Armstrong

School Program 2023-2024

Lesson 3

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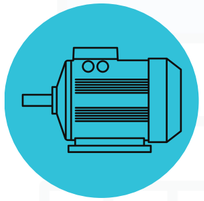
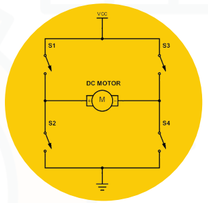
Lesson Content



Motor



Motor Driver

Moving wheels

Robot Movement

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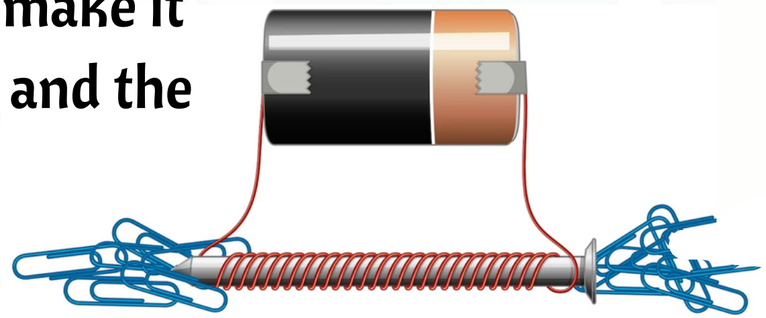
Motor

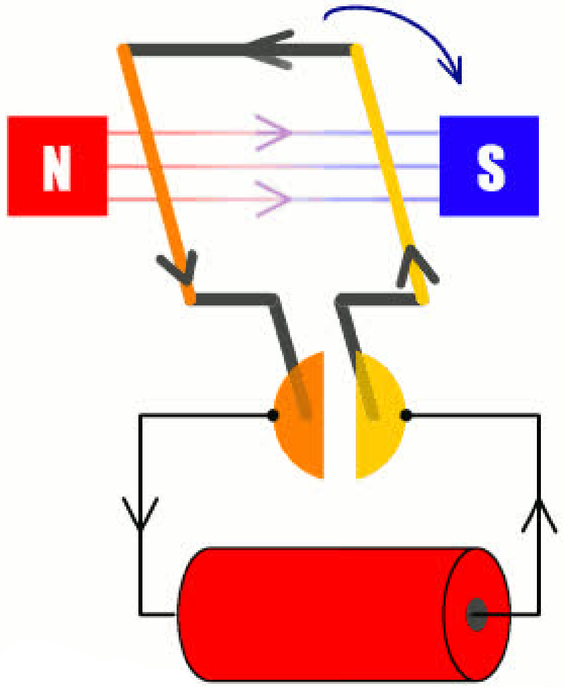
What is a motor?

It is a device that converts electrical, chemical, or nuclear energy into mechanical energy.

How does an electric motor work?

An electric circuit produces a magnetic field. So putting the circuit between 2 magnets will make it rotate due to repulsion between the circuit and the magnets.

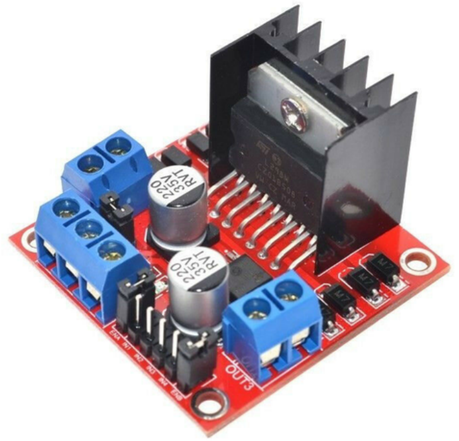




Motor Driver

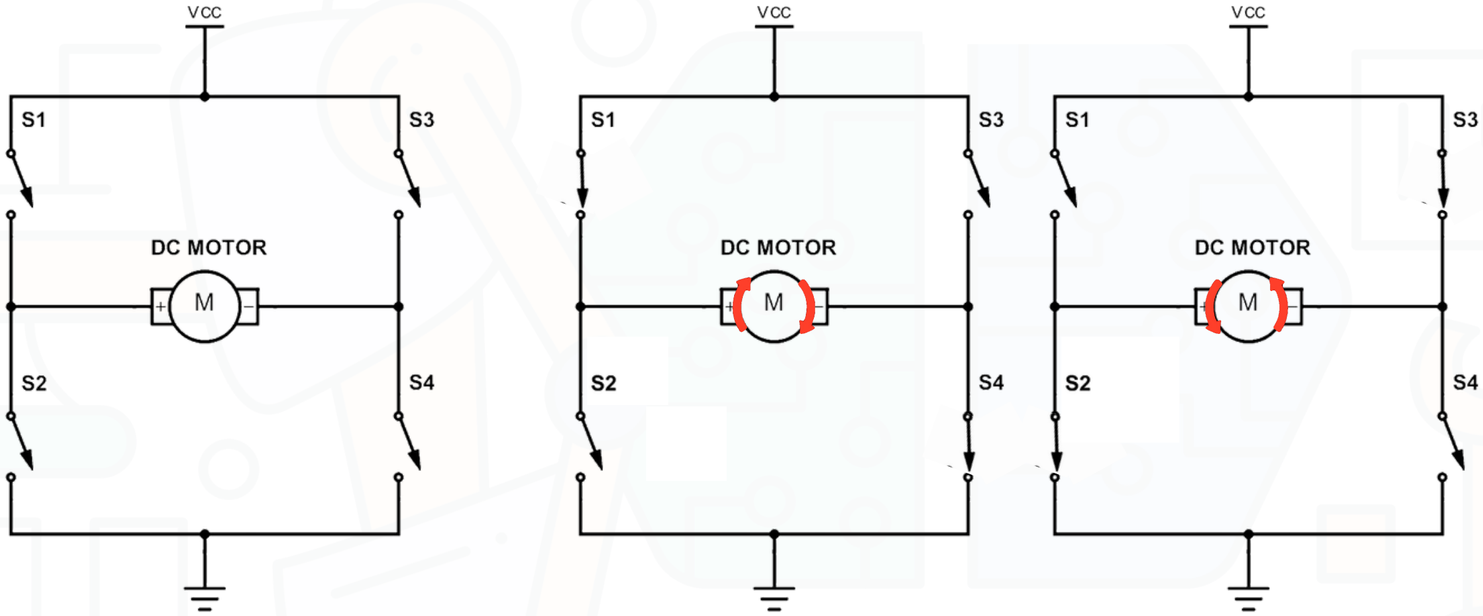
Motor driver

It is a device that controls motor's movement (direction & speed) depending on its inputs (direction of current).



H bridge circuit

The principle of motor Driver depends on The H bridge circuit.



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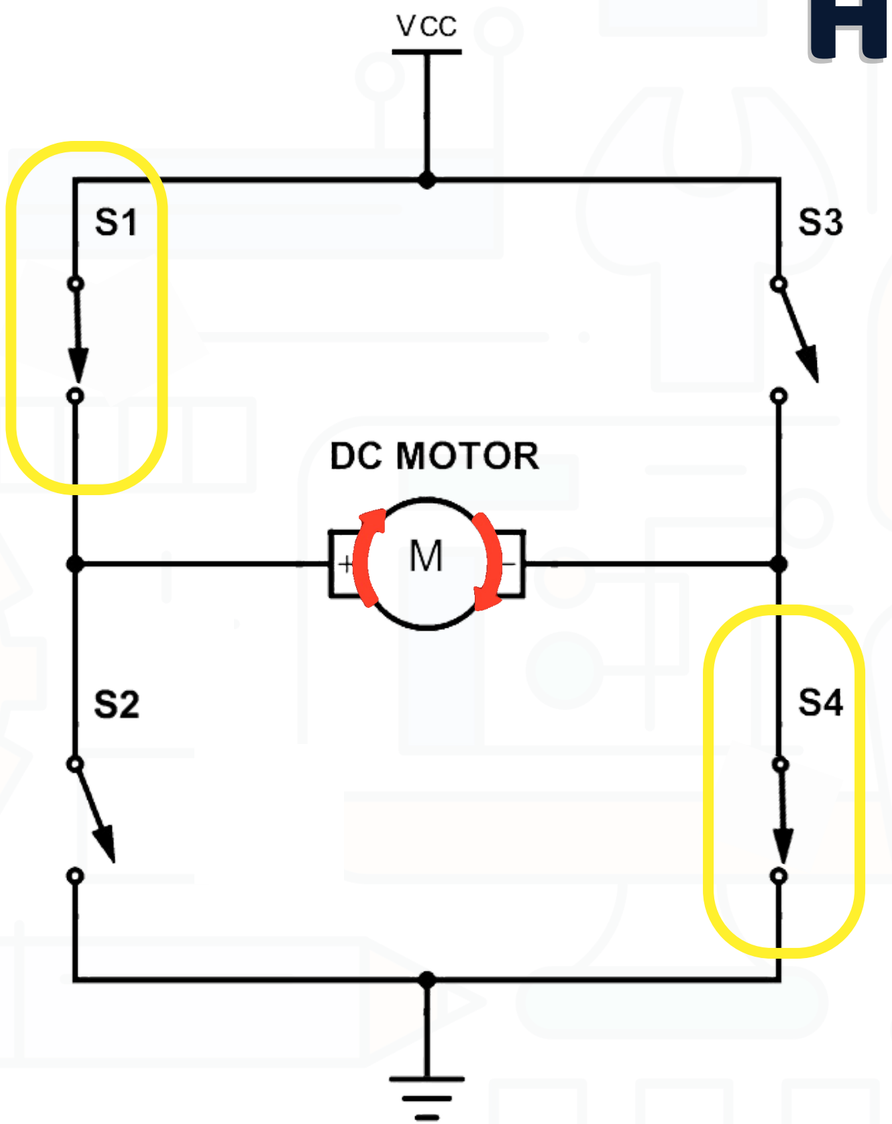
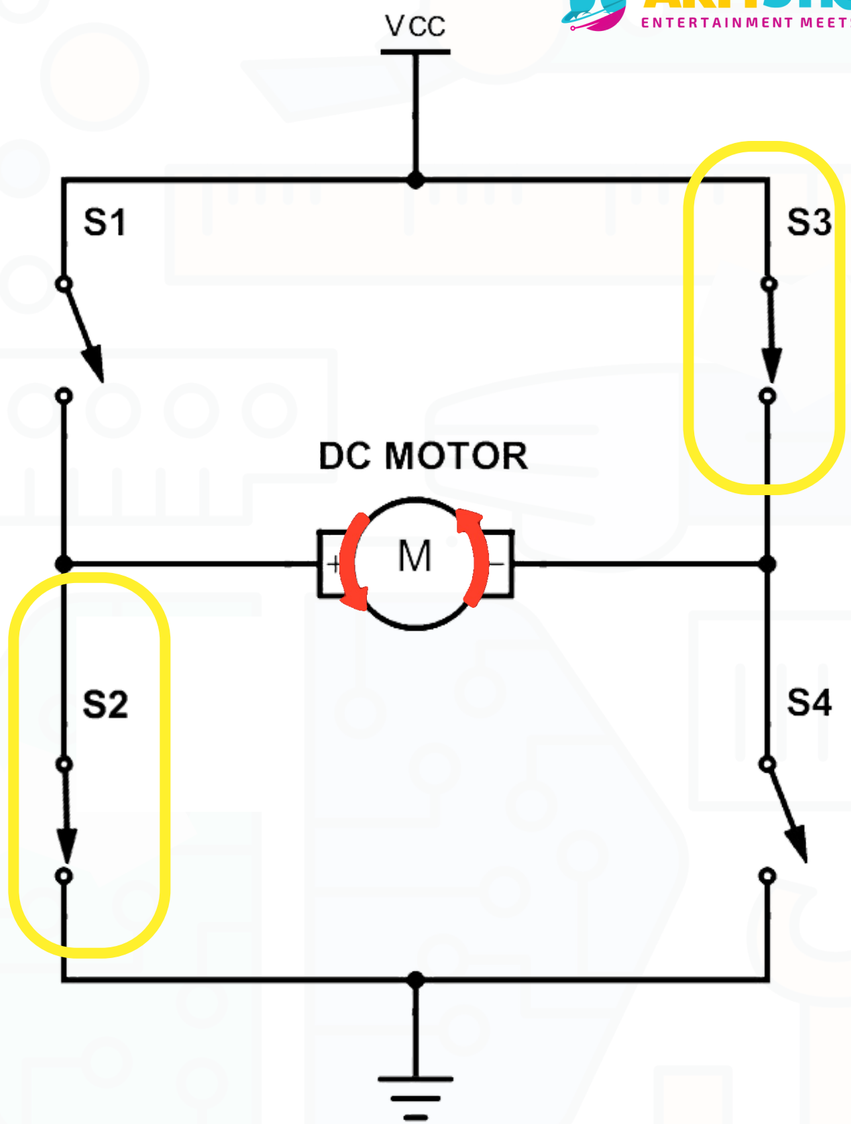
H bridge



