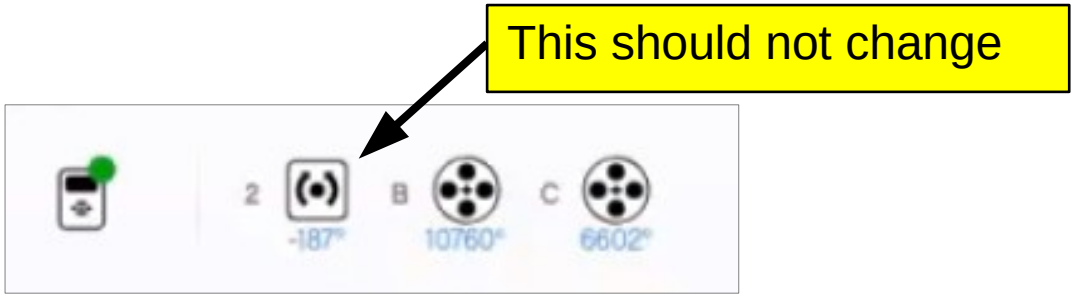
Gyro Turn

- Gyro Sensor
- Turning
- Creating “My Blocks”

Gyro Sensor

- **IMPORTANT!**
  - The gyro is calibrated on start-up
  - If correctly calibrated, the gyro angle should remain constant
  - The value is not important as long as it doesn't changes when the robot is stationary
  - If it changes, recalibrate by unplugging and re-plugging the gyro (...or restart the device) while keeping it stationary



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Gyro Sensor

Set the port number correctly (...check where you plugged in your gyro sensor)

Notice the rounded shape of this block?

This is a value block. It returns a numeric value (eg. 1, 2, 42).

Spike prime version. **Make sure to switch to “Yaw”**

Find it under “Sensors”

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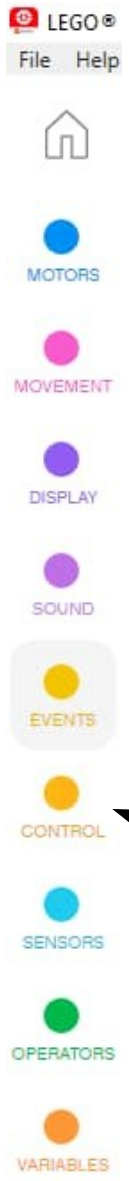
“wait until”



This space is for the condition

This block will wait until the condition is true, before the program can continue to the next block

Find it under “Control”

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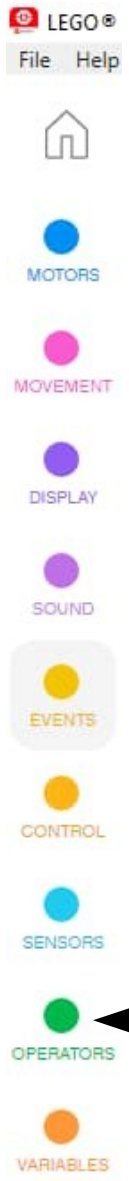
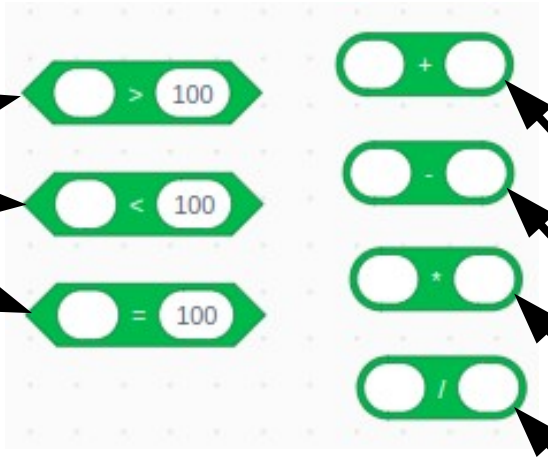
Conditions and Math



We can check if the value on the left is…

- `>` Greater than
- `<` Less than
- `=` Equal to

…the value on the right



We can also…

Add
Subtract
Multiply
Divide

...two numbers

Find them under “Operators”

