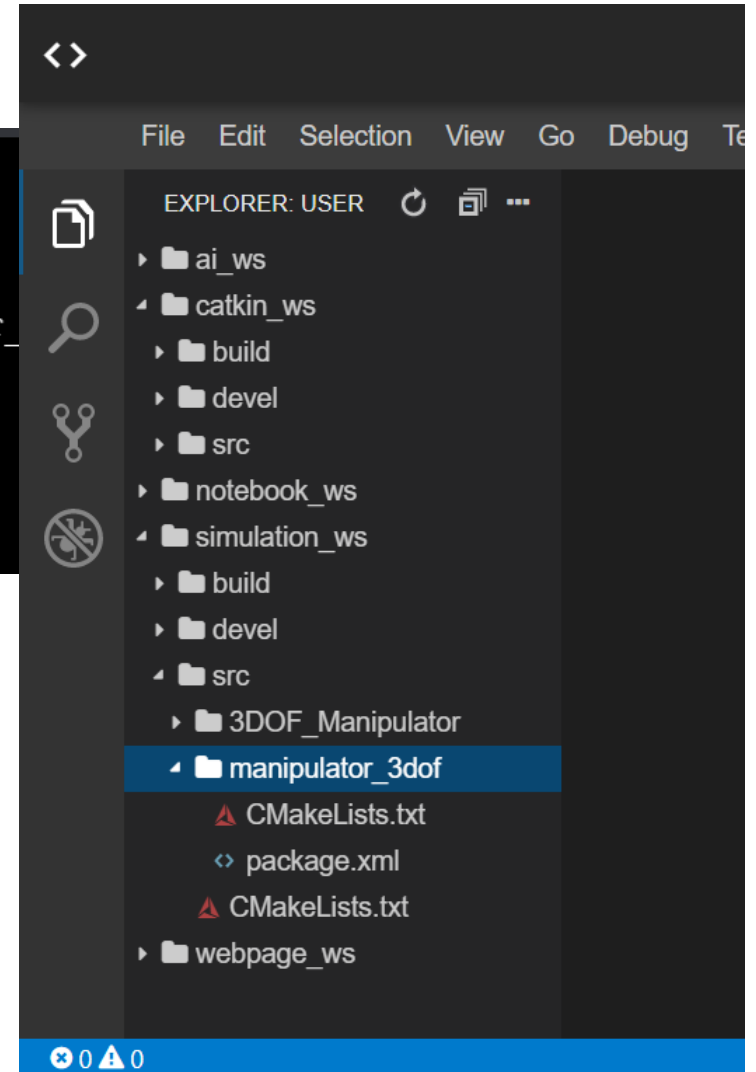
ROS Development Studio – 구조도



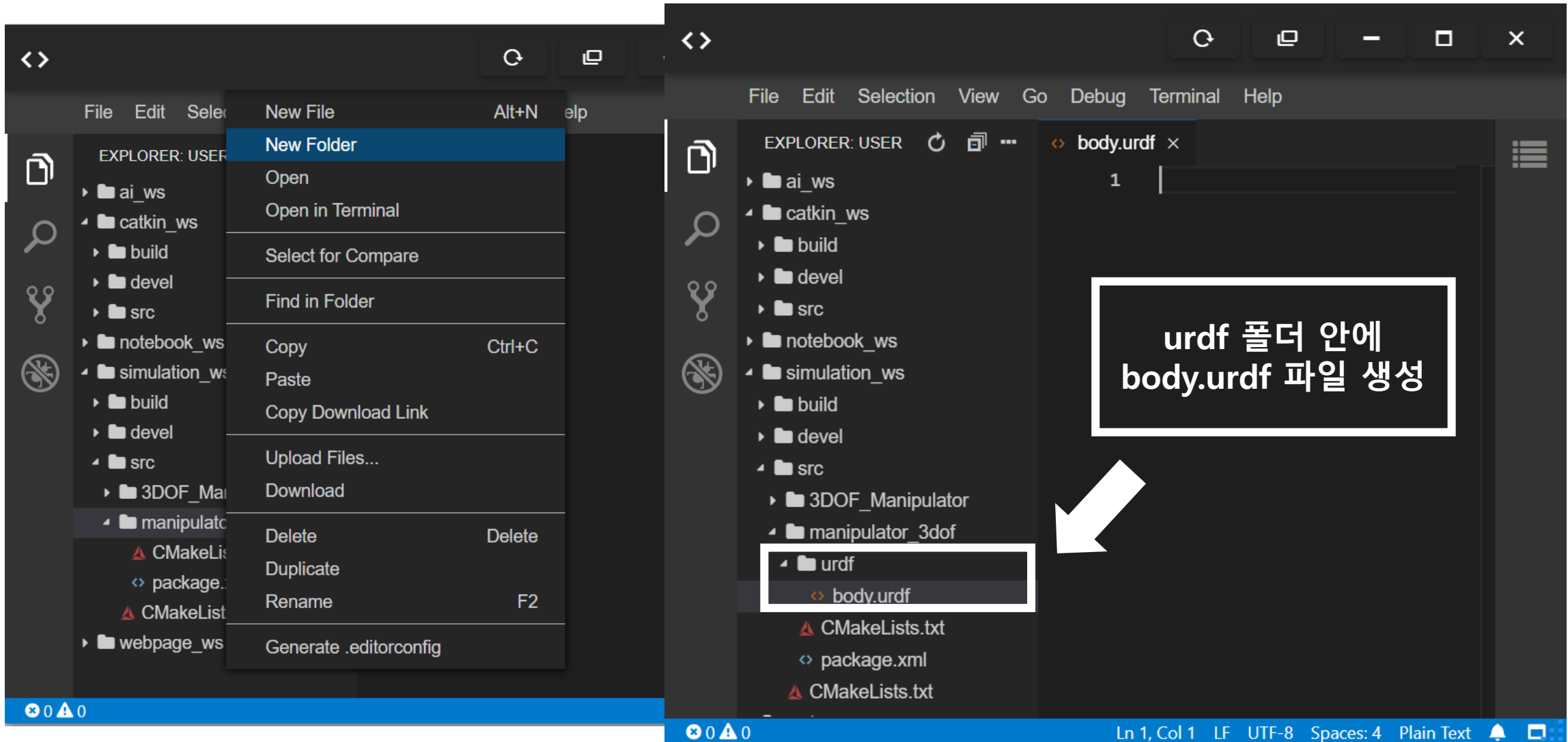
ROS Development Studio – 명령어

```
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_3dof  
Please adjust the values in package.xml.  
user:~/simulation_ws/src$ ls  
3DOF_Manipulator  CMakeLists.txt  manipulator_3dof  
user:~/simulation_ws/src$
```

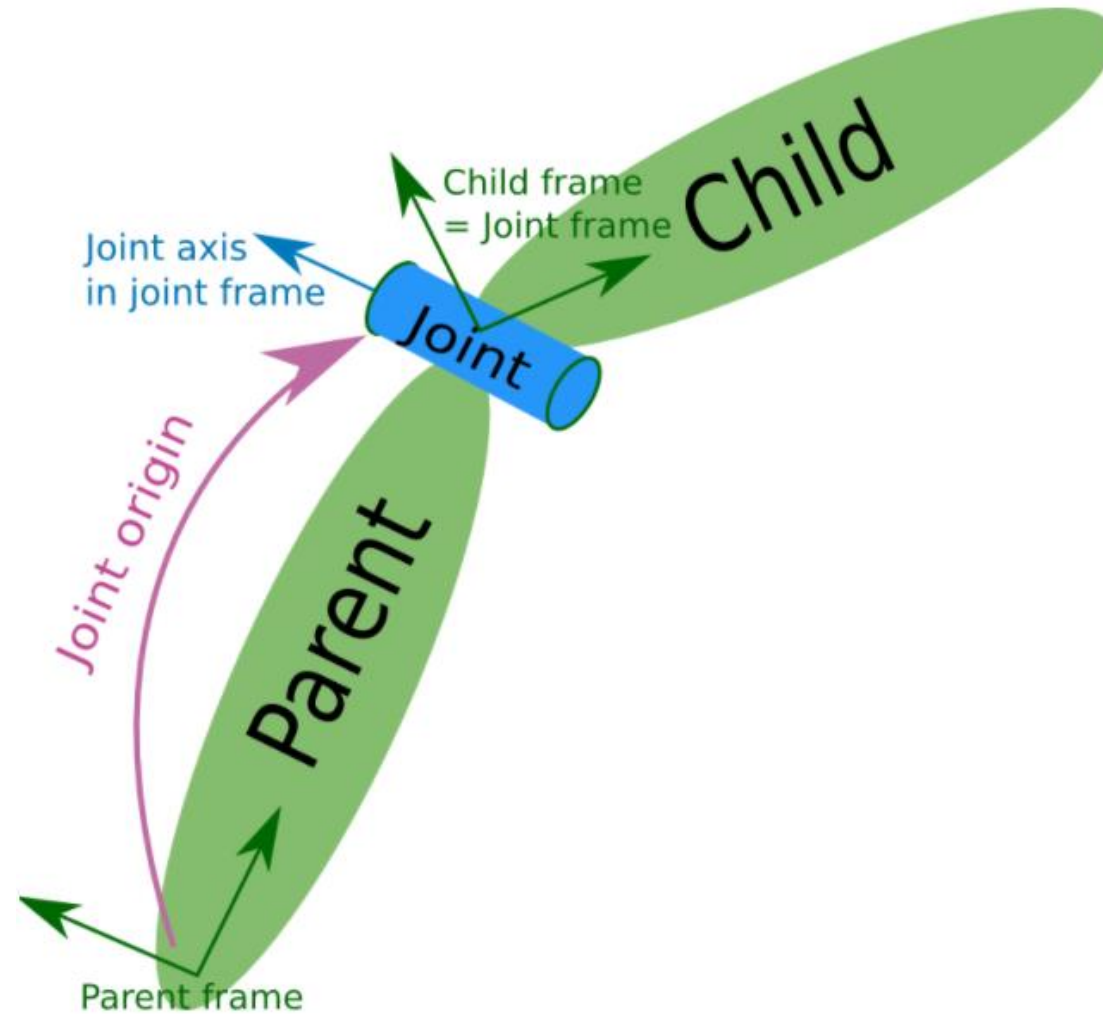
- cd : 폴더 이동
