

URDF - mira robot

AI ROBOT

Exported on 12/04/2021

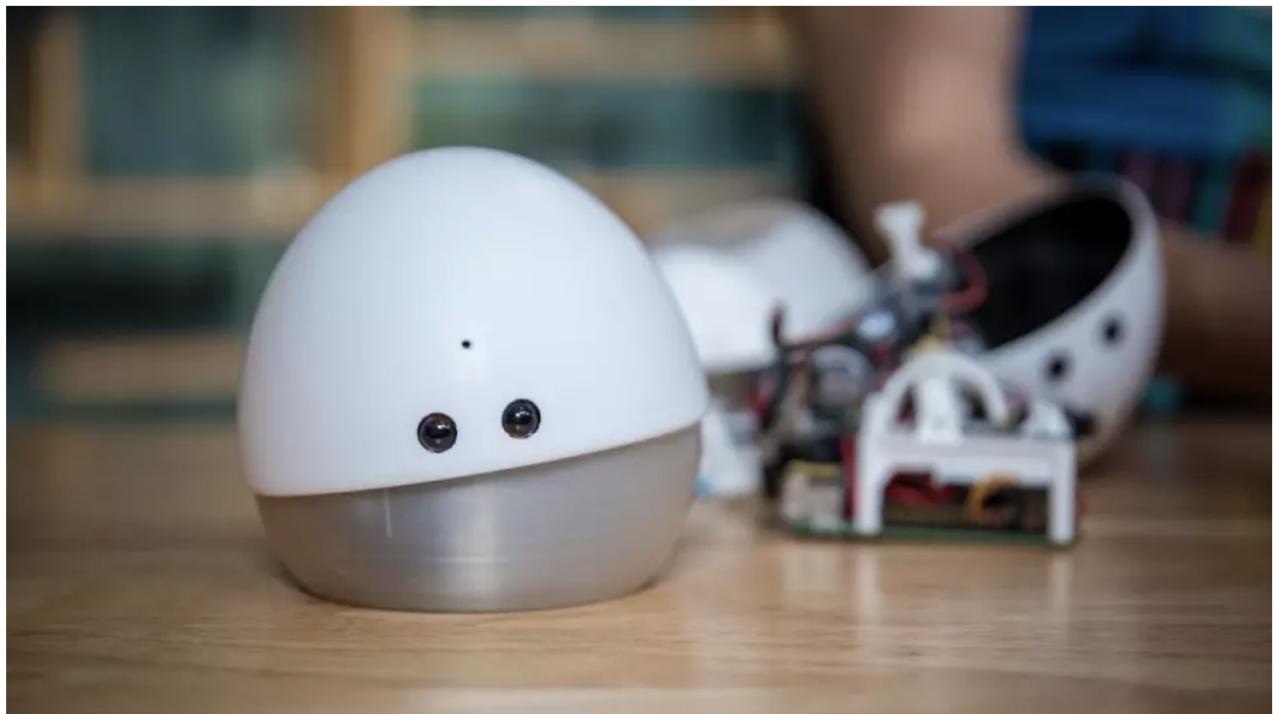
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1 MIRA robot

1.1 MIRA robot

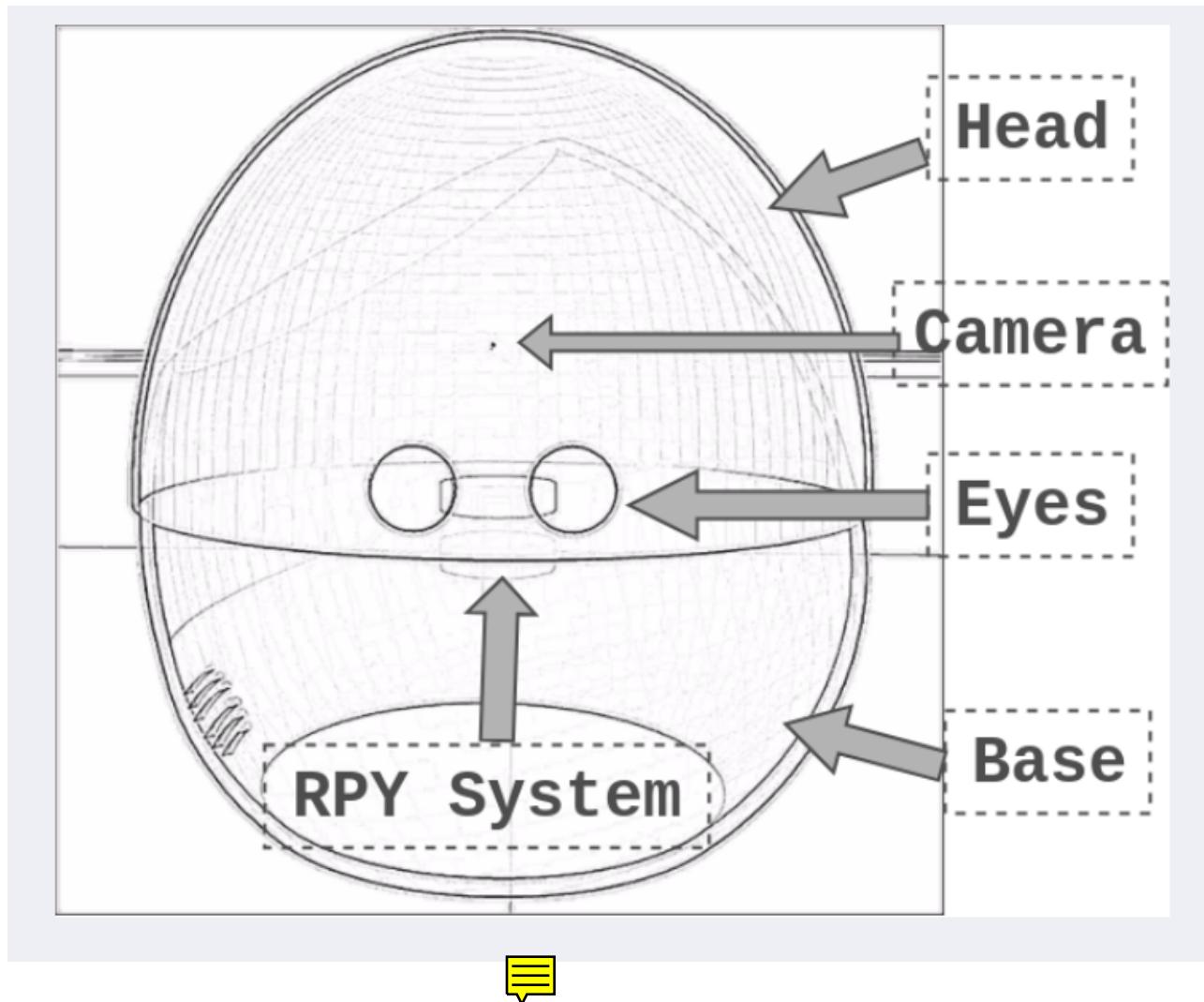


- <https://www.youtube.com/watch?v=bRn4ZjMaChU>
- CPU : RaspberryPI 3 + Teensy¹
- Servo : MicroServo DSM44 or (similar to SG90)²
- Vision : Camera
- Other : RGBA led, Speaker

¹ <https://www.personalrobots.biz/shop/>

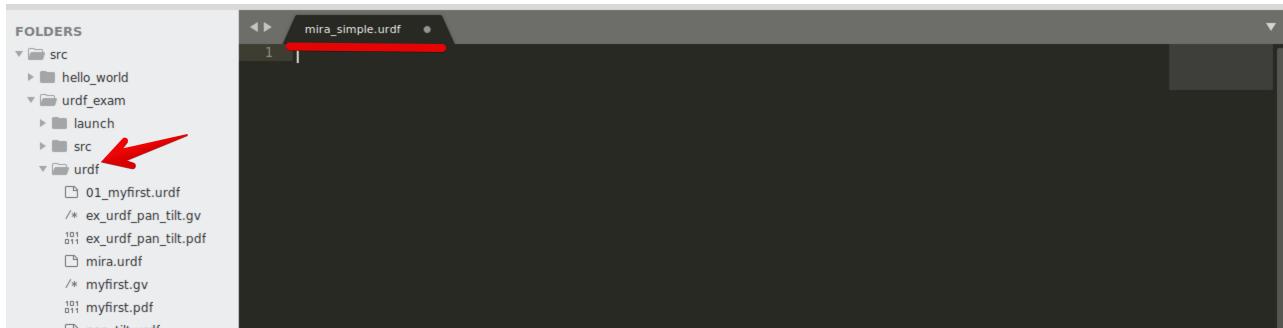
² <https://www.personalrobots.biz/shop/>

