Territory Acknowledgment

We acknowledge and respect the Lekwungen peoples on whose traditional territory the University of Victoria stands, and the Songhees, Esquimalt and W̱SÁNEĆ peoples whose historical relationships with the land continue to this day.

https://www.youtube.com/watch?time_continue=105&v=Fwa9c8nqHUo&feature=emb_logo

ENGR 120

Design & Communication II

ENGR 121

Design II

Position sensing and control

Milestone 1 – Mechanical systems test

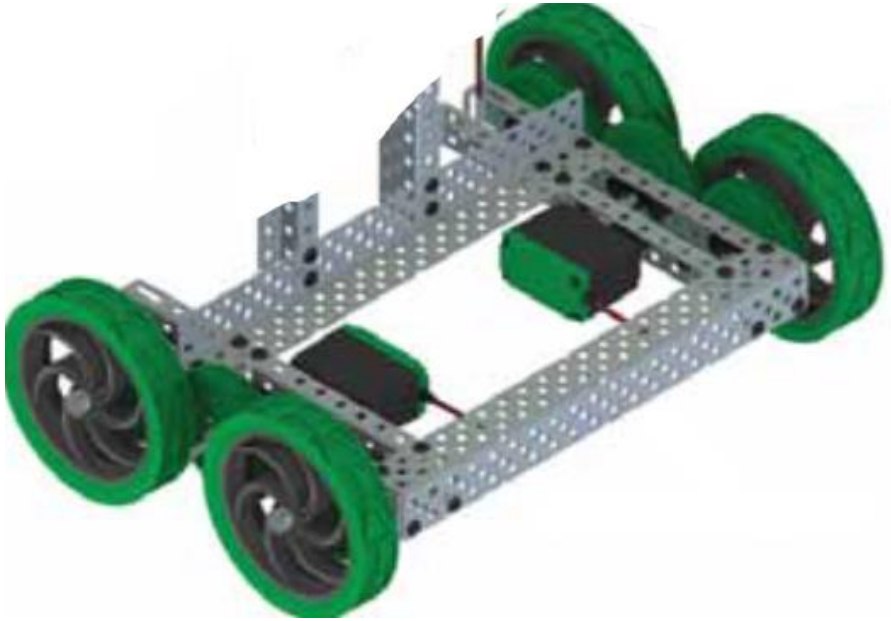
- Make your robot move in a straight line for about a meter
- Make your robot turn about 90 degrees
- Make your robot place the ball on the target

Learning Outcomes

- Generate: Ideas to control the movement of the robot

Robot drive mechanism

Has 2 motors powering 4 wheels through idler gears.



Assume that the two motors have integrated encoders in them

Activity 1 – working in teams of 2 or 3

Come up with a logic to make the robot go about 100 cm and stop

Remember: 627 ticks of encoder correspond to one rotation

Note:

- *Some measurements might have to be made before finalizing the logic*
- *Direction of rotation of the motors might have to be corrected*

Steps to be followed

1) Make sure that the robot moves forward

2) Power the motors so that they make one rotation
(627 ticks of encoder)

3) Measure how far the robot goes

4) Adjust the number of encoder ticks to achieve 100 cm distance

What do you think?

Assume that the motors are powered equally

Assume that the robot is moving forward

Do you expect the robot to move along a straight line or drift towards one side? Discuss.

