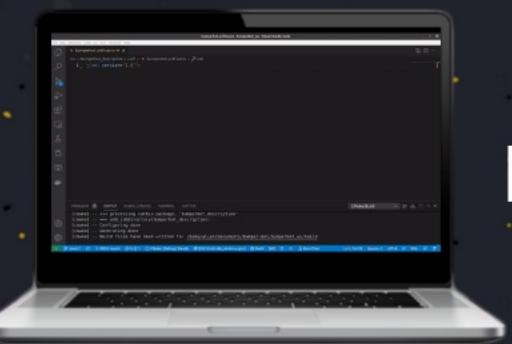


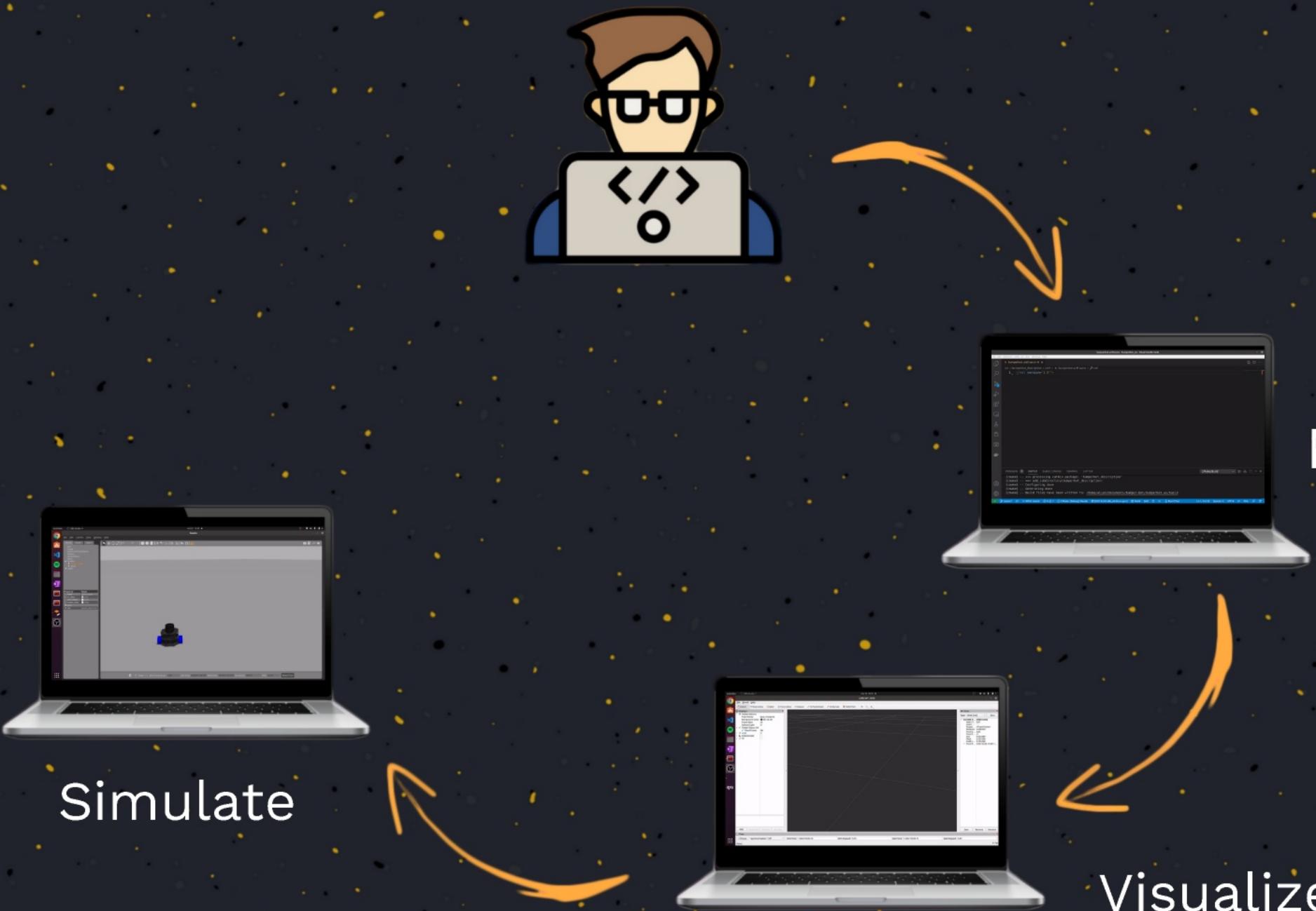
Model

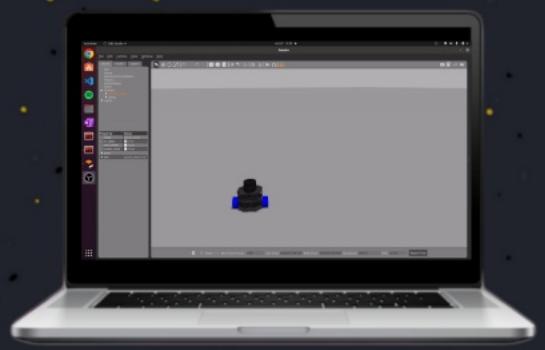


Model

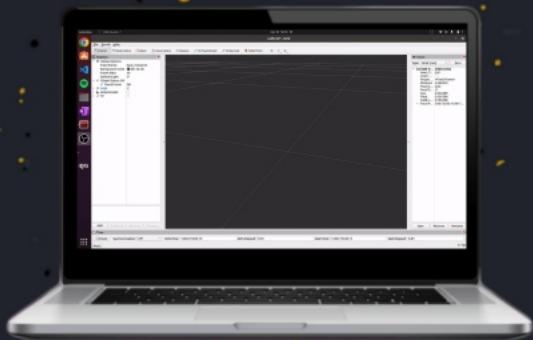


Visualize

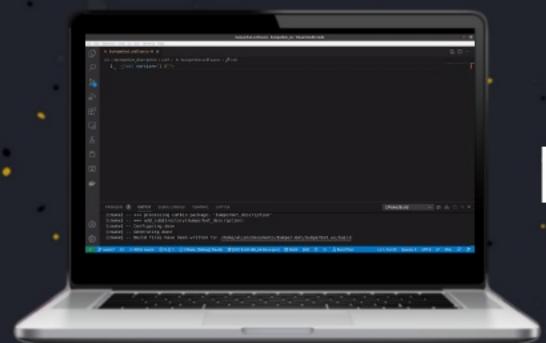




Simulate



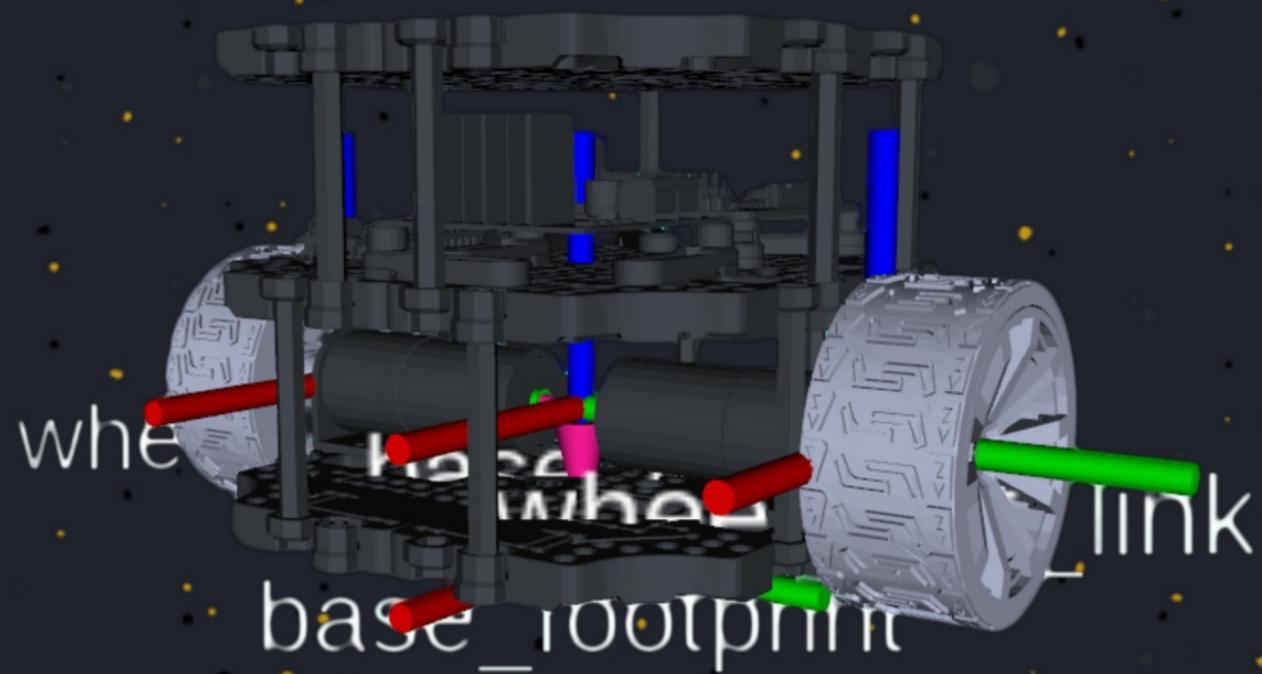
Visualize



Model



# URDF - Unified Robot Description Format



# URDF - Unified Robot Description Format



```
<robot>
...
</robot>
```

# URDF - Unified Robot Description Format



# URDF - Unified Robot Description Format



<robot>

</robot>

# URDF - Unified Robot Description Format



```
<robot>
  <link>
    ...
  </link>
  ...
</robot>
```

```
<link>
```

```
...
```

```
</link>
```



