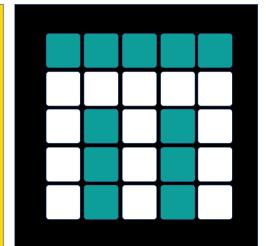
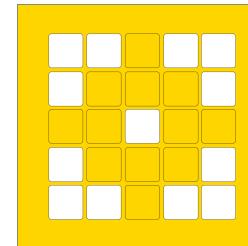


**PRIME LESSONS**  
By the Makers of EV3Lessons



# MOVING OBJECTS & STALL DETECTION

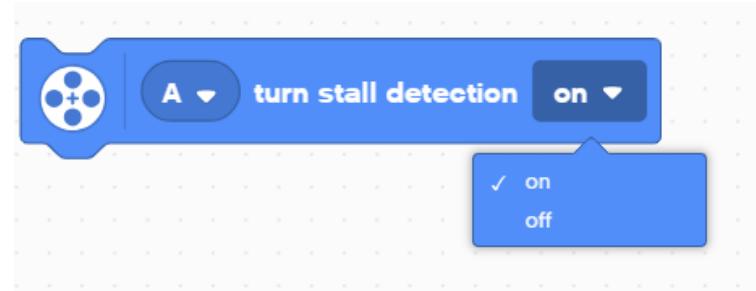
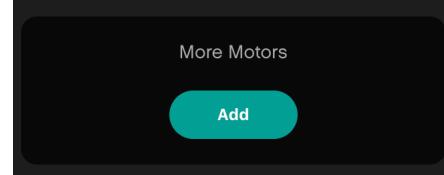
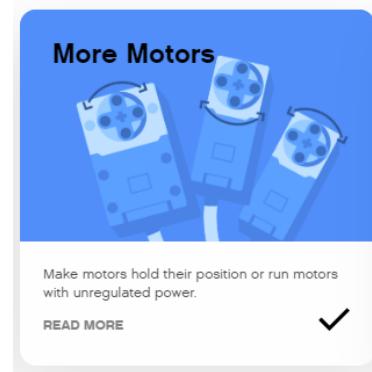
SANJAY AND ARVIND SESHAN

# LESSON OBJECTIVES

- Learn how to move non-drive motors
- Learn about motor stalls
- Note: Images in the lesson may show a SPIKE Prime, but the same technique works on Robot Inventor

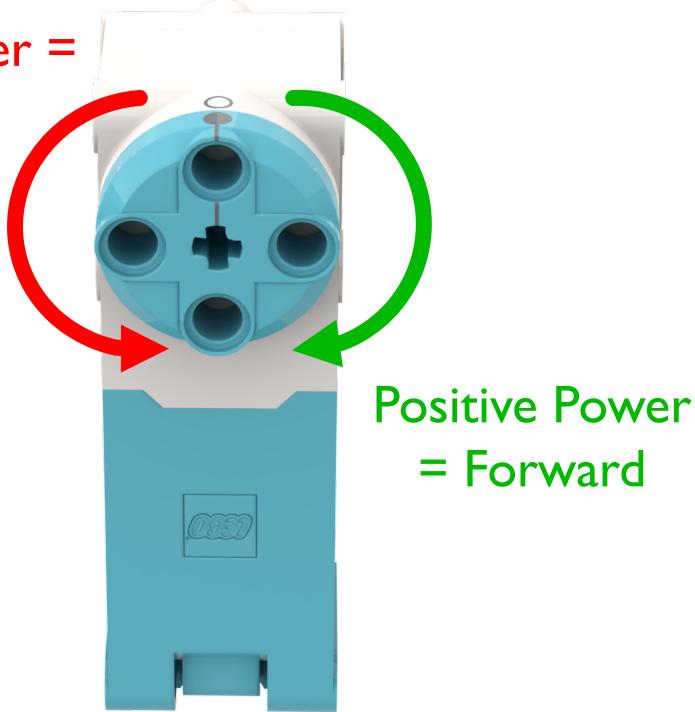
# STALL DETECTION

- Often times, you program the motor to move a particular amount. However, the motor gets stuck before it reaches that amount.
- Stall Detection allows your program to automatically move on to the next block in the stack when a particular motor block is stuck (unable to complete its move)
- SPIKE Prime and Robot Inventor have a built-in Stall Detection
- By default, Stall Detection is **on** for your blue motor blocks. However, you can turn this feature off using the Turn Stall Detection Block in the Motor Motors Palette (use Extensions to add the block)