- catkin_create_pkg <package name> depend : depend에 의존하는 package 생성
- ls : 현재 경로의 파일, 폴더 보여줌



ROS Development Studio –urdf 파일 생성



ROS Development Studio – origin



ROS Development Studio – urdf

```
1  <?xml version='1.0' ?>
2  <robot name='mainpulator_body'>
3
4      <material name="Black">
5          <color rgba="0.0 0.0 0.0 1.0"/>
6      </material>
7      <material name="White">
8          <color rgba="1.0 1.0 1.0 1.0"/>
9      </material>
10
11     <link name='base'>
12         <visual>
13             <origin xyz='0 0 0.25' rpy='0 0 0'/>
14             <geometry>
15                 <box size='1 1 0.5'/>
16             </geometry>
17             <material name='Black'/>
18         </visual>
19     </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

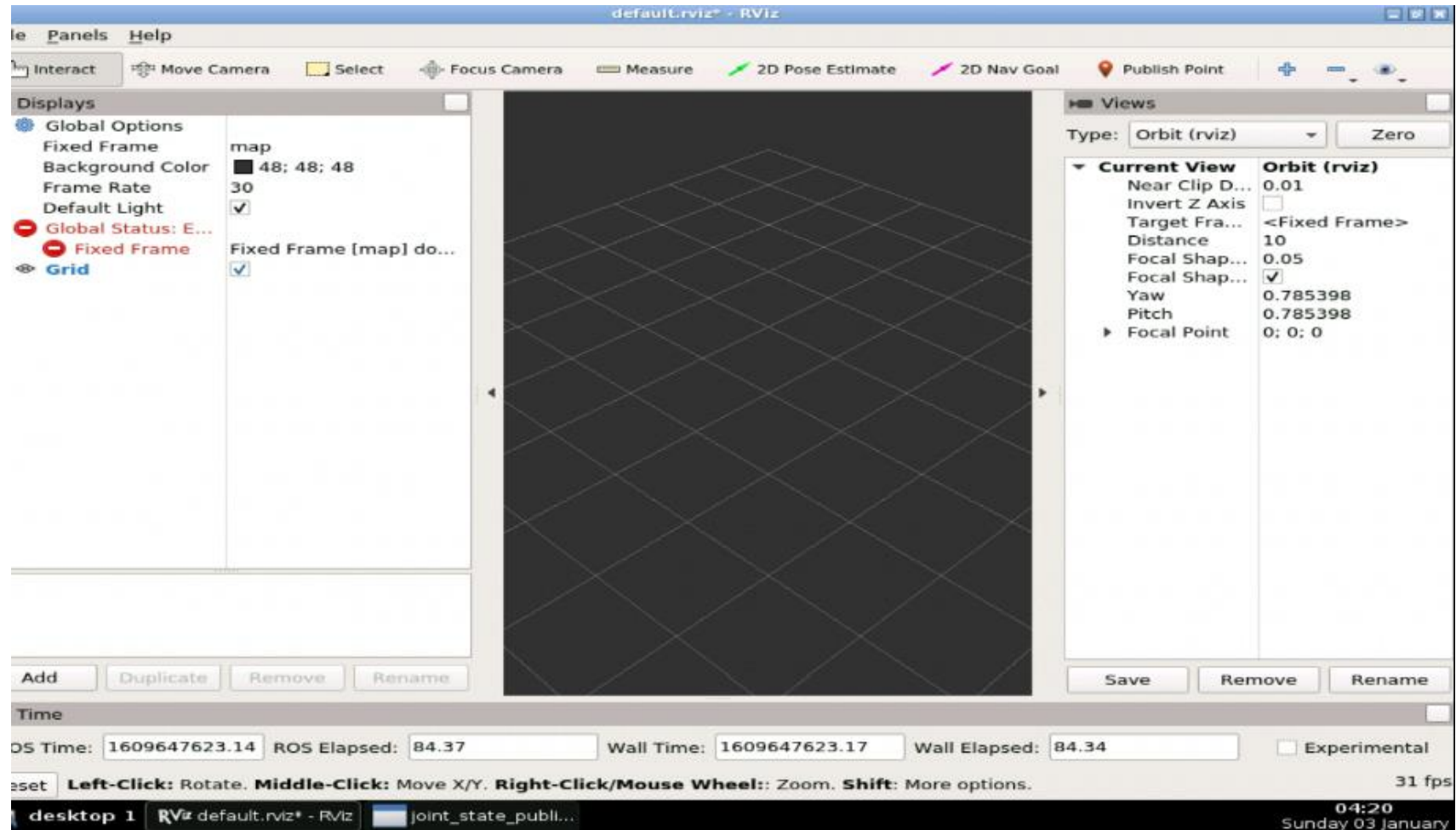
```
1 <launch>
2
3   <param name="robot_description" textfile="$(find manipulator_3dof)/urdf/body.urdf"/>
