Team	Ardent
Members	Nathan Collins
Assignment	Deliverables

Execution of Lab Tasks

Starting Nodes:

Multiple Terminals Screen Shots

```
yahboom@VM:~/Desktop/Intro-to-Robotic-Coding$ ros2 pkg executables turtlesim
turtlesim draw_square
turtlesim mimic
turtlesim turtle_teleop_key
turtlesim turtlesim_node
yahboom@VM:~/Desktop/Intro-to-Robotic-Coding$ ros2 run turtlesim turtlesim_node
[INFO] [1737674221.988608017] [turtlesim]: Starting turtlesim with node name /turtlesim
[INFO] [1737674221.995633303] [turtlesim]: Spawning turtle [turtle1] at x=[5.544445], y=[5.544445], theta=[0.000000]
[INFO] [1737675650.463732424] [turtlesim]: Rotation goal completed successfully
[INFO] [1737675666.561176967] [turtlesim]: Rotation goal canceled
[WARN] [1737675666.838058853] [turtlesim]: Rotation goal received before a previous goal finished. Aborting previous goal
[WARN] [1737675666.961407642] [turtlesim]: Rotation goal received before a previous goal finished. Aborting previous goal
[INFO] [1737675668.368610122] [turtlesim]: Rotation goal completed successfully
[INFO] [1737675670.990388611] [turtlesim]: Rotation goal completed successfully
[INFO] [1737675687.307459488] [turtlesim]: Rotation goal completed successfully
```