# NEGATIVE VALUES

Negative Power =  
Backwards

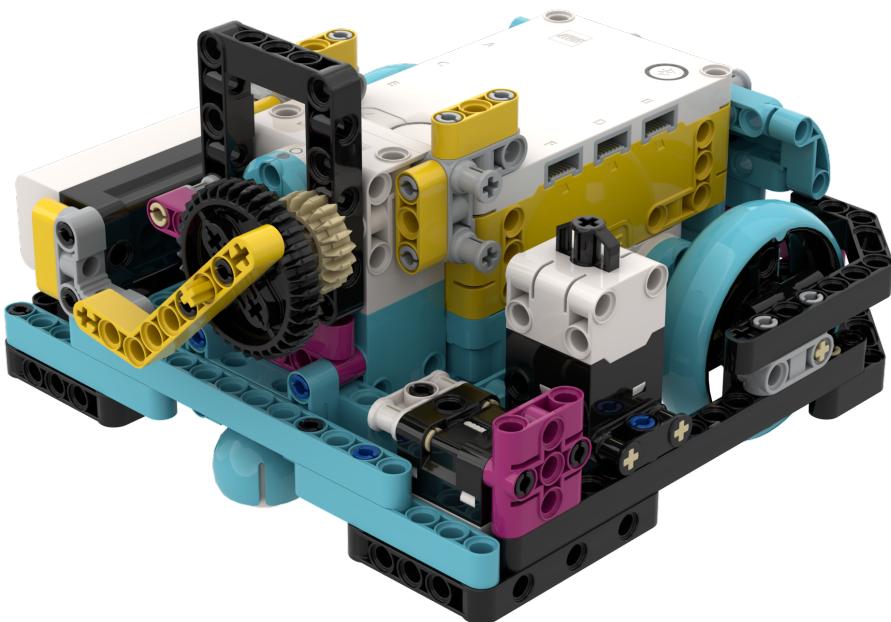
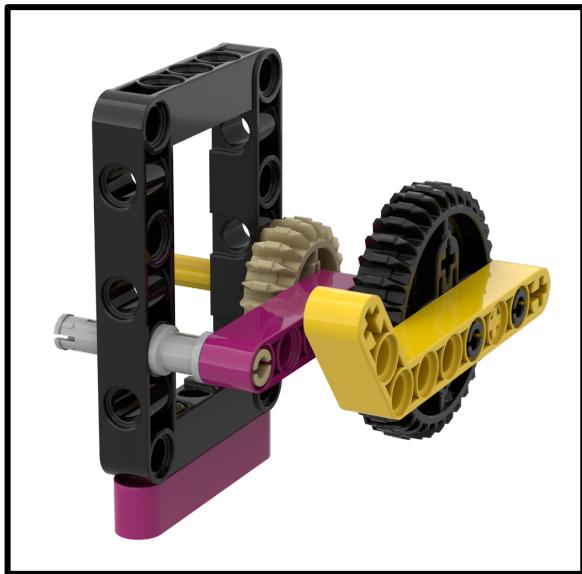


Positive Power  
= Forward

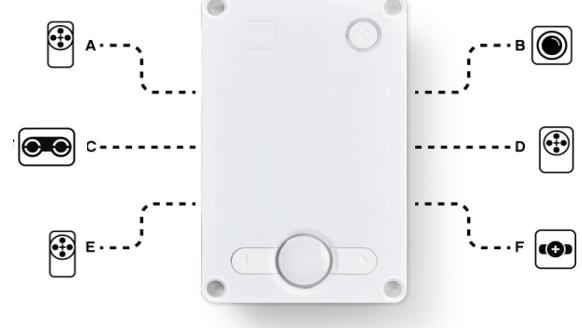
- You can enter negative values for power or distance
- This will make the robot move backwards
- If you negate two values (e.g. power and distance or distance and backwards direction), the robot will move forward.