Input 1



Input 2

Move 1st Wheel

Move the front right wheel forward and backward.

First we should know the connection of the driver and its pins.

Pins:

- Enable -> D10
- Input 1 -> A1(D15)
- Input2 -> A2(D16)

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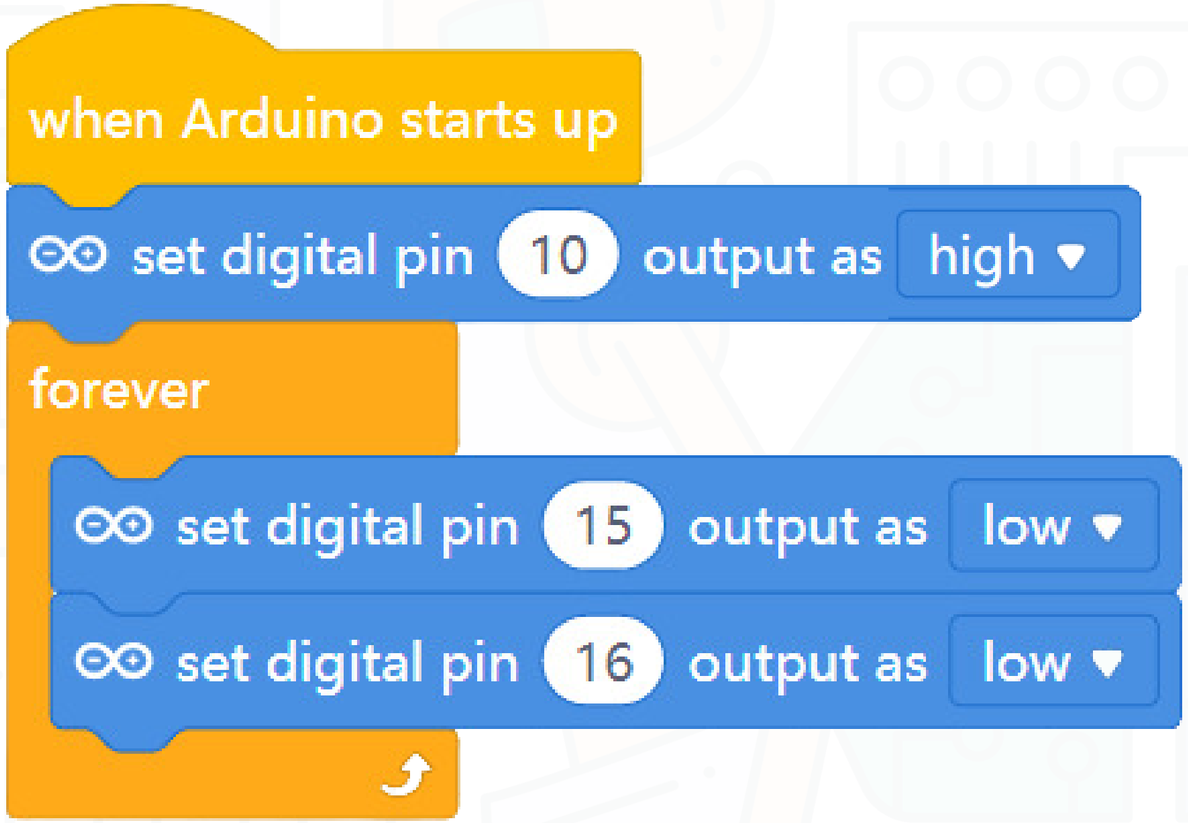
Stop The Robot

To Stop the robot we should set all input1 and input2 pins to "LOW"



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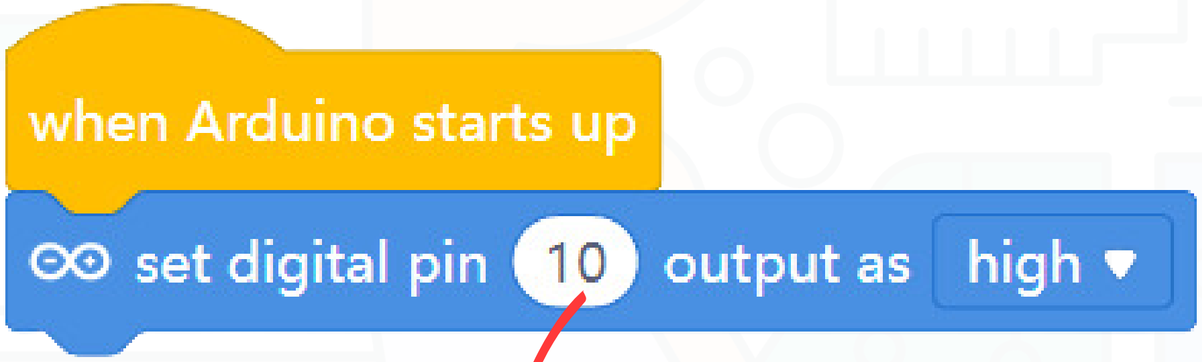
Move 1st Wheel