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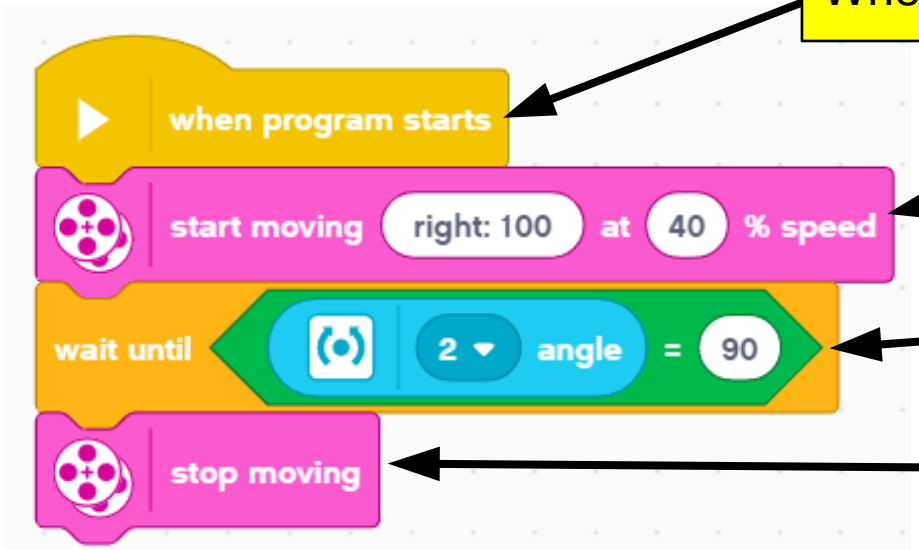
Example 1



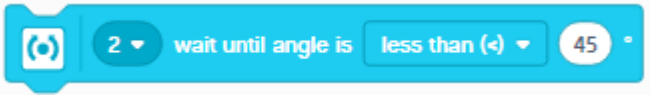
When the program starts...

Start turning (...note that we didn't tell the robot how many rotations to turn)

Wait until we reach 90 degrees

Stop the robot

EV3 Classroom have a "wait until angle" block that provides a shortcut, but the above example works with both EV3 and Spike Prime



Try it out!

- Add a gyro sensor to your robot. Spike prime already have one built-in.
- As long as the logo on the gyro is facing up, the orientation doesn't matter
- Run the program on your robot

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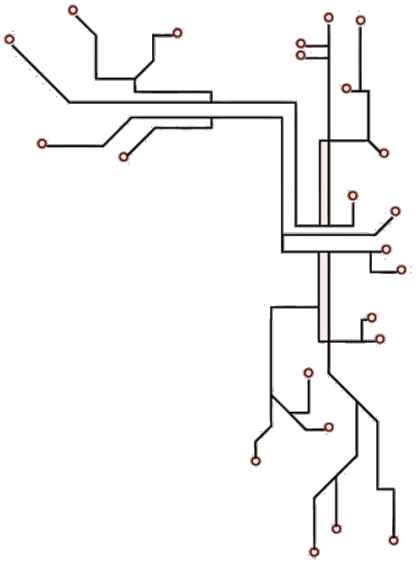
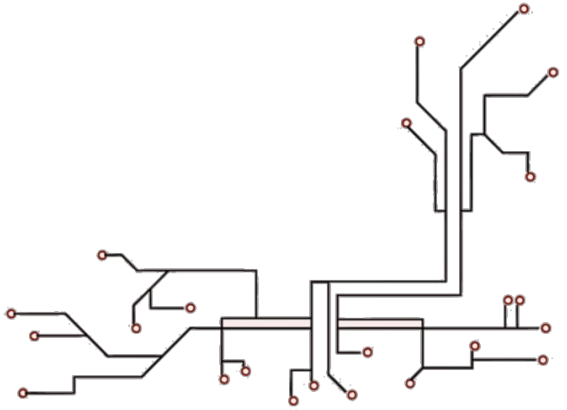
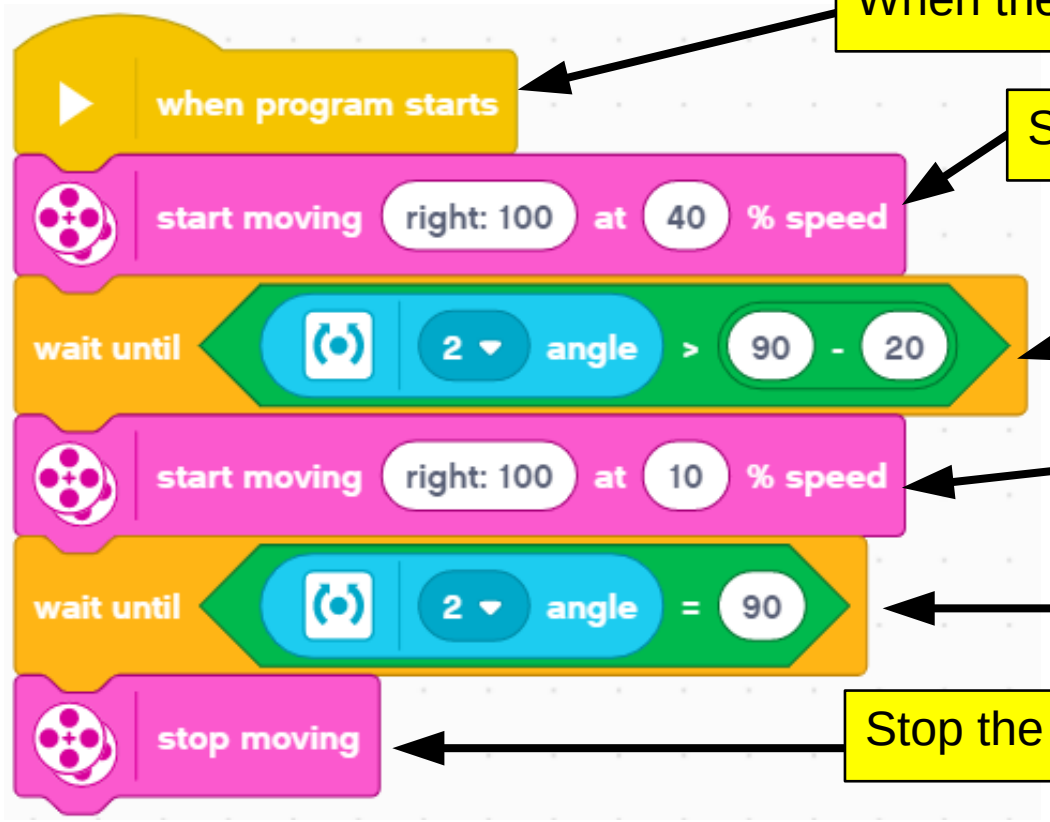
Example 1