base\_link

```
<link>
```

```
...
```

```
</link>
```

```
<name>
```



base\_link

```
<link>
```

```
  . . .
```

```
</link>
```

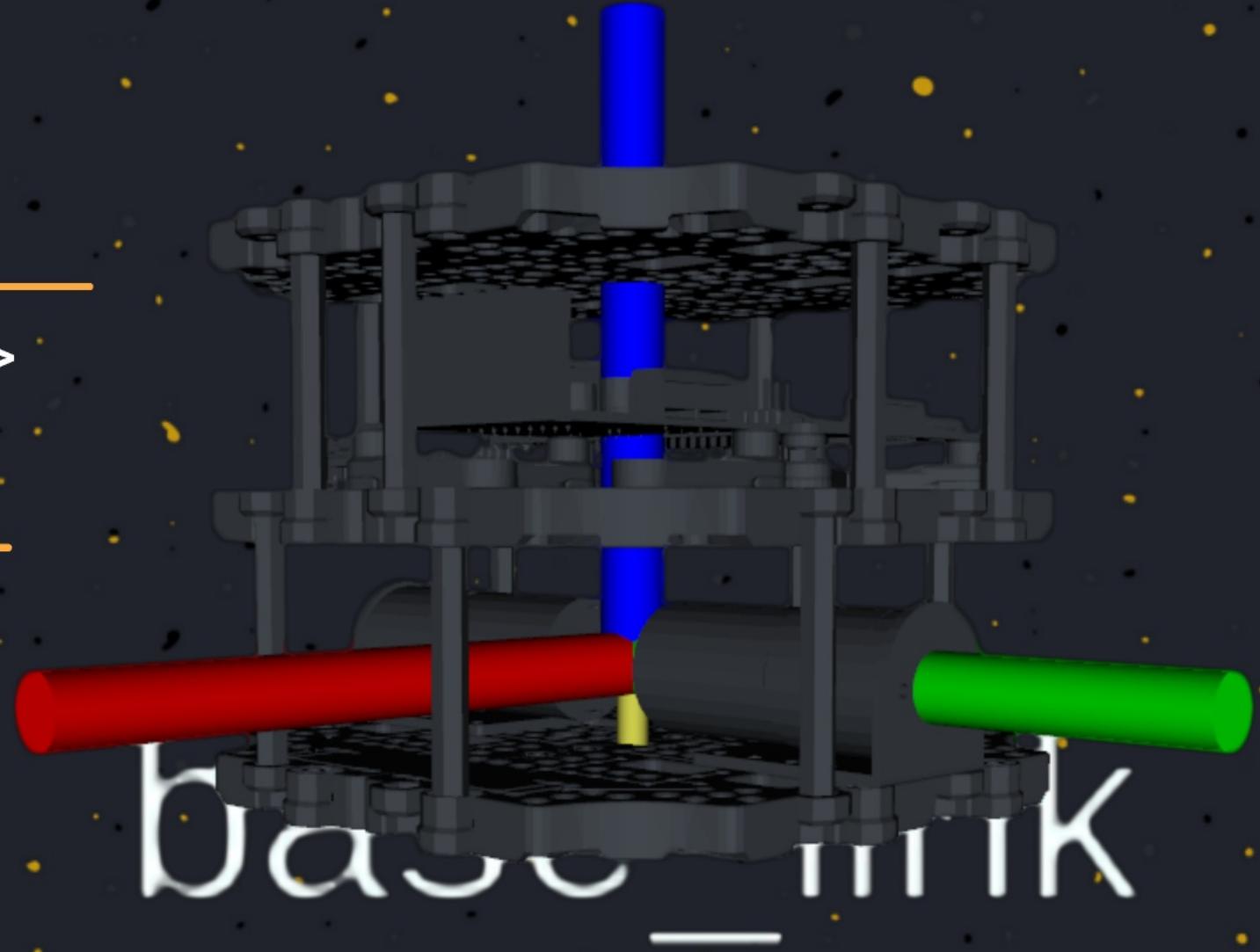
```
    <name>
```

```
      <visual>
```

```
        <---
```

```
        <collision>
```

```
        <inertial>
```



# URDF - Unified Robot Description Format



```
<robot>
  <link>
    ...
  </link>
  ...
</robot>
```

# URDF - Unified Robot Description Format



```
<robot>
  <link>
    ...
  </link>
  <joint>
    ...
  </joint>
</robot>
```

```
<joint>
```

```
...
```

```
</joint>
```



```
<joint>
```

```
...
```

```
</joint>
```

```
    <parent>
```

```
    <---
```

```
    <child>
```

```
        <---
```



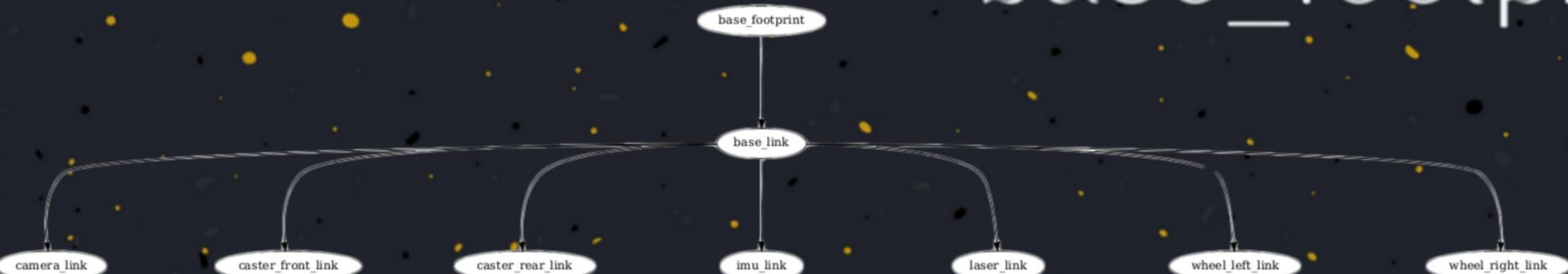
```
<joint>
```

```
...
```

```
</joint>
```

```
    <parent>
```

```
    <child>
```



```
<joint>
```

```
...
```

```
</joint>
```

```
    <parent>
```

```
    <---
```

```
    <child>
```

```
        <---
```



```
<joint>
```

```
...
```

```
</joint>
```

```
    <type>
```

```
        <parent>
```

```
            <child>
```

```
                <origin>
```



```
<joint>
```

```
...
```

```
</joint>
```

```
    <type>
```

```
        <parent>
```

```
            <child>
```

```
                <origin>
```

```
                    <limit>
```

```
    <axis>
```



# URDF - Unified Robot Description Format



```
<robot>
  <link>
    ...
  </link>
  <joint>
    ...
  </joint>
</robot>
```

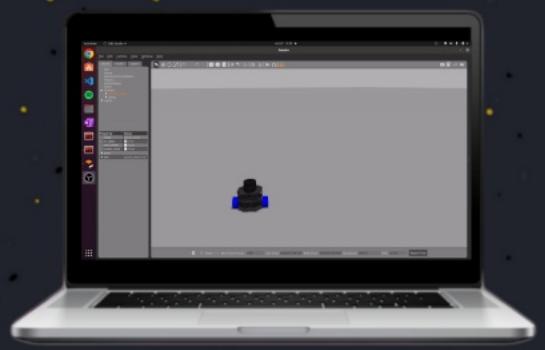
# URDF - Unified Robot Description Format

```
<robot>
  <link>
    ...
  </link>
  <joint>
    ...
  </joint>
</robot>
```

# URDF - Unified Robot Description Format



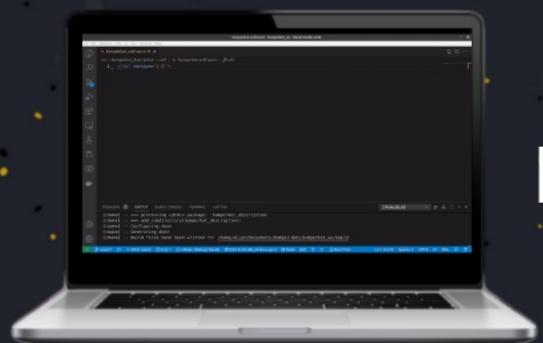
```
<robot>
  <link>
    ...
  </link>
  <joint>
    ...
  </joint>
</robot>
```



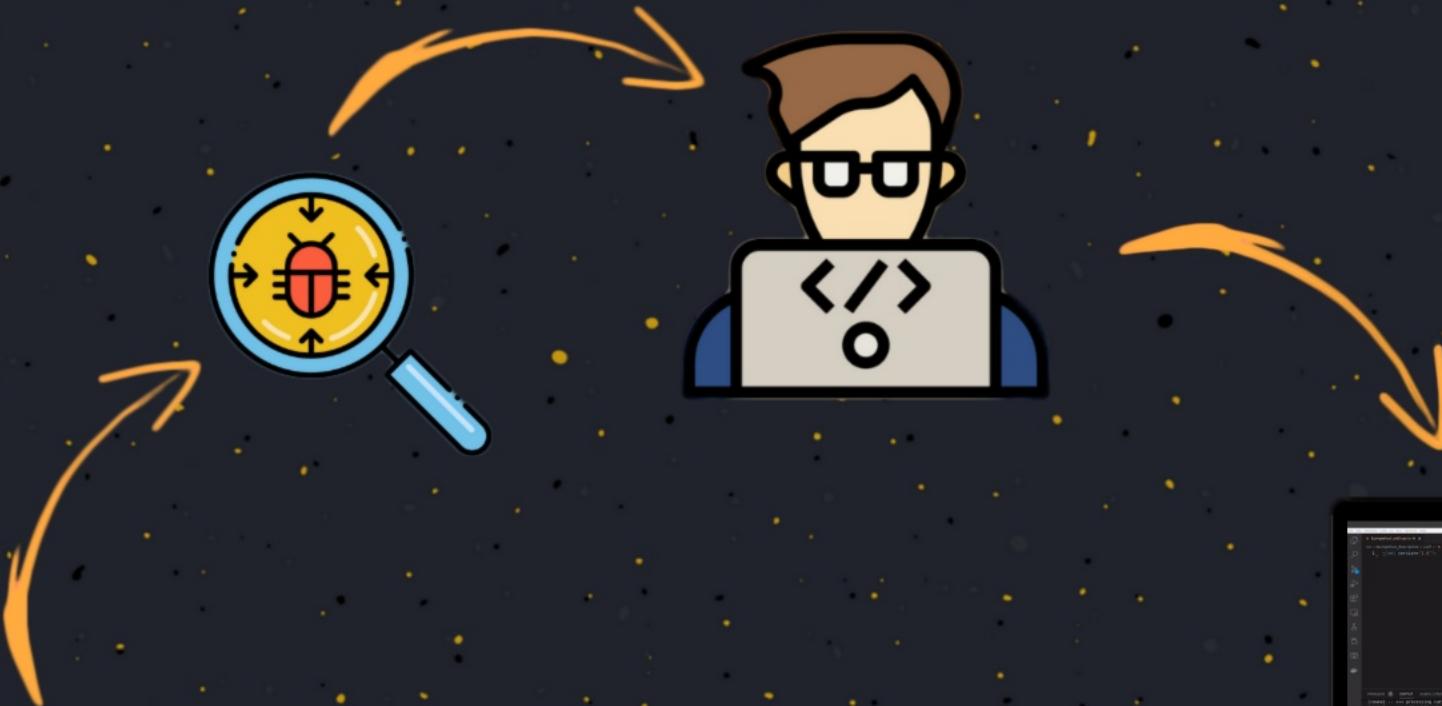
Simulate



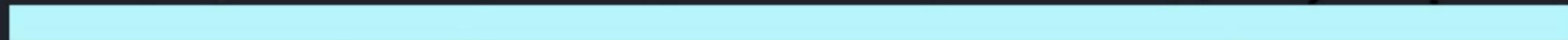
Visualize



Model



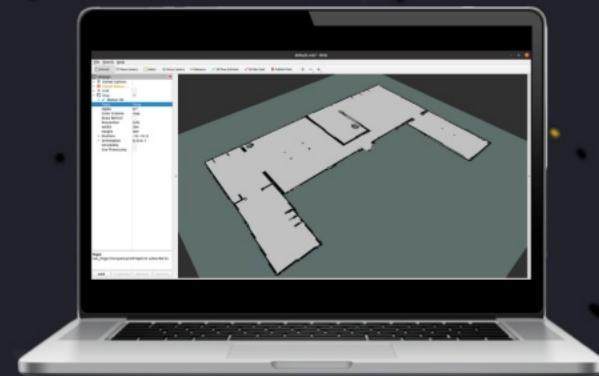
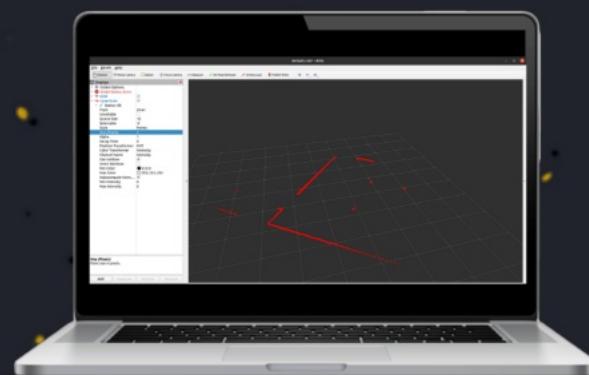
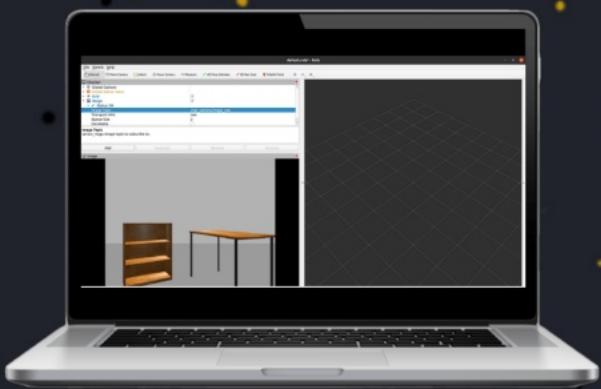
# RViz 2 - ROS 2 Visualization

