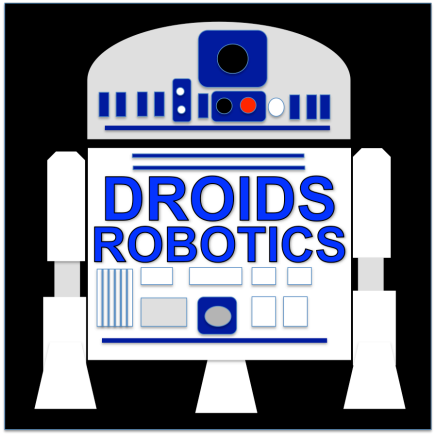
INTERMEDIATE PROGRAMMING LESSON:



DIFFERENT WAYS OF MOVING: SYNCHRONIZATION, REGULATED POWER, RAMP UP & DOWN

BY DROIDS ROBOTICS

GOAL

- The goal of this lesson is to teach you different blocks for moving the robot and when to use which block
- It can be confusing to figure out which block to use to move the motor

DIFFERENT WAYS TO MOVE

1

2

- **How are these different from each other in terms of the following?**
  - Power Regulation
  - Motor Synchronization
  - Ramp up/ramp down

3

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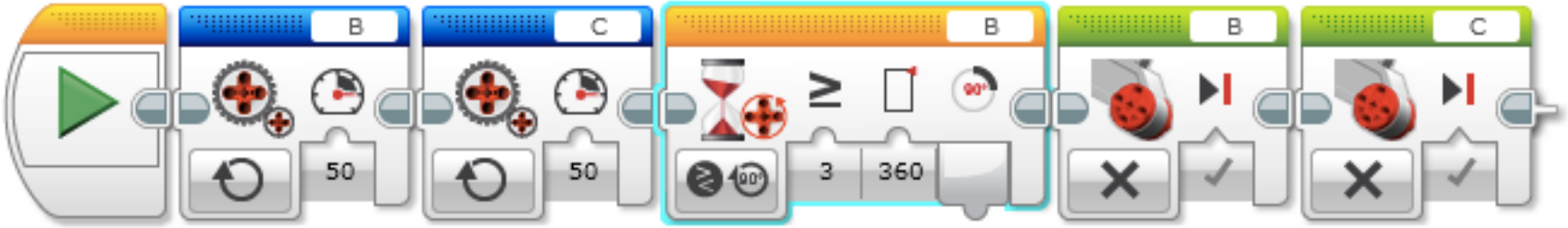

REGULATED POWER

- Regulated power tries to move the robot at a fixed target speed
- When the robot has trouble moving because it is heavy, it is moving uphill, its battery is dead, or it is blocked, power regulation gives more power to the motor to reach its target speed
- This is good for ensuring that the robot is moving at a predictable speed

SYNCHRONIZED MOTORS

- Synchronized motors makes sure that both motors turn the same amount (or at some fixed ratio)
- If one wheel gets stuck, it prevents the other wheel from spinning
- If you have the motors turning the same amount, it helps ensure that the robot moves straight when one wheel is slowed by friction or anything else
- When you have synchronized motors with a ratio, it makes the robot make predictable and smooth turns

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SYNCHRONIZED VS. UNSYNCHRONIZED

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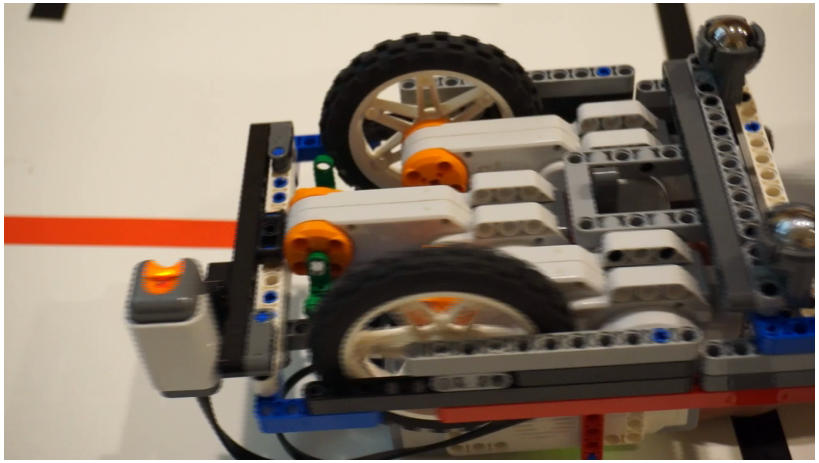
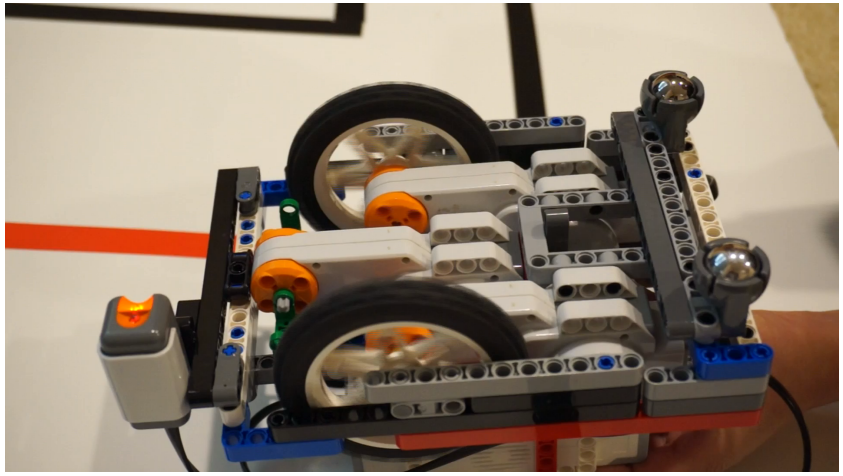
Synchronized motors
One motor getting stuck causes other motor to stop



