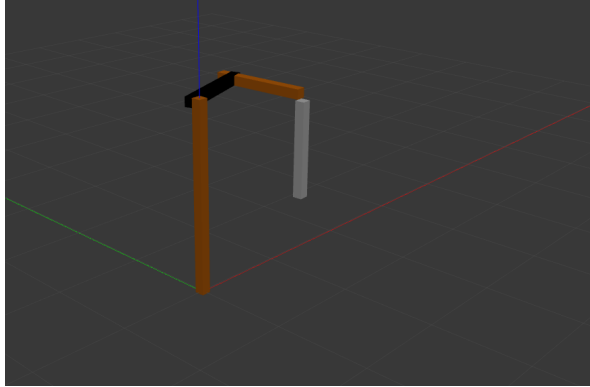


Ethan Wilke

```

[INFO] [1668736460.699632160] [forwardkinematics]:
Position:
x: '1.011351',y: '0.670467',z: '1.200000'
Orientation:
w: '0.000000',x: '0.730219',y: '0.683214',z: '0.000000'
[INFO] [1668736461.699646240] [forwardkinematics]:
Position:
x: '1.011351',y: '0.670467',z: '1.200000'
Orientation:
w: '0.000000',x: '0.730219',y: '0.683214',z: '0.000000'
[INFO] [1668736462.699696173] [forwardkinematics]:
Position:
x: '1.011351',y: '0.670467',z: '1.200000'
Orientation:
w: '0.000000',x: '0.730219',y: '0.683214',z: '0.000000'
shiva@shiva-inspiron-15-5501:~$ ros2 topic pub /joint_states sensor_msgs/msg/JointState "[position:
[0.333470, 1.837779, 0.800000]]"
publisher: Beginning loop
publishing #1: sensor_msgs.msg.JointState(header=std_msgs.msg.Header(stamp=builtin_interfaces.msg.Ti
me(sec=0, nanosec=0), frame_id=''), name=[], position=[0.33347, 1.837779, 0.8], velocity=[], effort
=[])
publishing #2: sensor_msgs.msg.JointState(header=std_msgs.msg.Header(stamp=builtin_interfaces.msg.Ti
me(sec=0, nanosec=0), frame_id=''), name=[], position=[0.33347, 1.837779, 0.8], velocity=[], effort
=[])
publishing #3: sensor_msgs.msg.JointState(header=std_msgs.msg.Header(stamp=builtin_interfaces.msg.Ti
me(sec=0, nanosec=0), frame_id=''), name=[], position=[0.33347, 1.837779, 0.8], velocity=[], effort
=[])
publishing #4: sensor_msgs.msg.JointState(header=std_msgs.msg.Header(stamp=builtin_interfaces.msg.Ti
me(sec=0, nanosec=0), frame_id=''), name=[], position=[0.33347, 1.837779, 0.8], velocity=[], effort
=[])
publishing #5: sensor_msgs.msg.JointState(header=std_msgs.msg.Header(stamp=builtin_interfaces.msg.Ti
me(sec=0, nanosec=0), frame_id=''), name=[], position=[0.33347, 1.837779, 0.8], velocity=[], effort
=[])
publishing #6: sensor_msgs.msg.JointState(header=std_msgs.msg.Header(stamp=builtin_interfaces.msg.Ti
me(sec=0, nanosec=0), frame_id=''), name=[], position=[0.33347, 1.837779, 0.8], velocity=[], effort
=[])