4
5   <!-- Combine joint values -->
6   <node name="robot_state_publisher" pkg="robot_state_publisher" type="state_publisher"/>
7
8   <!-- Show in Rviz -->
9   <node name="rviz" pkg="rviz" type="rviz" />
10
11  <!-- send joint values -->
12  <node name="joint_state_publisher" pkg="joint_state_publisher" type="joint_state_publisher">
13    <param name="use_gui" value="True"/>
14  </node>
15
16 </launch>
```

ROS Development Studio – rviz

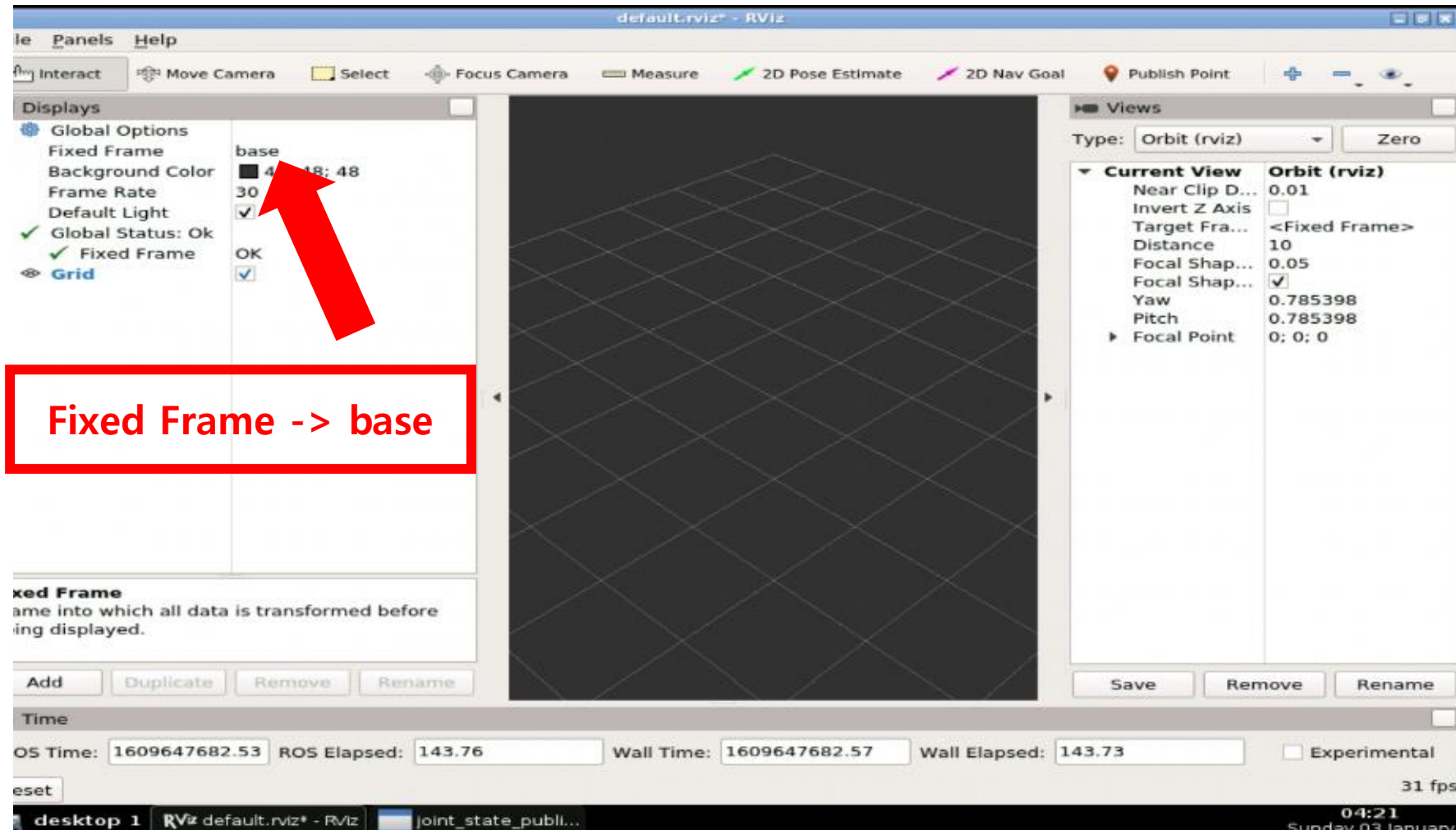
```
user:~/simulation_ws/src/manipulator_3dof$ cd ~/simulation_ws/  
user:~/simulation_ws$ catkin_make  
Base path: /home/user/simulation_ws  
Source space: /home/user/simulation_ws/src  
Build space: /home/user/simulation_ws/build  
Devel space: /home/user/simulation_ws/devel
```

```
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.