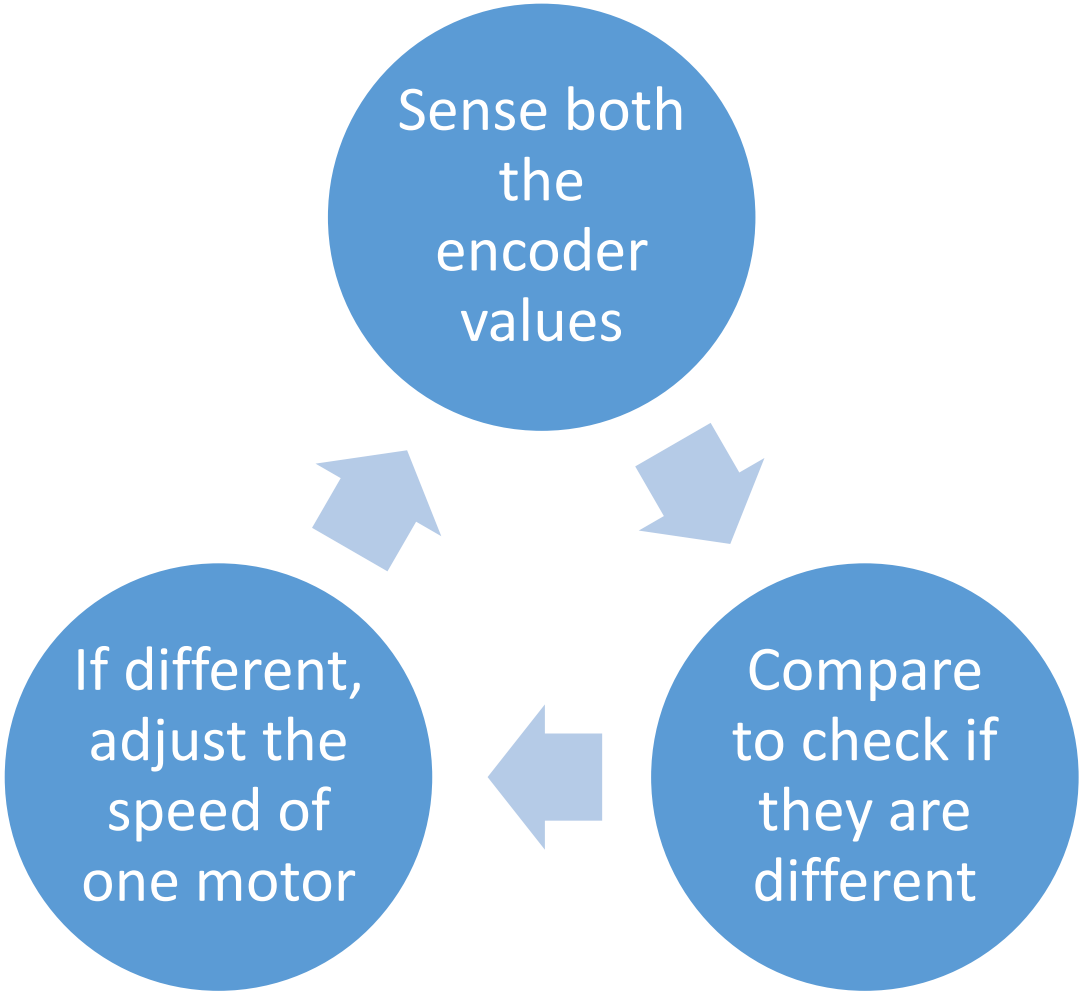
Activity 2 – working in teams of 2 or 3

Come up with a logic to make the robot move straight.

Hint: Use encoder readings from the two motors

Steps to be followed

At any instant, if the encoder values from the two motors are equal or almost equal then the robot will move straight



Activity 3 – working in teams of 2 or 3

Come up with a logic to make the robot turn left by about 90˚

1) Point turn

2) Swing turn

Ball placement

Initial position of the robot is decided by the team

Ball can be tampered with; ball can be housed

Ball placement might need motor operation

- Typical, motor on-off control
- Some designs → angular position sensing

Potentiometer as position sensor

Potentiometer – a sensor that produces voltage depending upon its angular position

Using potentiometer and motor, you will achieve desired position control!

Of course, desired position has to be within a range

Working with a potentiometer

Potentiometer output → 0 to 4095

Must be connected to one of the Analog ports

Configure potentiometer in ***Analog Sensor*** tab

SensorValue[*label of the potentiometer*]

https://www.robotc.net/teaching_rc_cortex_v2/lesson/media_files/hp_pot.pdf

Summary

Generated a few ideas to control the movement of the robot

Remember:

Your robot must be quick!

Less hardware and more software is the way to go

Announcement

In next lab session, you will

- Build your robot to accomplish milestone 1 related tasks
- Set the robot in autonomous mode