1.2 mira 로봇의 구조

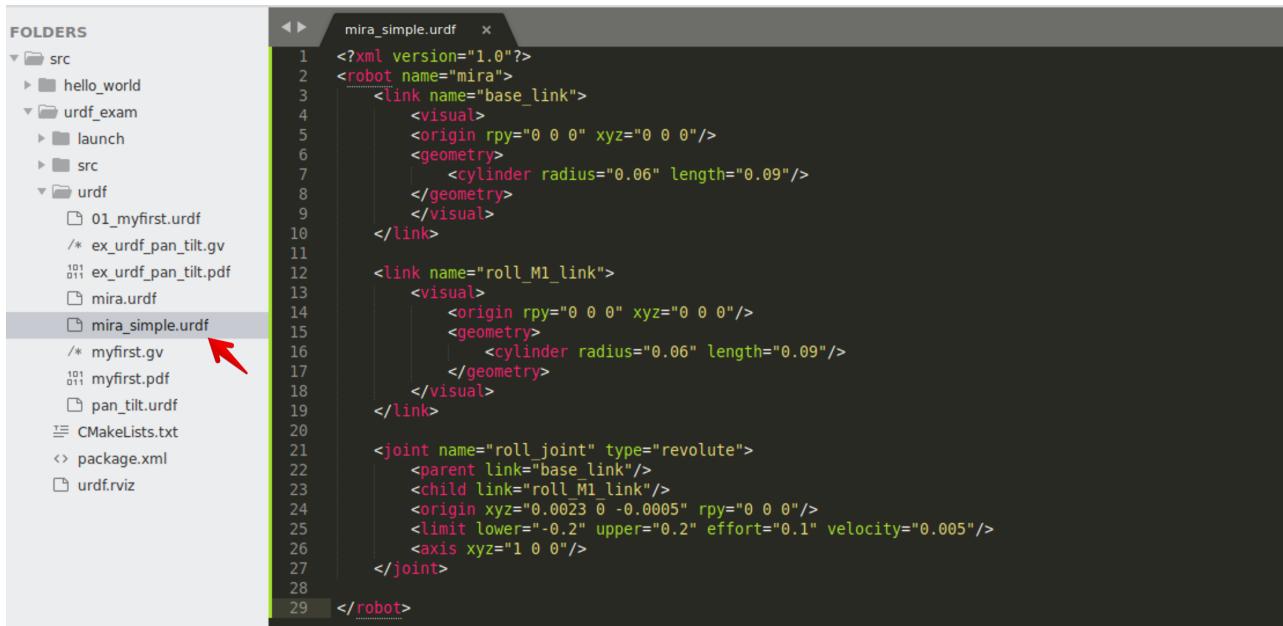


2 URDF

2.1 mira_simple.urdf 생성

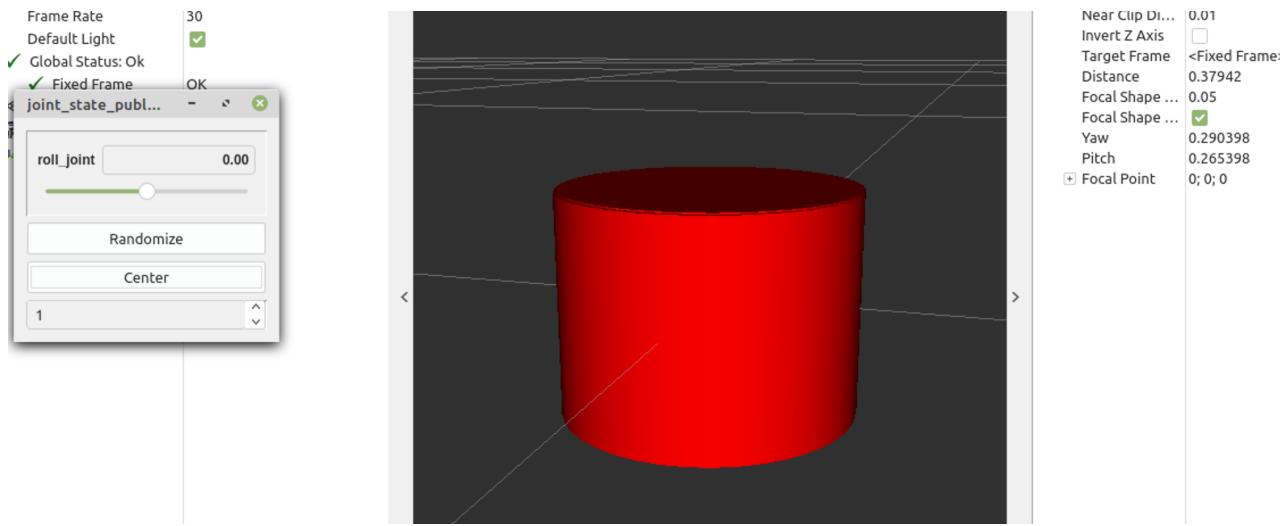


2.2 기초 코드

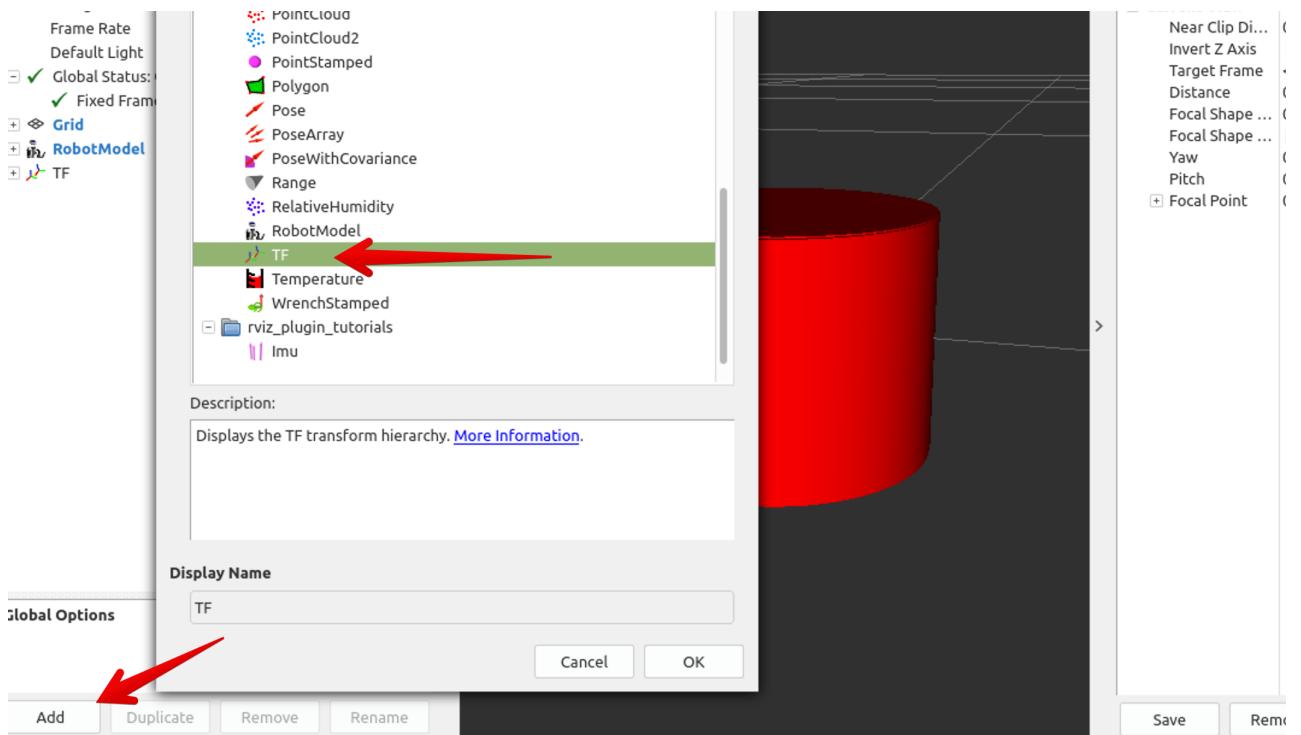


2.3 display.launch

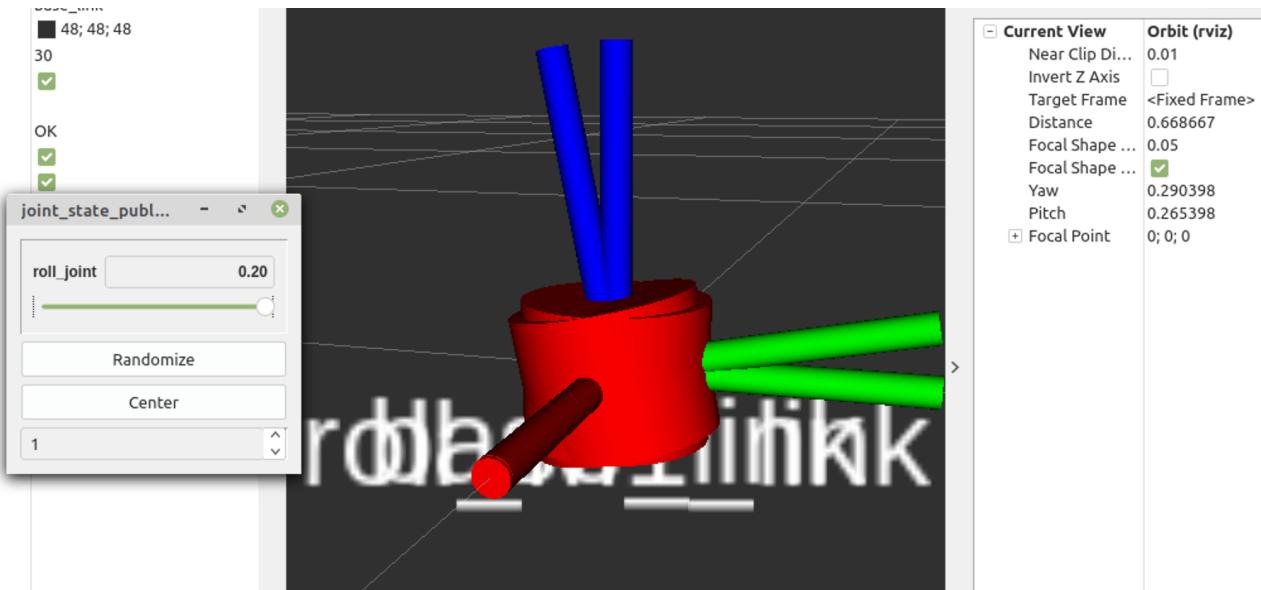
- rosrun urdf_exam display.launch model:=\$(find urdf_exam)/urdf/mira_simple.urdf'



