LIMIT SWITCH CONTROLLED MOTOR LAB

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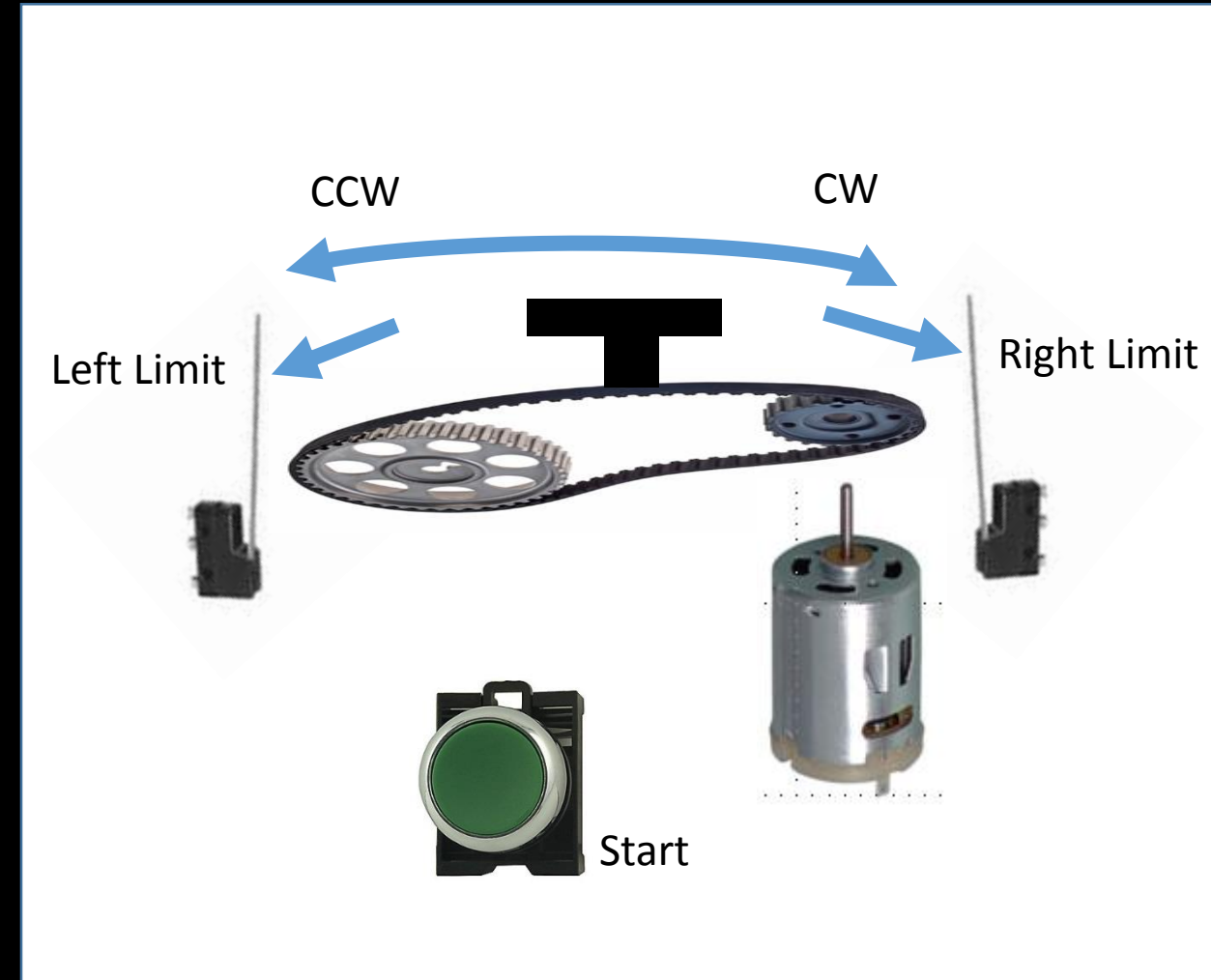
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LIMIT SWITCH HARDWARE

- As the motor turns CCW, it clicks on the left limit switch

- As the motor turns CW, it clicks on the right limit switch

LIMIT SWITCH PROGRAM CHALLENGE

- Overview: Create a program that detects the limit of travel for a motor. You are to detect when the motor has turned to the clock wise limit (Right Most) , or the counter clock wise limit (Left most)