- Result?
  - Did it achieve an exact 90 degrees turn?
  - Why not?
  - Try increasing and reducing the speed. Did the robot turn more accurately now?



Example 2



When the program starts...

Start turning at 40% speed (fast)

Wait until angle is greater than 70 degrees (90 - 20)

Continue turning at 10% speed (sloooow)

Wait until we reach 90 degrees

Stop the robot

Try it out!

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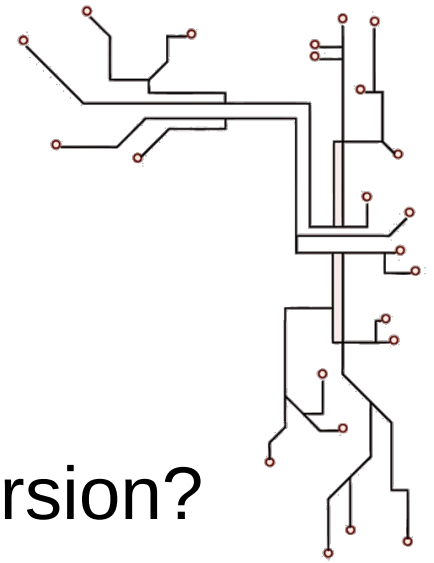
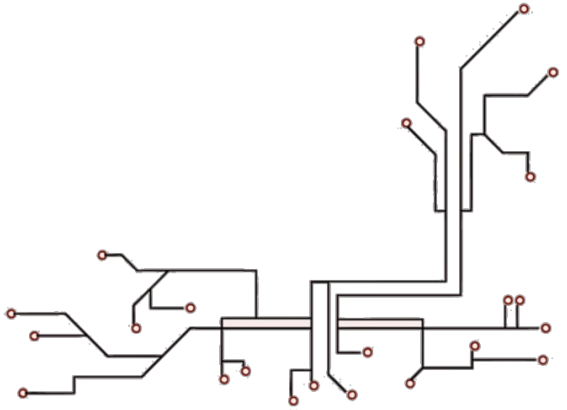
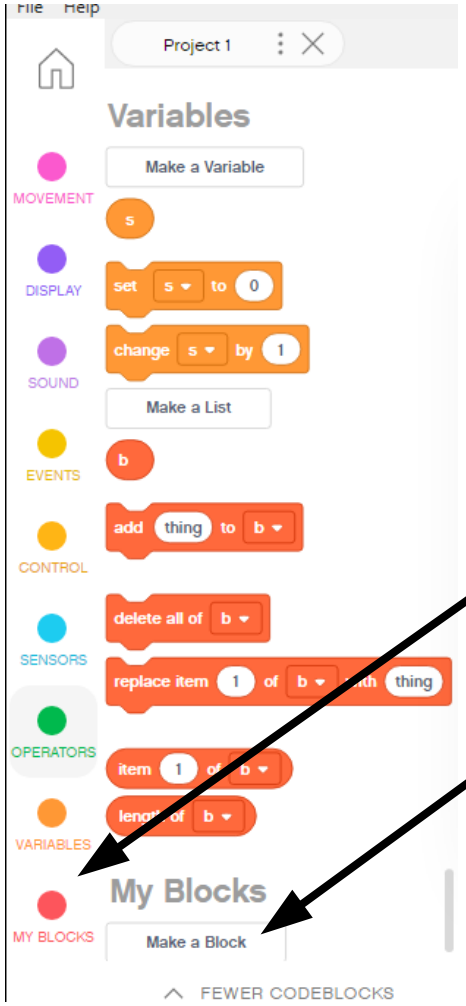
Example 2