2.4 tf 추가



2.5 각도 변경



2.6 이 상태에서 RVIZ 환경 저장

2.7 이제 하나씩 추가해봅시다

2.8 먼저 색상값 지정

```

FOLDERS
urdf_exam
  launch
  src
urdf
  01_myfirst.urdf
  /* ex_urdf_pan_tilt.gv
  ex_urdf_pan_tilt.pdf
  mira.urdf
  mira_2.urdf
  mira_geometric.urdf
  mira_simple.urdf
  /* myfirst.gv
  myfirst.pdf
  pan_tilt.urdf
CMakeLists.txt
package.xml
urdf.rviz

mirasimple.urdf  mirageometric.urdf x

1  <?xml version="1.0"?>
2  <robot name="mira">
3
4    <material name="blue">
5      <color rgba="0 0 0.8 1"/>
6    </material>
7    <material name="red">
8      <color rgba="0.8 0 0 1"/>
9    </material>
10   <material name="green">
11     <color rgba="0 0.8 0 1"/>
12   </material>
13   <material name="grey">
14     <color rgba="0.75 0.75 0.75 1"/>
15   </material>
16   <material name="white">
17     <color rgba="1.0 1.0 1.0 1"/>
18   </material>
19   <material name="black">
20     <color rgba="0 0 0 1"/>
21   </material>
22
23   <link name="base_link">
24     <visual>
25       <origin rpy="0 0 0" xyz="0 0 0"/>
26
  
```

The screenshot shows a code editor with two tabs: 'mira_simple.urdf' and 'mira_geometric.urdf'. The 'mira_simple.urdf' tab is active. The code defines a robot named 'mira' with various materials: blue, red, green, grey, white, and black. The 'black' material is highlighted with a red box. A yellow callout points to the 'black' material definition. The code editor also shows a sidebar with file navigation and a preview window.

2.9 base_link 수정

```

23      <link name="base_link">
24          <visual>
25              <origin rpy="0.0 0 0" xyz="0 0 0"/>
26              <geometry>
27                  <cylinder radius="0.06" length="0.09"/>
28              </geometry>
29              <material name="grey"/>
30          </visual>
31      </link>
32
33

```

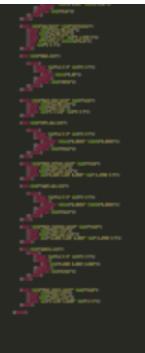


2.10 roll 링크 수정

```

34      <link name="roll_M1_link">
35
36          <visual>
37              <origin rpy="0 0 0" xyz="0 0 0"/>
38              <geometry>
39                  <cylinder length="0.005" radius="0.01"/>
40              </geometry>
41              <material name="red"/>
42          </visual>
43      </link>
44
45

```

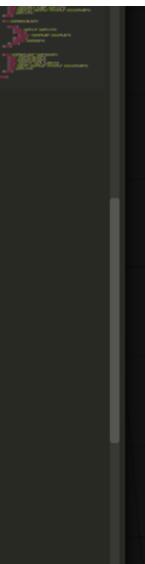


2.11 pitch 구동축 추가

```

17          <axis xyz="1 0 0"/>
18      </joint>
19
20      <link name="pitch_M2_link">
21
22          <visual>
23              <origin rpy="0 0 0" xyz="0 0 0"/>
24              <geometry>
25                  <cylinder length="0.005" radius="0.01"/>
26              </geometry>
27              <material name="green"/>
28          </visual>
29      </link>
30
31
32      <joint name="pitch_joint" type="revolute">
33          <parent link="roll_M1_link"/>
34          <child link="pitch_M2_link"/>
35          <origin xyz="0 0 0" rpy="0 -1.5708 0"/>
36          <limit lower="0" upper="0.44" effort="0.1" velocity="0.005"/>
37          <axis xyz="0 1 0"/>
38      </joint>
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70  </robot>

```

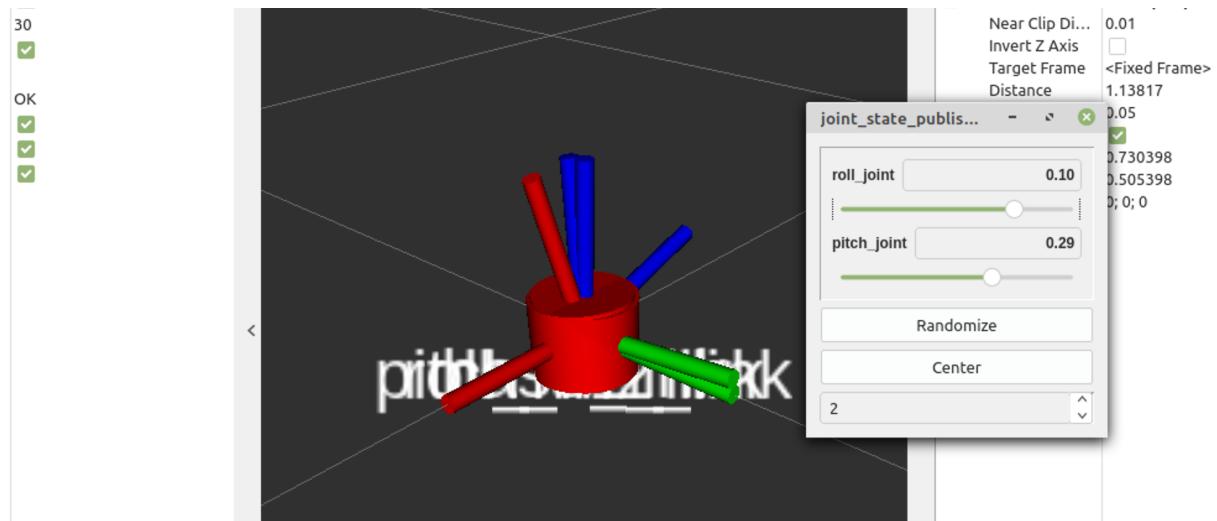


2.12 다시 display.launch 실행

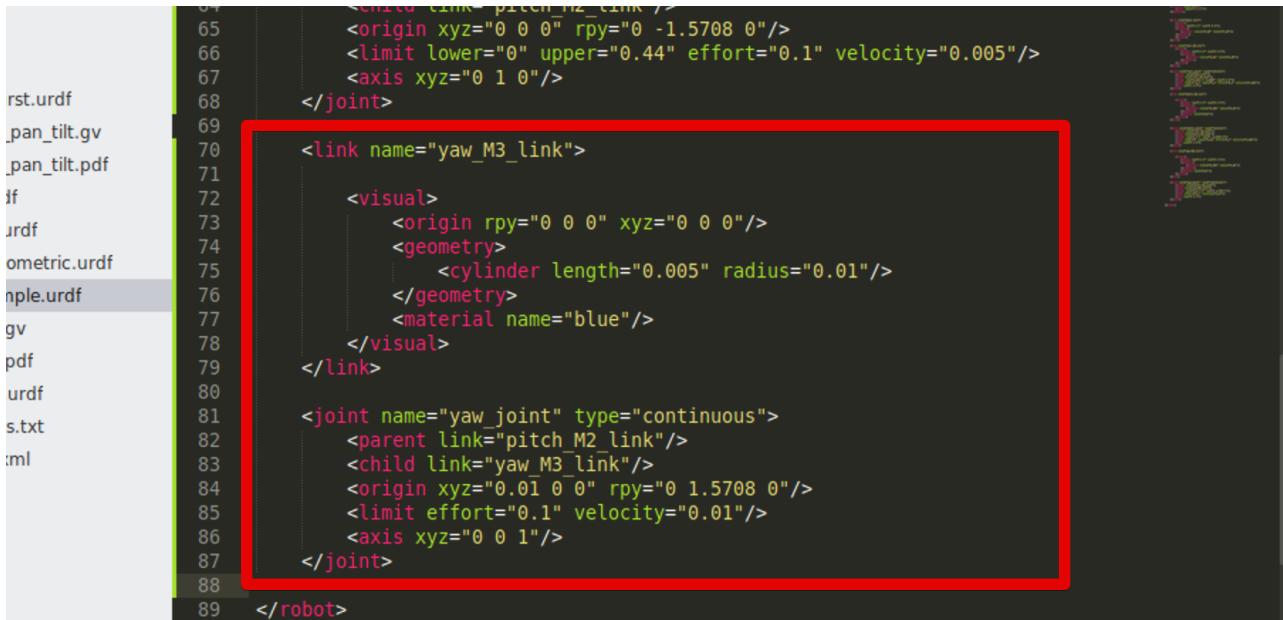
```
pw@melodic:~/ws/src/urdf_exam$ rosrun urdf_exam display.launch model:=$(find urdf_exam)urdf/mira_simple.urdf'
... logging to /home/pw/.ros/log/b693df06-9c1a-11ea-9e6e-001c420be203/roslaunch-melodic-3459.log
Checking log directory for disk usage. This may take a while.
Press Ctrl-C to interrupt
Done checking log file disk usage. Usage is <1GB.

started roslaunch server http://melodic:46693/
SUMMARY
=====
PARAMETERS
```

