

# ADVANCED EV3 PROGRAMMING LESSON



## Stall Detection



By Droids Robotics and Hoosier Girlz



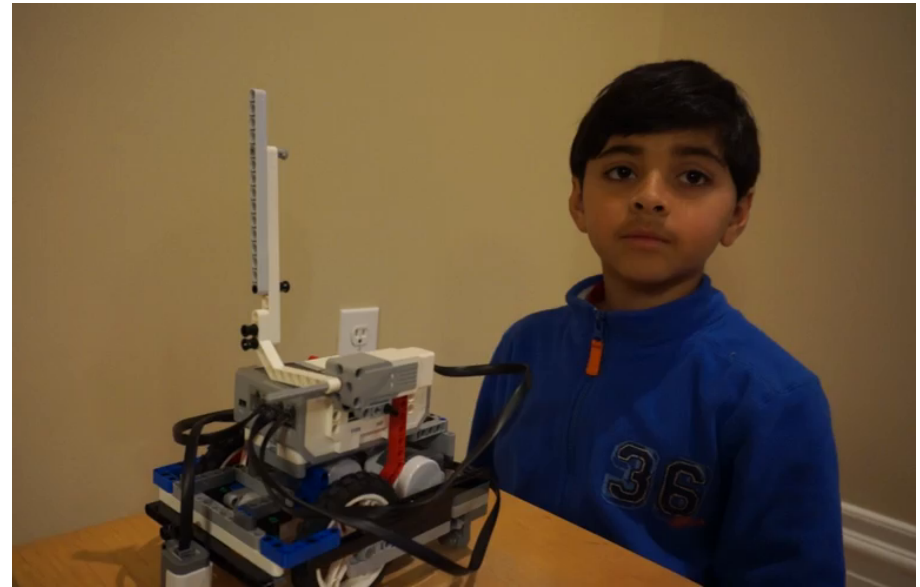
# Lesson Objectives

1. Learn what stall detection is and why it is useful
2. Learn how stall detection can help your robot recover from failures
3. Learn how to move on the next block when your robot is stalled

Prerequisites: Math Blocks, Data Wires, Logic Blocks, Loops, Move Block Lesson

# What is Stall Detection and Why Use It?

- Stall detection is a program that stops your motor when the motor gets stuck
- If you are an FLL team, you usually have to grab your robot and get a touch penalty if your robot stalls
- When you use stall detection techniques, your robot will move on to the next program block
- In the video, the robot needs to move the arm down before it says “Good job”. However, if the motor stalls, it will never say “Good job.”



**Click on Video to learn  
about Stall Detection**

# Move Degrees vs. Move Seconds

- In our lesson on Move Blocks (Intermediate tab), we said that if you use Move Degrees, your motor may get stuck
- We told you that Move Seconds helps avoid stalls, but is not as accurate
- Are these the only choices?
- How can you use Move Degrees and prevent stalls?
- We show you how in this lesson

# Requirements

- In this lesson, you will need an arm connected to a motor
- We have set our code to use a medium motor connected to motor A – this can be changed to suit your team's needs
- Follow along using the EV3 Code provided. Start with Step 1

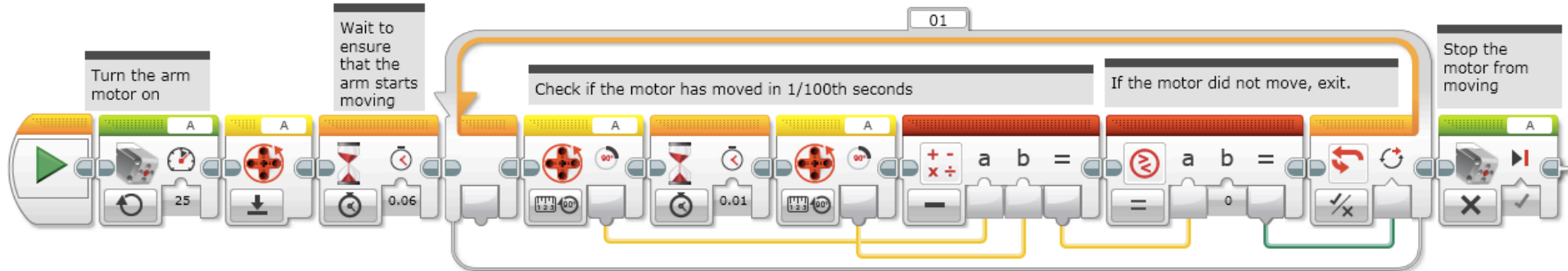
# Step 1: Move Until Stall

This code was originally made by Hoosier Girlz: [www.flhoosiergirlz.com](http://www.flhoosiergirlz.com) with comments and modifications by Not The Droids You Are Looking For: [www.droidsrobotics.org](http://www.droidsrobotics.org), [www.ev3lessons.com](http://www.ev3lessons.com)

The goal of Step 1 is to stop the motor from moving when the arm hits an obstacle. (eg: wall, ground, mission model)

Pseudocode:

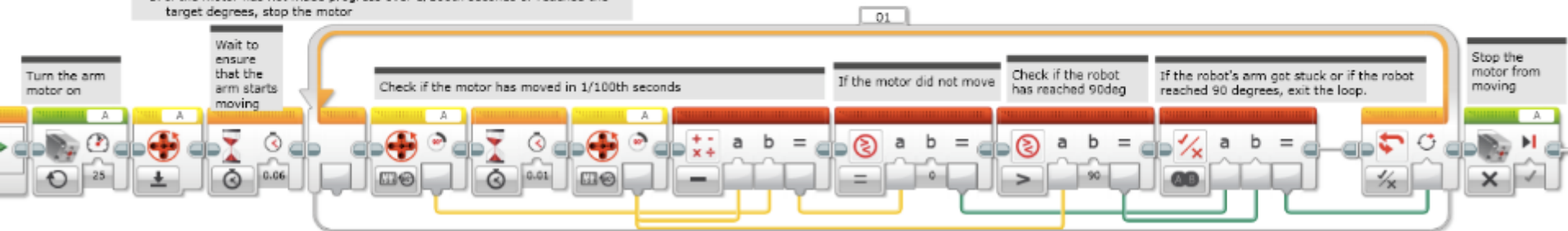
1. Turn the motor on
2. Continuously check if the motor has moved over 1/100th seconds
3. If the motor has not made progress over 1/100th seconds, stop the motor



# Step 2a: Move Degrees + Stall Detection

This code was originally made by Hoosier Girlz: [www.filhoosiergirlz.com](http://www.filhoosiergirlz.com)  
with comments and modifications by Not The Droids You Are Looking For:  
[www.droidsrobotics.org](http://www.droidsrobotics.org), [www.ev3lessons.com](http://www.ev3lessons.com)

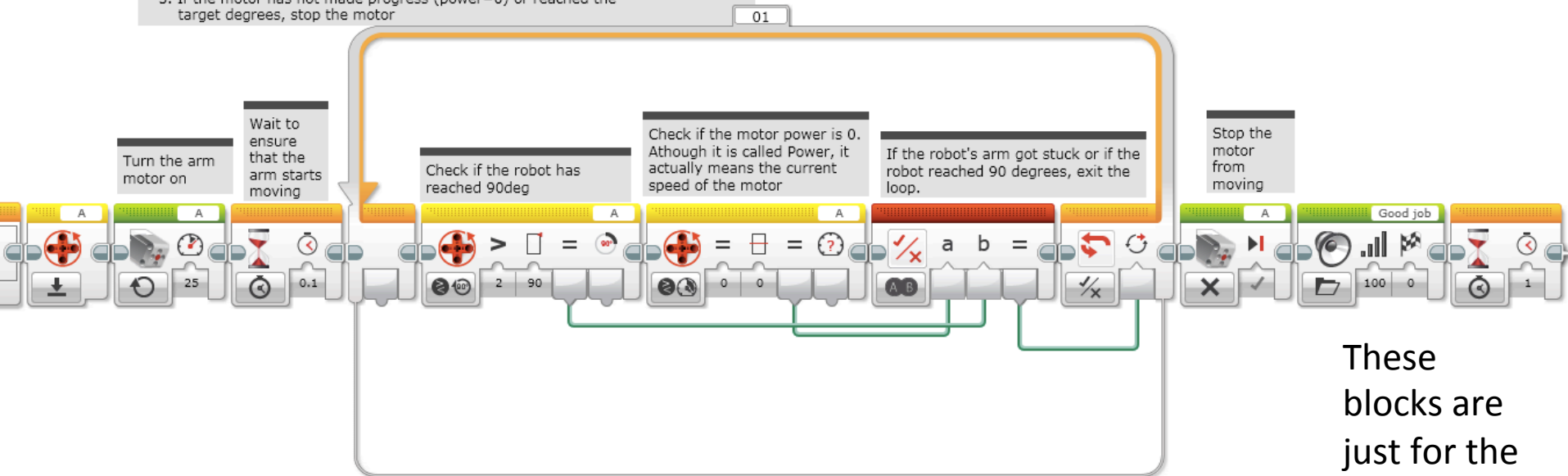
The goal of this program is to stop the motor from moving when the arm hits an obstacle (eg: wall, ground, mission model) or if it moves an amount of degrees.  
Pseudocode:  
1. Turn the motor on  
2. Continuously check if the motor has moved over 1/100th seconds or has reached the target degrees  
3. If the motor has not made progress over 1/100th seconds or reached the target degrees, stop the motor



# Step 2b: Alternate Move Degrees + Stall Detection

The goal of the Step 2 program is to stop the motor from moving when the arm hits an obstacle (eg: wall, ground, mission model) or if it moves an amount of degrees.  
Pseudocode:

1. Turn the motor on
2. Continuously check if the motor power is 0 or has reached the target degrees
3. If the motor has not made progress (power=0) or reached the target degrees, stop the motor



These blocks are just for the video



# Discussion Guide

1. **What is a stall?**

Ans. When you motor gets stuck and the program never moves on to the next block.

2. **Why is stall detection useful?**

Ans. When the robot stalls, it gives up on that block of code and moves on to the next block of code

# Credits

- This tutorial was created by Sanjay Seshan and Arvind Seshan from Droids Robotics.
- The Code was created by both Hoosier Girlz and Droids Robotics.
  - Step 1 and 2a by [www.flhoosiergirlz.com](http://www.flhoosiergirlz.com)
  - Step 2a and 2b by [www.droidsrobotics.org](http://www.droidsrobotics.org)
- More lessons at [www.ev3lessons.com](http://www.ev3lessons.com)



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