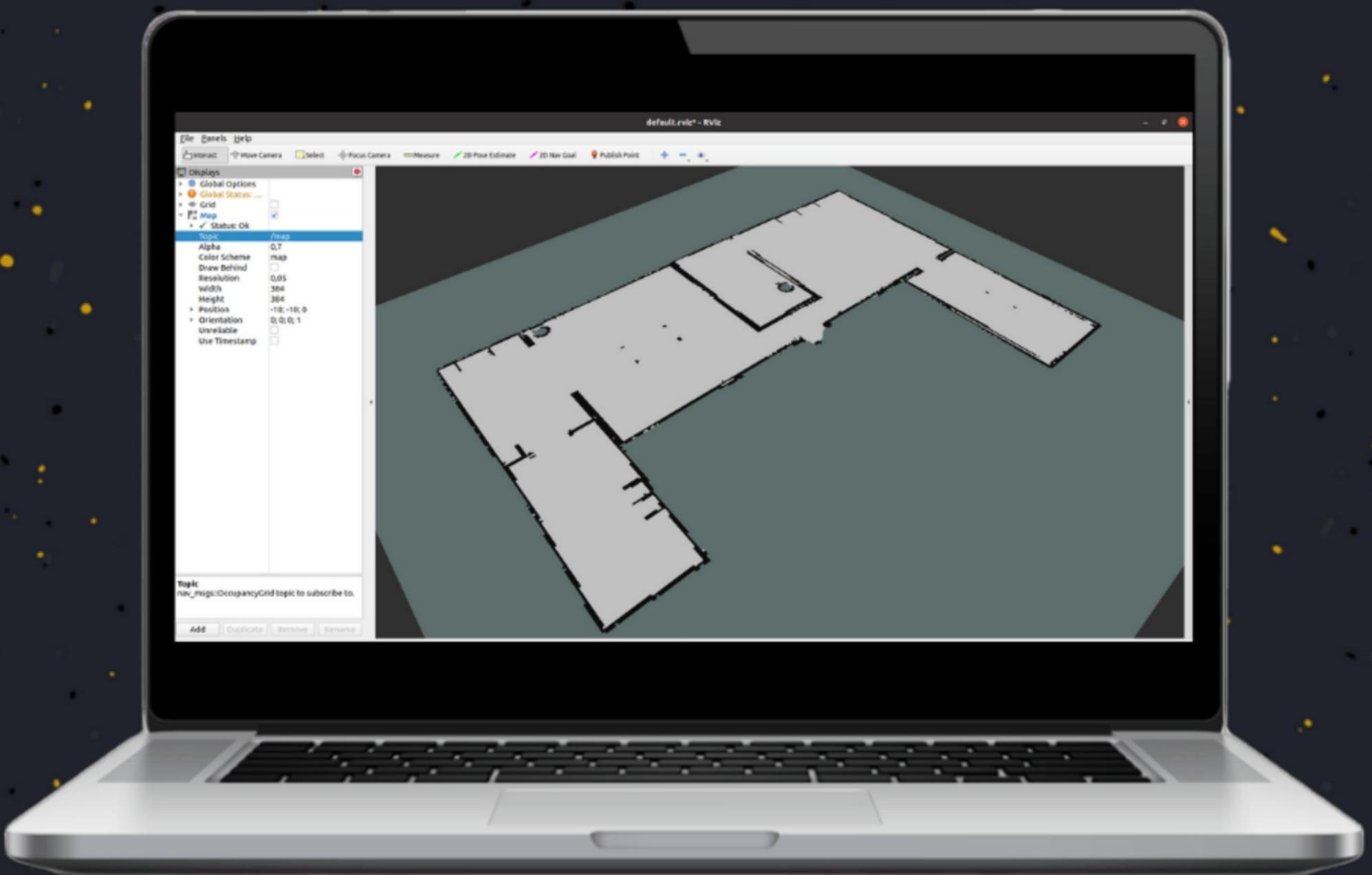


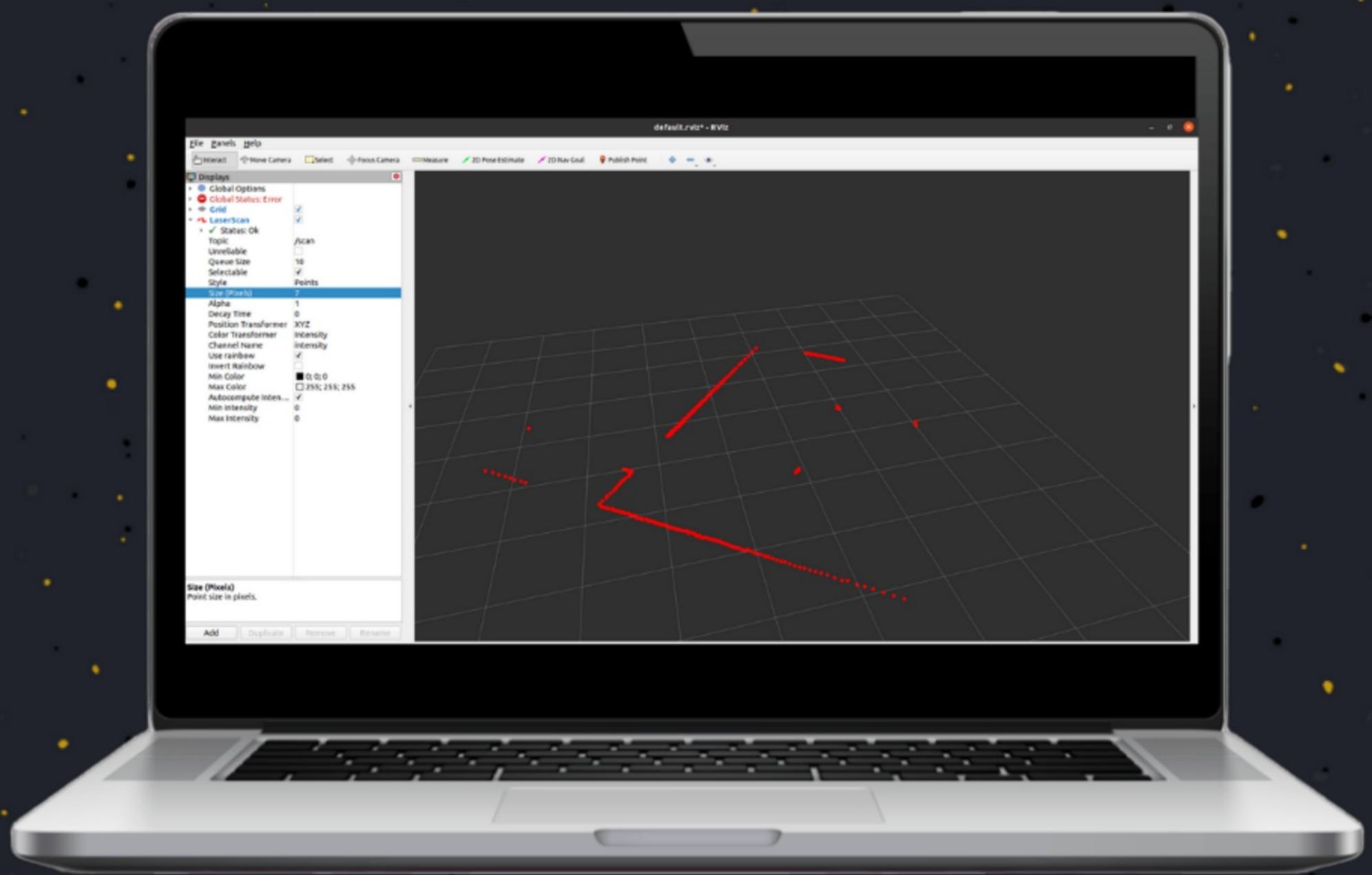
# RViz 2 - ROS 2 Visualization

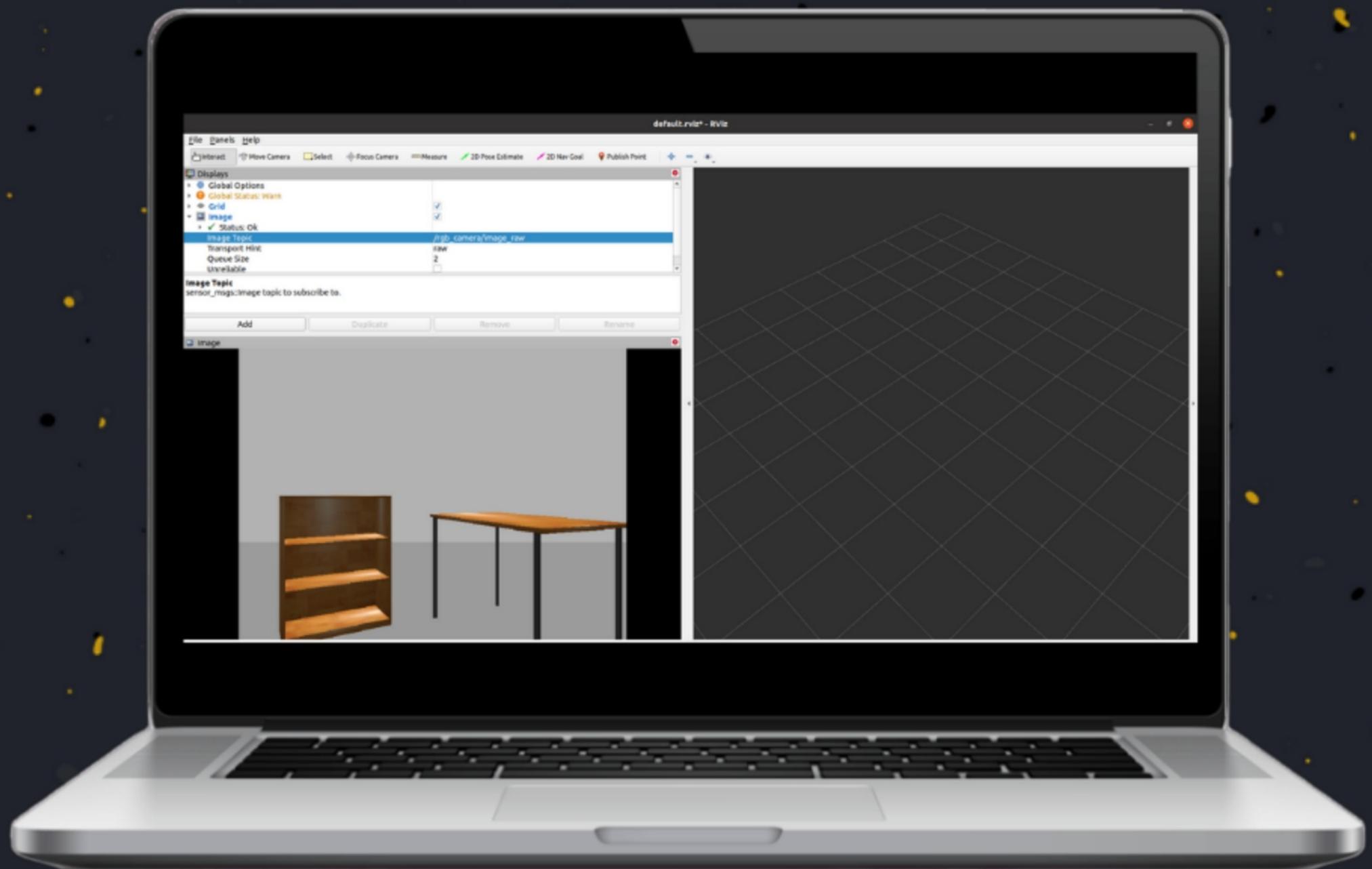


# RViz 2 - ROS 2 Visualization

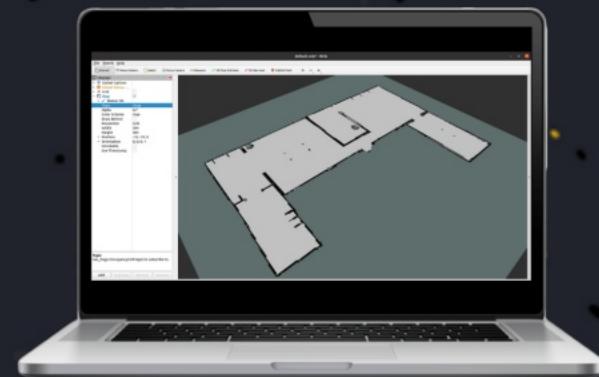
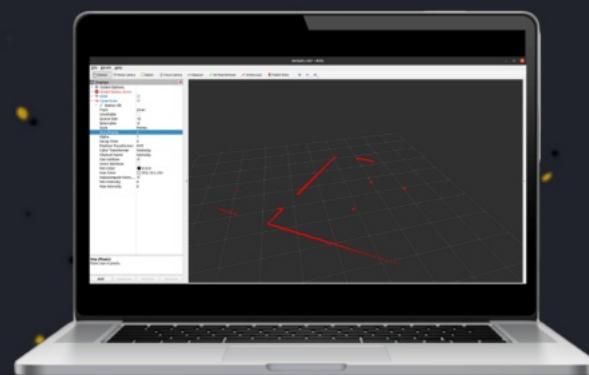
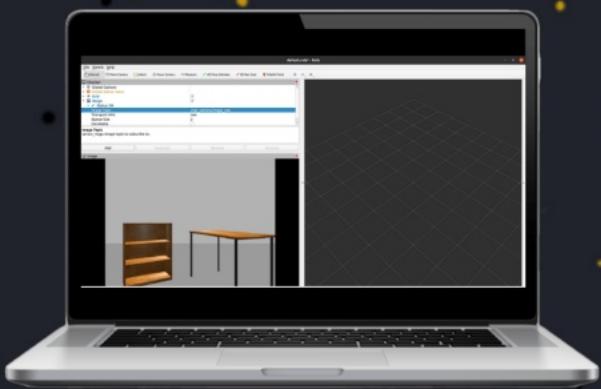