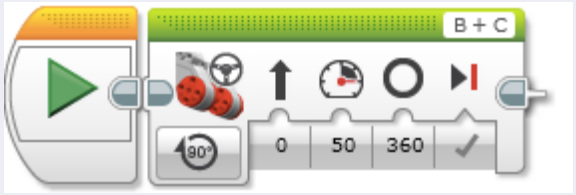
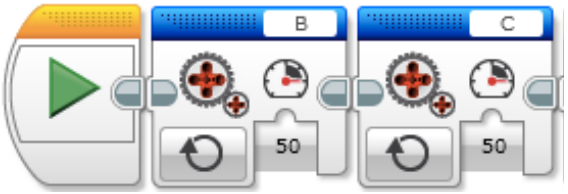
Unsynchronized motors
Second motor continues when first gets stuck



RAMP UP / RAMP DOWN

- Ramp up makes the robot speed up gradually at the beginning of a move
- Ramp down makes the robot brake gradually at the end
- Without ramp up/ramp down you might see the robot jerk at the beginning or end
  - The robot will still adjust its motors after a brake to reach that target rotation sensor value but this may still be less accurate

DIFFERENT WAYS TO MOVE

		Regulated Power	Synchronized Motors	Ramp Up / Ramp Down
1		✔	✔	✔
2		✔	✔	✔
3		✔	✗	✗
4		✗	✗	✗

MOVING DEGREES VS. SECONDS

Move Degrees/Rotations

- Block does not complete until the target degree rotation is reached
- So what if the robot gets stuck somewhere on the mat?
  - Program stalls and never goes to next block
  - You will have to save the robot and take a touch penalty

Move Seconds

- Less accurate for robot movement
  - Distance traveled depends on speed, battery level, weight of robot
- You have to remember this when deciding if move secs should be used.
- However, can help avoid stalls
  - E.g. Can be useful if your attachment arm gets stuck

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MOVING DEGREES VS. SECONDS

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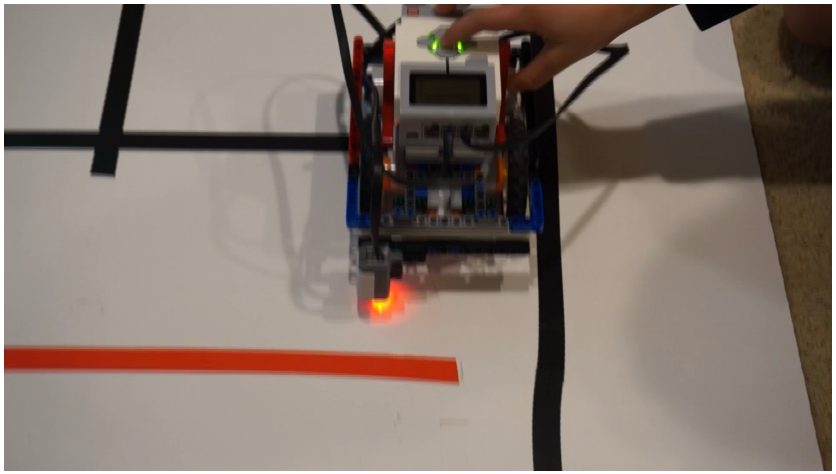
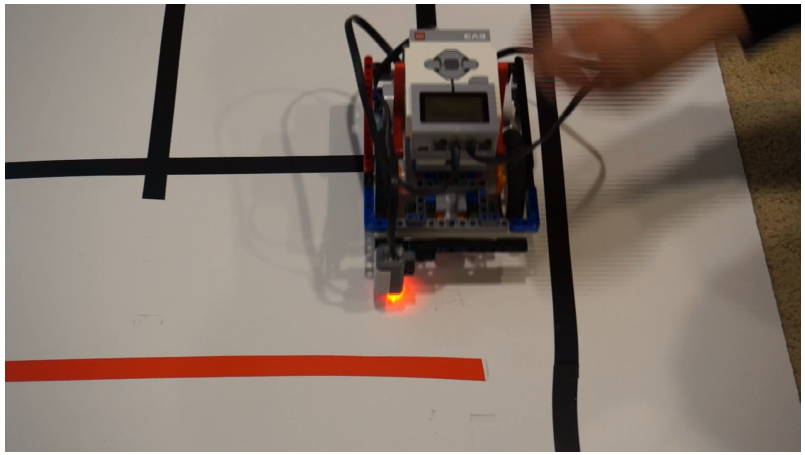
Stalled Robot
Robot gets stuck. Finishes only when released.



Unstalled Robot
Robot gets stuck but still finishes (you can hear the sound)



CREDITS

- This lesson was made by Arvind Seshan and Sanjay Seshan from FLL Team Not the Droids You Are Looking For
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