2.13 현재까지



2.14 yaw 구동축 추가

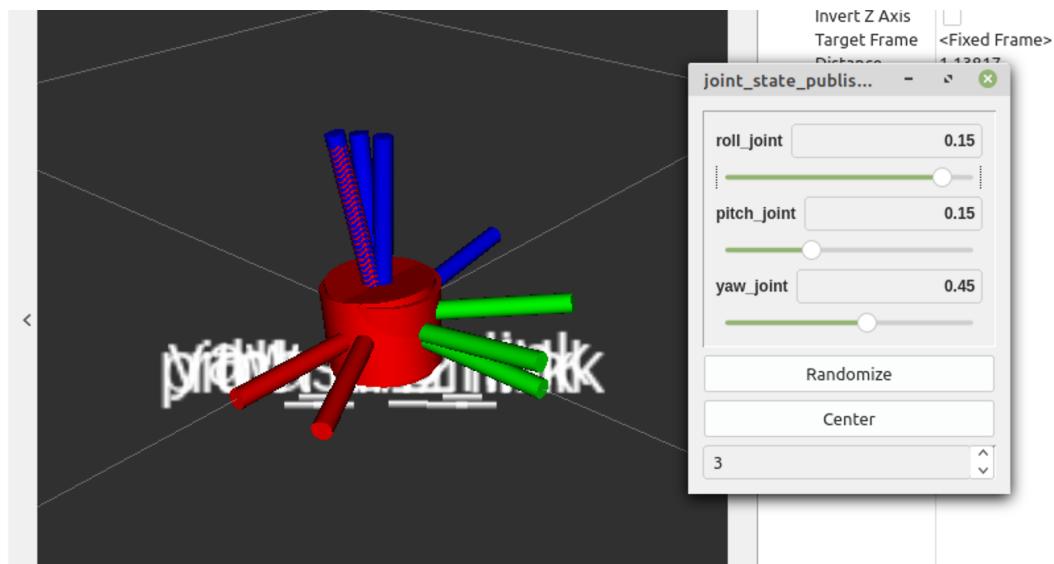


```

54      <child link="pitch_M2_link" />
55      <origin xyz="0 0 0" rpy="0 -1.5708 0"/>
56      <limit lower="0" upper="0.44" effort="0.1" velocity="0.005"/>
57      <axis xyz="0 1 0"/>
58  </joint>
59
60  <link name="yaw_M3_link">
61
62    <visual>
63      <origin rpy="0 0 0" xyz="0 0 0"/>
64      <geometry>
65        <cylinder length="0.005" radius="0.01"/>
66      </geometry>
67      <material name="blue"/>
68    </visual>
69  </link>
70
71  <joint name="yaw_joint" type="continuous">
72    <parent link="pitch_M2_link"/>
73    <child link="yaw_M3_link"/>
74    <origin xyz="0.01 0 0" rpy="0 1.5708 0"/>
75    <limit effort="0.1" velocity="0.01"/>
76    <axis xyz="0 0 1"/>
77  </joint>
78
79 </robot>
80
81
82
83
84
85
86
87
88
89

```

2.15 yaw가 추가된 결과



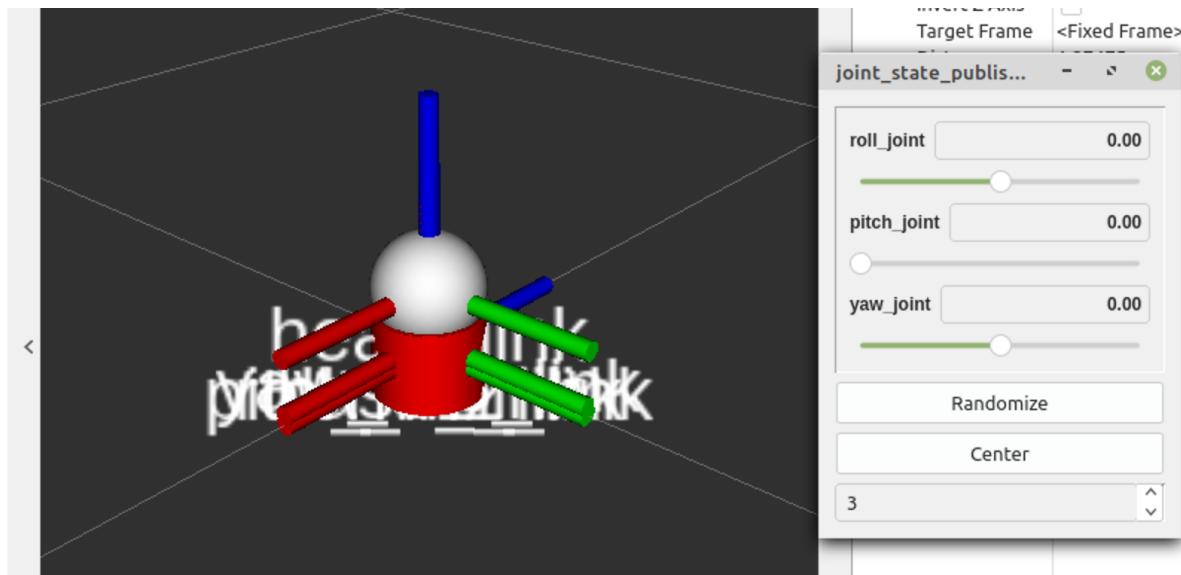
2.16 head link 추가

```

84      <origin xyz="0.01 0 0" rpy="0 1.5708 0"/>
85      <limit effort="0.1" velocity="0.01"/>
86      <axis xyz="0 0 1"/>
87  </joint>
88
89  <link name="head_link">
90
91      <visual>
92          <origin rpy="0.0 0 0" xyz="0 0 0"/>
93          <geometry>
94              <sphere radius="0.06"/>
95          </geometry>
96          <material name="white"/>
97      </visual>
98  </link>
99
100
101  <joint name="base_head_joint" type="fixed">
102      <parent link="yaw_M3_link"/>
103      <child link="head_link"/>
104      <origin xyz="0 0 0.06" rpy="0 0 0"/>
105  </joint>
106
107</robot>
108

```

2.17 head link는 fix 시켰기 때문에 움직이지 않는다



2.18 왼쪽 눈 추가

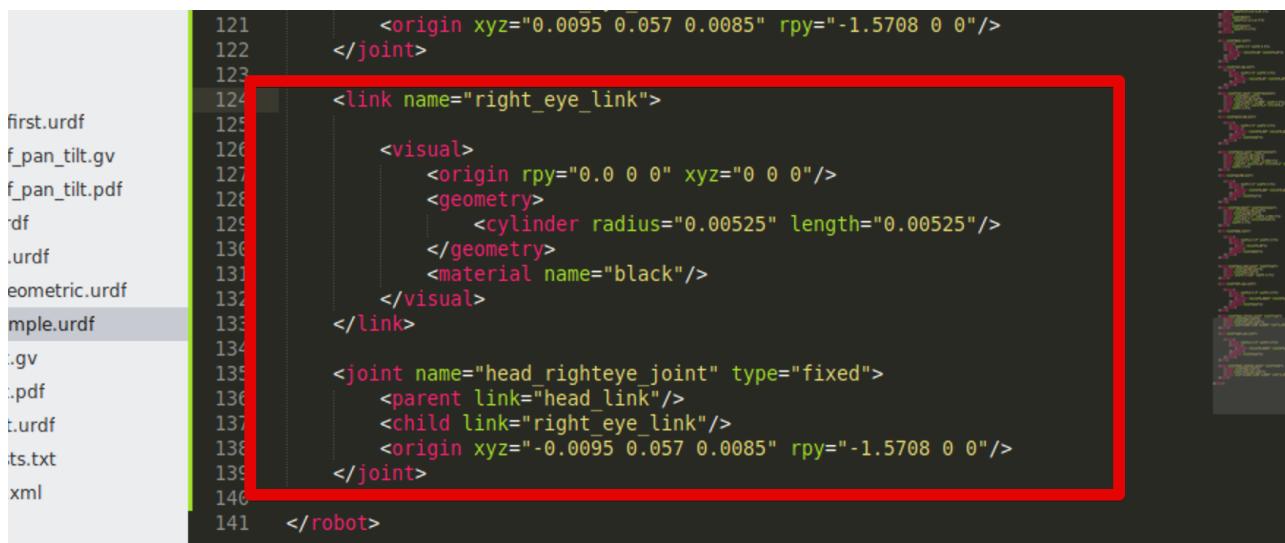


```

101      <origin xyz="0 0 0" rpy="0 0 0"/>
102    </joint>
103
104    <link name="left_eye_link">
105      <visual>
106        <origin rpy="0.0 0 0" xyz="0 0 0"/>
107        <geometry>
108          <cylinder radius="0.00525" length="0.00525"/>
109        </geometry>
110        <material name="black"/>
111      </visual>
112    </link>
113
114    <joint name="head_lefteye_joint" type="fixed">
115      <parent link="head_link"/>
116      <child link="left_eye_link"/>
117      <origin xyz="0.0095 0.057 0.0085" rpy="-1.5708 0 0"/>
118    </joint>
119
120    <link name="right_eye_link">
121      <visual>
122        <origin xyz="0.0095 -0.057 0.0085" rpy="-1.5708 0 0"/>
123      </visual>
124    </link>
125
126  </robot>