- Result?
  - Is this more accurate than the previous version?
  - Is this faster than the previous version?
  - Try adjusting the “-20” to improve the speed while maintaining accuracy
  - * Note, you don’t need it to be perfect. A 1 degree error is ok.



Creating a “My Block”



Go to the “My Blocks” category...

...and select “Make a Block”

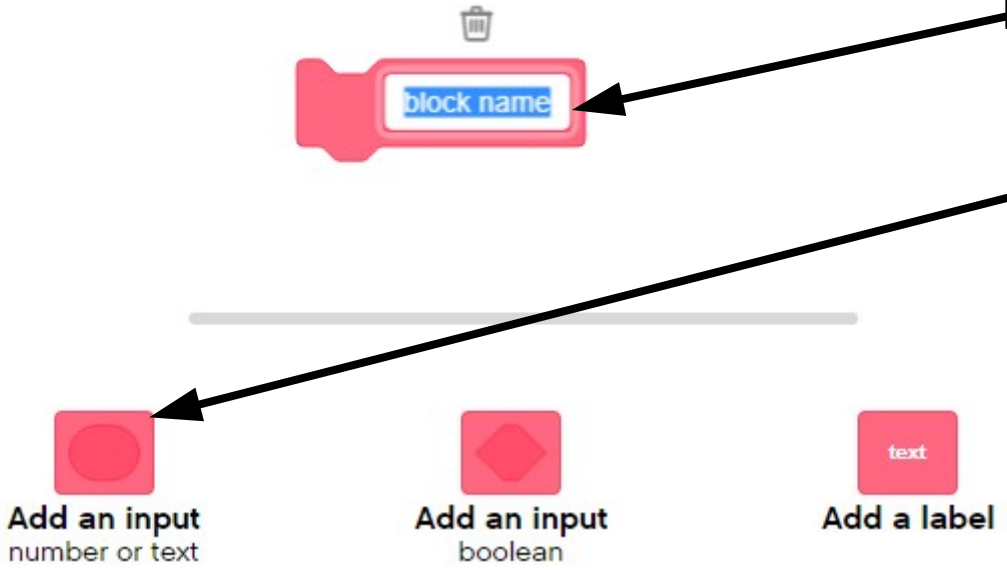
Use My Blocks to create code that you can re-use again and again.

Our robot needs to turn often, so let’s make our turning code into a My Block.