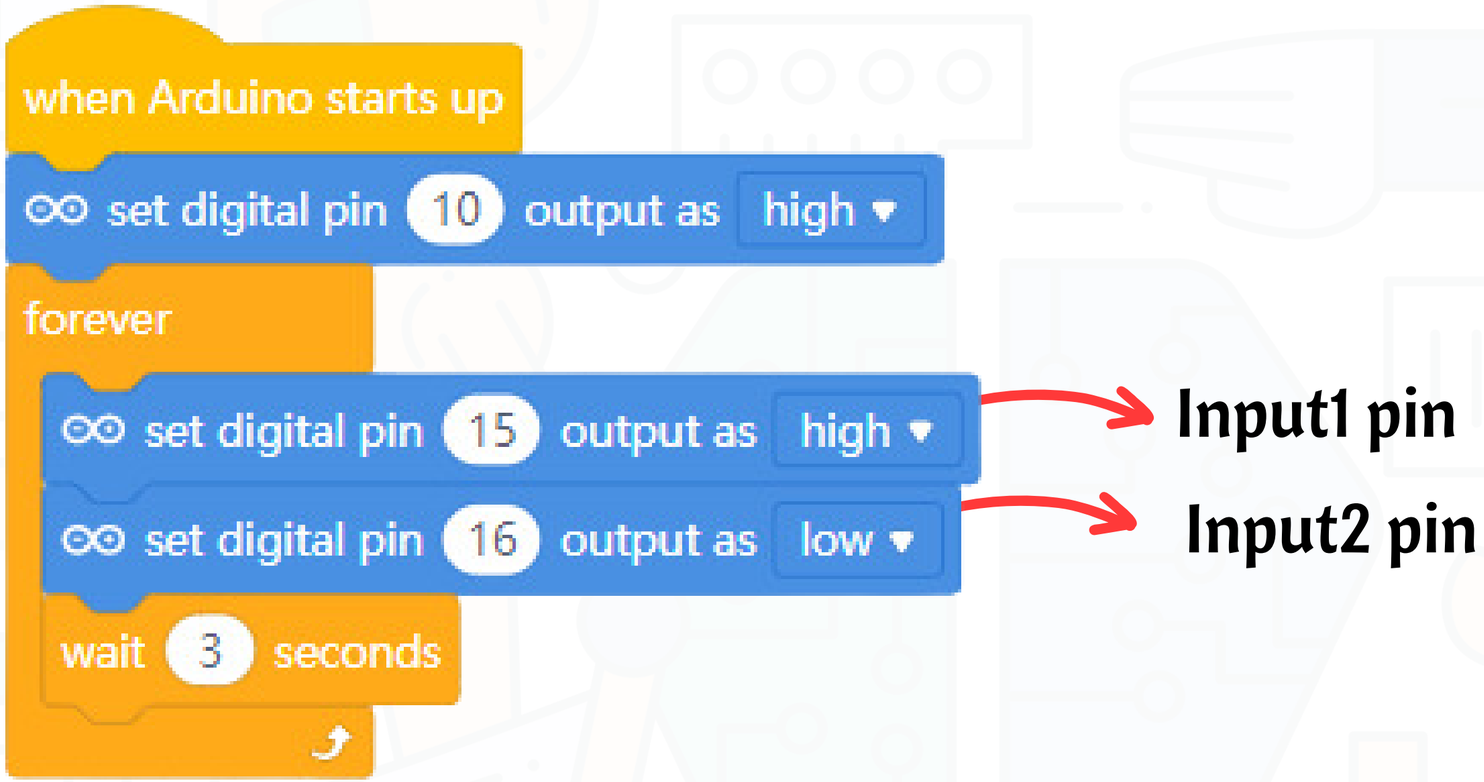
Step 1: Enabling the motor



Enable pin

Move 1st Wheel

Step 2: Moving the wheel forward



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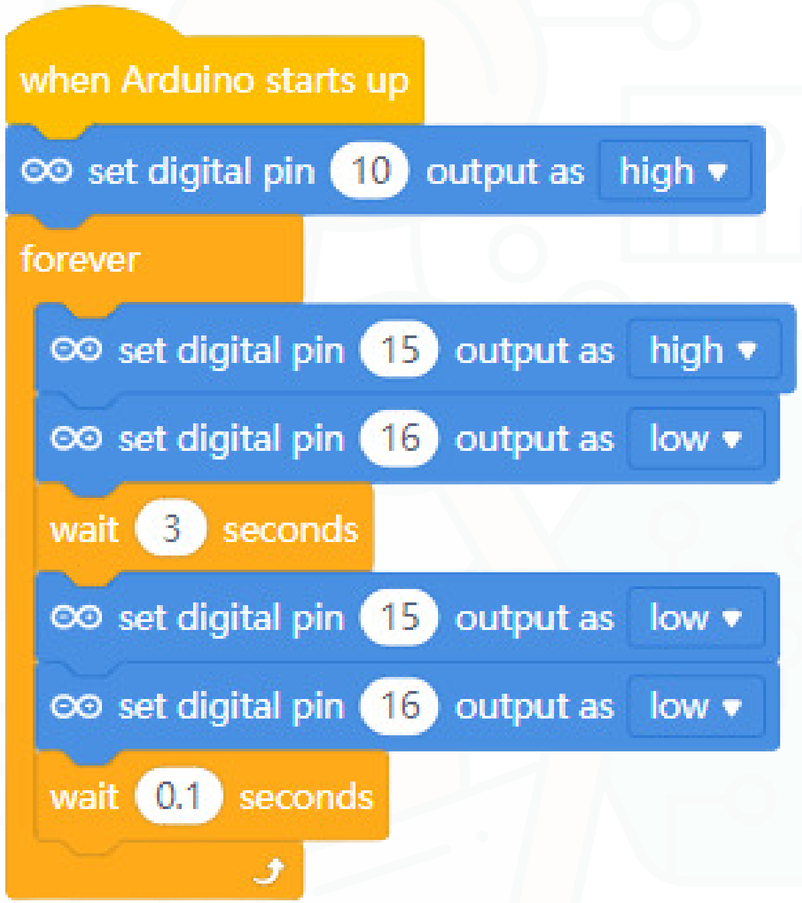
Move 1st Wheel

Step 3: Stop the wheel

Note: We stop the wheel before motor moving in a different direction so the motor doesn't break



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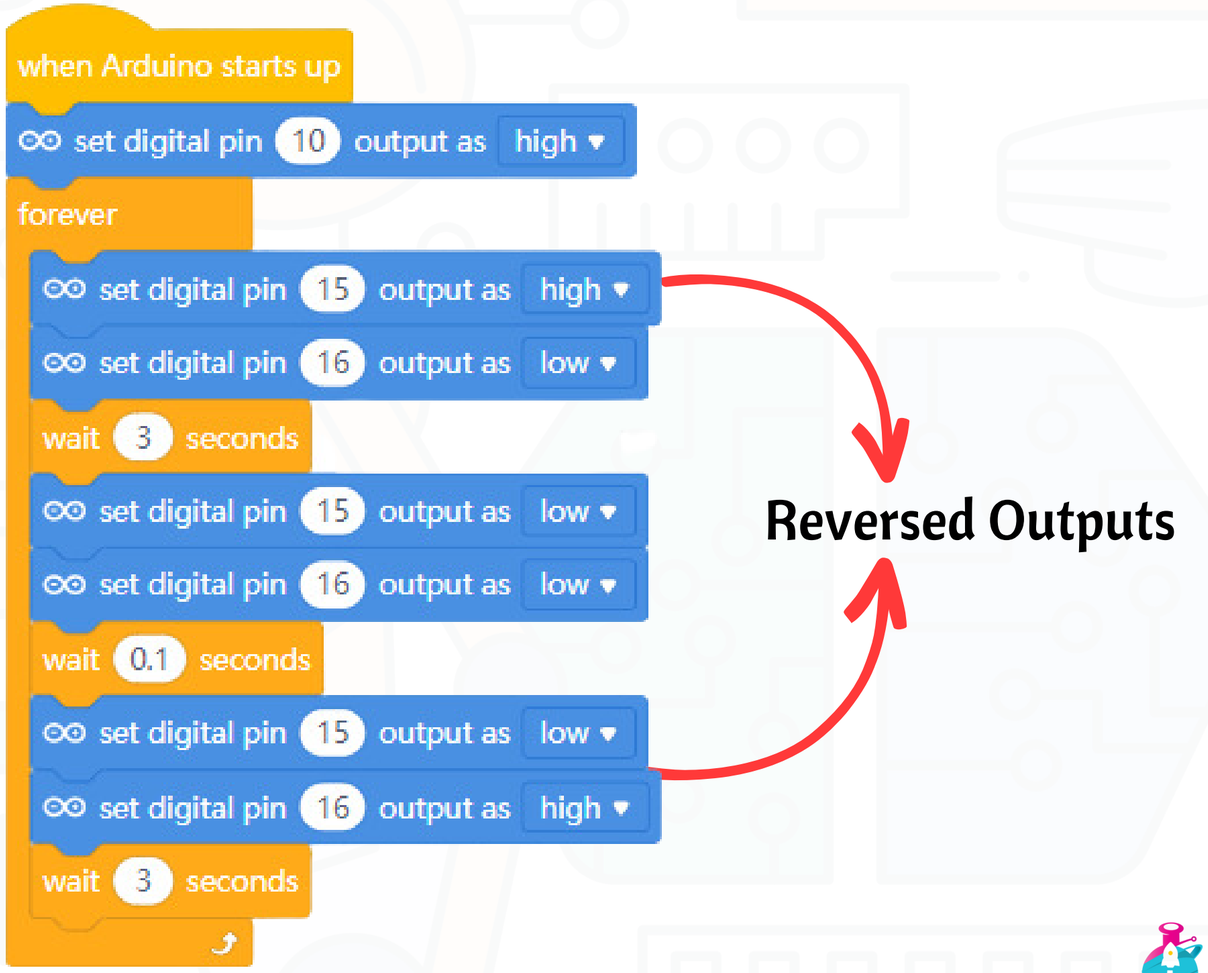
Move 1st Wheel

Step 4: Moving the wheel backward



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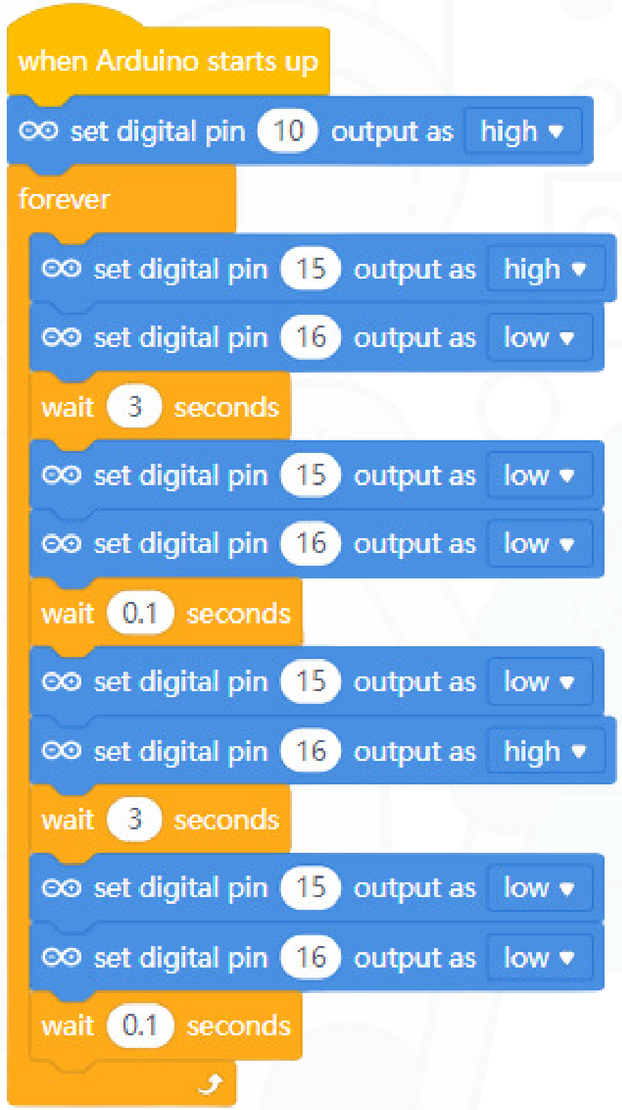
Move 1st Wheel

Step 4: Stop the wheel



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Let's try it on mBlock

To move the front left wheel

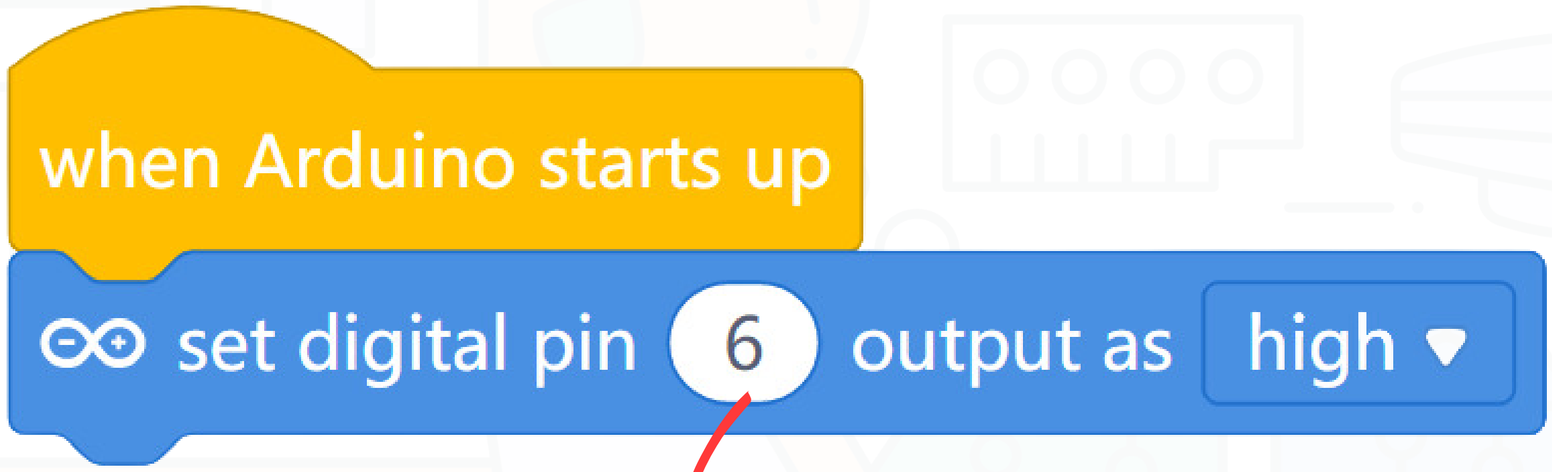
Knowing the pins of the motor are:

- Enable -> D6
- Input 1 -> D11
- Input2 -> D12

Hint: Remember the previous steps to move the front right wheel.