```

2.19 오른쪽 눈 추가

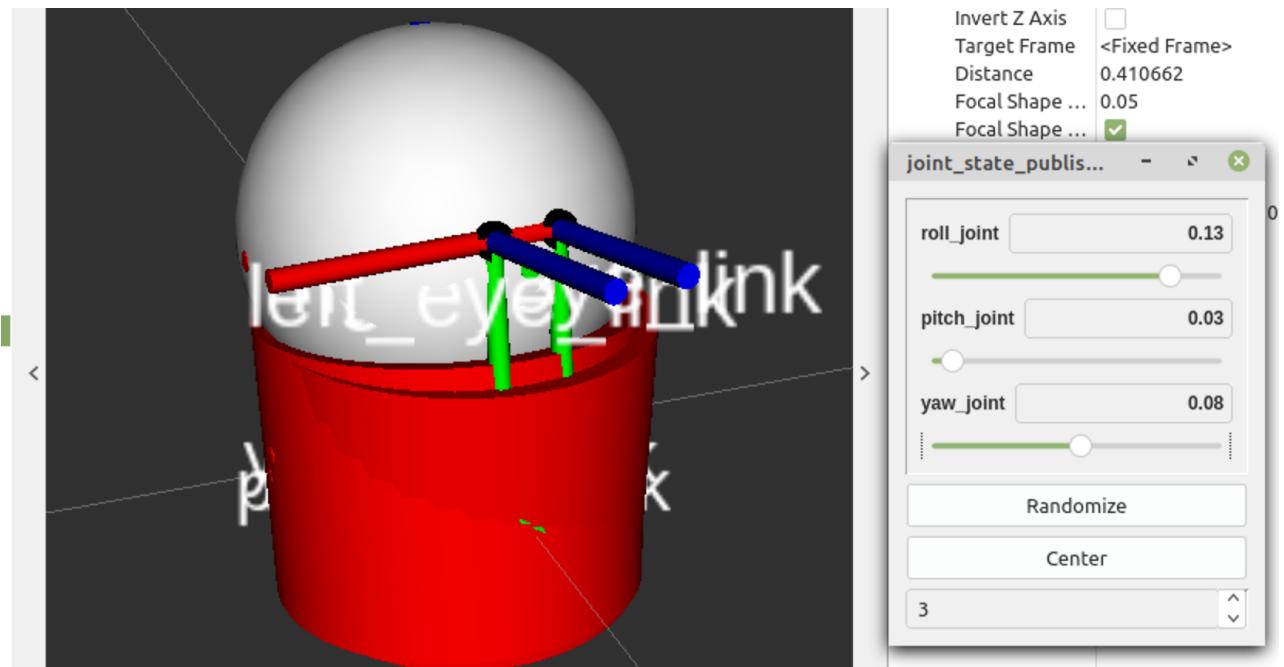


```

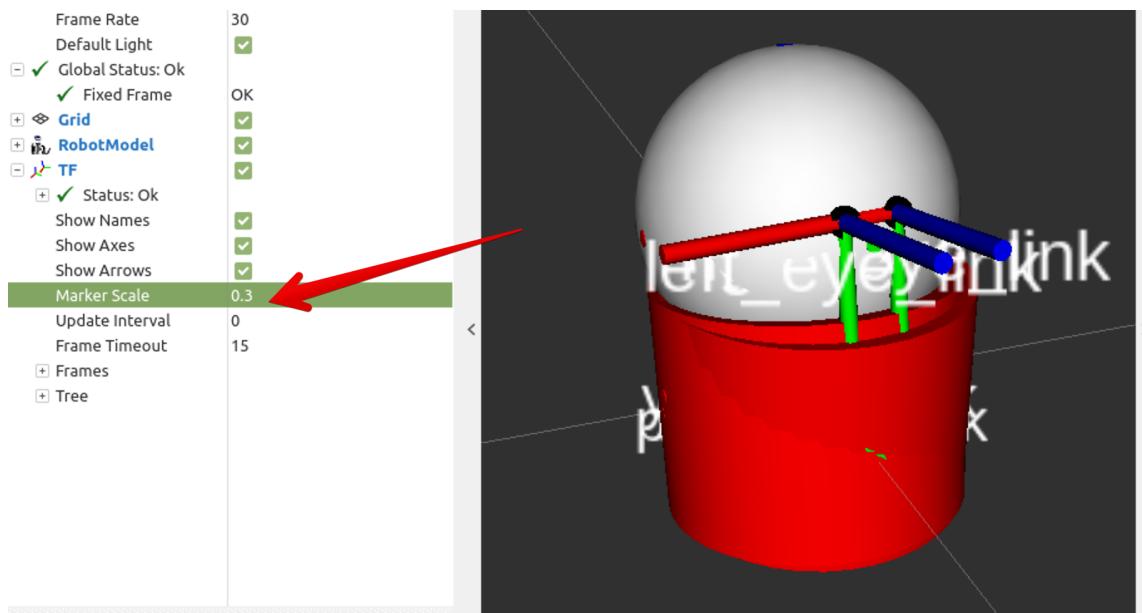
121      <origin xyz="0.0095 0.057 0.0085" rpy="-1.5708 0 0"/>
122    </joint>
123
124    <link name="right_eye_link">
125      <visual>
126        <origin rpy="0.0 0 0" xyz="0 0 0"/>
127        <geometry>
128          <cylinder radius="0.00525" length="0.00525"/>
129        </geometry>
130        <material name="black"/>
131      </visual>
132    </link>
133
134    <joint name="head_righteye_joint" type="fixed">
135      <parent link="head_link"/>
136      <child link="right_eye_link"/>
137      <origin xyz="-0.0095 0.057 0.0085" rpy="-1.5708 0 0"/>
138    </joint>
139
140  </robot>
141

