

Summer 2016 Writing Assignment:

**Technical Summary of
Differential Drive Movement,
and Recommendations for
Robot Movement API.**

ECE 2031 Writing Assignments

All UPCP assignments in 2031 have:

- **In-class lecture:** Overview of the assignment
 - **Assignment sheet:** Details of the assignment
 - **Template:** Microsoft Word template with formatting
 - **Evaluation Sheet:** Used by GTAs to grade the paper
 - **Example documents:** To show you writing style
- All of these resources are on the UPCP site:
upcp.ece.gatech.edu

WA1 Writing Consultation

- You will review a complete draft of your document with your GTA.
 - Will be done in pairs to fit in summer schedule.
- You get 15% of your grade for coming to the consultation prepared and on time.
- Schedule: one week to write document, one week of consultations, and three days to make final changes.

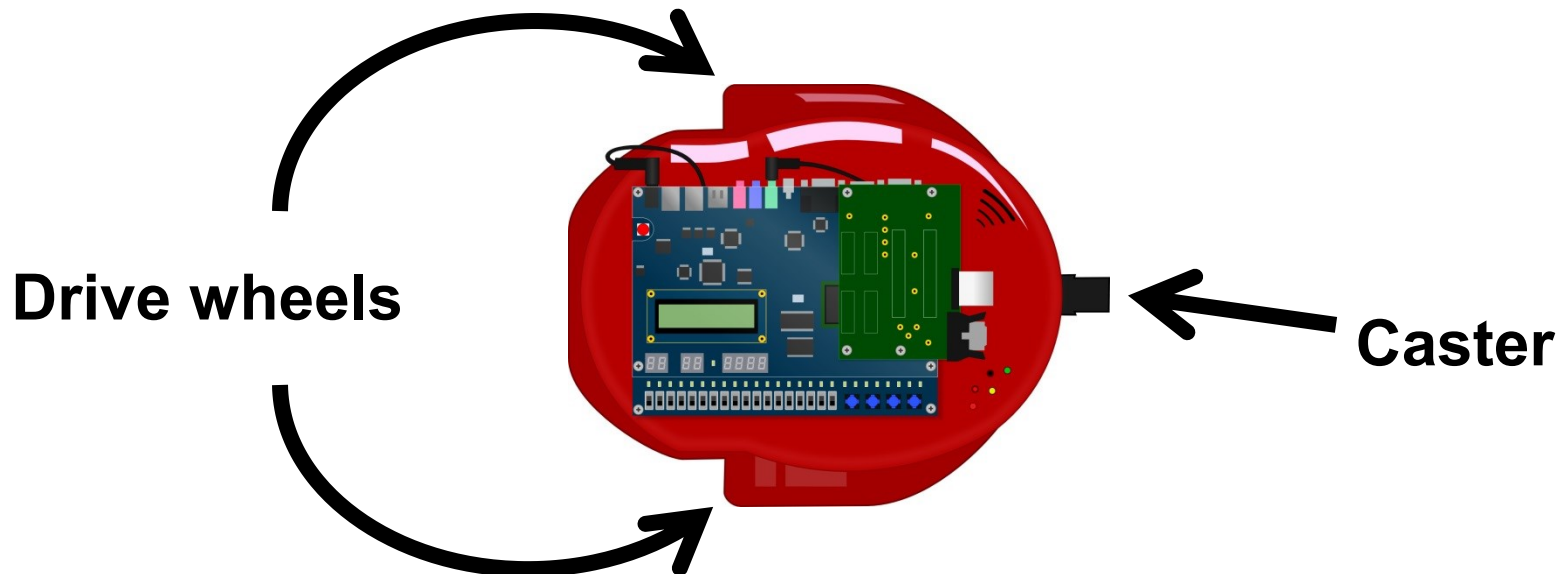
DE2Bot Background

- In the final project, you will be using a robot called the DE2Bot.
- You will be trying to get the robot to move accurately, which is not trivial.



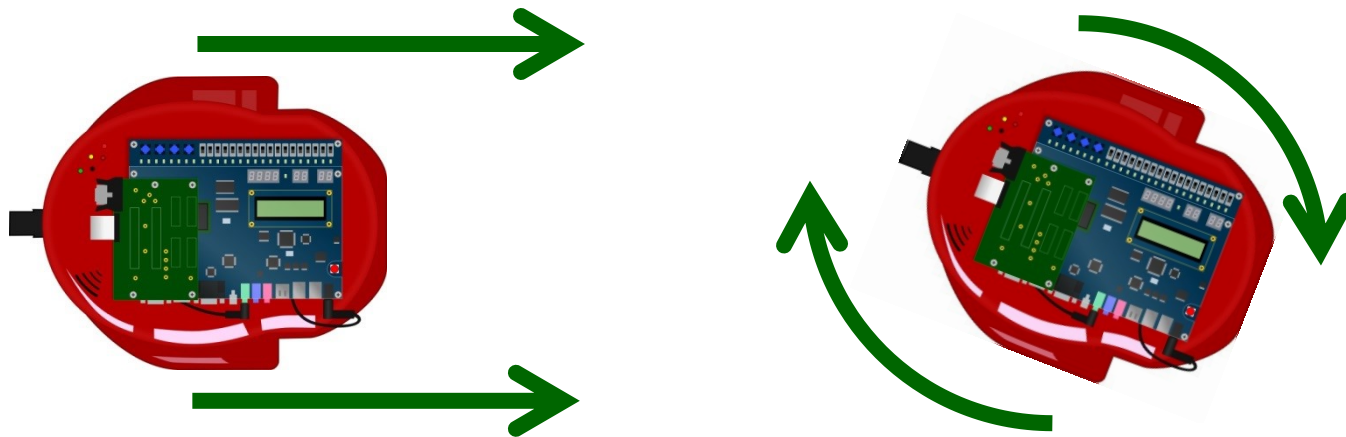
DE2Bot Movement

- The DE2Bot has two drive wheels, with a passive caster to support the rear end.
- This is called a “differential drive” or “differential wheeled” robot.