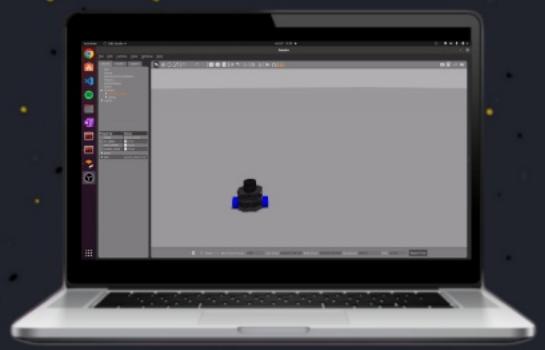






# RViz 2 - ROS 2 Visualization

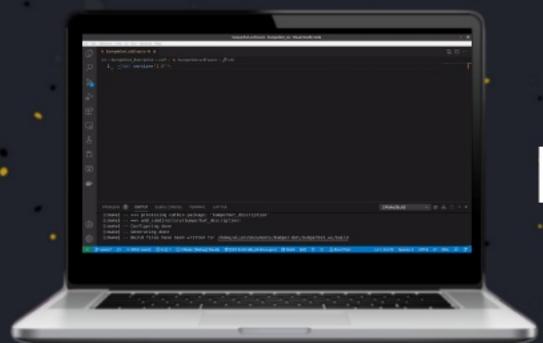




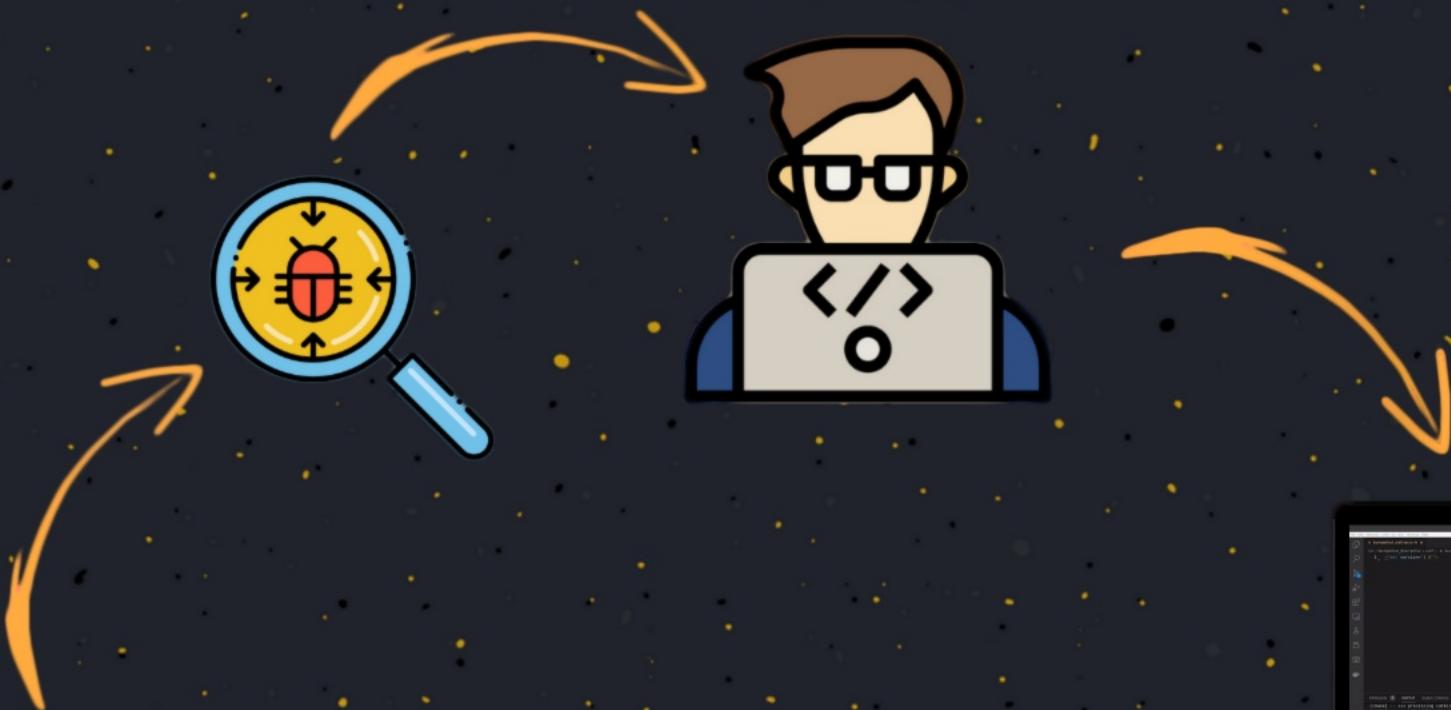
Simulate



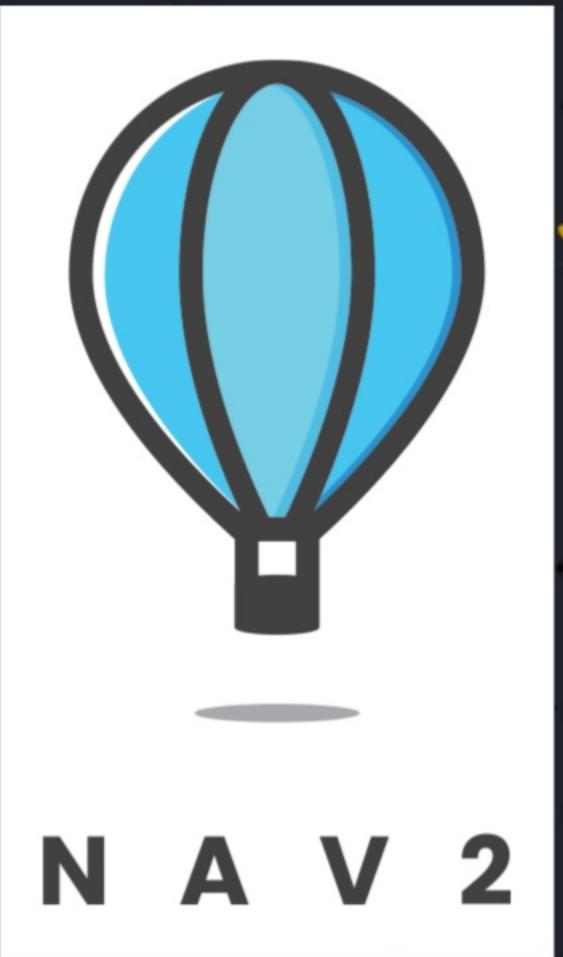