Move 2nd Wheel

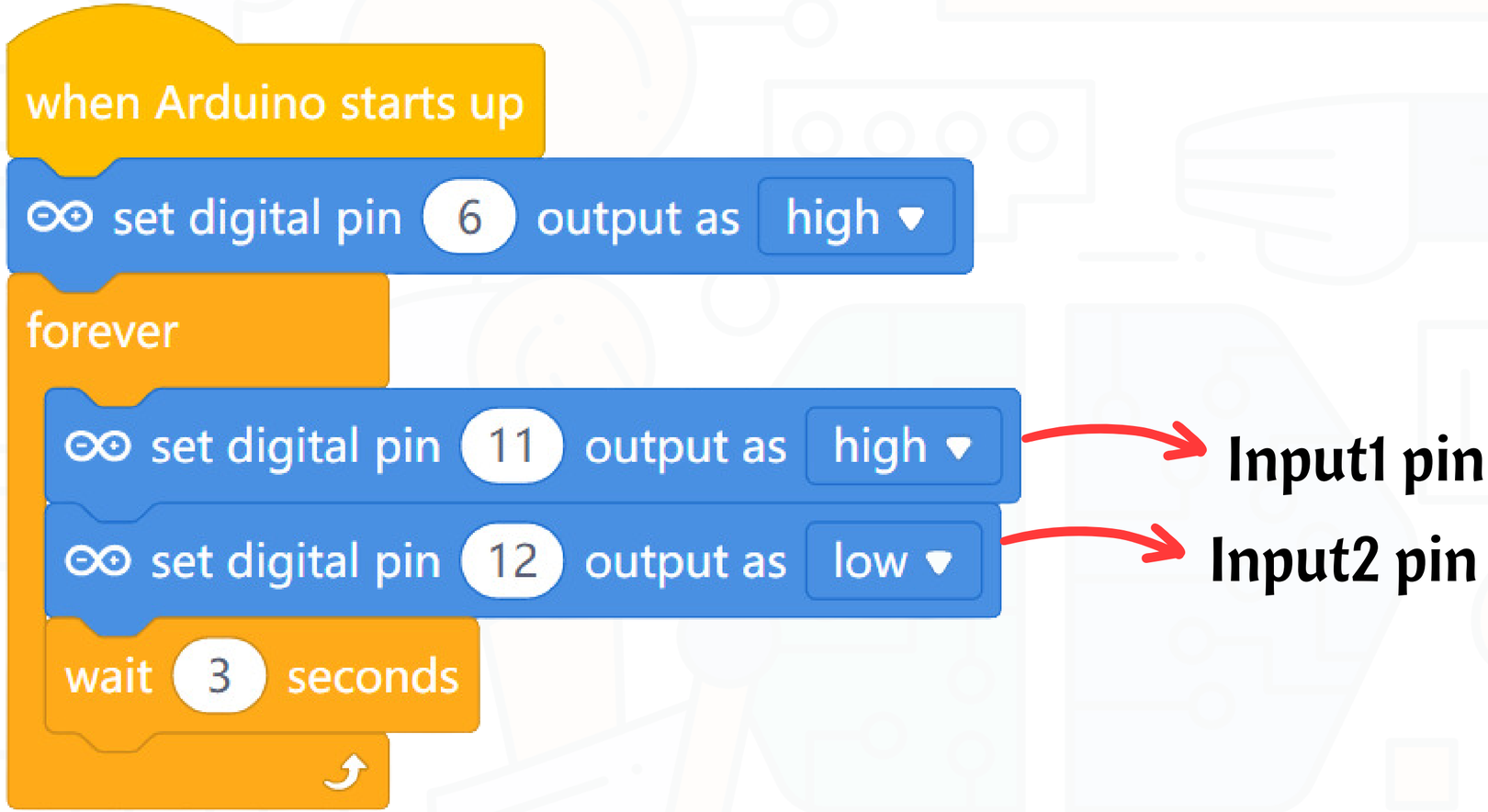
Step 1: Enabling the motor



Enable pin

Move 2nd Wheel

Step 2: Moving the wheel Forward



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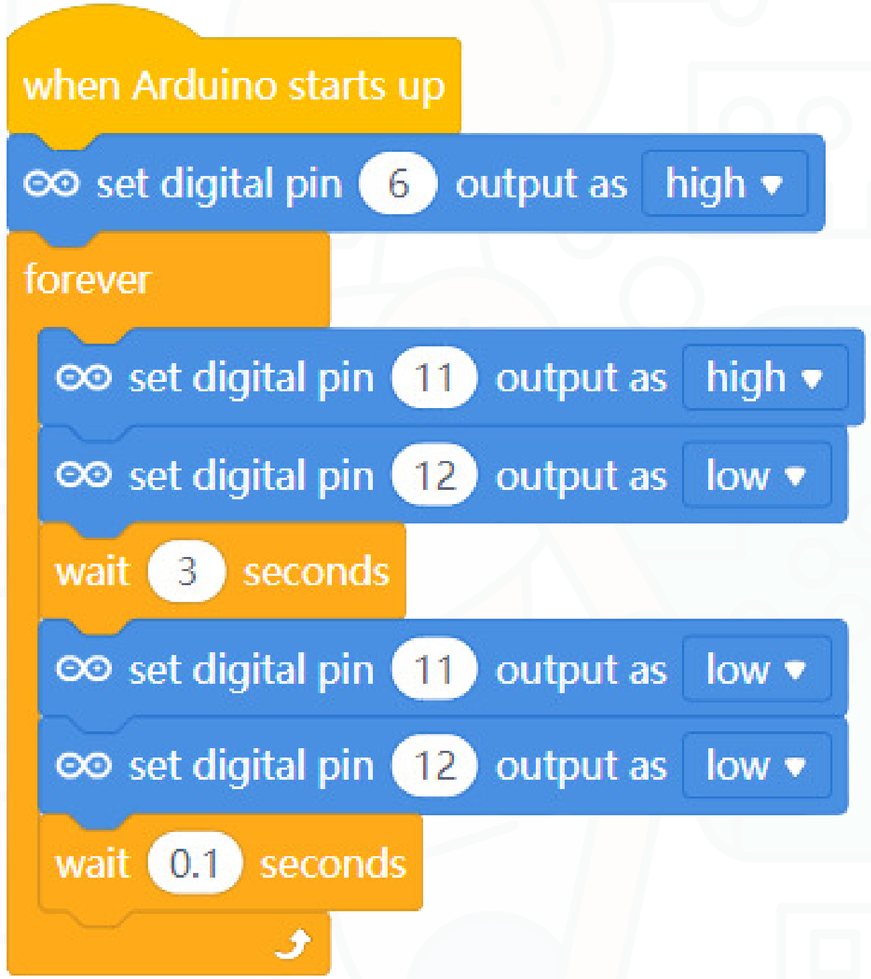
Move 2nd Wheel

Step 3: Stop the wheel



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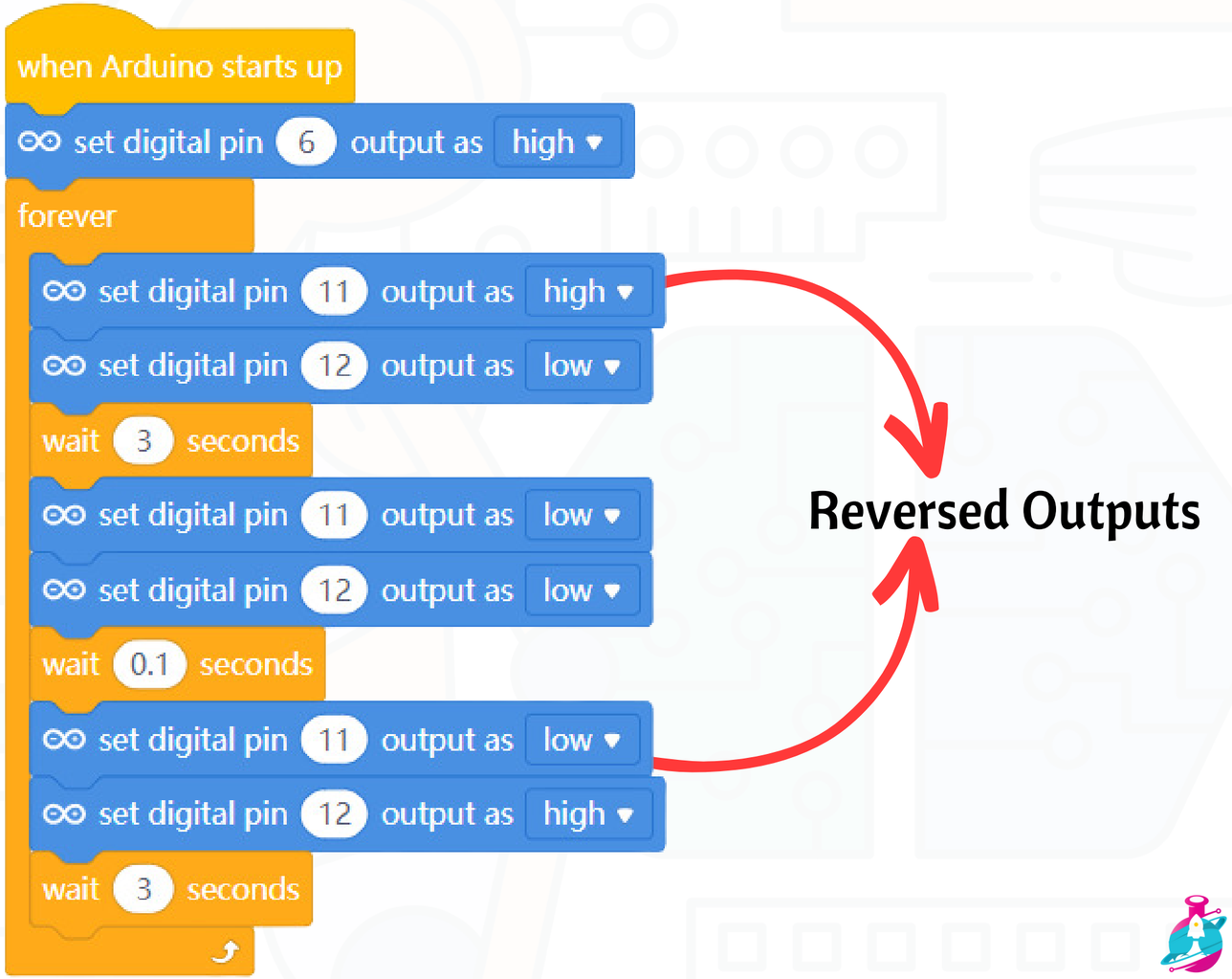
Move 2nd Wheel