```

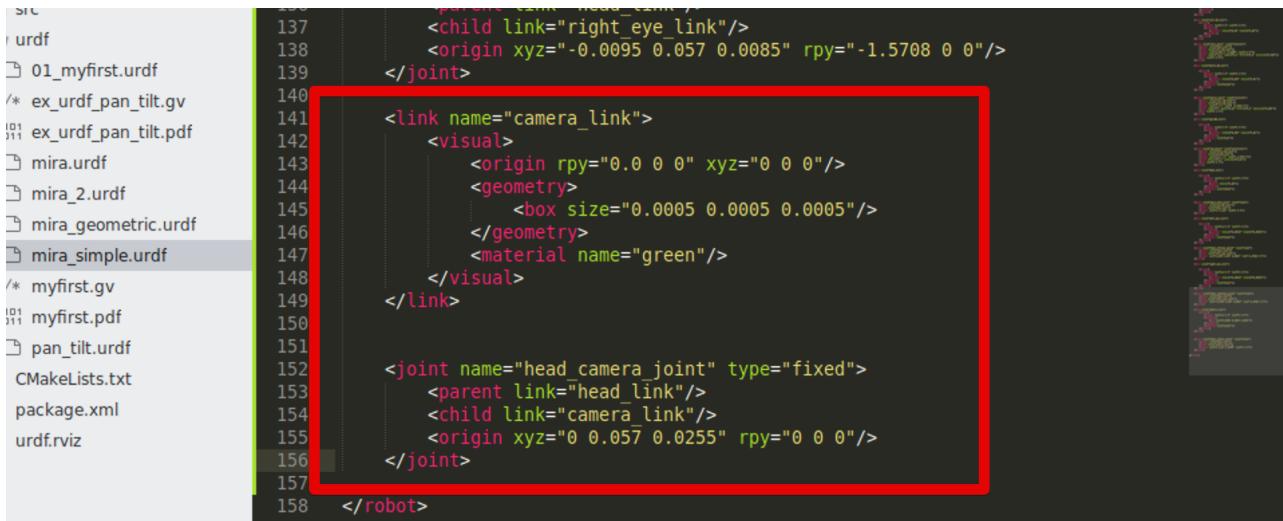
2.20 결과



2.21 혹시 마커가 너무 크면



2.22 카메라 링크 추가



```

src
└ urdf
  └ 01_myfirst.urdf
    /* ex_urdf_pan_tilt.gv
     * ex_urdf_pan_tilt.pdf
    └ mira.urdf
    └ mira_2.urdf
    └ mira_geometric.urdf
    └ mira_simple.urdf
    /* myfirst.gv
     * myfirst.pdf
    └ pan_tilt.urdf
    CMakeLists.txt
    package.xml
    urdf.rviz

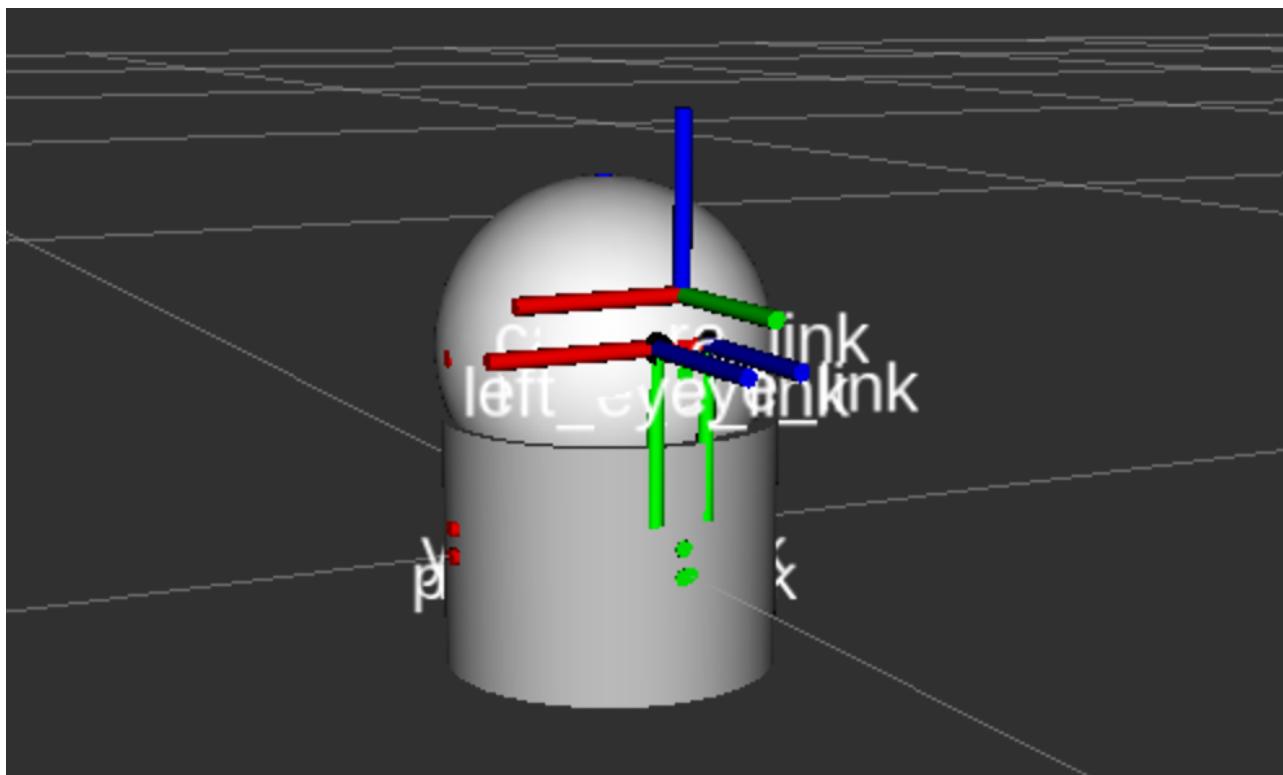
```

```

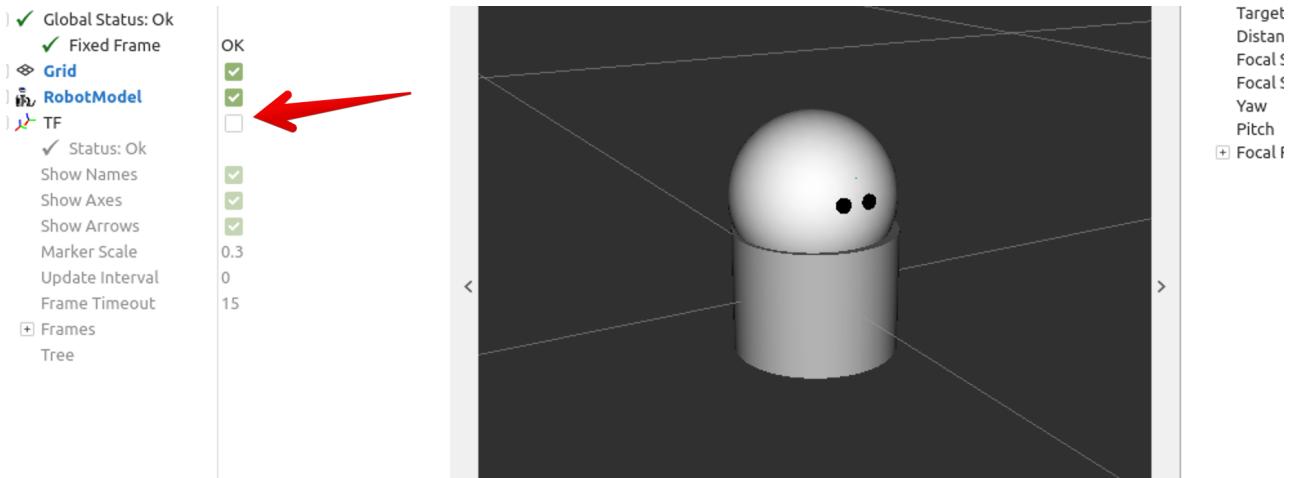
135           <parent link="head_link"/>
136           <child link="right_eye_link"/>
137           <origin xyz="-0.0095 0.057 0.0085" rpy="-1.5708 0 0"/>
138       </joint>
139
140
141   <link name="camera_link">
142     <visual>
143       <origin rpy="0.0 0 0" xyz="0 0 0"/>
144       <geometry>
145         <box size="0.0005 0.0005 0.0005"/>
146       </geometry>
147       <material name="green"/>
148     </visual>
149   </link>
150
151
152   <joint name="head_camera_joint" type="fixed">
153     <parent link="head_link"/>
154     <child link="camera_link"/>
155     <origin xyz="0 0.057 0.0255" rpy="0 0 0"/>
156   </joint>
157
158 </robot>