Visualize



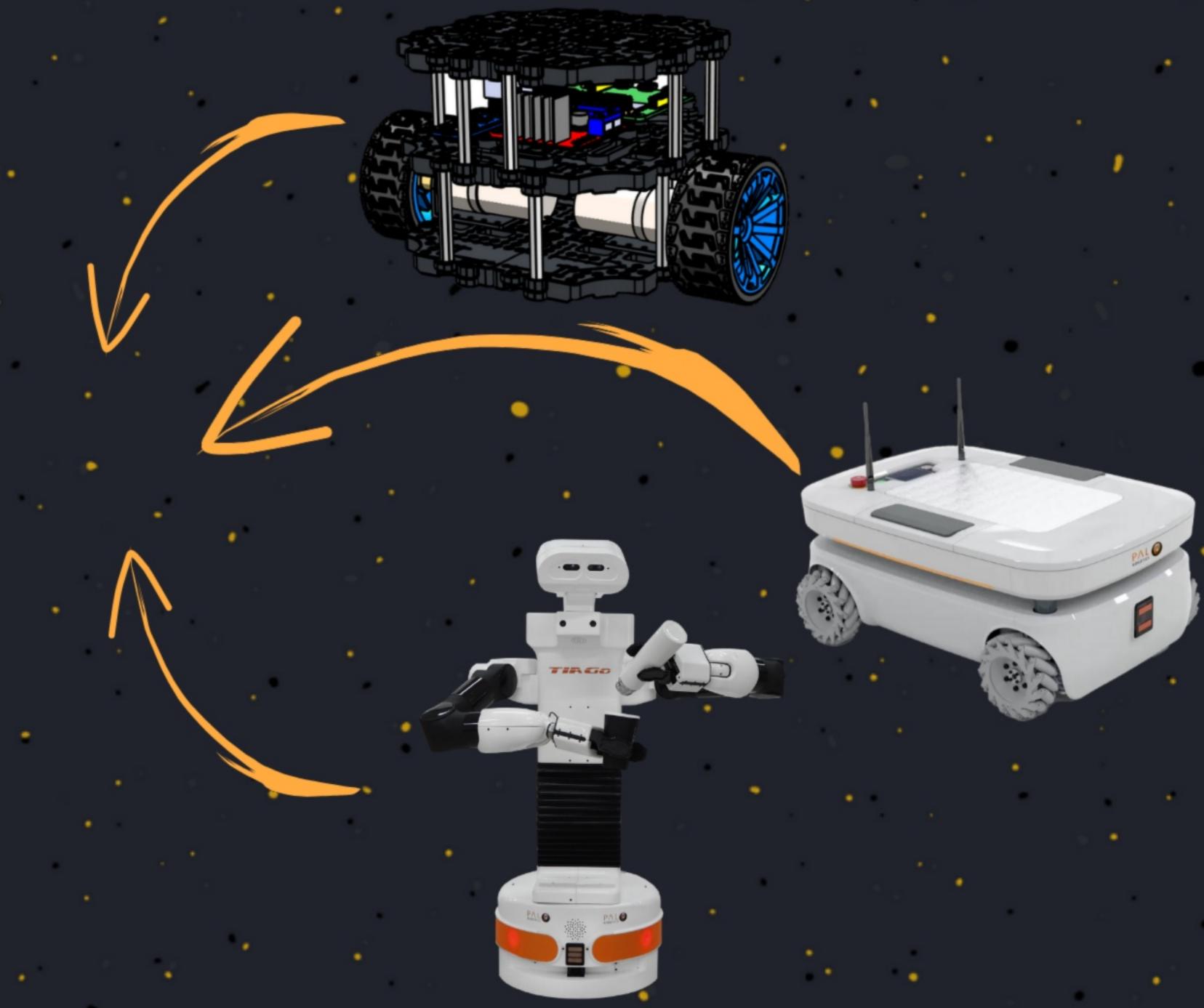
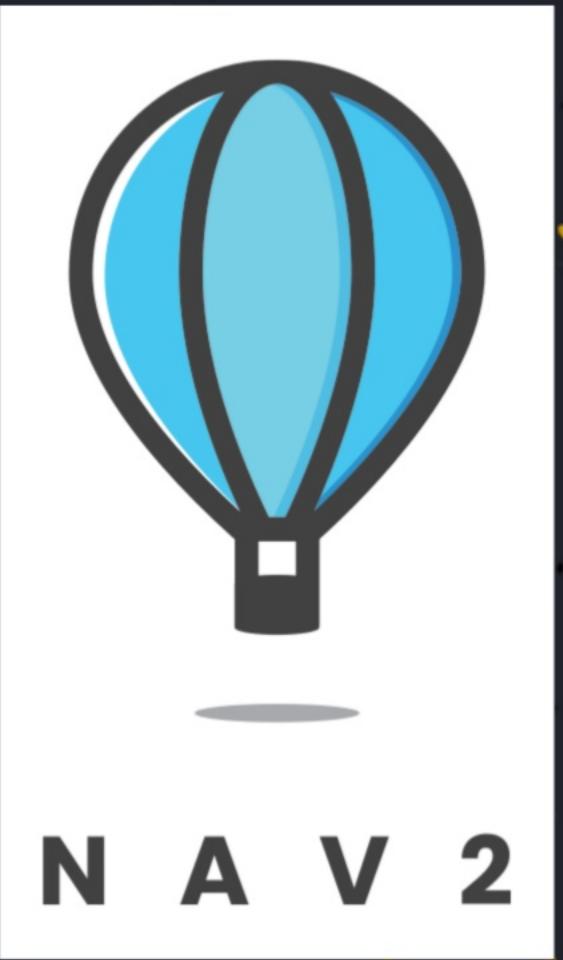
Model



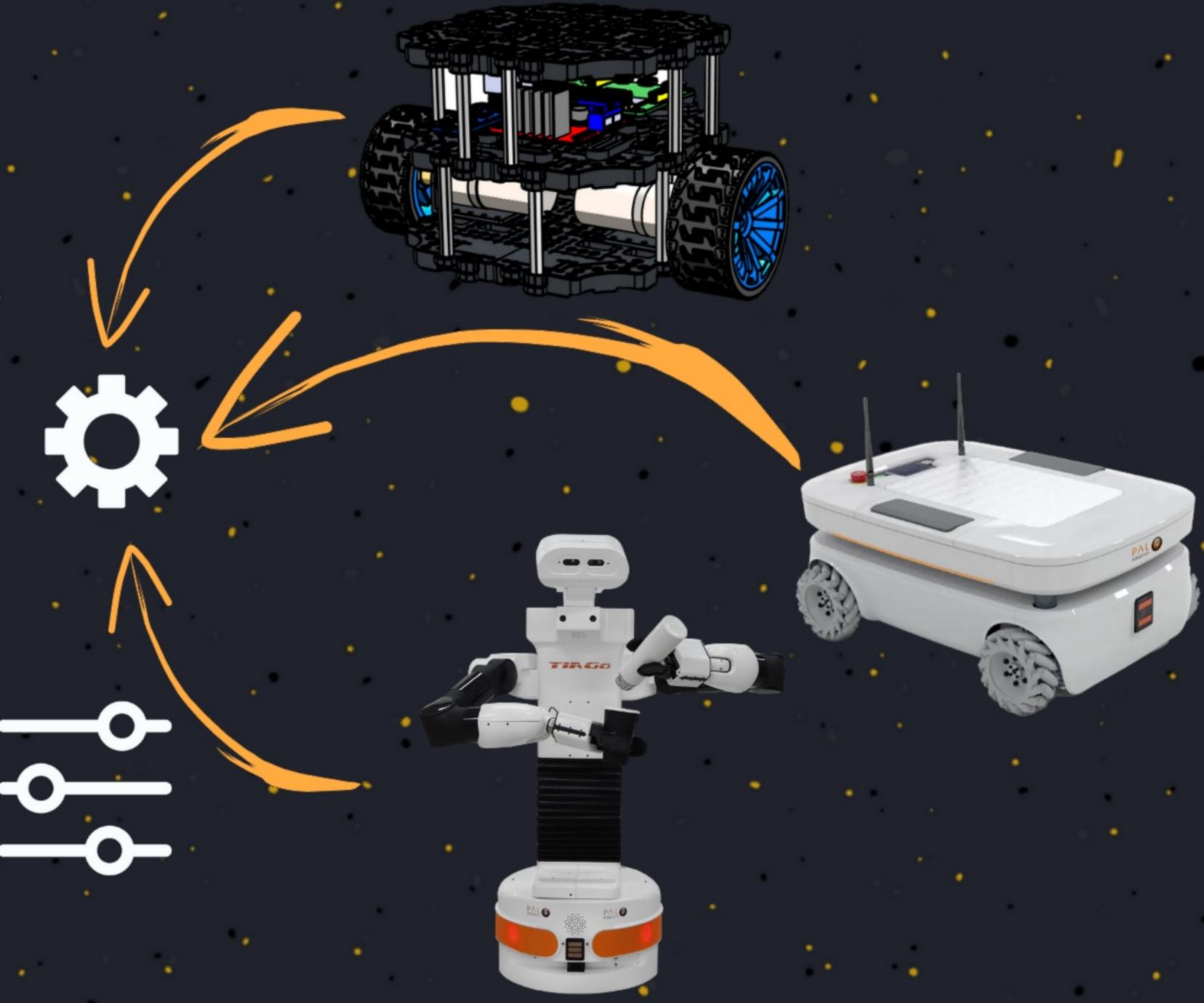
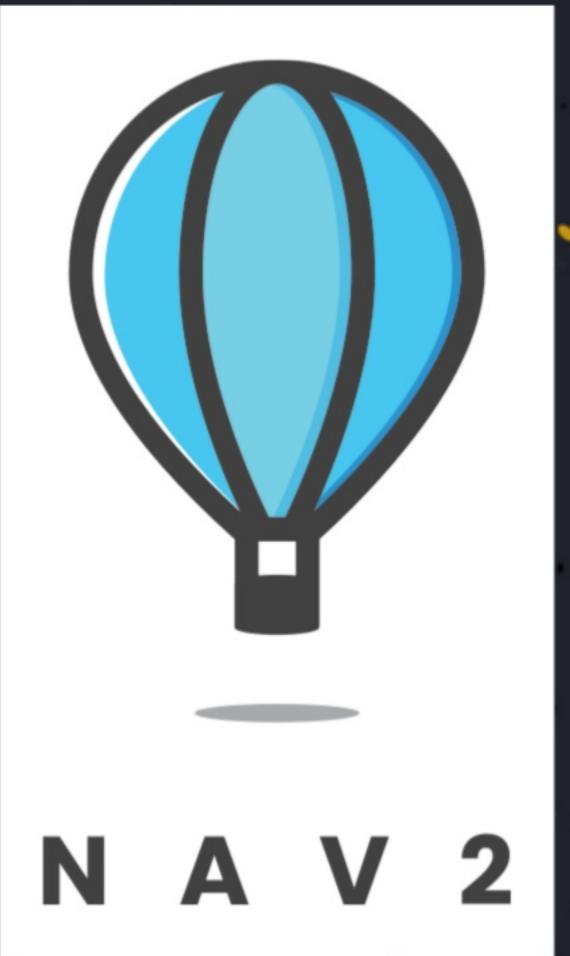
# Parameters