Step 4: Moving the wheel backward



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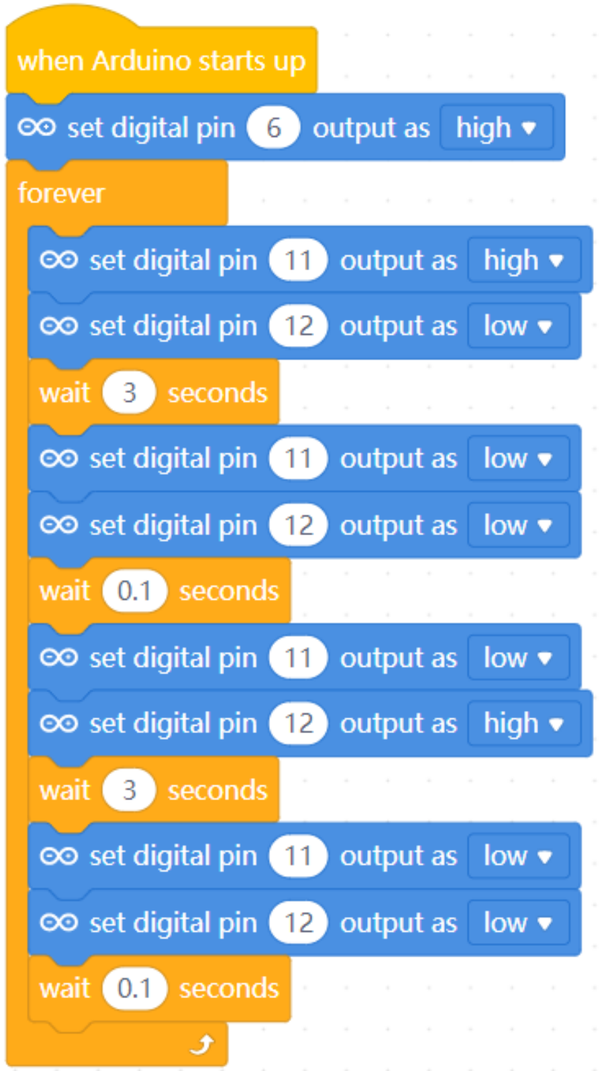
Move 2nd Wheel

Step 5: Stop the wheel



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Think

How will we move the robot forward?

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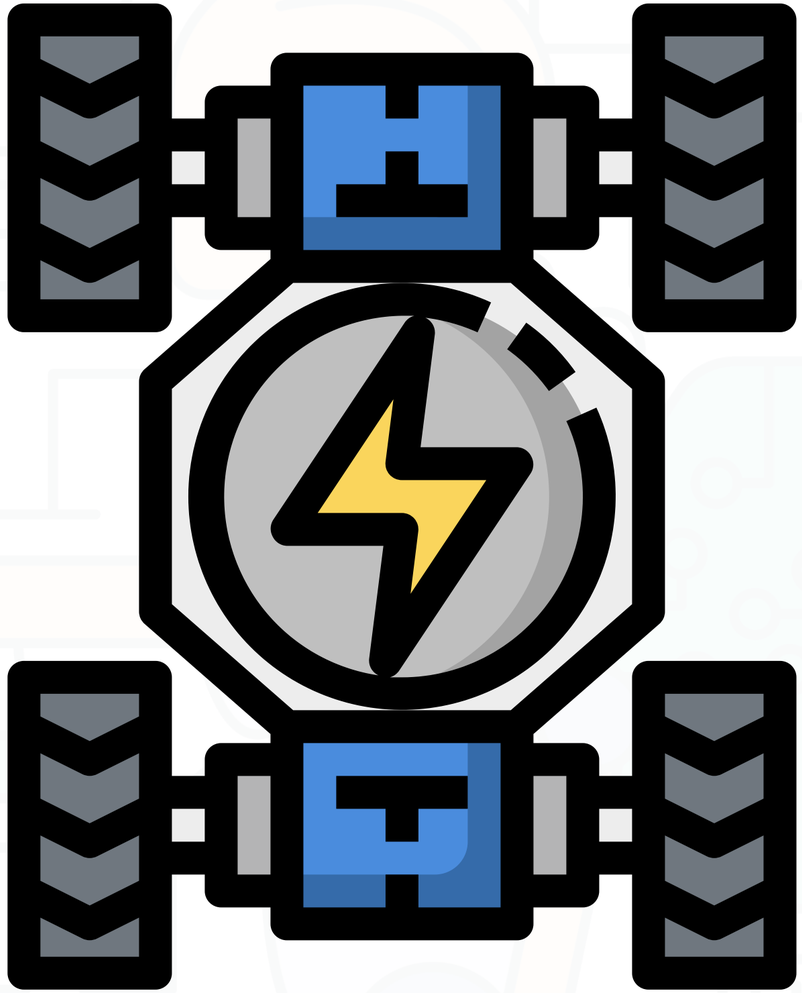
Let's move The Robot

Move Forward

Pins we need:

- Enable -> D6
- Input 1 -> D11
- Input2 -> D12



- Enable -> D10
- Input 1 -> A1(D15)
- Input2 -> A2(D16)

- Enable -> D5
- Input 1 -> D7
- Input2 -> D8

- Enable -> D9
- Input 1 -> D13
- Input2 -> A0(D14)

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Let's move The Robot

Step 1: Enabling the motors

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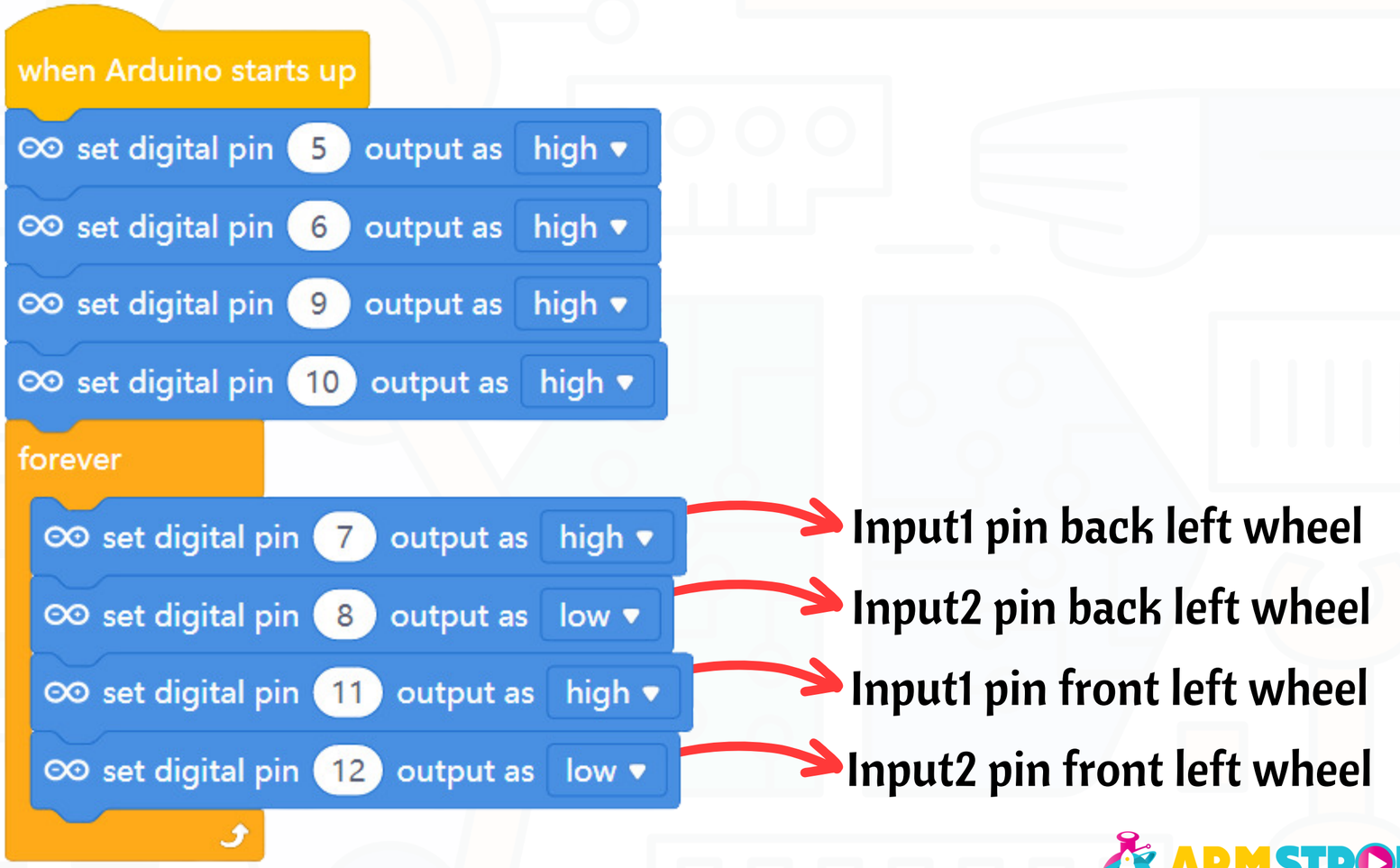
Let's move The Robot

