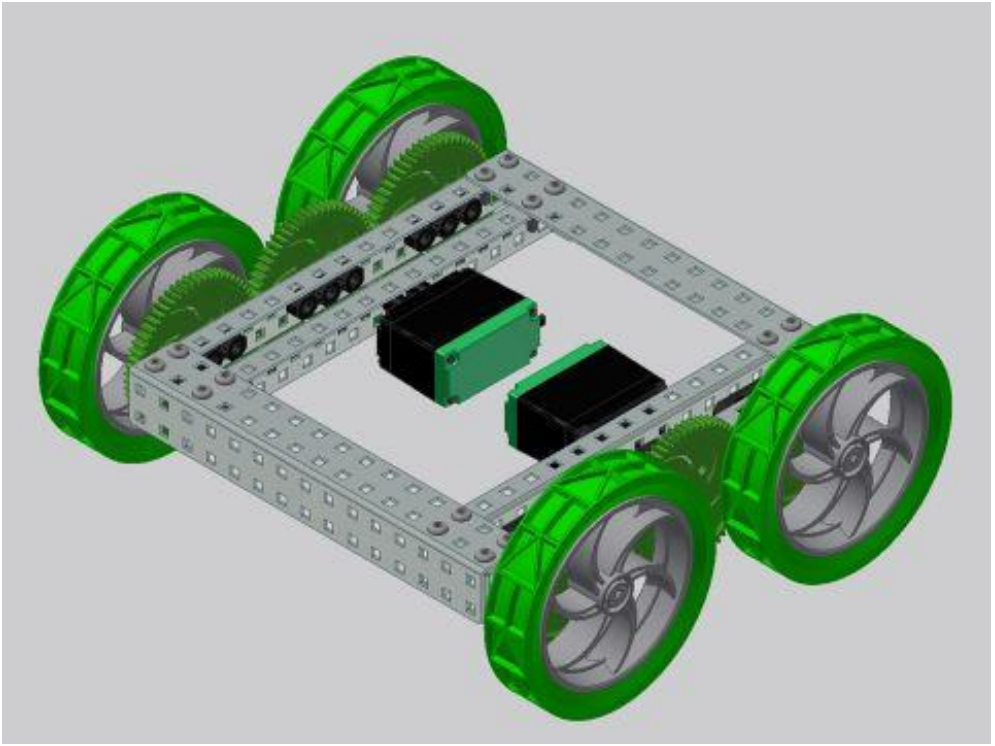
HOLONOMIC MOBILITY

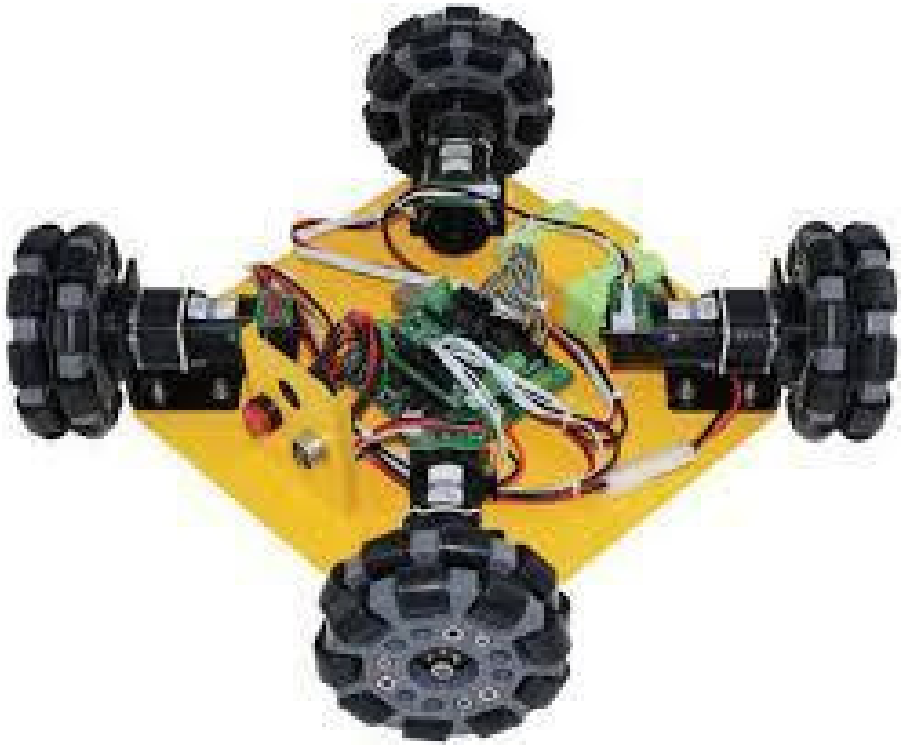
MATT
ZACH

THE CONCEPTS

Non-Holonomic



Holonomic



WHAT IS HOLONOMIC MOBILITY

- Holonomic robot - a robot capable of moving in all directions and rotating independently.

- A robot with tank drive is not holonomic - it must rotate before moving in another direction.