```

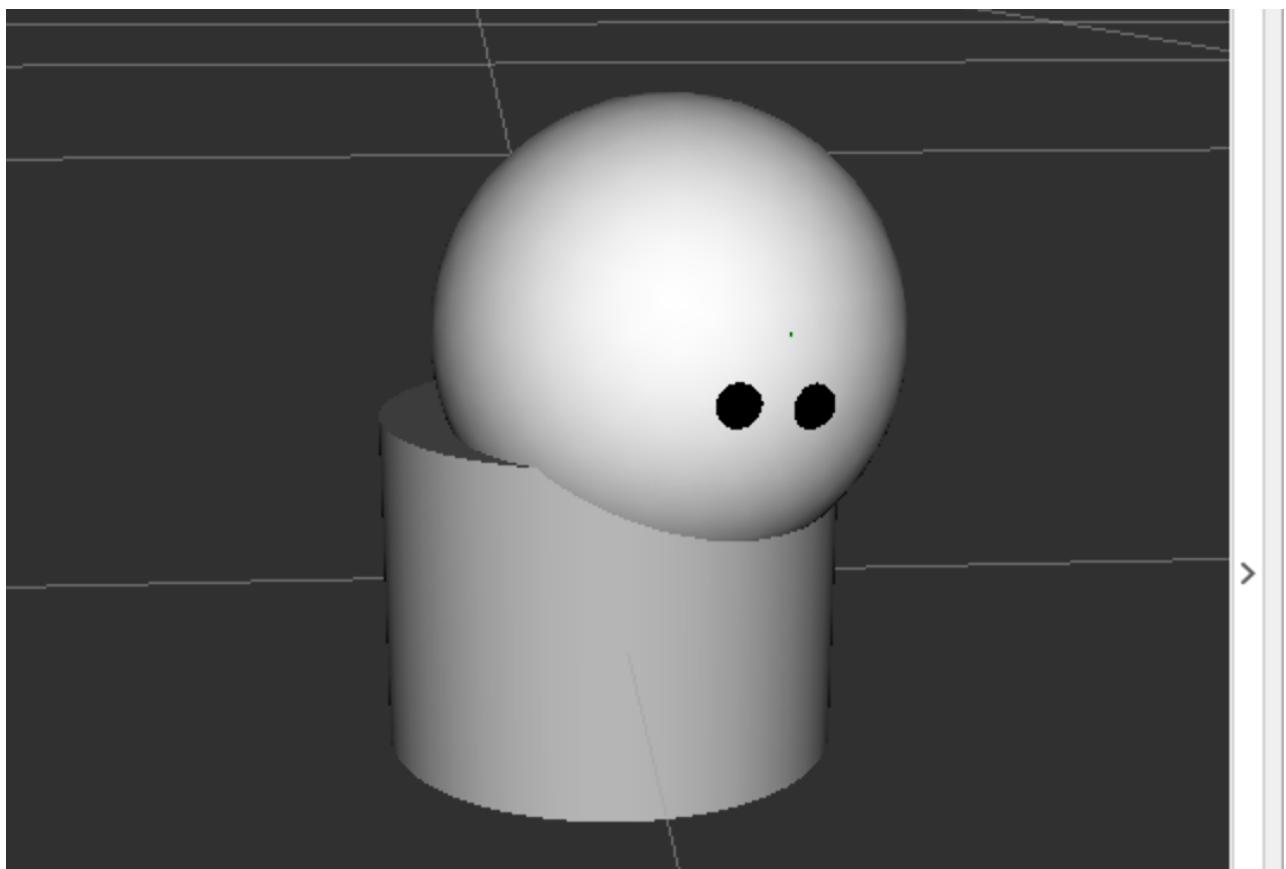
2.23 결과



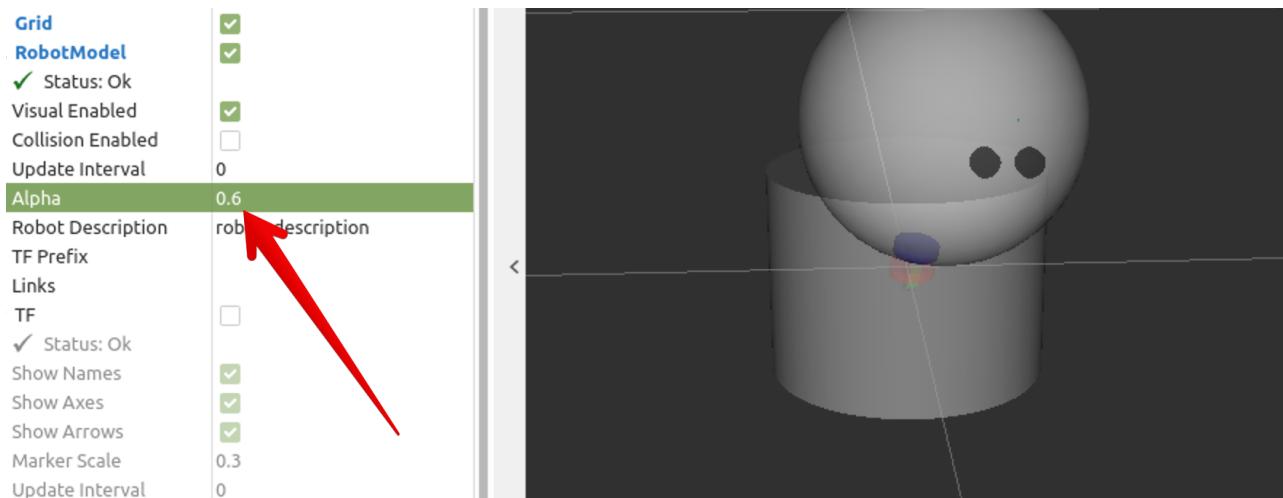
2.24 tf를 끄고 보면



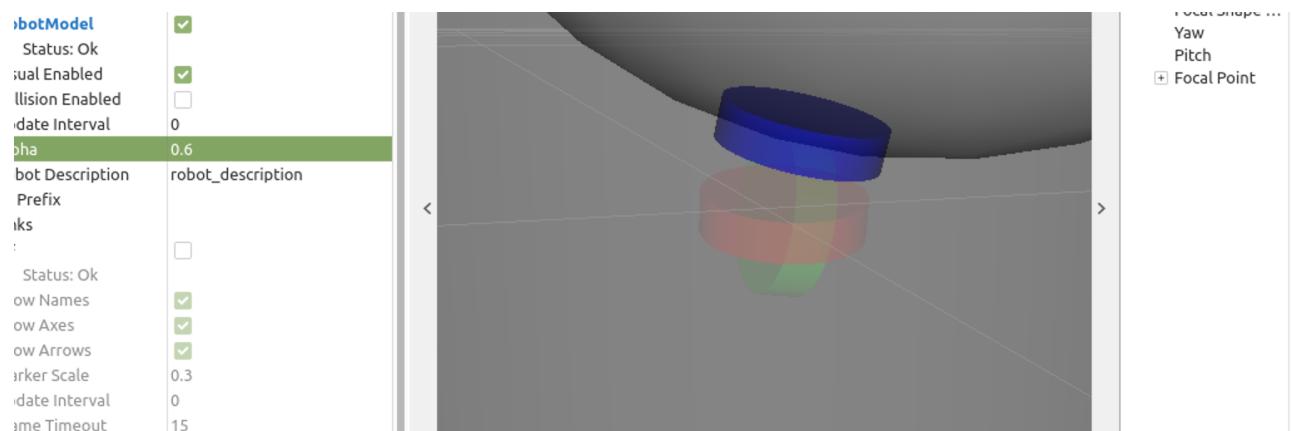
2.25 약간 귀엽다



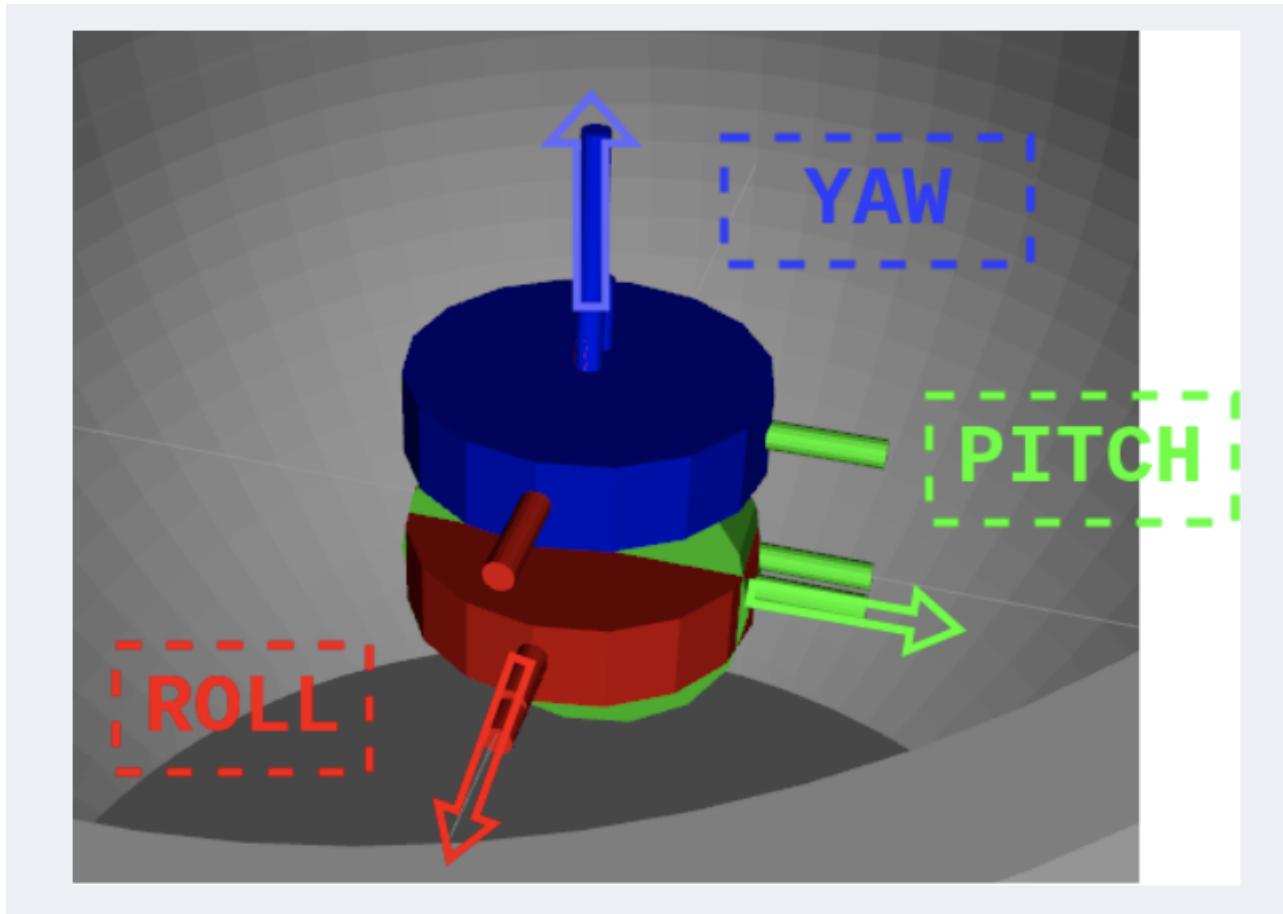
2.26 robot model의 alpha를 조절해보자



2.27 그리고 확대해보면



2.28 그 의미는 이렇다



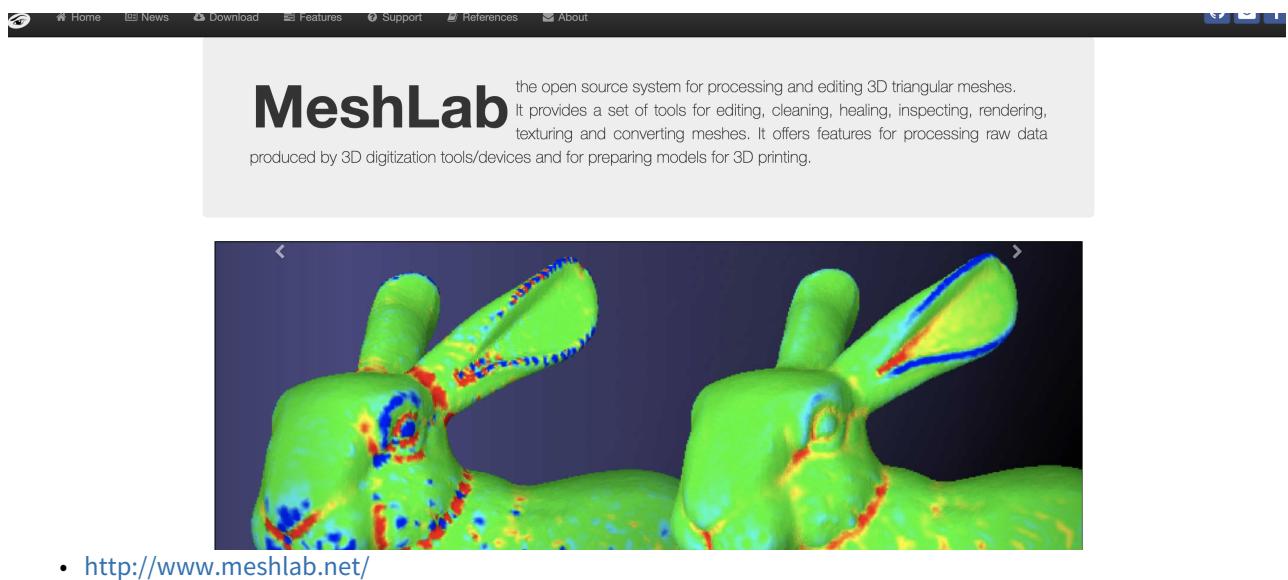
2.29 이제 이 파일을 배포합니다~



2.30 dae 파일이 뭐지?