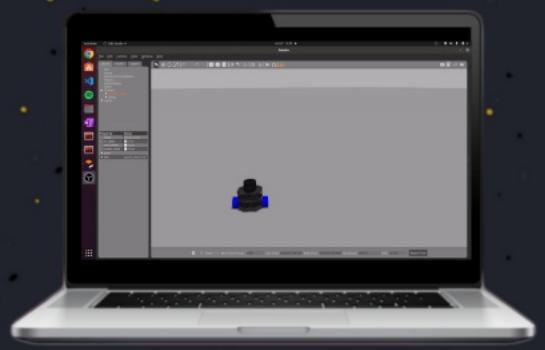


# Parameters



# Parameters

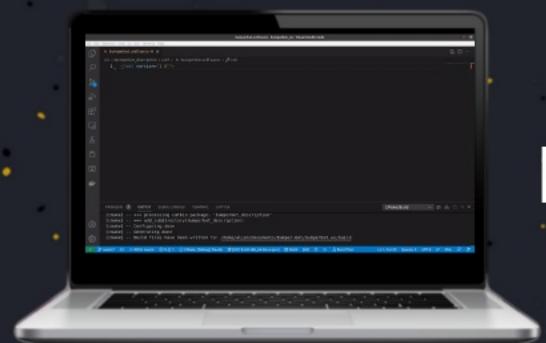




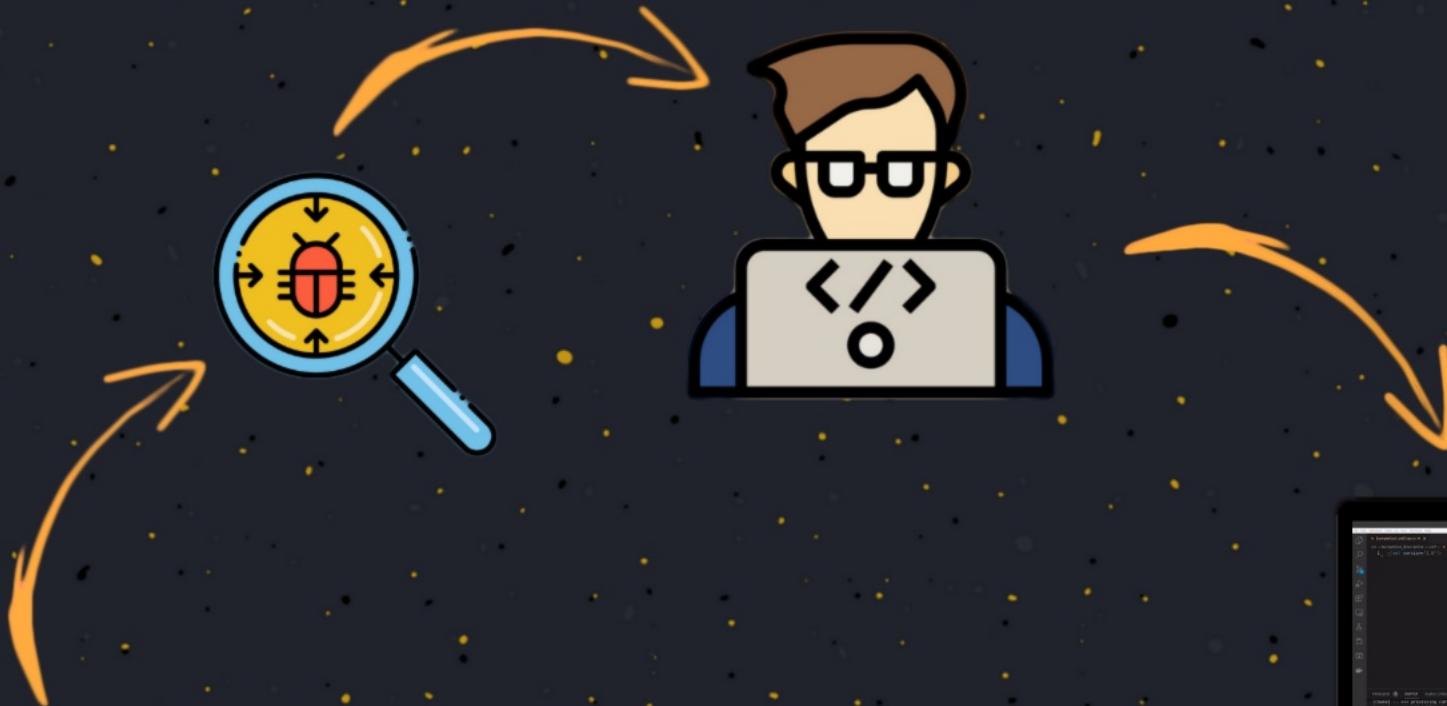
Simulate



Visualize



Model



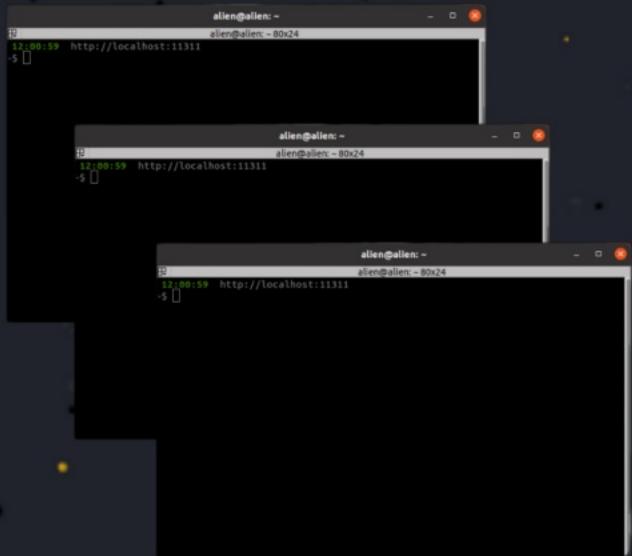
# Launch Files

# Launch Files



ros2 node

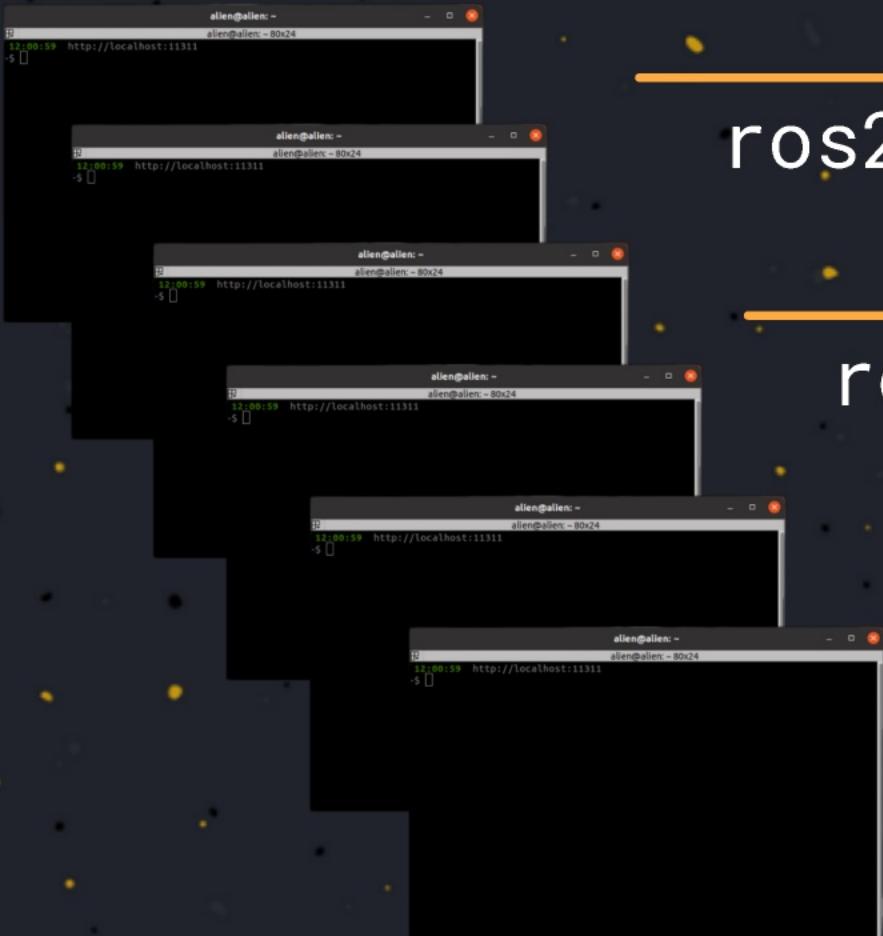
# Launch Files



ros2 node

ros2 node

# Launch Files

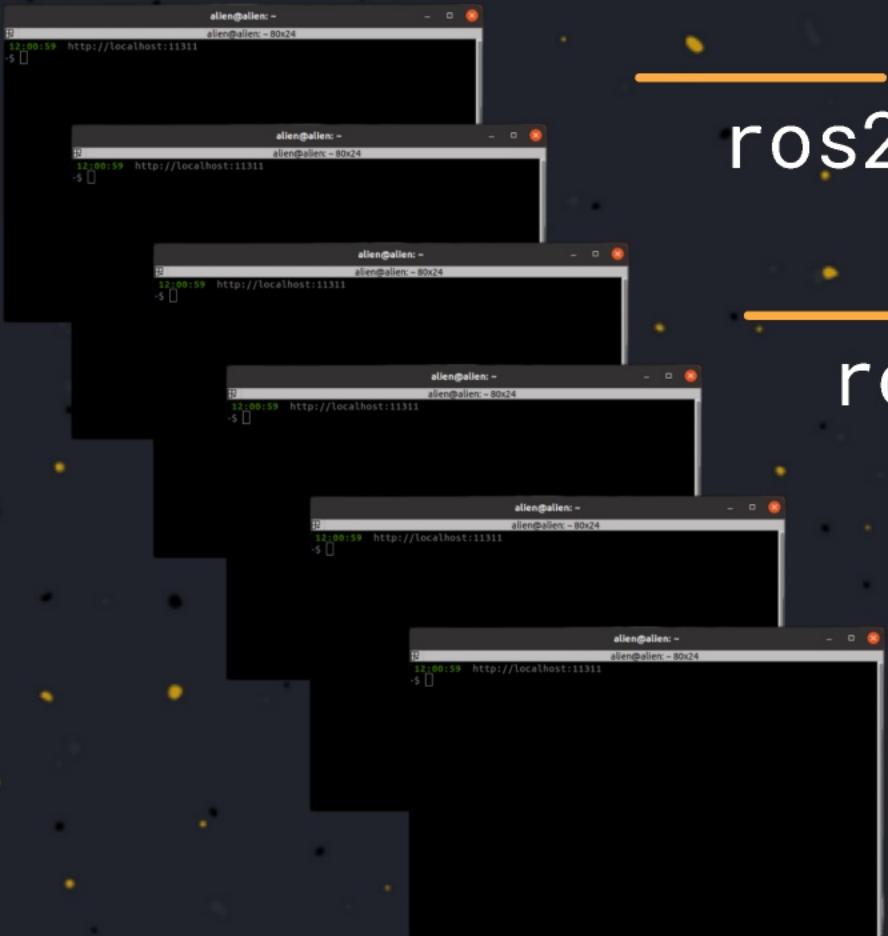


ros2 node

ros2 node

ros2 param

# Launch Files



ros2 node

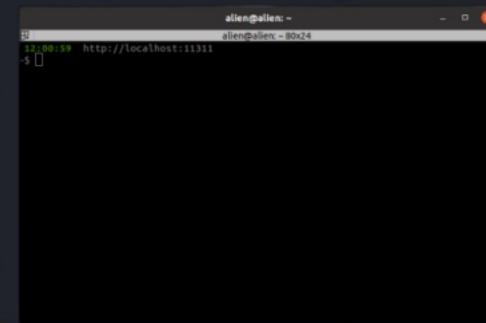
ros2 node

ros2 param



Launch

# Launch



ros2 launch

# Launch



ros2 launch



Nodes



# Launch



ros2 launch



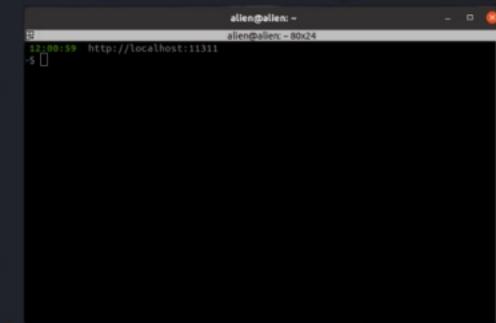
Nodes



Parameters



# Launch



ros2 launch



Nodes



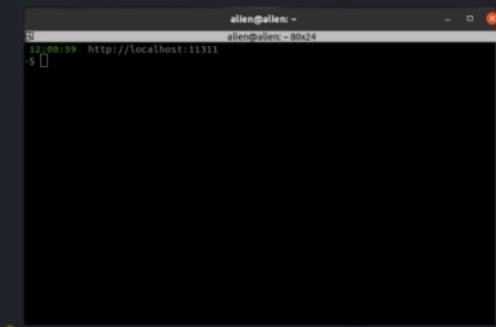
Parameters



Processes



# Launch



ros2 launch