PROS AND CONS

PROS

- No constraints on motion
- Faster movement
- More complex movement (moving and turning at the same time)

CONS

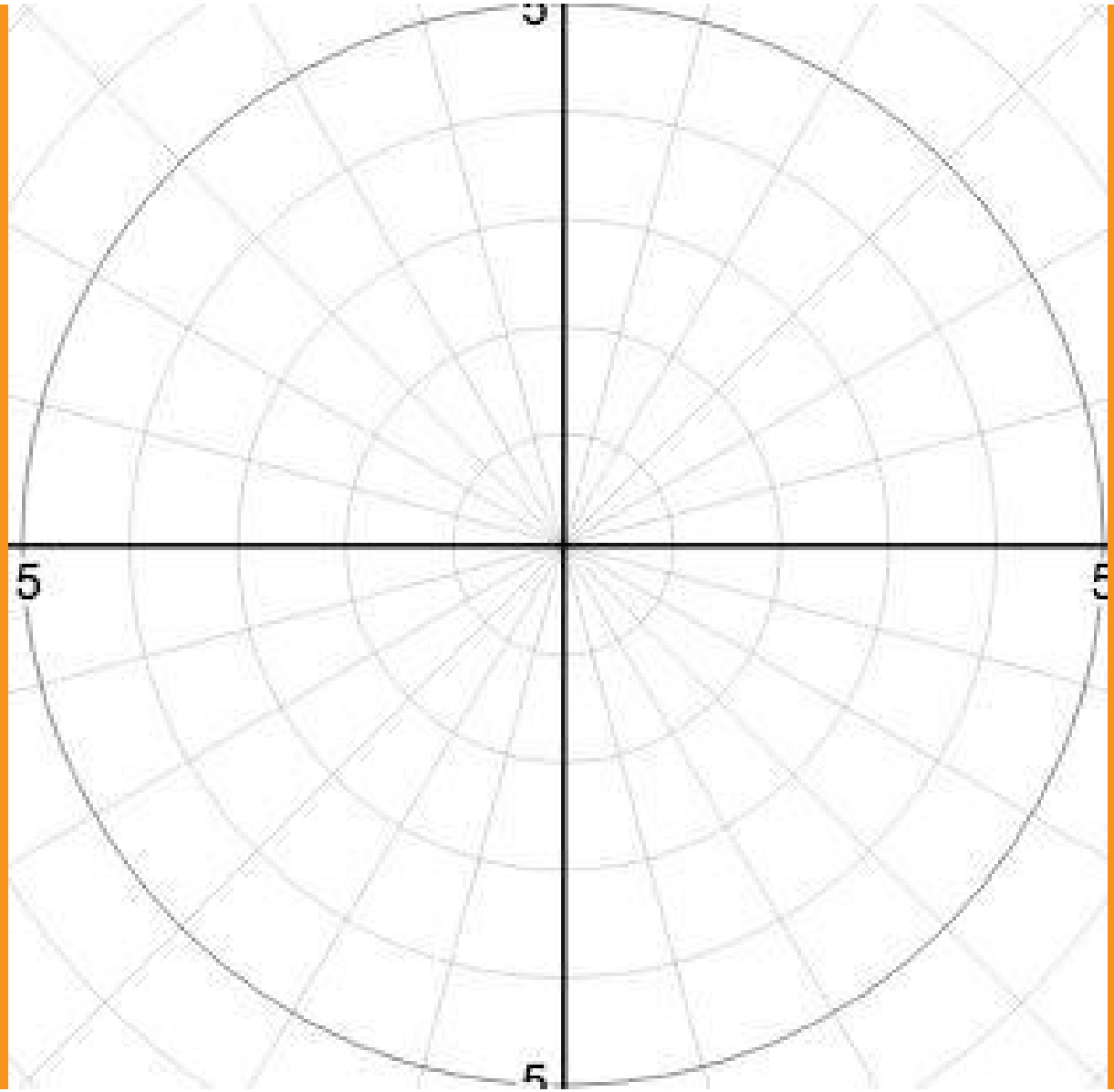
- Requires slightly more advanced driving skills
- You can only use omni-wheels
- Wheels must being equidistant from the center of the robot

THE MATH

POLAR COORDINATES

- Coordinates locating the position of a point on the polar plane, opposed to the Euclidean plane.

- Polar coordinates take the form (r, θ), representing radius and angle.


5
5

Robotics Code Math

Zach Battleman

October 2018

Based of off work by Ben Axelrod

$$\phi_{joy} = \arctan\frac{Y_{joy}}{X_{joy}} = atan2(Y_{joy}, X_{joy})$$

$$r_{joy} = \sqrt{X_{joy}^2 + Y_{joy}^2}$$

$$S = S_{max} * r_{joy}$$

$$\alpha_1, \alpha_2, \alpha_3 = \text{the angle to each wheel} = \frac{\pi}{2}, \frac{7\pi}{6}, \frac{11\pi}{6}$$

$$\theta_n = \alpha_n - \phi_{joy}$$

$$M_n = S * \sin(\theta_n)$$

THE CODE

ABSTRACT

- Read the joystick inputs
- Implement the math
  - Calculate the angles
  - Calculating the speeds
  - Apply the calculated speed to the motors

THEORY IN ACTION

MOVE

- Create variables for the x and y values of joystick A
- Create variables for each of the calculations
- Return the final values for each wheel based off of the calculations.

TURN

- Create a variable for the x value of joystick B
- Create a variable for the speed of the wheels
- Return this value

MOVING THE MOTORS

- Sum the turning value and movement value for each wheel.
- Apply this value to each wheel respectively.

CODE EXAMPLE

https://gist.github.com/xoreo/b716eb35112ea1a49069289090c993fb

THANKS!