# ATTACHMENT ARM

- Create a simple attachment arm for Droid Bot IV for the Large Motor connected to Port D

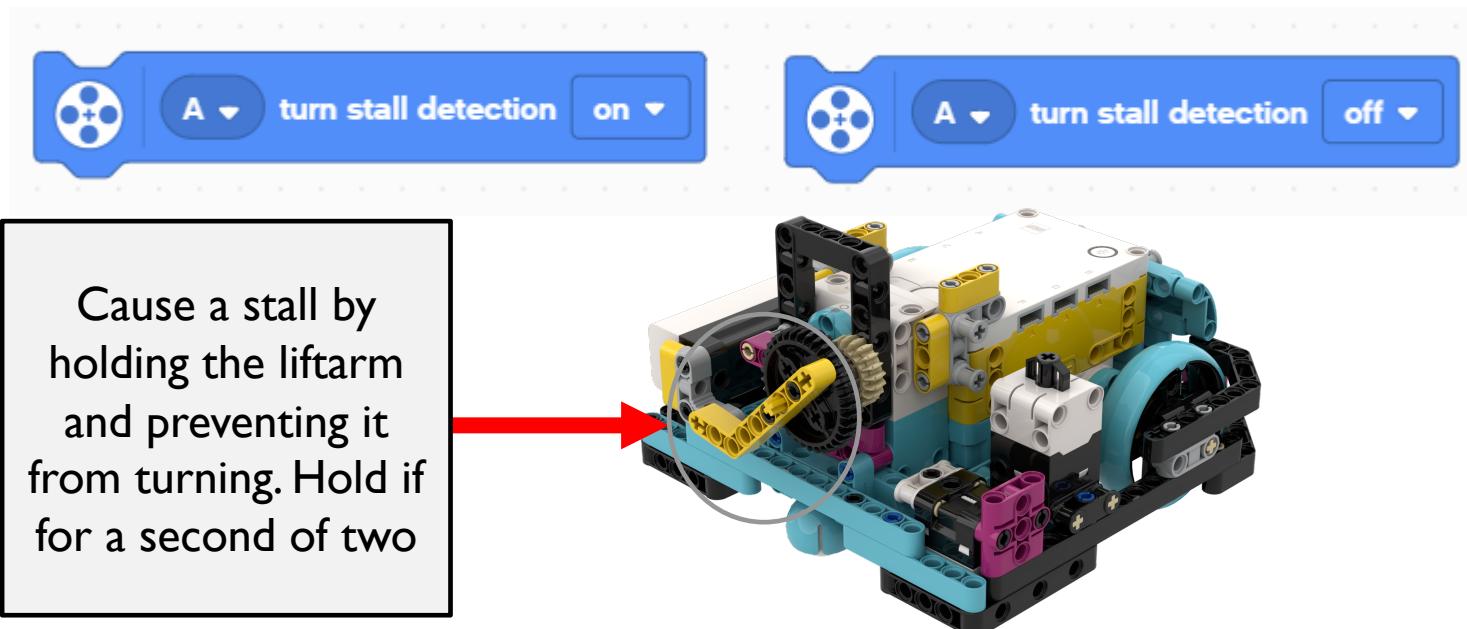


Droid Bot IV Configuration



# CHALLENGE I: LEARN ABOUT STALL WITH DROID BOT IV

- Create one program with stall detection turned on and one with stall detection turned off.
- Using Droid Bot IV or similar, program the arm to turn 1000 degrees.
- Hold the arm with your hand to prevent motor from completing 1000 degrees. Hold for a couple of seconds.
- Compare what happens in each program. Will the cat meow play in both or only one program?