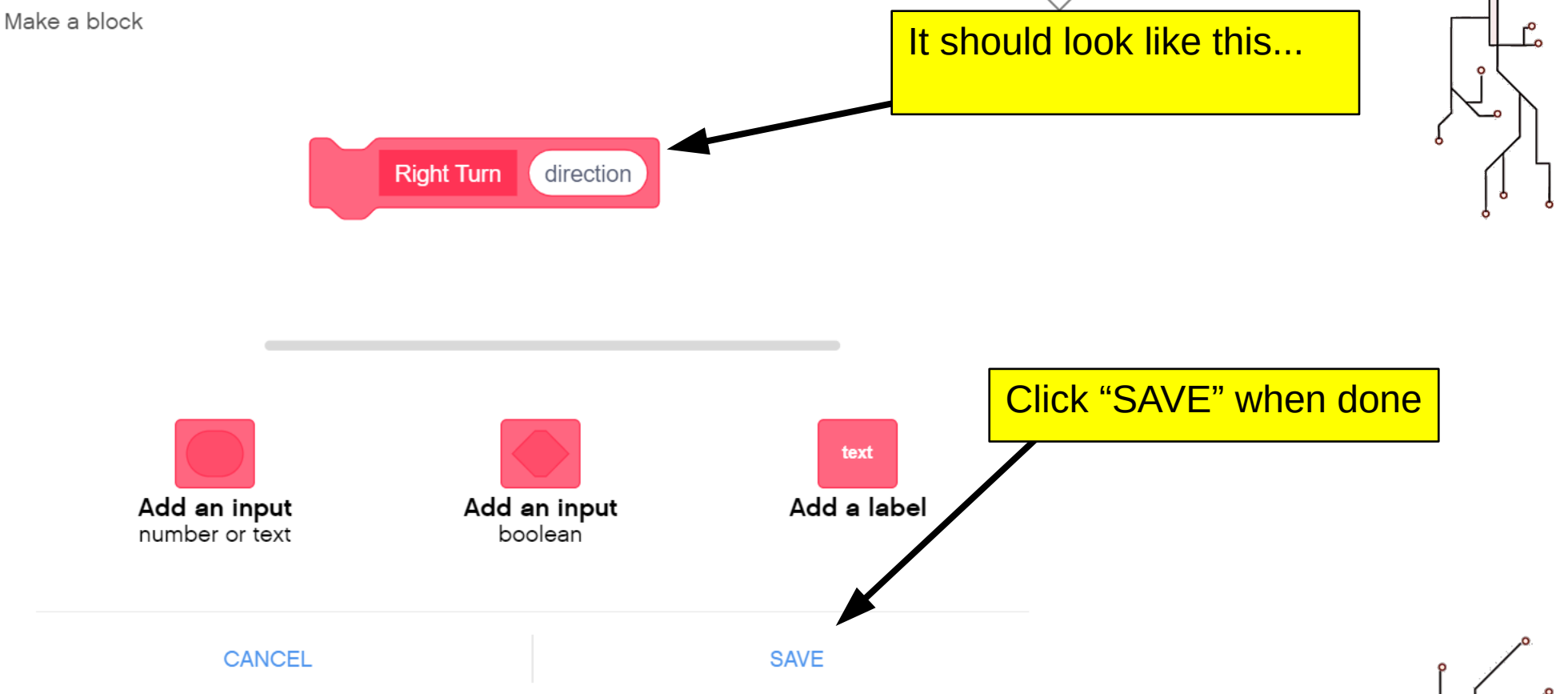
Creating a “My Block”

Give your My Block a name.
Something like “Right Turn”

Add a “number” input.
Give the input a name, like “direction”



Creating a “My Block”