```



Input: Joint Values - [-0.814449, 2.059023, 1.7]
Output: Position - [1.006736, 0.219912, 0.3]

```

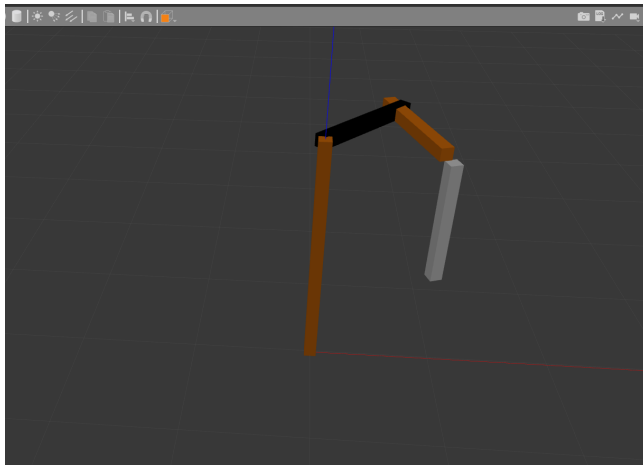
$ivagshiva-Inspiron-15-5501:~$ ros2 run rbot_gazebo fk_subpub
[INFO] [1668736896.971258997] [forwardkinematics]:
Position:
x: '1.006736',y: '0.219912',z: '0.300000'
Orientation:
w: '0.000000',x: '0.812548',y: '0.582895',z: '0.000000'
[INFO] [1668736897.972836325] [forwardkinematics]:
Position:
x: '1.006736',y: '0.219912',z: '0.300000'
Orientation:
w: '0.000000',x: '0.812548',y: '0.582895',z: '0.000000'
[INFO] [1668736898.971923545] [forwardkinematics]:
Position:
x: '1.006736',y: '0.219912',z: '0.300000'
Orientation:
w: '0.000000',x: '0.812548',y: '0.582895',z: '0.000000'
[INFO] [1668736899.972866029] [forwardkinematics]:
Position:
x: '1.006736',y: '0.219912',z: '0.300000'
Orientation:
w: '0.000000',x: '0.812548',y: '0.582895',z: '0.000000'
[INFO] [1668736900.972803623] [forwardkinematics]:
Position:
x: '1.006736',y: '0.219912',z: '0.300000'
Orientation:
w: '0.000000',x: '0.812548',y: '0.582895',z: '0.000000'