Step 2: Moving the left wheels forward



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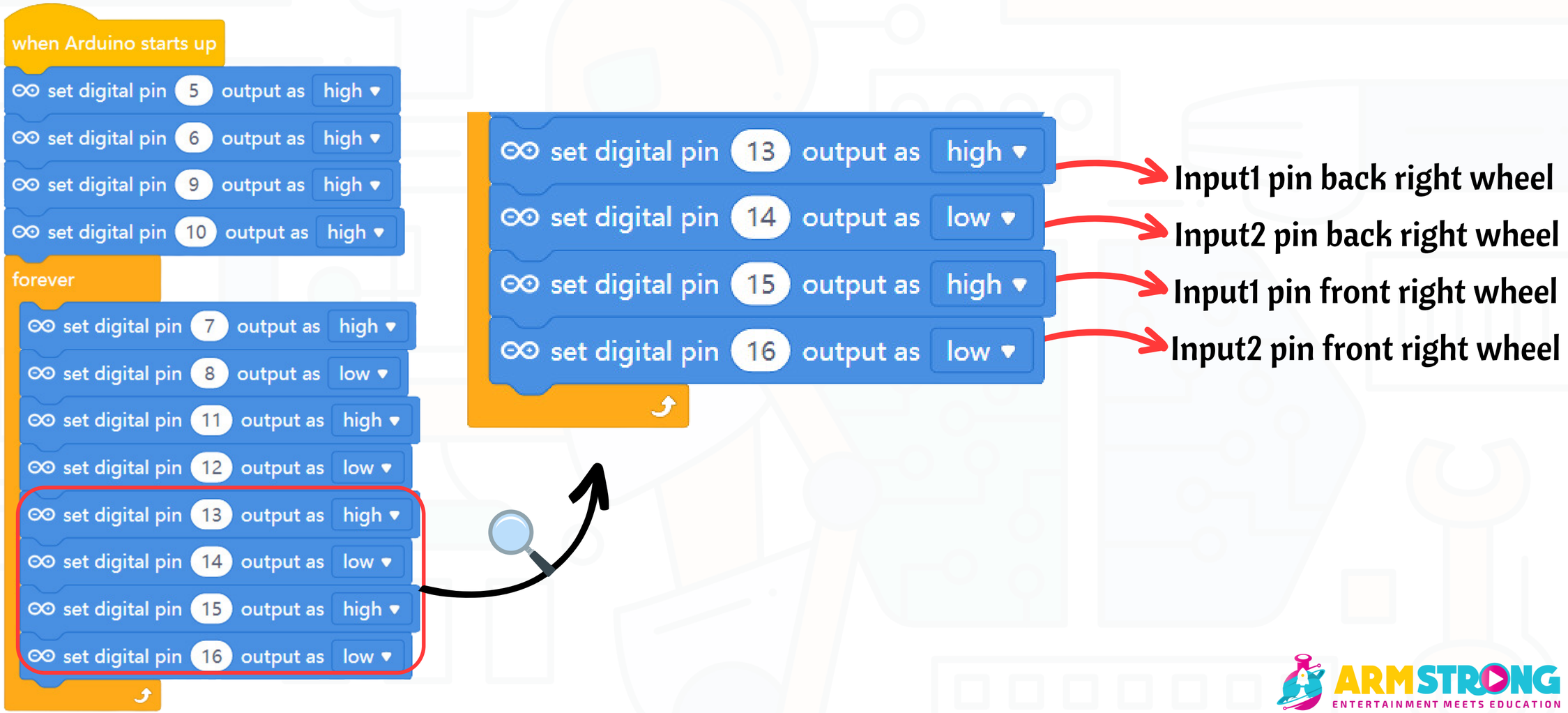
Let's move The Robot

Step 3: Moving the right wheels forward



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Let's try it on mBlock

Write a code to move the robot backward.

Try it by yourself

Hint: Reverse the outputs of the previous code.

Let's move The Robot

Step 1: Enabling the motors

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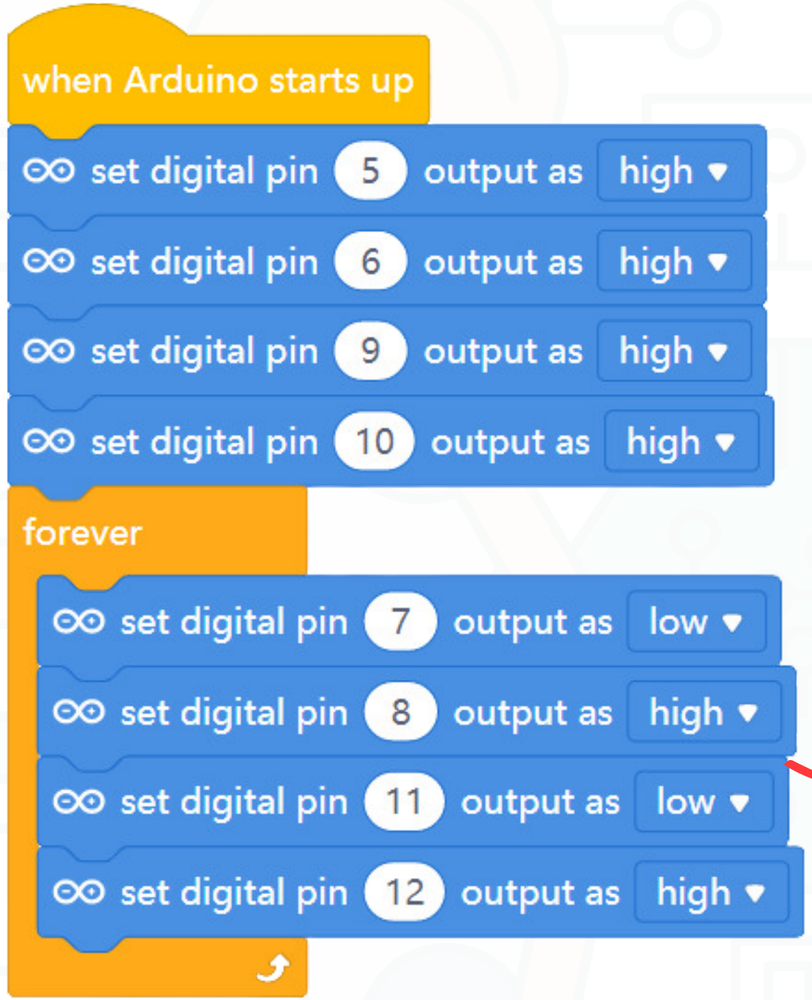
Let's move The Robot

Step 2: Moving the left wheels backward.



Reversed Outputs

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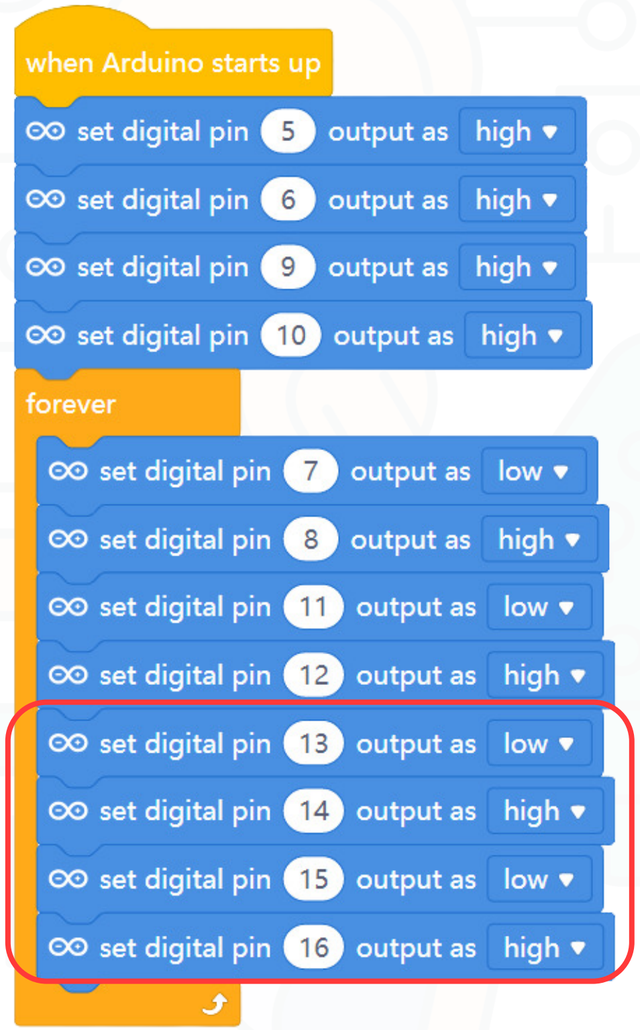
Let's move The Robot

Step 3: Moving the right wheels backward



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Let's try it on mBlock

Write a code to move the robot forward and backward with a delay.

Try it by yourself

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Let's move The Robot

Step 1: Enabling the motors

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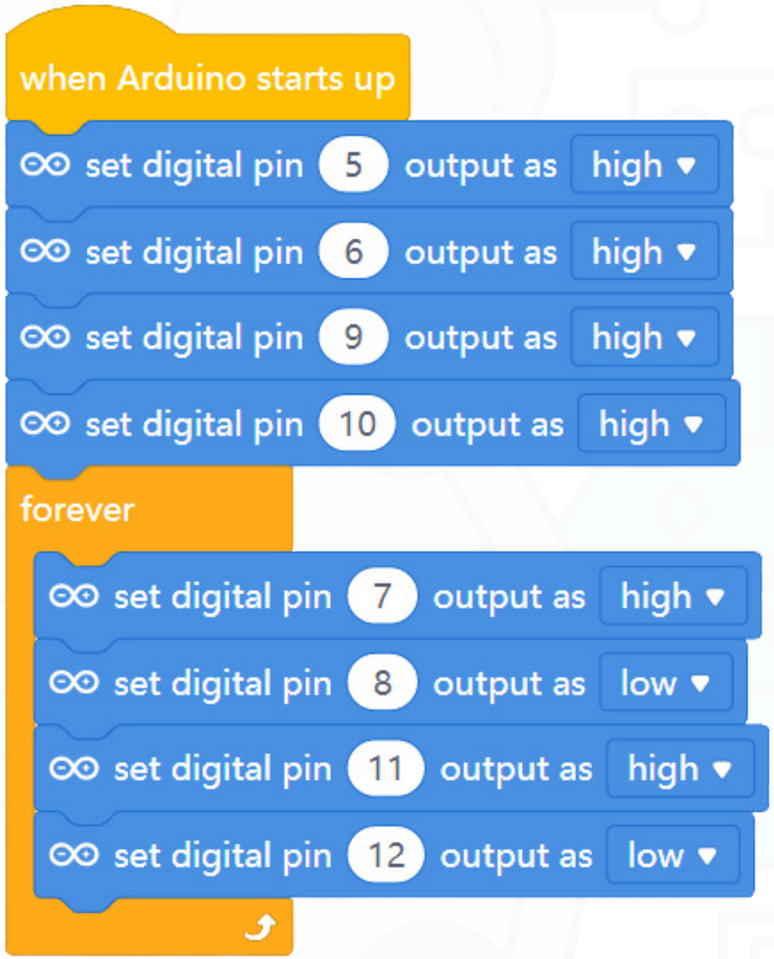
Let's move The Robot