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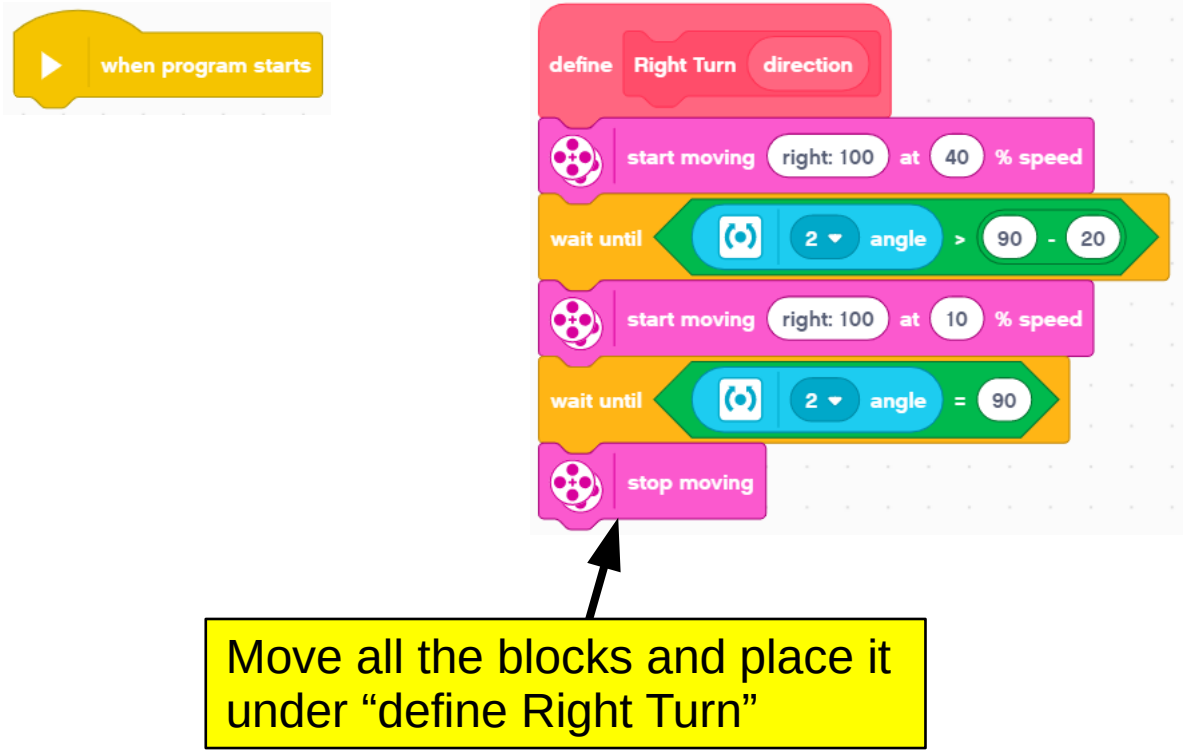
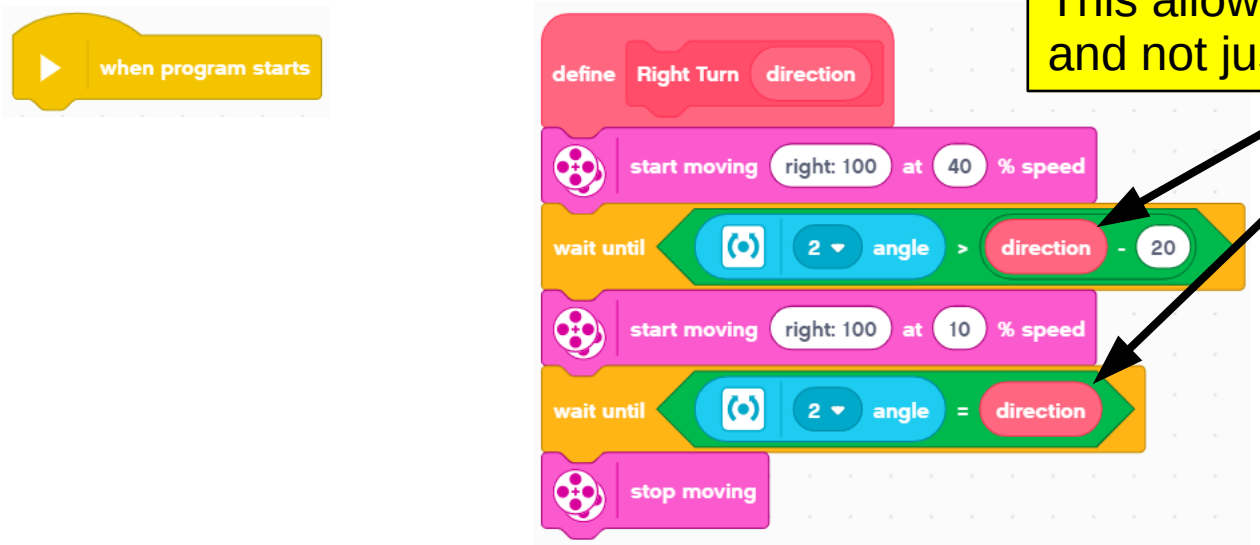
Creating a “My Block”



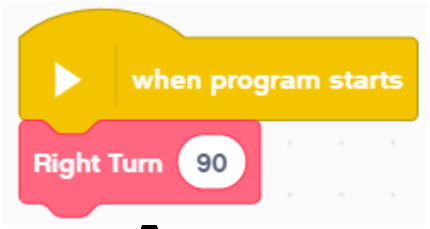
Move all the blocks and place it under “define Right Turn”

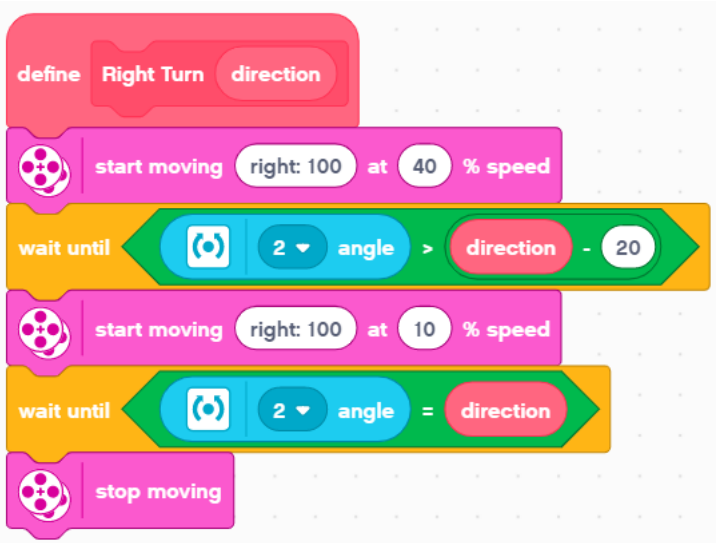
Creating a “My Block”