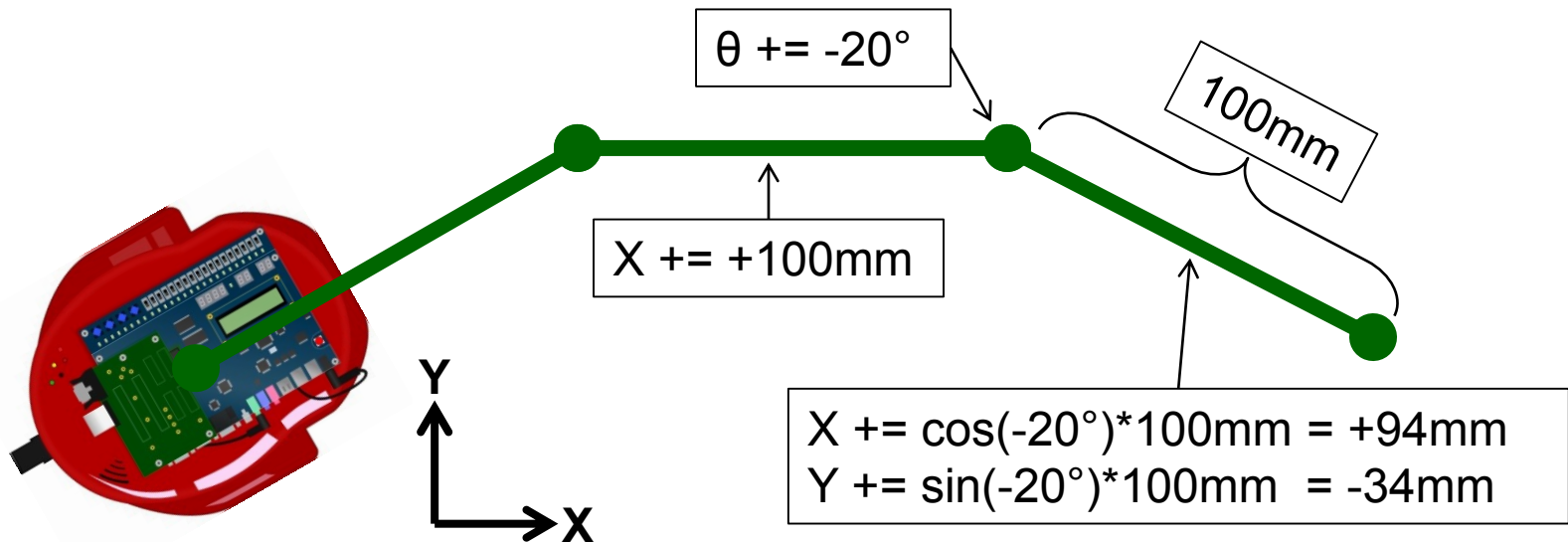
Controlling the DE2Bot

- Each drive wheel is controlled independently.
 - E.g. “set left wheel velocity to +200mm/s and right wheel velocity to -80mm/s”
- This allows for movement in straight lines and arcs, as well as in-place spins.



DE2Bot Odometry

- The DE2Bot can measure each wheel's rotation.
- By integrating the wheel movement, the robot can keep track of its real-world position.
- This is called “dead reckoning odometry”, and was the subject of the project in Summer 2012.



Previous Movement Projects

- Several previous projects have focused on using odometry to get the robot to a specific place:
 - Summer 2012: Implemented odometry
 - Spring 2014: Warehouse robot
 - Spring 2015: Arctangent subroutine
 - Summer 2015: Point-to-point movement (specific order)
 - Fall 2015: Point-to-point movement (any order)
- Each semester, teams had to create their own code to control the movement of the robot.

Distributable Movement Code

- Creating movement code takes a lot of time.
- Distributing pre-written movement code would allow future teams to focus on other work.
- So this semester, you will be creating a portable “Go To (X,Y)” method.
 - Essentially a robot movement API.
 - Specific details can wait until the final project.

Writing Assignment Motivation

- Before trying to make the robot move, you (and your team mates) need to understand the basic kinematics of differential drive vehicles.
 - You will create a “technical review” (or “technical summary”) describing differential drive movement as it applies to the DE2Bot.
- You will also make some recommendations about basic robot movement.
 - Will be used to help define your goals during the project.

Document Content



- A technical review is used to condense existing information for a particular audience.
 - Your audience is your future team members.
 - There is a LOT of existing information that your audience does NOT need.
 - Your main goals are organization and clarity.
- Your review of differential drive will be tailored to creating a simple but robust “go to” function.
 - How does a differential drive robot move and keep track of its movement? What types of movement are possible or not possible?

Movement Recommendation

- Based on your summary of differential drive movement, recommend a basic strategy for making a robot move to a destination.
 - Details are provided in the assignment sheet.
- Describe the benefits and potential downsides to your recommended strategy.
- There is no right or wrong answer here, so you must provide support for your argument.

Document Length



- There is no minimum length for a technical document. As long as the content is there, shorter is better.
- This document is expected to be written in two weeks: one week for a draft and one week for a second pass.
- If you find yourself writing more than six pages, reconsider what your audience needs.