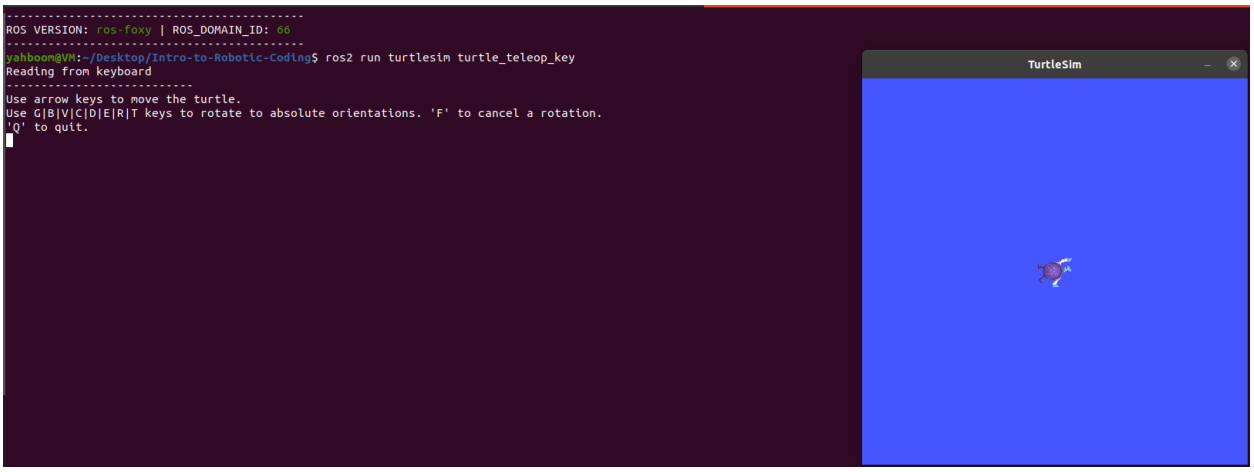
```
----------------------------------------
ROS VERSION: ros-foxy | ROS_DOMAIN_ID: 66
----------------------------------------
yahboom@VM:~/Desktop/Intro-to-Robotic-Coding$ ros2 node list
WARNING: Be aware that are nodes in the graph that share an exact name, this can have unintended side effects.
/turtlesim
/turtlesim
yahboom@VM:~/Desktop/Intro-to-Robotic-Coding$ ros2 node info /turtlesim
There are 2 nodes in the graph with the exact name "/turtlesim". You are seeing information about only one of them.
/turtlesim
  Subscribers:
    /parameter_events: rcl_interfaces/msg/ParameterEvent
    /turtle1/cmd_vel: geometry_msgs/msg/Twist
  Publishers:
    /parameter_events: rcl_interfaces/msg/ParameterEvent
    /rosout: rcl_interfaces/msg/Log
    /turtle1/color_sensor: turtlesim/msg/Color
    /turtle1/pose: turtlesim/msg/Pose
  Service Servers:
    /clear: std_srvs/srv/Empty
    /kill: turtlesim/srv/Kill
    /reset: std_srvs/srv/Empty
    /spawn: turtlesim/srv/Spawn
    /turtle1/set_pen: turtlesim/srv/SetPen
    /turtle1/teleport_absolute: turtlesim/srv/TeleportAbsolute
    /turtle1/teleport_relative: turtlesim/srv/TeleportRelative
    /turtlesim/describe_parameters: rcl_interfaces/srv/DescribeParameters
    /turtlesim/get_parameter_types: rcl_interfaces/srv/GetParameterTypes
    /turtlesim/get_parameters: rcl_interfaces/srv/GetParameters
    /turtlesim/list_parameters: rcl_interfaces/srv/ListParameters
    /turtlesim/set_parameters: rcl_interfaces/srv/SetParameters
    /turtlesim/set_parameters_atomically: rcl_interfaces/srv/SetParametersAtomically
  Service Clients:

  Action Servers:
```

```
yahboom@VM:~/Desktop/Intro-to-Robotic-Coding$ ros2 node info /teleop_turtl
Unable to find node '/teleop_turtl'
yahboom@VM:~/Desktop/Intro-to-Robotic-Coding$ rqt_graph
WARNING: Package name "yahboomcar_KCFTracker" does not follow the naming conventions. It should start with a lower case letter and only contain lower case letters, digits, underscores, and dashes.
WARNING: Package name "yahboomcar_KCFTracker" does not follow the naming conventions. It should start with a lower case letter and only contain lower case letters, digits, underscores, and dashes.
yahboom@VM:~/Desktop/Intro-to-Robotic-Coding$ ros2 topic list
/parameter_events
/rosout
/turtle1/cmd_vel
/turtle1/color_sensor
/turtle1/pose
yahboom@VM:~/Desktop/Intro-to-Robotic-Coding$ ros2 topic info /turtle1/cmd_vel
Type: geometry_msgs/msg/Twist
Publisher count: 0
Subscription count: 2
yahboom@VM:~/Desktop/Intro-to-Robotic-Coding$ ros2 interface show geometry_msgs/msg/Twi
Could not find the interface '/opt/ros/foxy/share/geometry_msgs/msg/Twi.idl'
yahboom@VM:~/Desktop/Intro-to-Robotic-Coding$ c /turtle1/pose
c: command not found
yahboom@VM:~/Desktop/Intro-to-Robotic-Coding$  /turtle1/pose
bash: /turtle1/pose: No such file or directory
yahboom@VM:~/Desktop/Intro-to-Robotic-Coding$ /turtle1/pose
bash: /turtle1/pose: No such file or directory
yahboom@VM:~/Desktop/Intro-to-Robotic-Coding$ ros2 topic pub --once /turtle1/cmd_vel geometry_msgs/msg/Twist "{linear:
```

```
------------------------------------------
ROS VERSION: ros-foxy | ROS_DOMAIN_ID: 66
------------------------------------------
yahboom@VM:~/Desktop/Intro-to-Robotic-Coding$ ros2 pkg executables turtlesim
turtlesim draw_square
turtlesim mimic
turtlesim turtle_teleop_key
turtlesim turtlesim_node
yahboom@VM:~/Desktop/Intro-to-Robotic-Coding$ ros2 run turtlesim turtlesim_node
[INFO] [1738013909.920990522] [turtlesim]: Starting turtlesim with node name /turtlesim
[INFO] [1738013909.925240757] [turtlesim]: Spawning turtle [turtle1] at x=[5.544445], y=[5.544445], theta=[0.000000]
```

Topics

Step 7:



Step 21:

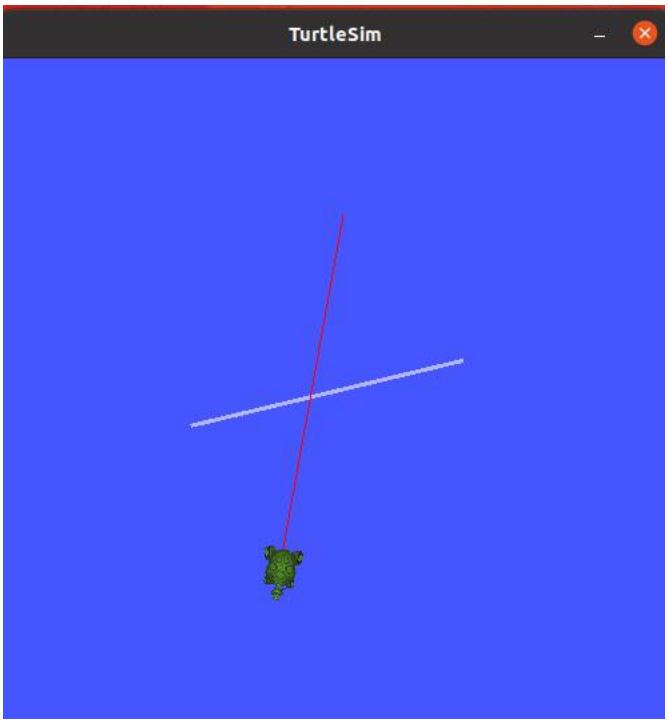
```
x: 5.544444561004639
y: 5.544444561004639
theta: 0.0
linear_velocity: 0.0
angular_velocity: 0.0
---
^Cyahboom@VM:~/Desktop/Intro-to-Robotic-Coding$ ros2 topic info /turtle1/pose
Type: turtlesim/msg/Pose
Publisher count: 1
Subscription count: 0
yahboom@VM:~/Desktop/Intro-to-Robotic-Coding$ ros2 interface show turtlesim/msg/Pose
float32 x
float32 y
float32 theta

float32 linear_velocity
float32 angular_velocity
yahboom@VM:~/Desktop/Intro-to-Robotic-Coding$
```

Step 25:

```
See 'snap info <snapname>' for additional versions.
yahboom@VM:~/Desktop/Intro-to-Robotic-Coding$ ros2 topic pub --once /turtle1/cmd_vel geometry_msgs/msg/Twist "{linear: {x: 2.0, y: 0.0, z: 0.0}, angular: {x: 0.0, y: 0.0, z: 1.8}}"
publisher: beginning loop
publishing #1: geometry_msgs.msg.Twist(linear=geometry_msgs.msg.Vector3(x=2.0, y=0.0, z=0.0), angular=geometry_msgs.msg.Vector3(x=0.0, y=0.0, z=1.8))

yahboom@VM:~/Desktop/Intro-to-Robotic-Coding$ ros2 topic pub --once /turtle1/cmd_vel geometry_msgs/msg/Twist "{linear: {x: 2.0, y: 0.0, z: 0.0}, angular: {x: 0.0, y: 0.0, z: 1.8}}"
publisher: beginning loop
publishing #1: geometry_msgs.msg.Twist(linear=geometry_msgs.msg.Vector3(x=2.0, y=0.0, z=0.0), angular=geometry_msgs.msg.Vector3(x=0.0, y=0.0, z=1.8))

yahboom@VM:~/Desktop/Intro-to-Robotic-Coding$ ros2 topic pub --once /turtle1/cmd_vel geometry_msgs/msg/Twist "{linear: {x: 1.0, y: 1.0, z: 0.0}, angular: {x: 0.0, y: 0.0, z: 2.0}}"
publisher: beginning loop
publishing #1: geometry_msgs.msg.Twist(linear=geometry_msgs.msg.Vector3(x=1.0, y=1.0, z=0.0), angular=geometry_msgs.msg.Vector3(x=0.0, y=0.0, z=2.0))
```

Services:

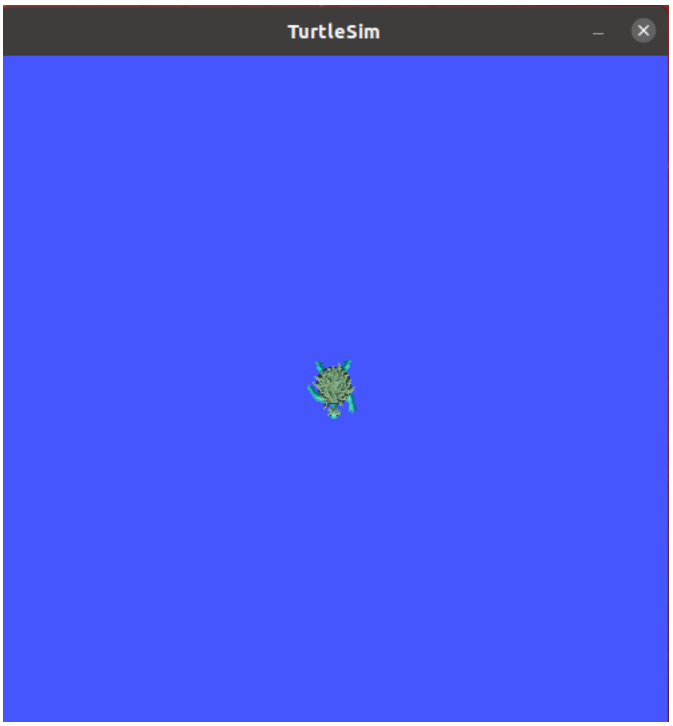
Image of Challenge Step: creating red line.



Action:

Step 8 with unique goal position output

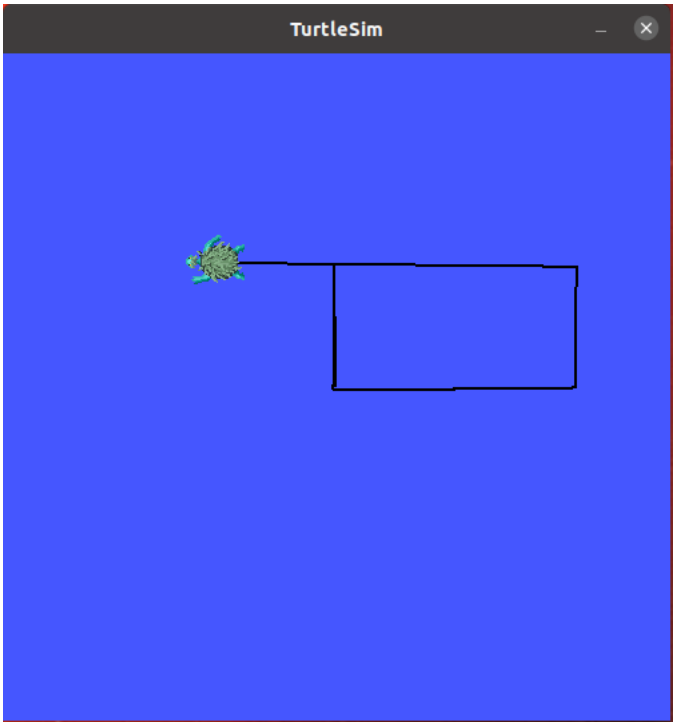
```
yahboom@VM:~/Desktop/Intro-to-Robotic-Coding$ ros2 action send_goal /turtle1/rotate_absolute turtlesim/action/RotateAbsolute "{theta: 4.71239}"
2025-01-29 07:23:12.012 [RTPS_TRANSPORT_SHM Error] Failed init_port fastrtps_port23912: open_and_lock_file failed -> Function open_port_internal
2025-01-29 07:23:12.012 [RTPS_TRANSPORT_SHM Error] Failed init_port fastrtps_port23913: open_and_lock_file failed -> Function open_port_internal
Waiting for an action server to become available...
Sending goal:
     theta: 4.71239

Goal accepted with ID: f37711f679944b9cb2d8c4d6465365d4

Result:
    delta: 1.536000370979309

Goal finished with status: SUCCEEDED
yahboom@VM:~/Desktop/Intro-to-Robotic-Coding$
```



Step 8 output displayed on the turtle

Task 3:

Image of square creating with black lines



To draw a square in Turtlesim, I used manual input keys to control the turtles movement while changing the pen color to black. First, I set the pen to black using the ‘set_pin’ service. Then, I utilized the arrow keys: pressing the up Arrow to move forward and the right arrow to rotate 90 degrees after each side of the square. By repeating this process, I was able to create a complete square through interactive control