- COLLADA 3D Digital Asset Exchange

2.31 meshlab으로 보자

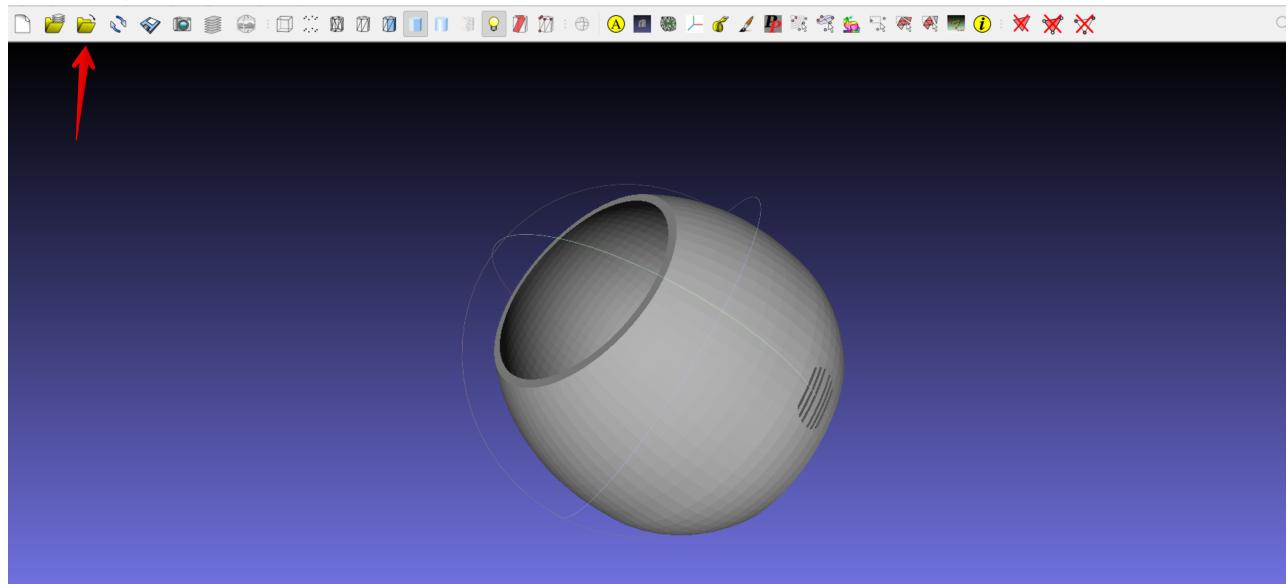


- <http://www.meshlab.net/>

2.32 설치

- sudo apt update
- sudo apt install meshlab

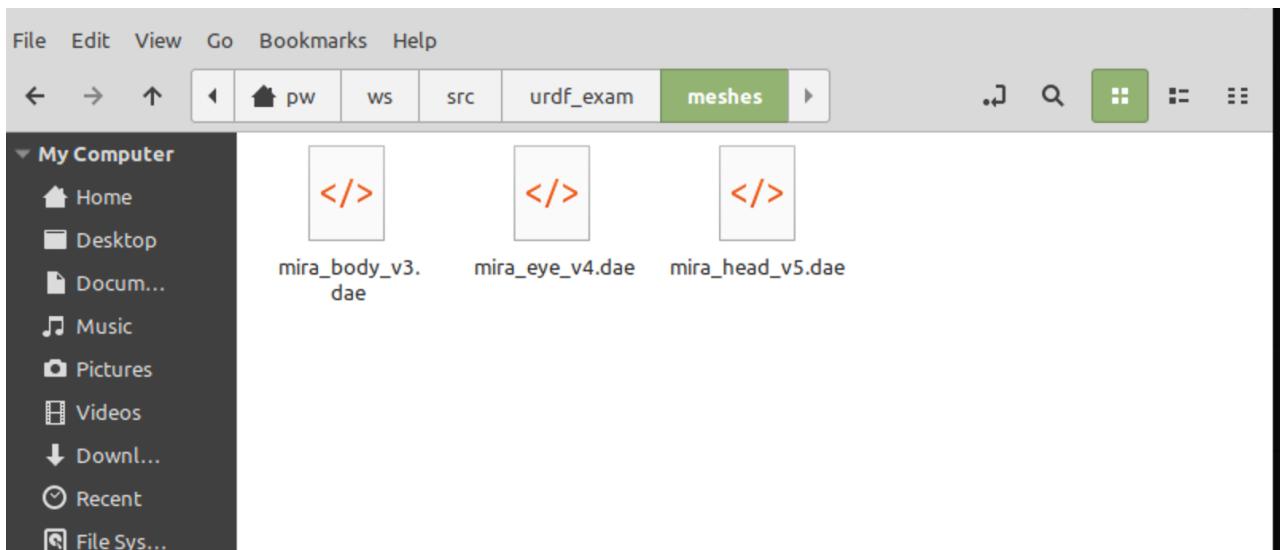
2.33 dae 파일을 불러오면 된다



2.34 pkg 폴더내에 meshes 폴더를 만듭니다

```
pw@melodic:~/ws/src/urdf_exam$  
pw@melodic:~/ws/src/urdf_exam$ ls  
CMakeLists.txt launch package.xml src urdf urdf.rviz  
pw@melodic:~/ws/src/urdf_exam$ mkdir meshes  
pw@melodic:~/ws/src/urdf_exam$ cd meshes  
pw@melodic:~/ws/src/urdf_exam/meshes$
```

2.35 방금 배포한 파일을 복사해 둡니다



2.36 base_link 부분을 변경

```
23  
24     <link name="base_link">  
25         <visual>  
26             <origin rpy="0.0 0 0" xyz="0 0 0"/>  
27             <geometry>  
28                 <mesh filename="package://urdf_exam/meshes/mira_body_v3.dae"/>  
29             </geometry>  
30         </visual>  
31     </link>  
32
```

2.37 head_link 부분을 변경

```
2     <link name="head_link">  
3         <visual>  
4             <origin rpy="0.0 0 0" xyz="0 0 0"/>  
5             <geometry>  
6                 <mesh filename="package://urdf_exam/meshes/mira_head_v5.dae"/>  
7             </geometry>  
8         </visual>  
9     </link>
```

2.38 left_eye_link 변경

```

107
108     <link name="left_eye_link">
109
110         <visual>
111             <origin rpy="0.0 0 0" xyz="0 0 0"/>
112             <geometry>
113                 <!--
114                 <cylinder radius="0.00525" length="0.00525"/>
115                 -->
116                 <mesh filename="package://urdf_exammeshes/mira_eye_v4.dae"/>
117             </geometry>
118         </visual>
119     </link>
120

```



2.39 right_eye_link 변경

```

126
127     <link name="right_eye_link">
128
129         <visual>
130             <origin rpy="0.0 0 0" xyz="0 0 0"/>
131             <geometry>
132                 <!--
133                 <cylinder radius="0.00525" length="0.00525"/>
134                 -->
135                 <mesh filename="package://urdf_exammeshes/mira_eye_v4.dae"/>
136             </geometry>
137         </visual>
138     </link>
139

```

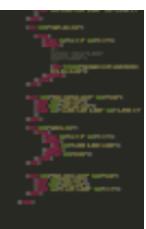


2.40 base_head joint 변경

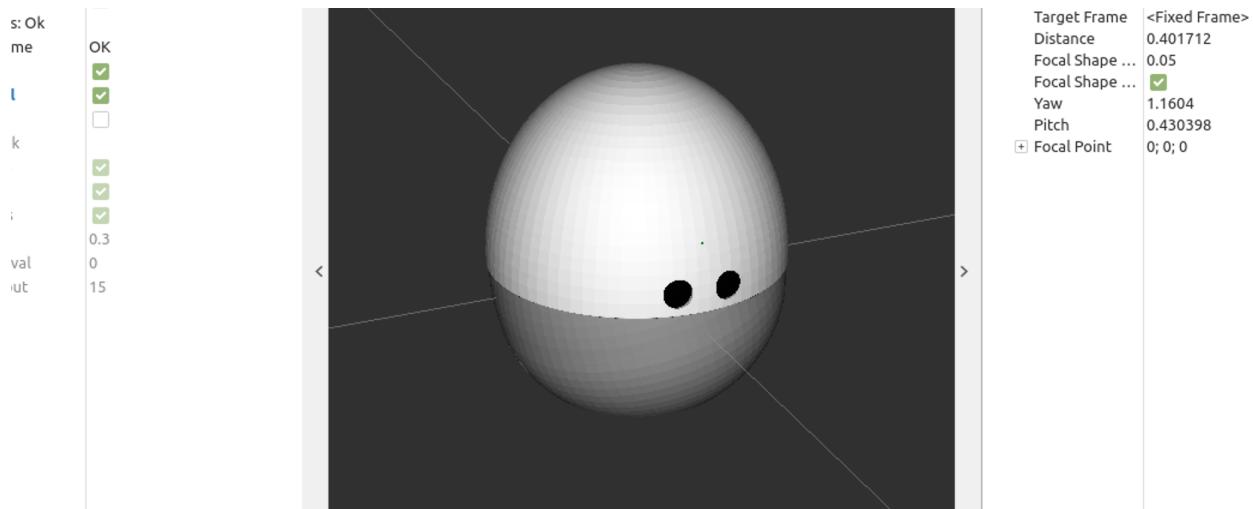
```

01
02     <joint name="base_head_joint" type="fixed">
03         <parent link="yaw_M3_link"/>
04         <child link="head_link"/>
05         <origin xyz="0 0 0" rpy="0 0 0"/>
06     </joint>
07

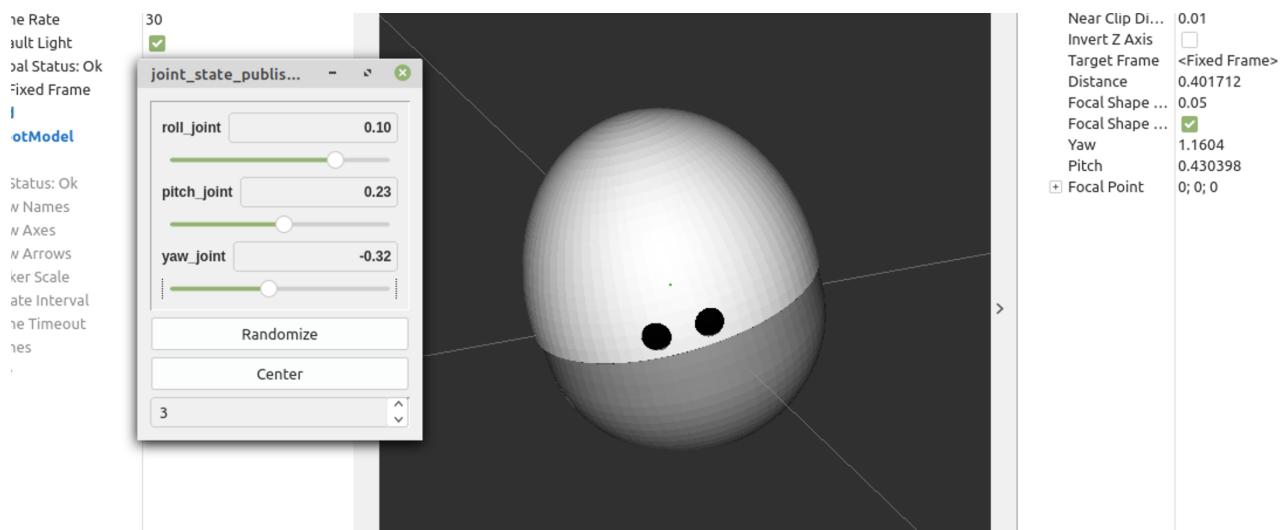
```



2.41 결과



2.42 귀엽다~



2.43 지금까지의 urdf

mira_simple.urdf

(see page 4)