```

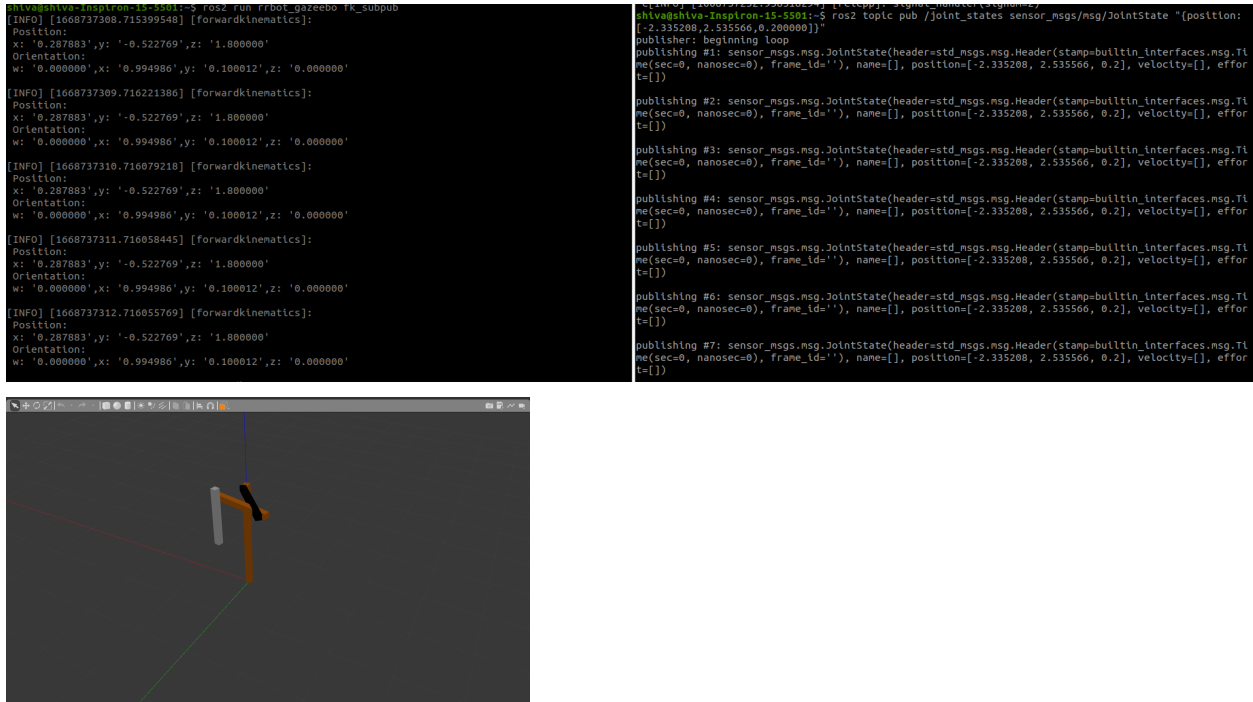
```

^C[INFO] [1668736902.002673755] [rclcpp]: signal_handler(signum=2)
$ivagshiva-Inspiron-15-5501:~$ ros2 topic pub /joint_states sensor_msgs/msg/JointState "{position: [-0.814449,2.059023,1.700000]}"
publisher: beginning loop
publishing #1: sensor_msgs.msg.JointState(header=std_msgs.msg.Header(stamp=builtin_interfaces.msg.Time(sec=0, nanosec=0), frame_id=''), name=[], position=[-0.814449, 2.059023, 1.7], velocity=[], effort=[], t=[])
publishing #2: sensor_msgs.msg.JointState(header=std_msgs.msg.Header(stamp=builtin_interfaces.msg.Time(sec=0, nanosec=0), frame_id=''), name=[], position=[-0.814449, 2.059023, 1.7], velocity=[], effort=[], t=[])
publishing #3: sensor_msgs.msg.JointState(header=std_msgs.msg.Header(stamp=builtin_interfaces.msg.Time(sec=0, nanosec=0), frame_id=''), name=[], position=[-0.814449, 2.059023, 1.7], velocity=[], effort=[], t=[])
publishing #4: sensor_msgs.msg.JointState(header=std_msgs.msg.Header(stamp=builtin_interfaces.msg.Time(sec=0, nanosec=0), frame_id=''), name=[], position=[-0.814449, 2.059023, 1.7], velocity=[], effort=[], t=[])
publishing #5: sensor_msgs.msg.JointState(header=std_msgs.msg.Header(stamp=builtin_interfaces.msg.Time(sec=0, nanosec=0), frame_id=''), name=[], position=[-0.814449, 2.059023, 1.7], velocity=[], effort=[], t=[])
publishing #6: sensor_msgs.msg.JointState(header=std_msgs.msg.Header(stamp=builtin_interfaces.msg.Time(sec=0, nanosec=0), frame_id=''), name=[], position=[-0.814449, 2.059023, 1.7], velocity=[], effort=[], t=[])
publishing #7: sensor_msgs.msg.JointState(header=std_msgs.msg.Header(stamp=builtin_interfaces.msg.Time(sec=0, nanosec=0), frame_id=''), name=[], position=[-0.814449, 2.059023, 1.7], velocity=[], effort=[], t=[])

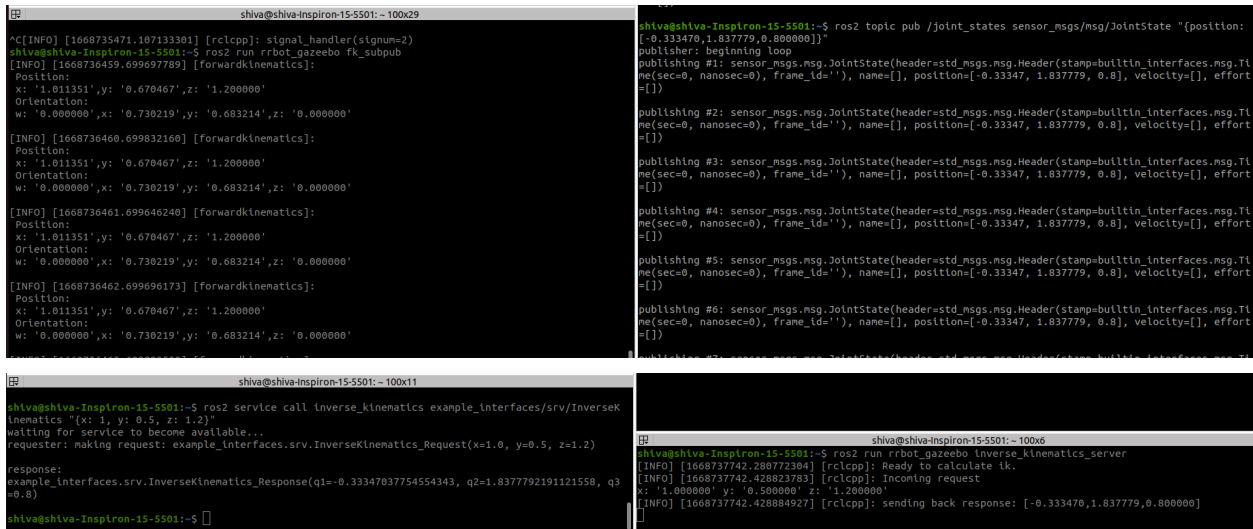
```



Input: Joint Values - [-2.335208, 2.5535566, 0.2]
Output: Position - [0.287883, -0.522769, 1.8]



Part 3.) Inverse Kinematics:
 Position Input: [1, 0.5, 1.2]
 Joint value Output: [-0.33347, 1.837779, 0.8]



Resulting Joint values from the Input POS.

