



Inspiring Excellence

Lab Report-4

Title: Turtlebots Control

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Task 1

```
#!/usr/bin/python3
import rospy
from geometry_msgs.msg import Twist

def move():
    rospy.init_node('robot_cleaner', anonymous=True)
    velocity_publisher = rospy.Publisher('/turtle1/cmd_vel',
Twist, queue_size=10)
    vel_msg = Twist()

    print("Let's move your robot")
    speed = input("Input your speed:")
    height = input("Type your height:")
    width = input("Type your width:")
    speed = float(speed)
    height = float(height)
    width = float(width)

    vel_msg.linear.x = abs(speed)
    t0 = rospy.Time.now().to_sec()
    current_distance = 0

    while current_distance < width:
        velocity_publisher.publish(vel_msg)
        t1 = rospy.Time.now().to_sec()
        current_distance = speed * (t1 - t0)

    vel_msg.linear.x = 0
```

```
velocity_publisher.publish(vel_msg)

vel_msg.linear.y = abs(speed)
t0 = rospy.Time.now().to_sec()
current_distance = 0

while current_distance < height:
    velocity_publisher.publish(vel_msg)
    t1 = rospy.Time.now().to_sec()
    current_distance = speed * (t1 - t0)

vel_msg.linear.y = 0
velocity_publisher.publish(vel_msg)

vel_msg.linear.x = -abs(speed)
t0 = rospy.Time.now().to_sec()
current_distance = 0

while current_distance < width:
    velocity_publisher.publish(vel_msg)
    t1 = rospy.Time.now().to_sec()
    current_distance = speed * (t1 - t0)

vel_msg.linear.x = 0
velocity_publisher.publish(vel_msg)

vel_msg.linear.y = -abs(speed)
t0 = rospy.Time.now().to_sec()
current_distance = 0
```

```
while current_distance < height:
    velocity_publisher.publish(vel_msg)
    t1 = rospy.Time.now().to_sec()
    current_distance = speed * (t1 - t0)

vel_msg.linear.y = 0
velocity_publisher.publish(vel_msg)
vel_msg.linear.x = 0
vel_msg.linear.y = 0
velocity_publisher.publish(vel_msg)

if __name__ == '__main__':
    try:
        move()
    except rospy.ROSInterruptException:
        pass
```

Task 2

```
#!/usr/bin/python3
import rospy
from geometry_msgs.msg import Twist
import math

def move():
    rospy.init_node('robot_cleaner', anonymous=True)
    velocity_publisher = rospy.Publisher('/turtle1/cmd_vel',
Twist, queue_size=10)
    vel_msg = Twist()
    print("Let's move your robot")
    speed = input("Input your speed:")
    speed = float(speed)

    num_turns = 12
    angular_speed = 2 * math.pi
    rate = rospy.Rate(4)
    radius_increment = 0.1
    t0 = rospy.Time.now().to_sec()
    current_angle = 0
    current_radius = 0

    while current_angle < (num_turns * 2 * math.pi):
        vel_msg.linear.x = speed
        vel_msg.angular.z = angular_speed
        velocity_publisher.publish(vel_msg)
        t1 = rospy.Time.now().to_sec()
        current_angle = angular_speed * (t1 - t0)
```

```
    current_radius += radius_increment
    if current_radius == 0:
        current_radius = 0.1
    vel_msg.linear.x = speed
    vel_msg.angular.z = speed / current_radius
    velocity_publisher.publish(vel_msg)

    rate.sleep()
    vel_msg.linear.x = 0
    vel_msg.angular.z = 0
    velocity_publisher.publish(vel_msg)

if __name__ == '__main__':
    try:
        move()
    except rospy.ROSInterruptException:
        pass
```

Questions and Answers:

1. How does the communication between the controller and the turtle bot happen?

In ROS, communication between the controller and the turtle bot happens through topics and messages. The controller publishes messages with instructions or commands on any specific topic. Such as velocity instruction, and movement instruction. The turtle bot receives these messages and commands from the controller. Then the turtle bot works on the instructions and commands.

2. What are the challenges faced in this lab?

Throughout the coding and simulation, we have faced some challenges and errors in this project.

1. First, I faced a problem while executing the ros command from the shared folder of Ubuntu. It gives some errors while running the command.
2. I also faced a problem while executing Python from the inside of the shared folder.
3. After that, it gives some errors while making the spiral shape. I faced a problem in adjusting the increment of the radius of the spiral shape. Every time it was going outside of the window.

Demonstration Video: <https://www.youtube.com/watch?v=9C8G7t8BnNk>