Replace all the “90” with “direction”
This allows us to turn to any angles, and not just 90 degrees.

Creating a “My Block”





My Blocks don’t run by themselves, we need to “call” it when we want it to run.

Here we add a call to “Right Turn” under “when program starts”

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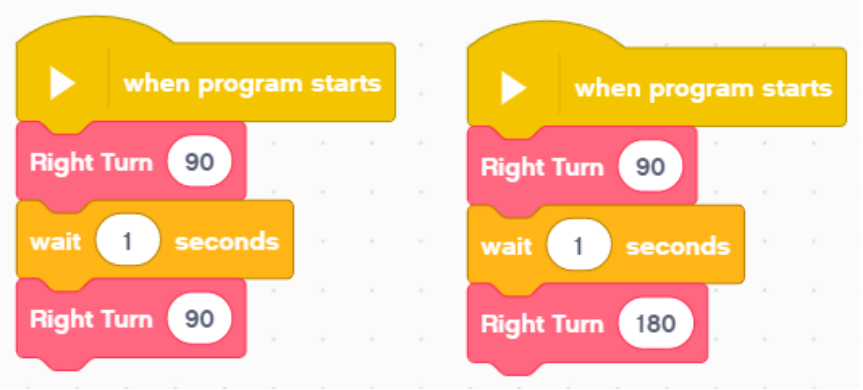
Experiment

- Try using “Right Turn” to turn to 45 degrees and 180 degrees. Does it work correctly?
- Try these two programs (one at a time)…



- The robot only turn once in the first program, but twice in the second program. Why?

Gyro

- Not just in robots
- Gyros are also used in ships, planes, and hoverboards

Ship Gyro

Gyro display used on aircrafts

Hoverboards uses a gyro to keep the user upright

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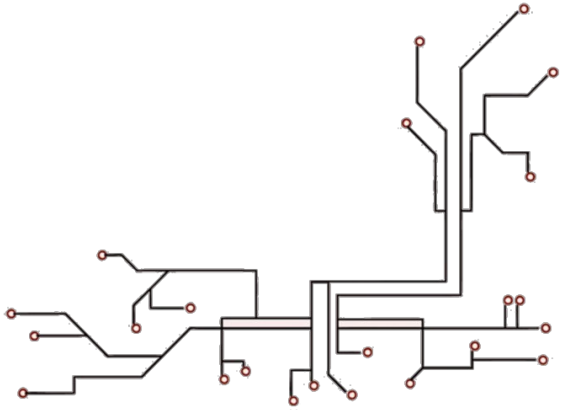
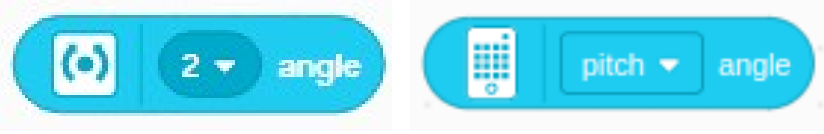
Challenge

- The current My Block is only for turning right
- Make another My Block for turning left