Position Input: [1, 0.2, 0.3]
 Joint value Output: [-0.814449, 2.059023, 1.70]

```
shiva@shiva-Inspiron-15-5501:~$ roslaunch rrbot_gazebo fk_subpub
[INFO] [1668736896.971235997] [forwardkinematics]:
Position:
x: '1.006736',y: '0.219912',z: '0.300000'
Orientation:
w: '0.000000',x: '0.812548',y: '0.582895',z: '0.000000'
[INFO] [1668736897.972036325] [forwardkinematics]:
Position:
x: '1.006736',y: '0.219912',z: '0.300000'
Orientation:
w: '0.000000',x: '0.812548',y: '0.582895',z: '0.000000'
[INFO] [1668736898.971923545] [forwardkinematics]:
Position:
x: '1.006736',y: '0.219912',z: '0.300000'
Orientation:
w: '0.000000',x: '0.812548',y: '0.582895',z: '0.000000'
[INFO] [1668736899.972066029] [forwardkinematics]:
Position:
x: '1.006736',y: '0.219912',z: '0.300000'
Orientation:
w: '0.000000',x: '0.812548',y: '0.582895',z: '0.000000'
[INFO] [1668736900.972003623] [forwardkinematics]:
Position:
x: '1.006736',y: '0.219912',z: '0.300000'
Orientation:
w: '0.000000',x: '0.812548',y: '0.582895',z: '0.000000'

shiva@shiva-Inspiron-15-5501:~$ roslaunch rrbot_gazebo inverse_kinematics_server
[INFO] [1668737872.237450755] [rclcpp]: signal_handler(signum=2)
shiva@shiva-Inspiron-15-5501:~$ roslaunch rrbot_gazebo inverse_kinematics_client
[INFO] [1668737872.237450755] [rclcpp]: Ready to calculate tk.
[INFO] [1668737872.479142581] [rclcpp]: Incoming request
x: '0.4',y: '-0.5',z: '1.8'
[INFO] [1668737872.479142581] [rclcpp]: sending back response: [-2.335208, 2.535566, 0.2]
```

Resulting Joint values from the Input POS.

Position Input: [0.4, -0.5, 1.8]
Joint value Output: [-2.335208, 2.535566, 0.2]

```
shiva@shiva-Inspiron-15-5501:~$ roslaunch rrbot_gazebo fk_subpub
[INFO] [1668737308.715399548] [forwardkinematics]:
Position:
x: '0.287883',y: '-0.522769',z: '1.800000'
Orientation:
w: '0.000000',x: '0.994986',y: '0.100012',z: '0.000000'
[INFO] [1668737309.716221386] [forwardkinematics]:
Position:
x: '0.287883',y: '-0.522769',z: '1.800000'
Orientation:
w: '0.000000',x: '0.994986',y: '0.100012',z: '0.000000'
[INFO] [1668737310.716079218] [forwardkinematics]:
Position:
x: '0.287883',y: '-0.522769',z: '1.800000'
Orientation:
w: '0.000000',x: '0.994986',y: '0.100012',z: '0.000000'
[INFO] [1668737311.716058445] [forwardkinematics]:
Position:
x: '0.287883',y: '-0.522769',z: '1.800000'
Orientation:
w: '0.000000',x: '0.994986',y: '0.100012',z: '0.000000'
[INFO] [1668737312.716055769] [forwardkinematics]:
Position:
x: '0.287883',y: '-0.522769',z: '1.800000'
Orientation:
w: '0.000000',x: '0.994986',y: '0.100012',z: '0.000000'

shiva@shiva-Inspiron-15-5501:~$ roslaunch rrbot_gazebo inverse_kinematics_server
[INFO] [1668738029.553219420] [rclcpp]: Ready to calculate tk.
[INFO] [1668738029.632437667] [rclcpp]: Incoming request
x: '0.4',y: '-0.5',z: '1.8'
[INFO] [1668738029.632492443] [rclcpp]: sending back response: [-2.335208, 2.535566, 0.2]
```

Resulting Joint values from the Input POS.