- Inputs:
  - leftLimitSwitch
  - rightLimitSwitch
  - startPulse

- Outputs:
  - motorSpeedControl
  - motorDirectionControl1
  - motorDirectionControl2

STEPS TO MAKE IT WORK

- Power on system
- Go to a known or Reset position (Left Limit)
- Turn off the motor
- Wait for a "startPulse"
- Turn on motor to find the right most position
- Turn off the motor
- Then stop for 5 seconds
- Then turn back to the left or counter clock wise to the center most position (make your best guess based on motor time on / speed etc
- Wait for next "startPulse"

STEPS TO BREAK DOWN THE PROBLEM

Power On &
Initialize

↓

Wait for Start

↓

Turn Right Then
Center, Then Wait

Power on system
Go to a known or Reset position (Left Limit)
Turn off the motor
Wait for a "startPulse"
Turn on motor to find the right most position
Turn off the motor
Then stop for 5 seconds
Then turn back to the left or counter clock wise to the center most position (make your best guess based on motor time on / speed etc
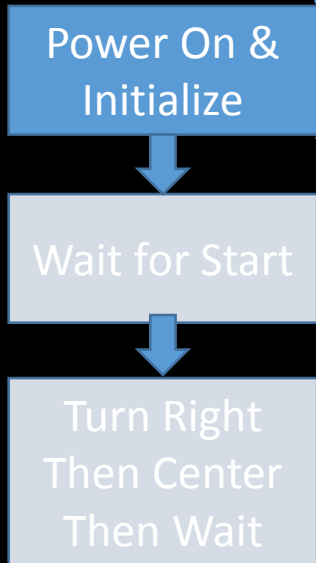
STEPS TO BREAK DOWN THE PROBLEM

Power On & Initialize

Wait for Start

Turn Right Then Center Then Wait

1. Setup Variables
2. Setup I/O (pinmode)
3. Set all variables and status to a default or "safe" state. (I.E Turn off the motor)
4. Go to a known or Reset position (Left Limit)
   - Test If Left Limit Reached
     1. What are you doing if True?
        - Turn Off Motor CCW (Left)
     2. What are you doing if False?
        - Turn On Motor CCW (Left)

STEPS TO BREAK DOWN THE PROBLEM

```
Power On &
Initialize
    ↓
Wait for Start
    ↓
Turn Right
Then Center
Then Wait
```
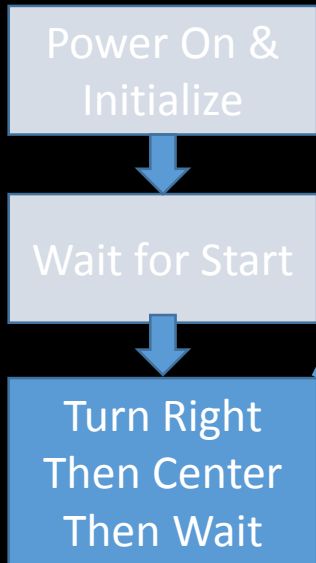
1. Make sure you know or set the default states
2. Read status of startPulse Pin
3. If statement
   1. What are you doing if True?
   2. What are you doing if False?

