

AGENDA CENG 5437_4391 March 22, 2023

9_5437_Lecture_3_22_2023_QuizReview_DDrobot

I. Quiz 1 Answers

0000_5437_4391_Quiz1_3_8_2023

II. Differential Drive Robots DD_ROBOT_3_22_2023.pptx (.pdf)

III. DD_Robot Magnus and Engineering Equation Academy

Control of Mobile Robots- 2.2 Differential Drive Robots 8:12

Mouhknowsbest (Magnus) **Play All**

<https://www.youtube.com/watch?v=aE7RQNhwnPQ>

Play - Note Model 3:42 -3:50 min; 5:31 Unicycle; About 7:30 The Model

Magnus Egerstedt is a Fellow of the IEEE and a recipient of the CAREER Award from the U.S. National Science Foundation.

Stacey Nicholas Dean of Engineering Irvine, CA Professor

Electrical Engineering and Computer Science Professor

Control of Mobile Robots- 2.2 Differential Drive Robots

Model 2.0

$$\begin{cases} \dot{x} = v \cos \phi \\ \dot{y} = v \sin \phi \\ \dot{\phi} = \omega \end{cases}$$

Design for this model!

$$v = \frac{R}{2}(v_r + v_\ell) \Rightarrow \frac{2v}{R} = v_r + v_\ell$$
$$\omega = \frac{R}{L}(v_r - v_\ell) \Rightarrow \frac{\omega L}{R} = v_r - v_\ell$$
$$\begin{cases} \dot{x} = \frac{R}{2}(v_r + v_\ell) \cos \phi \\ \dot{y} = \frac{R}{2}(v_r + v_\ell) \sin \phi \\ \dot{\phi} = \frac{R}{L}(v_r - v_\ell) \end{cases}$$

Implement this model!

$$v_r = \frac{2v + \omega L}{2R}$$
$$v_\ell = \frac{2v - \omega L}{2R}$$

far the wheels are apart, and the radius of the wheel. And with these parameters

A series of videos from Magnus – I would recommend ALL of those in Module 1 - Control

<https://www.youtube.com/@mouhknowsbest>

3_Magnus_DD_Robot2_2_2_3.pdf

Magnus 2.2 and 2.3 Videos

IIIA. Engineering Education Academy

(Optional: Derive the Basic DD_robot Equations)

Kinematics of Differential Drive Robots and Odometry 50.54

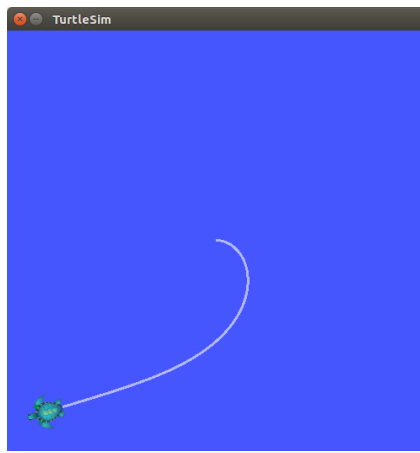
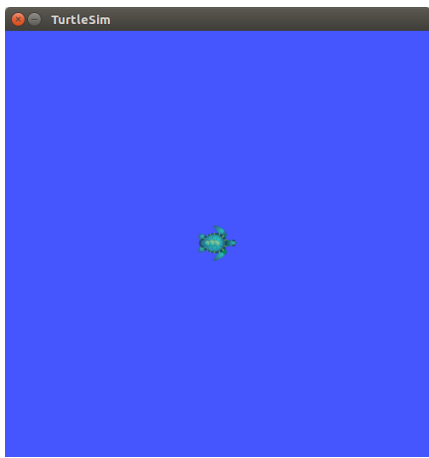
<https://www.youtube.com/watch?v=RZIZcDxQ8P4>

[Who Knows ROS?](#)

[Who Knows Linux?](#)

[Who Knows Python?](#)

IV. Demo Turtlesim with K-Control in Python



[4_ROS_PythonKControl_Tsim.pdf](#)

V. Review 2

[5_5437_4391_Review2_3_22_2023.pdf](#)

Discuss HW5

6_HW5_5437_4319_Drives_Magnus_March_29_2023.pdf

(Read Borenstein's article with help with this!) It is on the course website.

OdometryErrorspaperBorenstein.pdf

Control of Mobile Robots- 2.2 Differential Drive Robots - Magnus
<https://www.youtube.com/watch?v=aE7RQNhwnPQ&sns=em>

Robot Odometry Calibration Video

9,586 views 6:57

<https://www.youtube.com/watch?v=qsdiIzncgqo>

We can't do with just differential drive vehicles. Read these articles and Summarize the pros and cons of some common **steering methods**.

<http://robotsforroboticists.com/drive-selection/>

5-2 2. Wheel Control Theory – DD, Ackerman, etc.

http://www.robotplatform.com/knowledge/Classification_of_Robots/wheel_control_theory.html