```

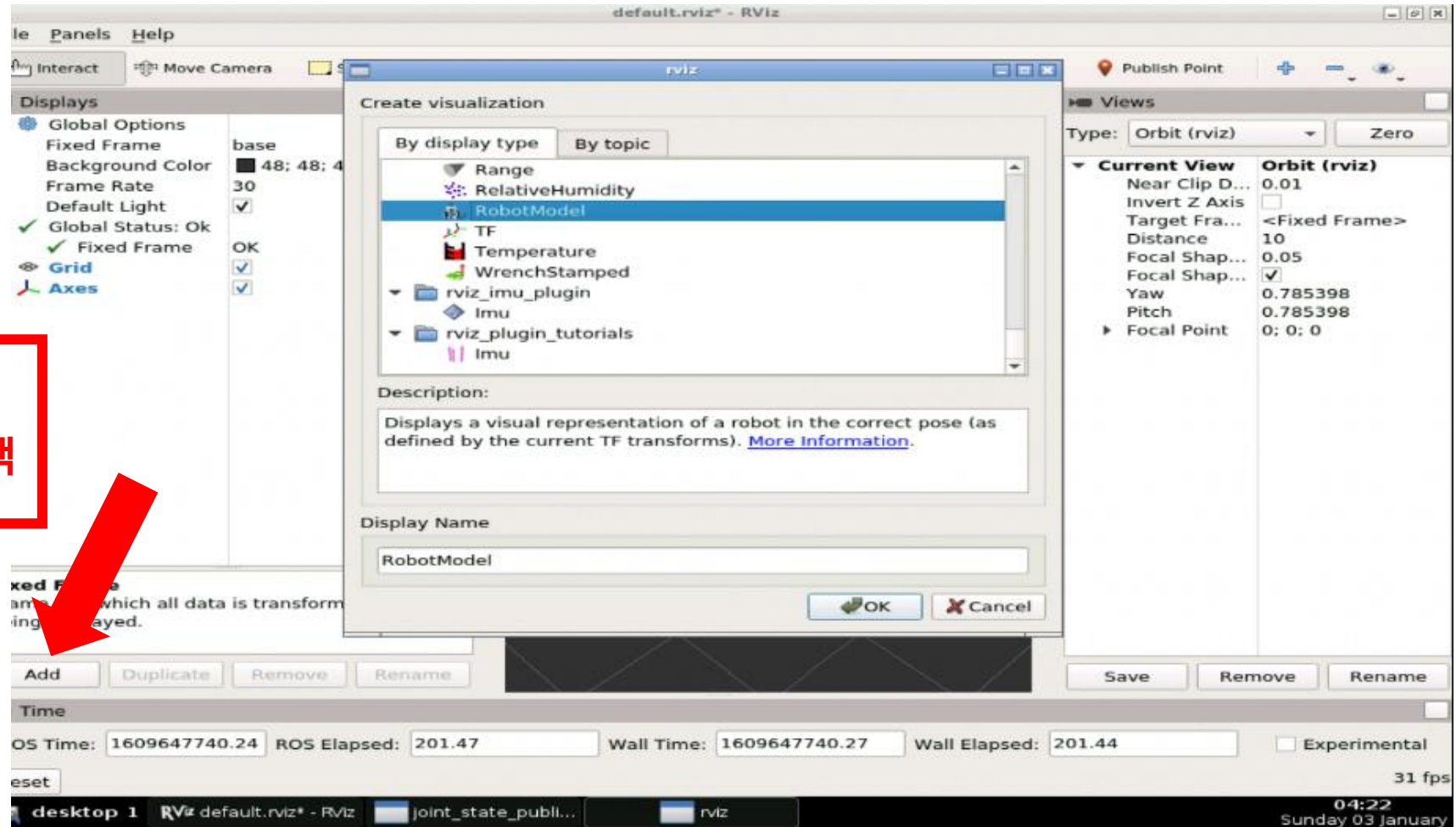
ROS Development Studio – rviz



ROS Development Studio – rviz



ROS Development Studio – rviz



ROS Development Studio – rviz

Joint 각도
조절 가능