# CHALLENGE I SOLUTION

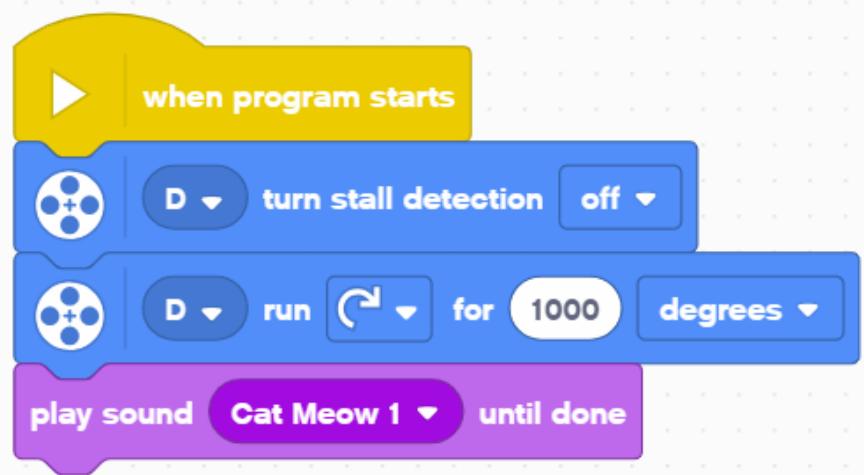
- Stall detection “on” allowed the code to move on to the next block even when the arm got stuck



A Scratch script starting with a yellow "when program starts" hat. It contains the following blocks:

- turn stall detection on
- run for 1000 degrees
- play sound Cat Meow 1 until done

The cat meow sound plays even if you hold the arm and prevent it from moving.



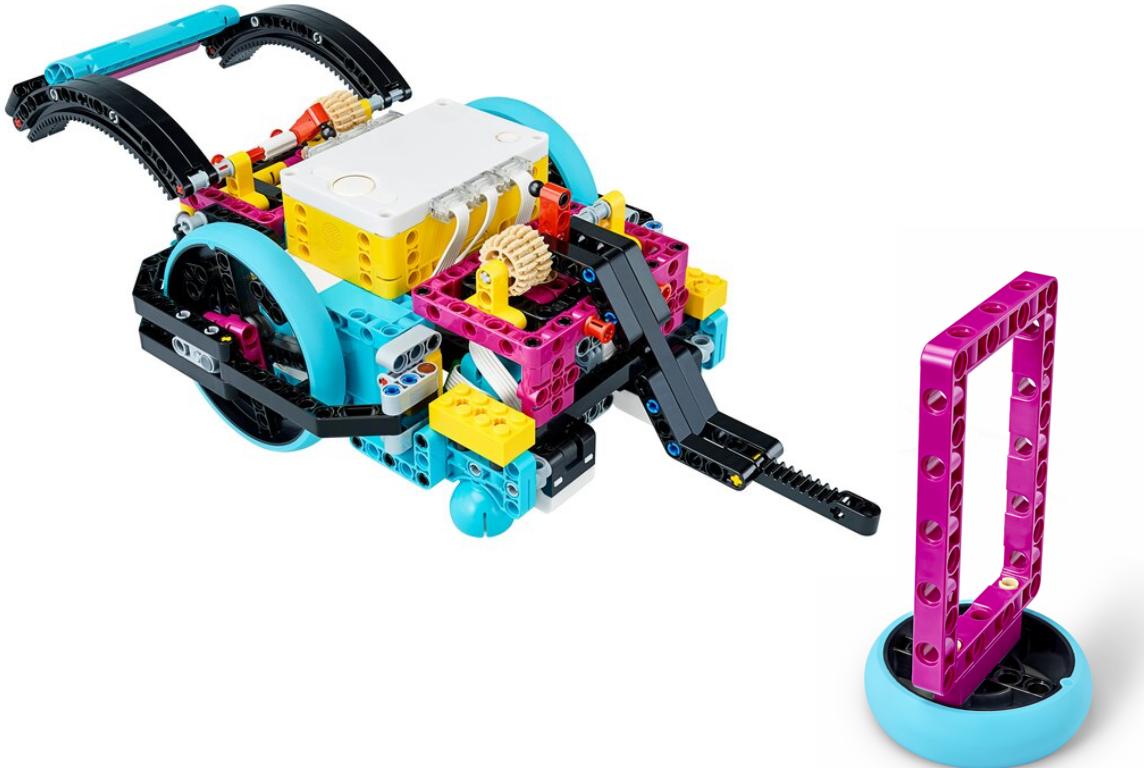
A Scratch script starting with a yellow "when program starts" hat. It contains the following blocks:

- turn stall detection off
- run for 1000 degrees
- play sound Cat Meow 1 until done

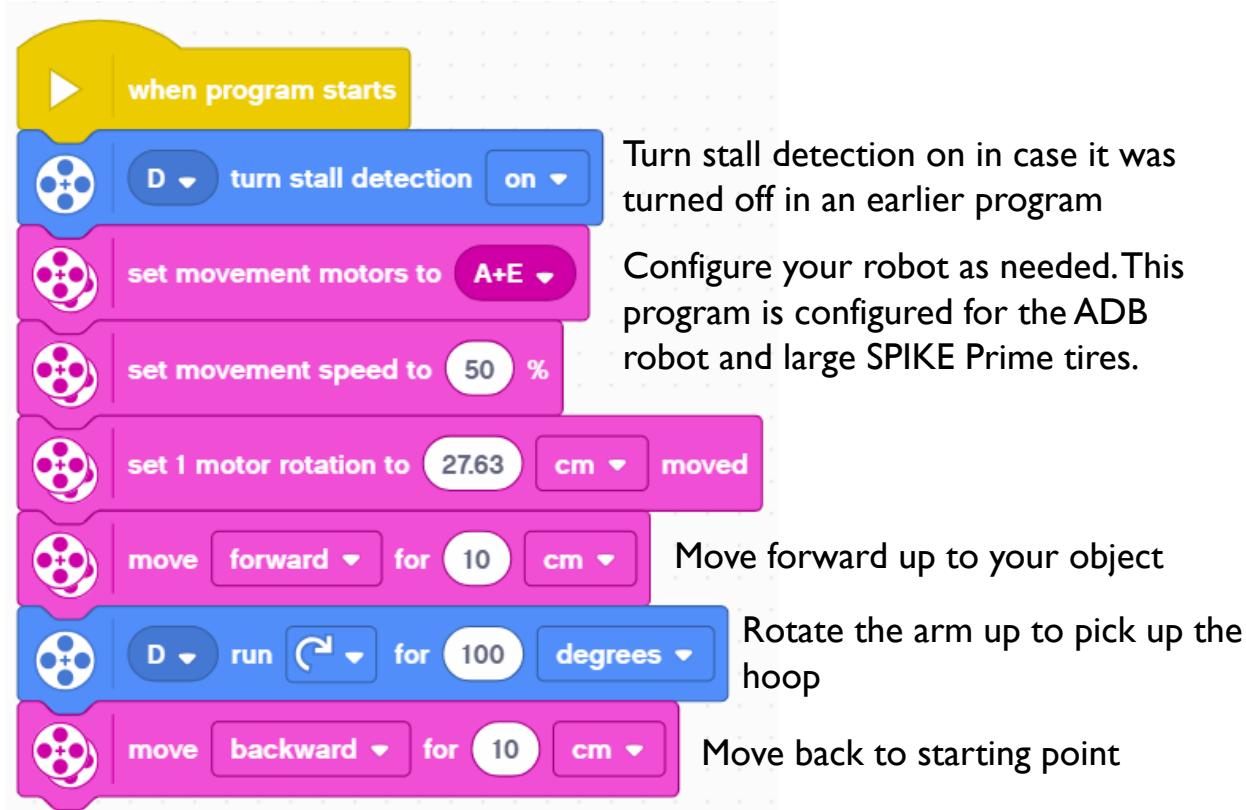
The cat meow sound will not play until you release the arm and allow the motor to complete its move

# CHALLENGE 2: PICK UP OBJECT (ADB CHALLENGE)

- Drive forward, pick up a hoop and return to the start
- Make sure to use stall detection in case the motor gets stuck while trying to collect the hoop



# CHALLENGE 2 SOLUTION



# EXTENSIONS

- Think about situations in FIRST LEGO League when stall detection would be helpful
  - When might the robot get stuck?

# CREDITS

- This lesson was created by Sanjay Seshan and Arvind Seshan for SPIKE Prime Lessons
- More lessons are available at [www.primelessons.org](http://www.primelessons.org)



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