Step 2: Moving the left wheels forward



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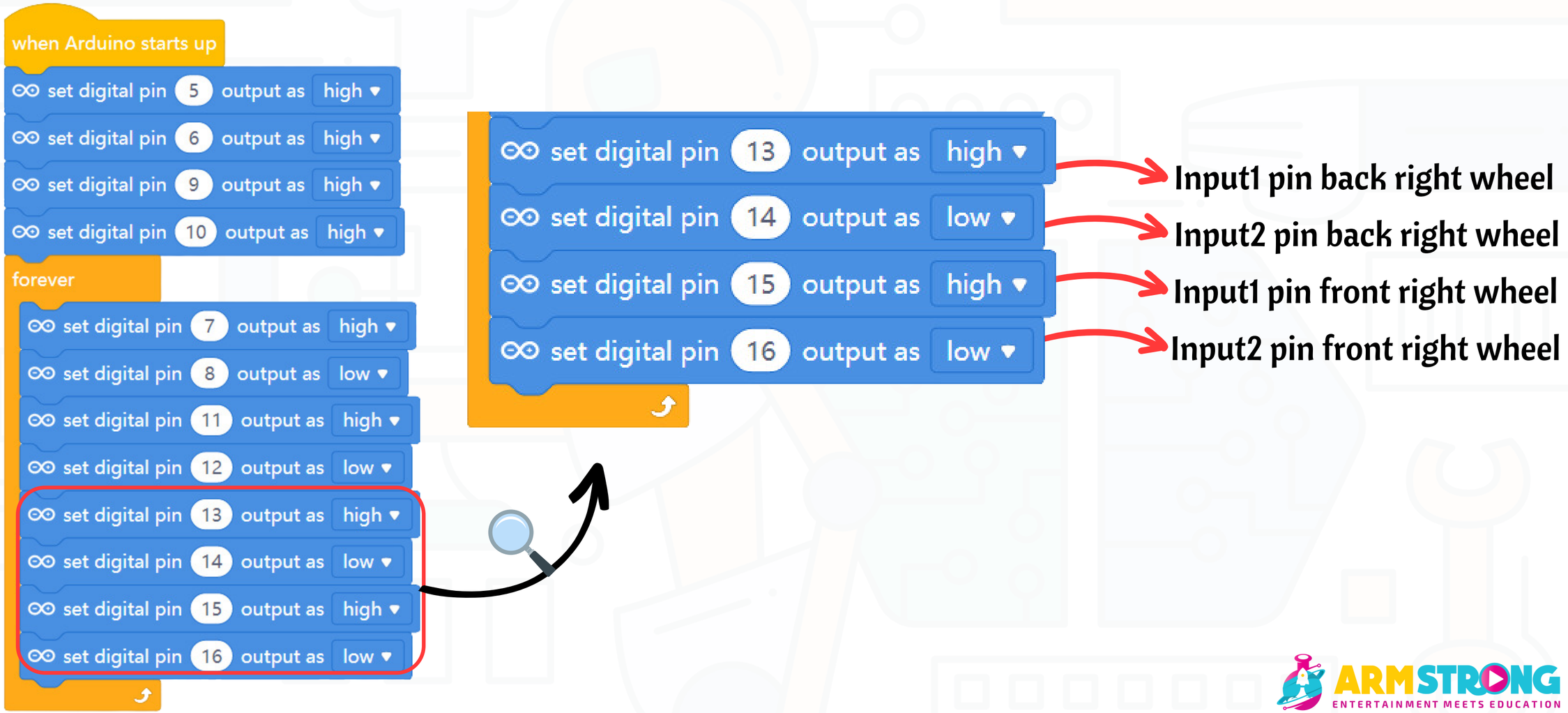
Let's move The Robot

Step 3: Moving the right wheels forward



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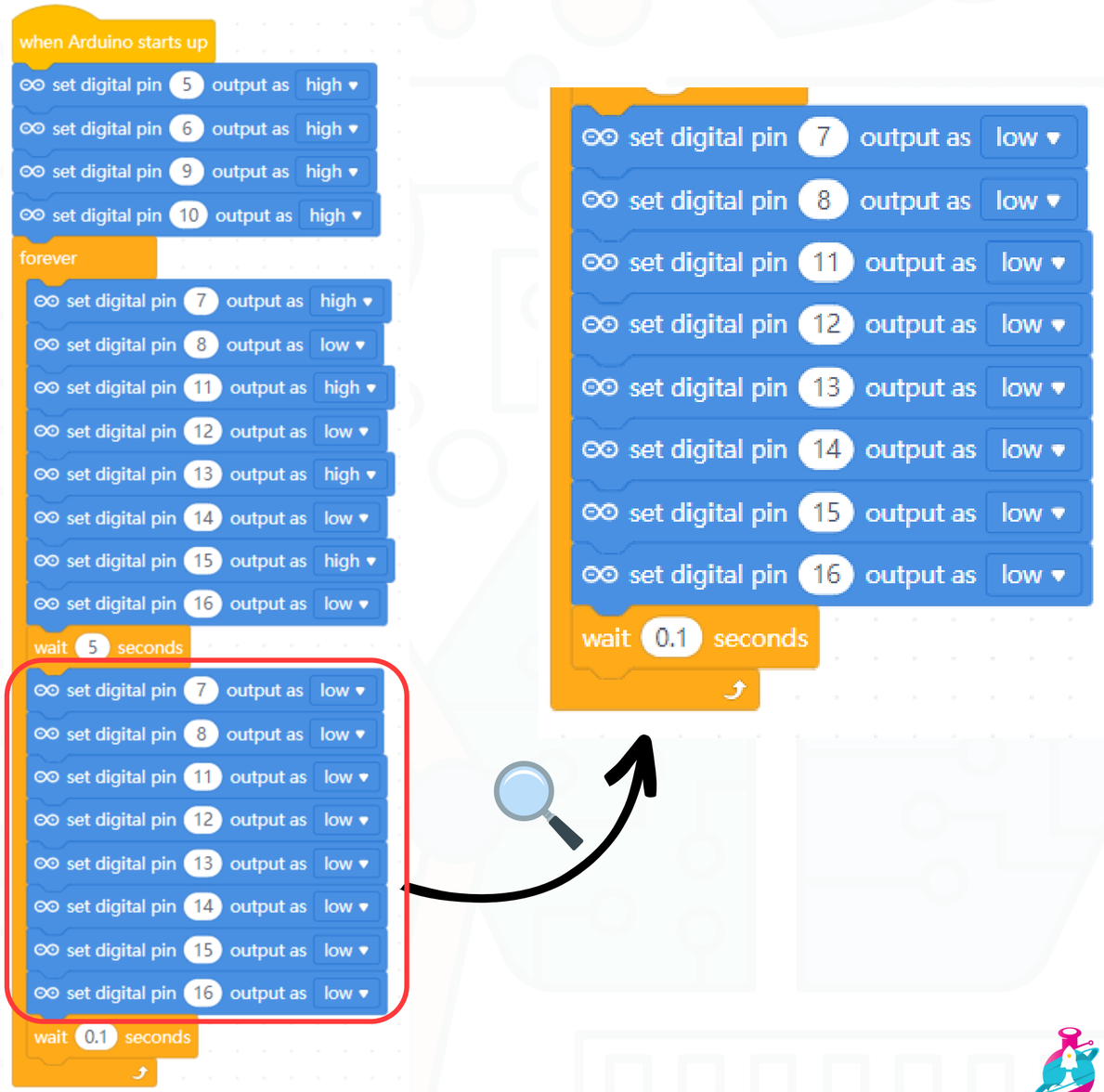
Let's move The Robot

Step 4: Stop the robot



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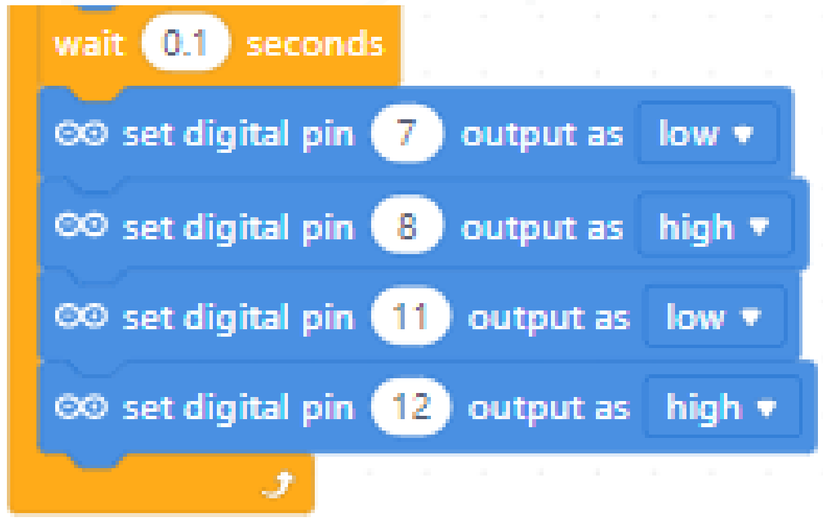
Let's move The Robot

Step 5: Moving the left wheels backward.