Nodes



Launch  
Files



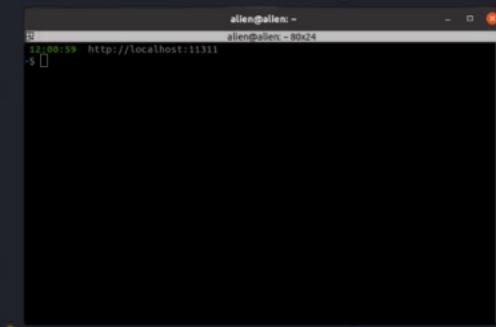
Parameters



Processes



# Launch



ros2 launch



Nodes



Launch  
Files



Parameters

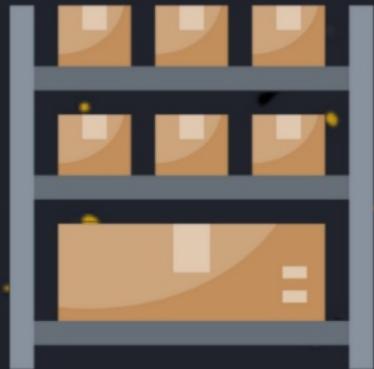


Processes

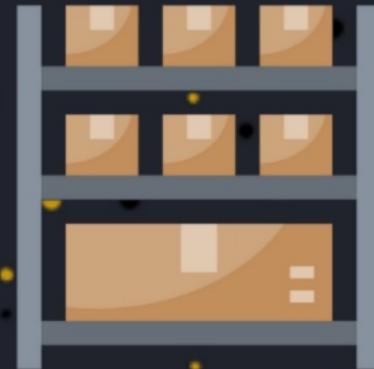


# Launch Description

# Launch Description

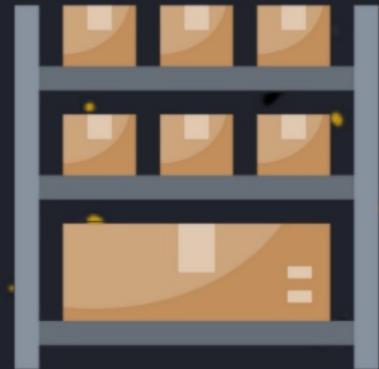


launch

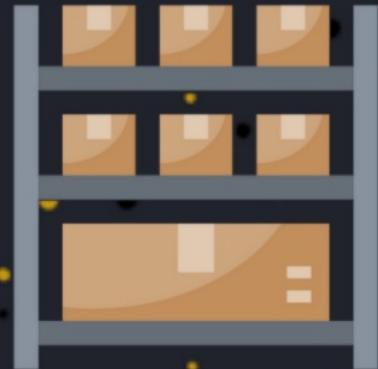


launch\_ros

# Launch Description



launch



launch\_ros



actions



substitutions

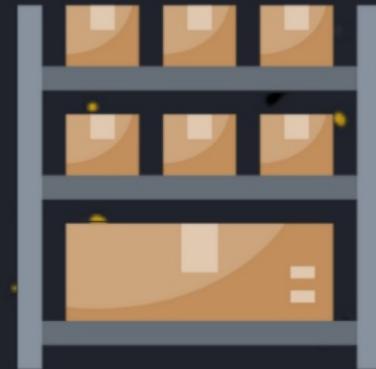


event handlers



conditions

# Launch Description



launch



launch\_ros



actions



actions



substitutions



substitutions



event handlers



event handlers



conditions



parameter\_descriptions

# Launch



ros2 launch



Nodes



Parameters



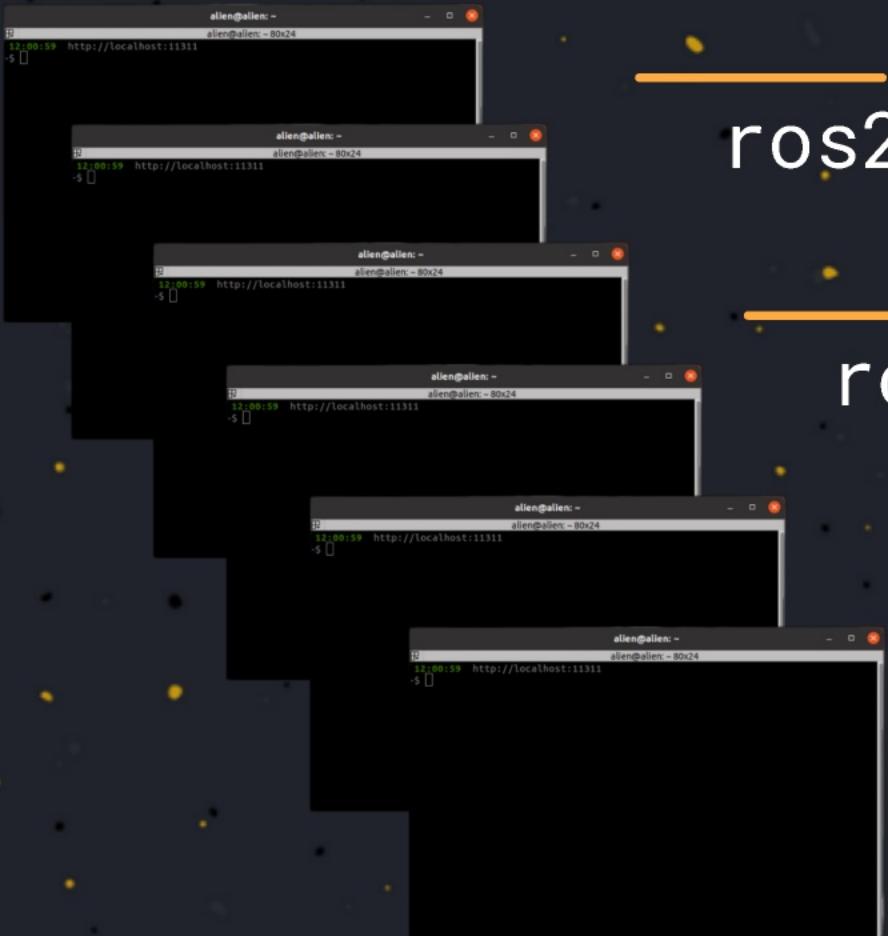
Processes