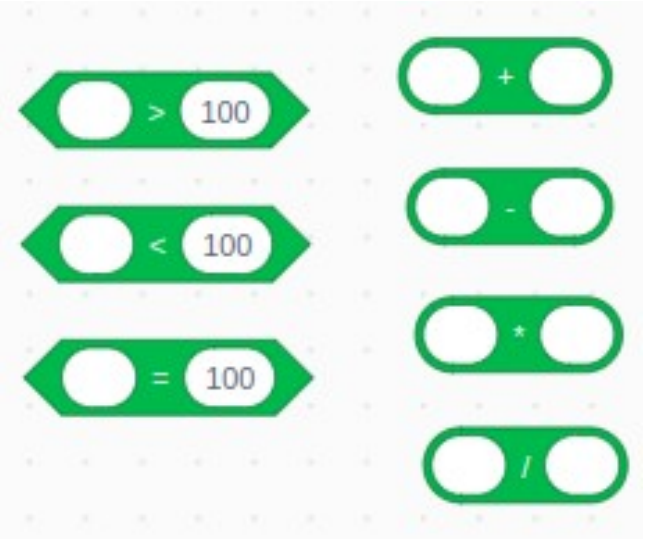
Summary

- Use the gyro blocks to check direction



- Use “wait” to make the program wait for a condition to be true

- Use the comparison blocks under “operators” to check a condition



- Use the math blocks to add, subtract, multiply, or divide

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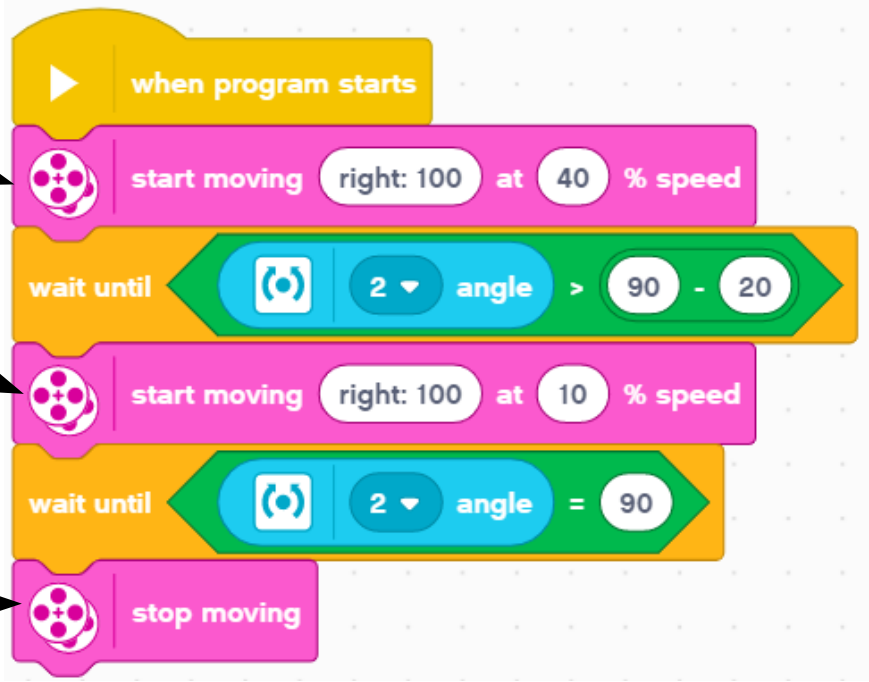
Summary

- Turn fast at the start...
- ...then slow down when your robot is near to the target direction
- Finally, stop



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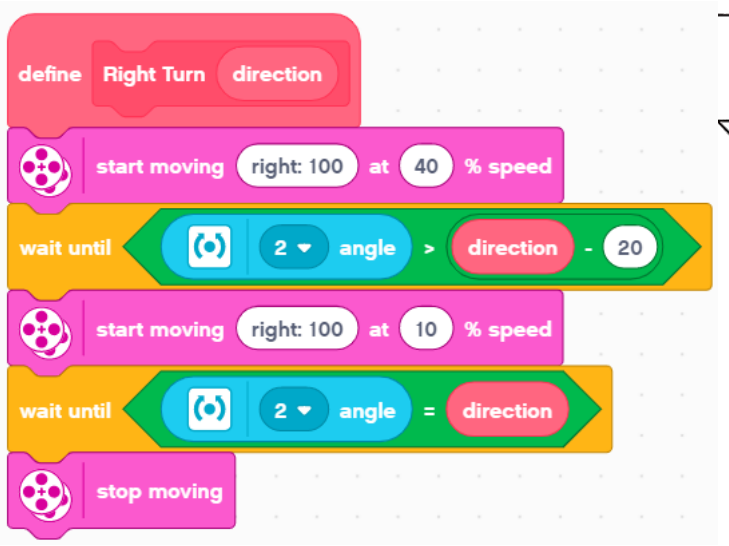
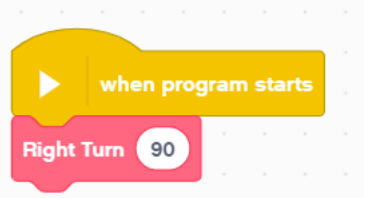
Summary

- Create My Blocks for code that you often need to run...



- ...then run it by “calling” it under “when program starts”



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