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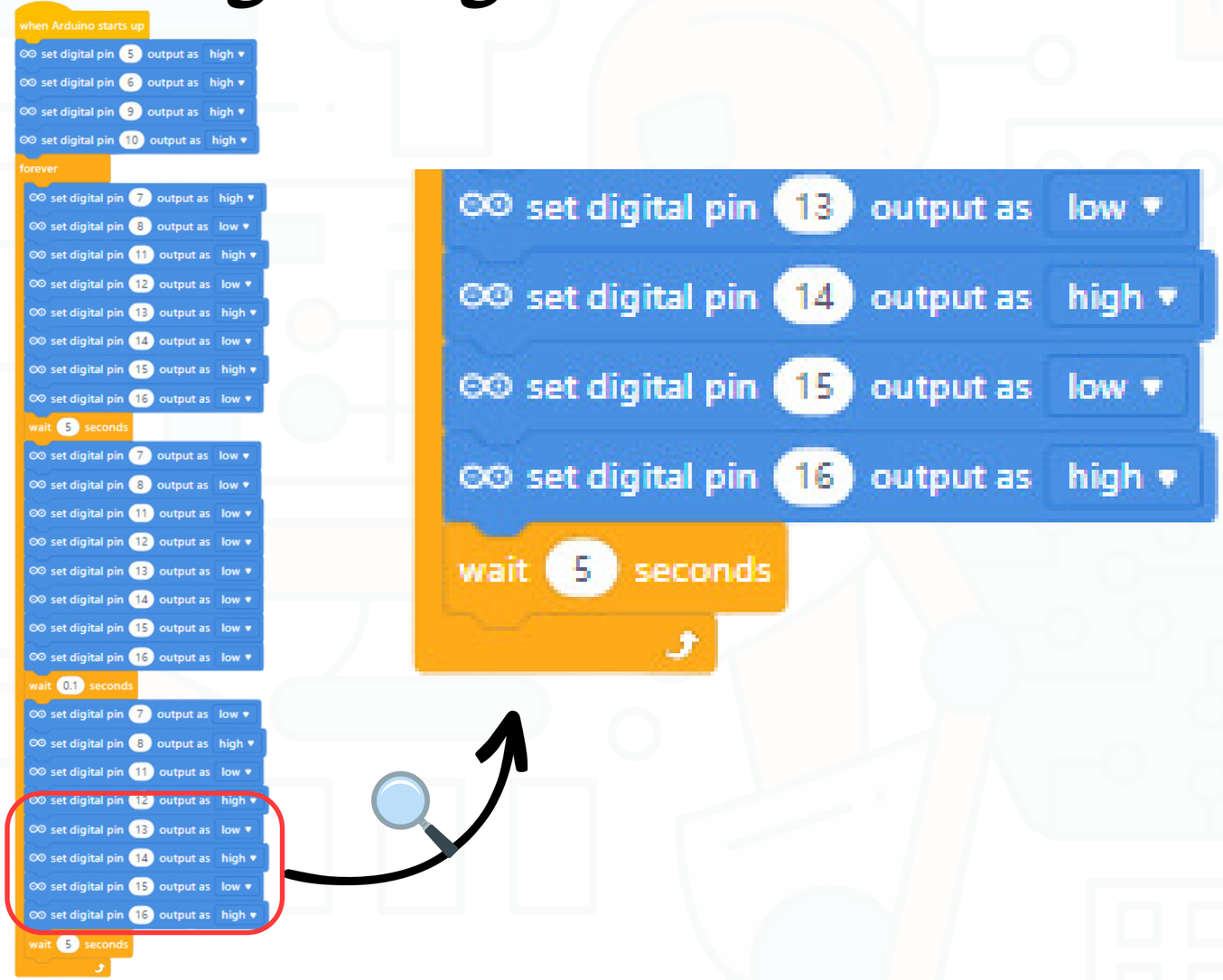
Let's move The Robot

Step 5: Moving the right wheels backward



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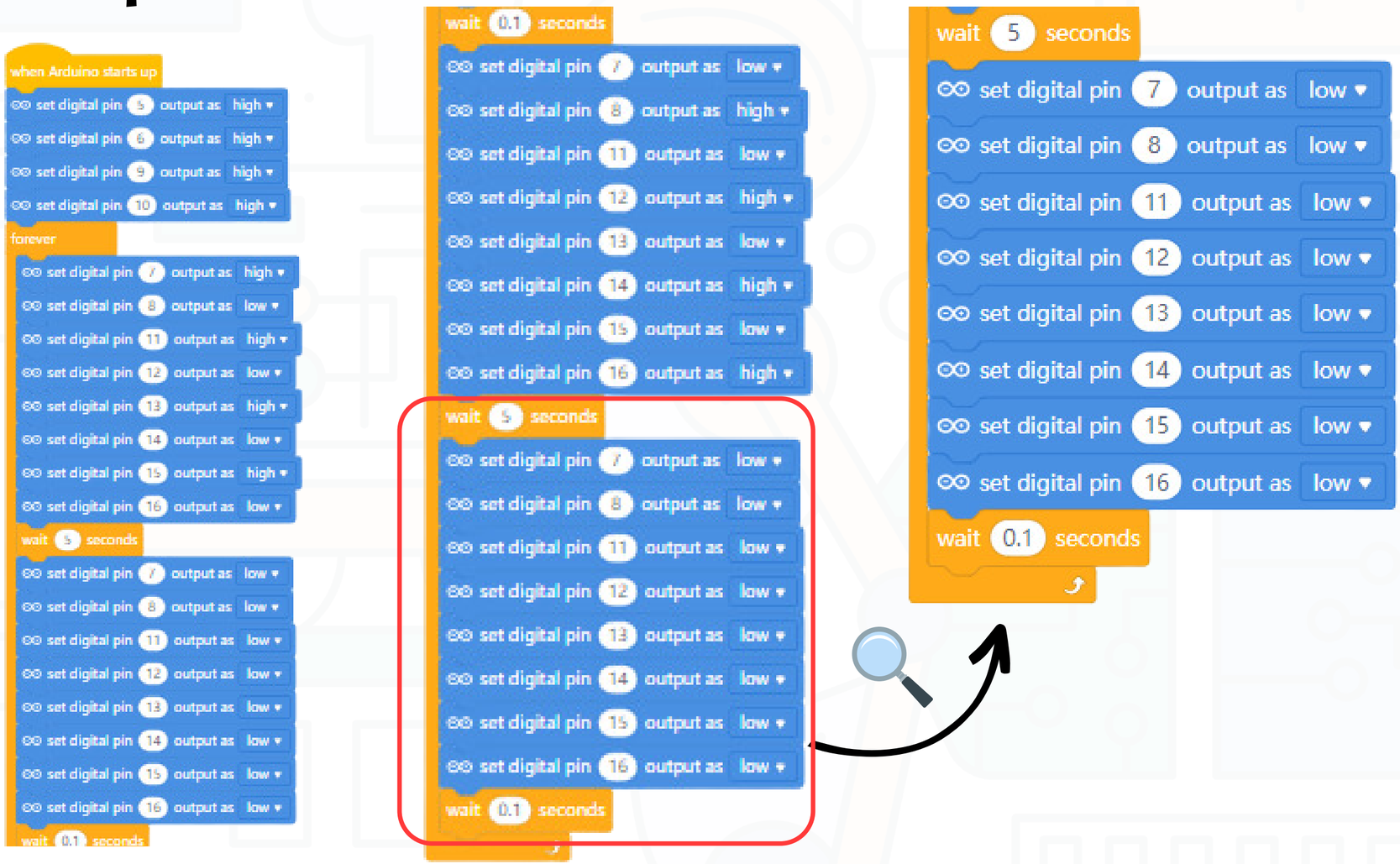
Let's move The Robot

Step 6: Stop the robot



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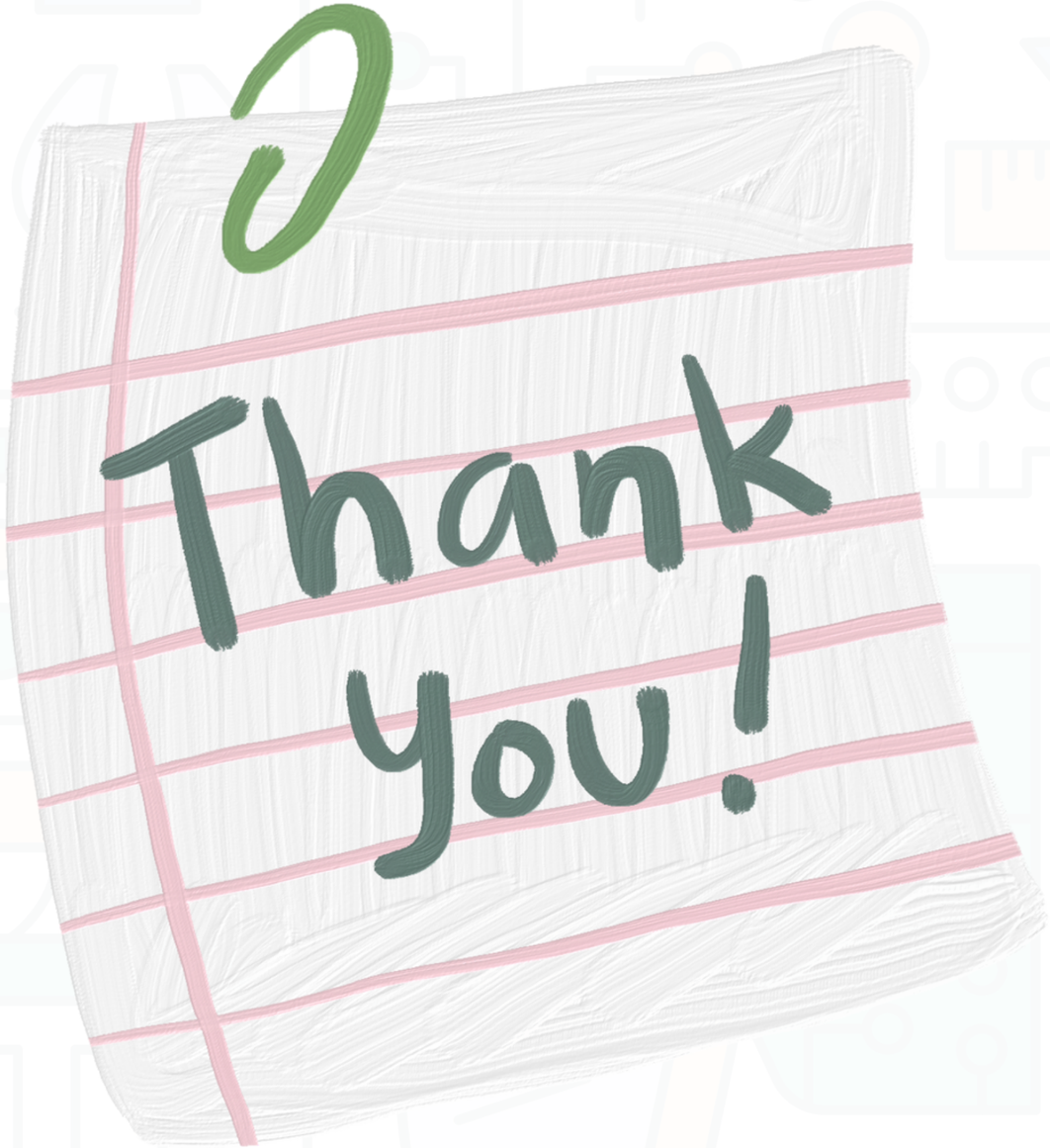

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