Launch  
Files



# Launch Files



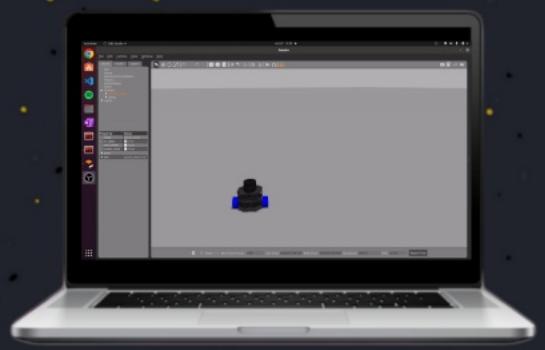
ros2 node

ros2 node

ros2 param



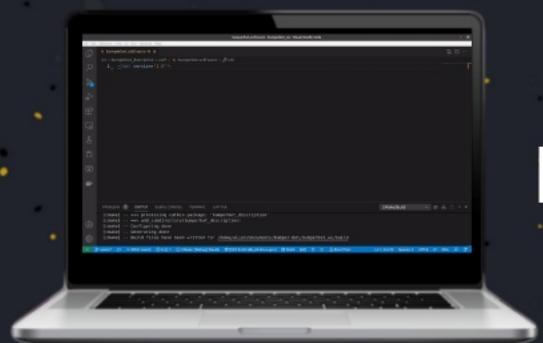
Launch



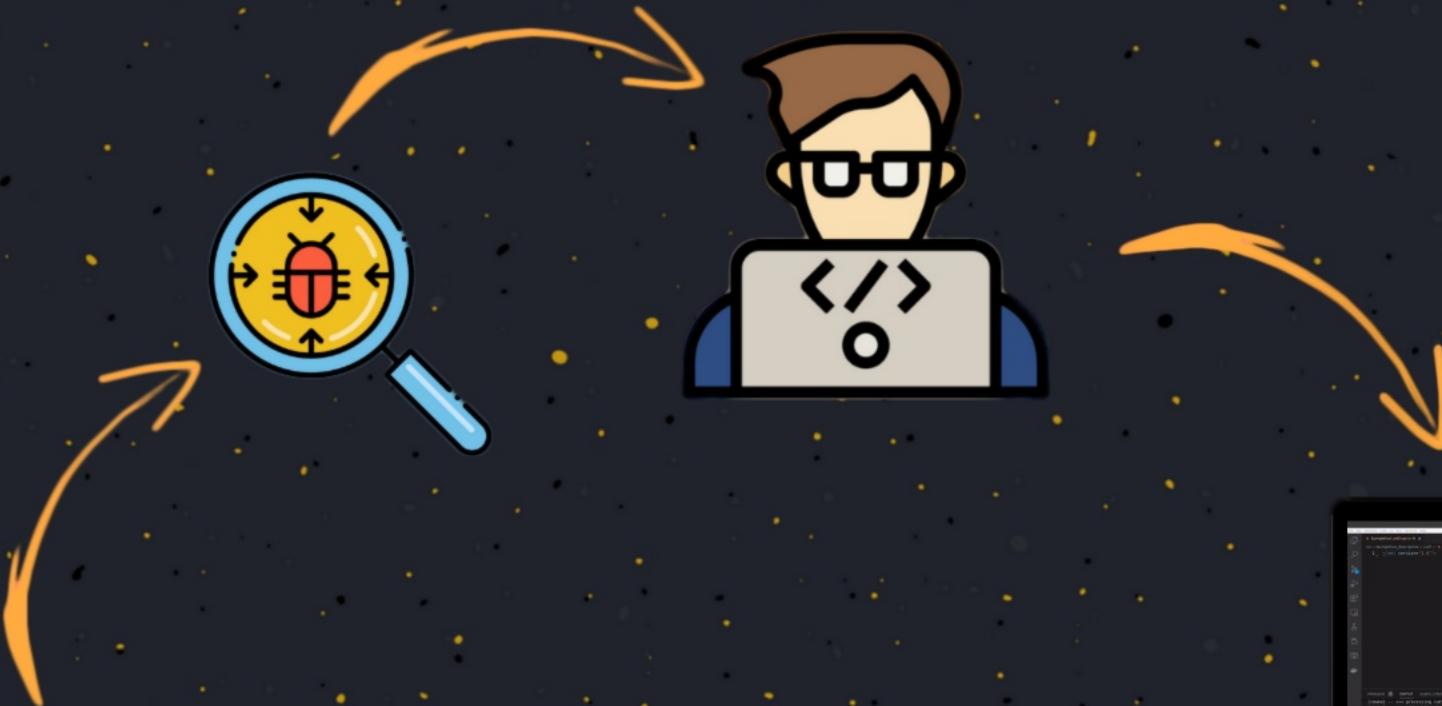
Simulate



Visualize

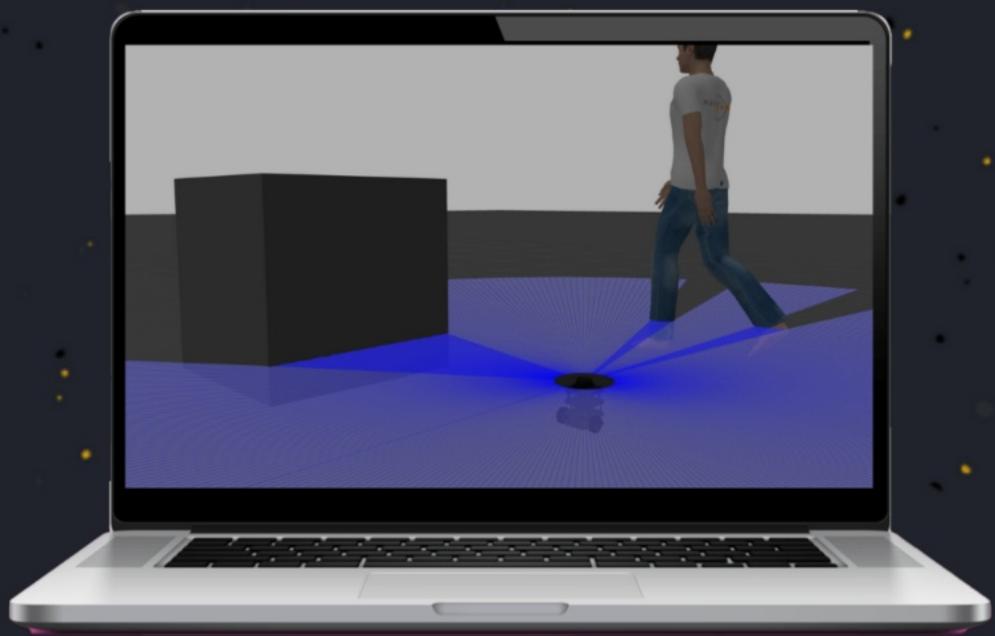


Model

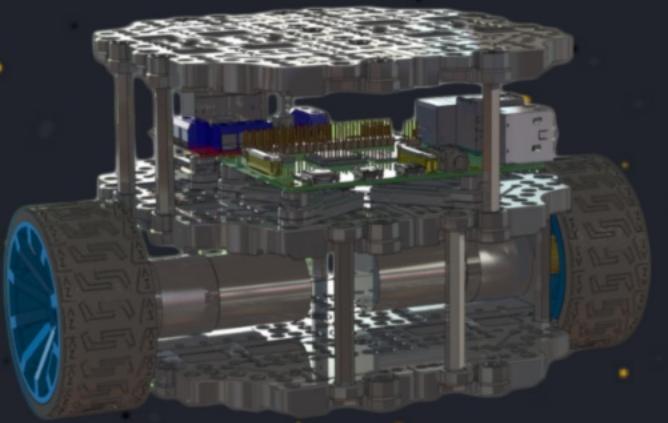




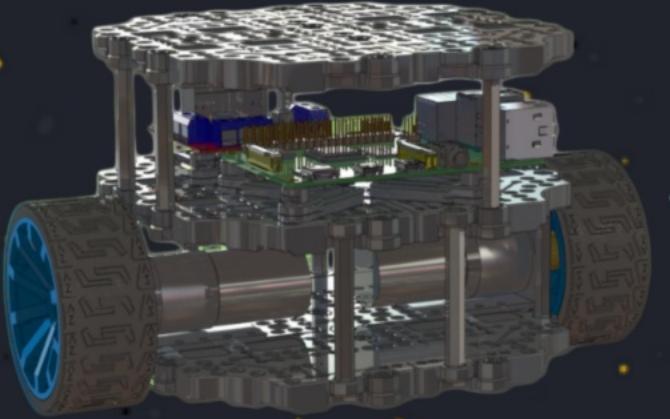
# GAZEBO







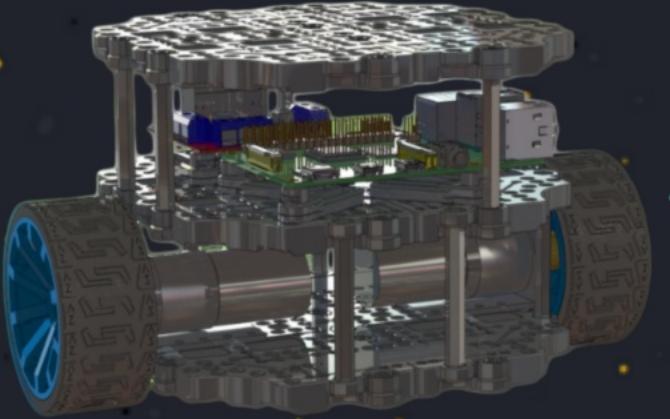
/joint\_states



/joint\_states



/imu



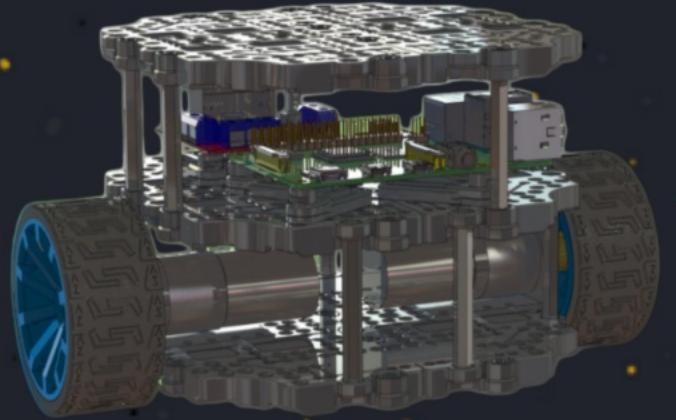
/joint\_states



/imu



/scan



/joint\_states



/imu



/scan

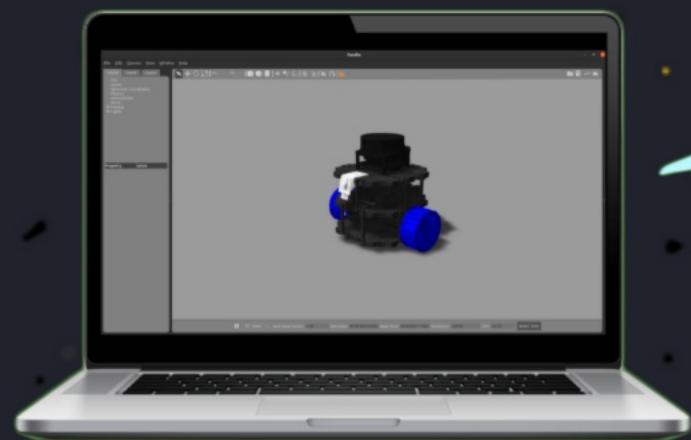






GAZEBO

/joint\_states



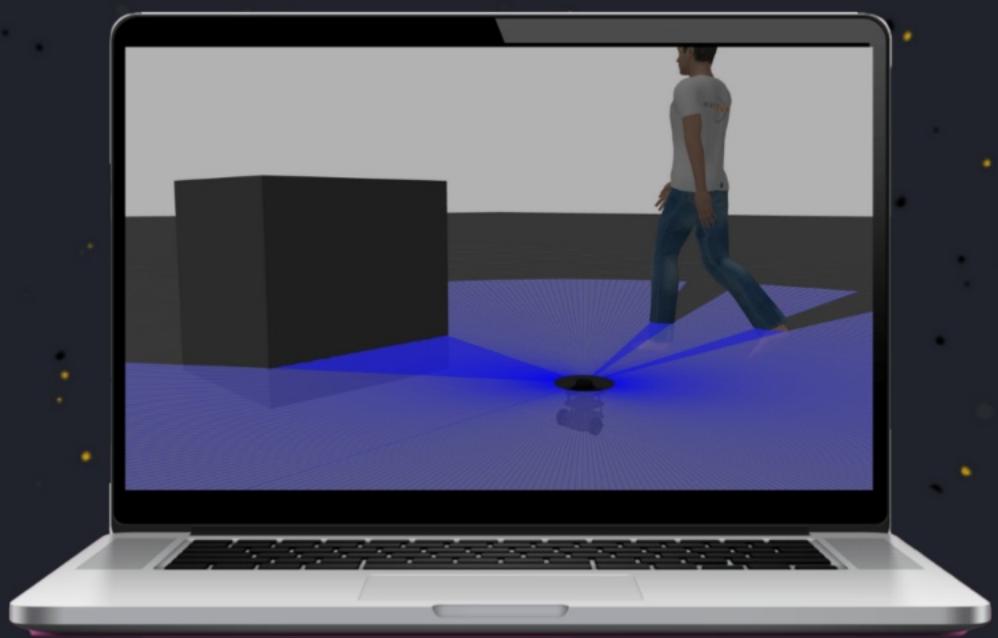
/imu

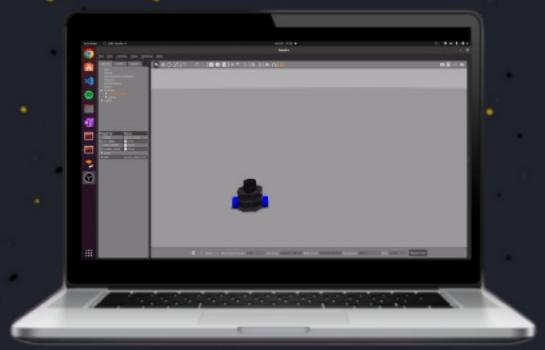


/scan



# GAZEBO

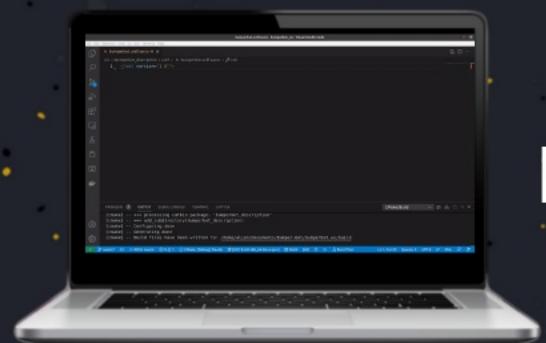




Simulate



Visualize



Model