STEPS TO BREAK DOWN THE PROBLEM

Power On & Initialize

Wait for Start

Turn Right Then Center Then Wait
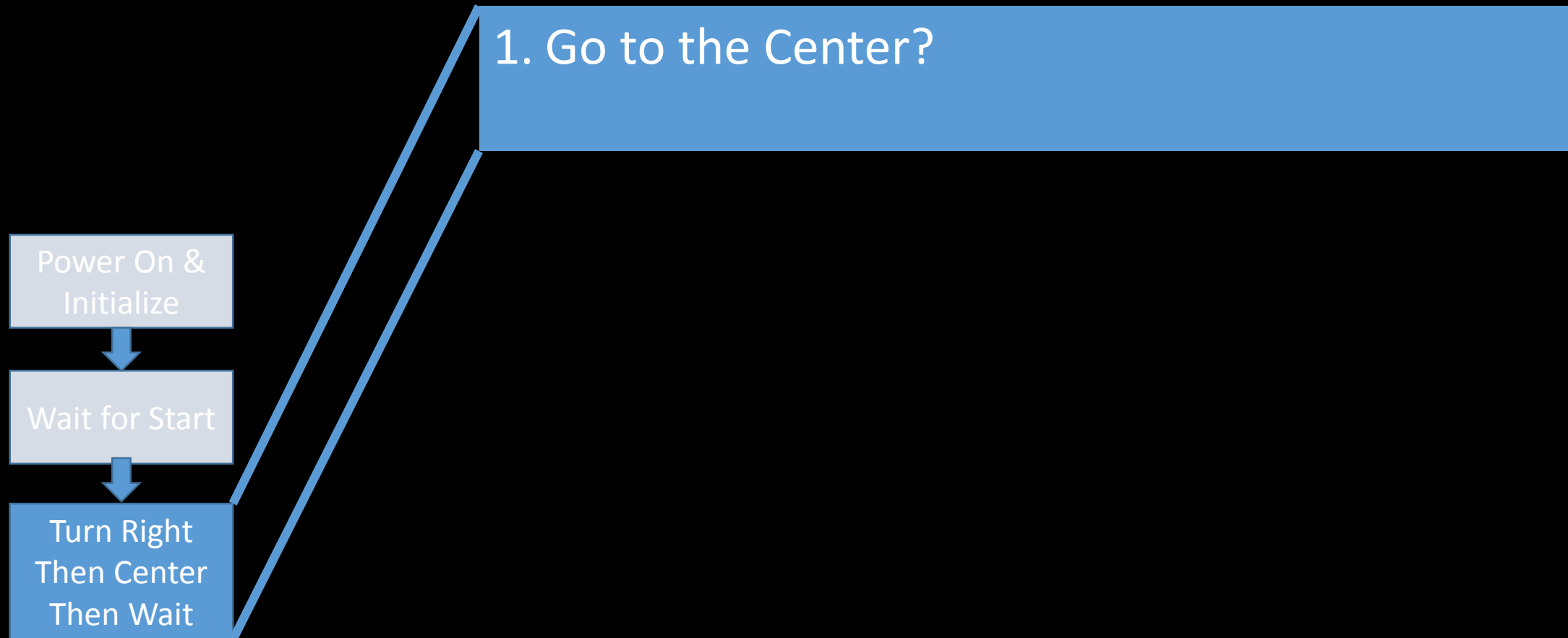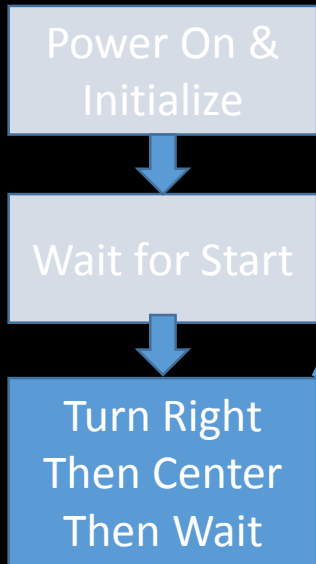
1. Test If startPulse
2. Go to the Right Limit
   - Test If Right Limit Reached
     1. What are you doing if True?
        - Turn Off Motor CW (Right)
     2. What are you doing if False?
        - Turn On Motor CW (Right)
3. Pause for a while (5 sec)
4. Go to the Center?
5. Then end loop and go back to #1

STEPS TO BREAK DOWN THE PROBLEM

1. Go to the Center?

Power On & Initialize

↓

Wait for Start

↓

Turn Right Then Center Then Wait

STEPS TO BREAK DOWN THE PROBLEM

Power On & Initialize

Wait for Start

Turn Right Then Center Then Wait

1. Go to the Center? - How?
    1. Hard Code how long it takes to go to the Center
    2. Could have setup a timer, timing how long it take s to go from left to right
        - Then do the math to see how long to turn on motor to go to the Center
    3. How Else?

INPUT SIGNALS

- The "startPulse" will be a signal on pin 2 that goes low to high, and then low again
- The "leftMotorLimit" will go from low to high on pin 3
- The "rightMotorLimit" will go from low to high on pin 4

OUTPUT SIGNALS

- "motorEnable" not used yet, but will be on pin 5

- "motorSpeed" will be on pin 9

- "motorDirection" will be a code on pin 7 and 6 where
  - 10 is clock wise, and 01 is counter clock wise

PROGRAM OUTPUT

- At each change in operation or limits, print status
    - "System Powered On"
    - "Start Pulse Detected"
    - "Motor turning Left" or "Right"
    - "Left Limit Detected"
    - "Right Limit Detected"

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APPENDIX

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