Cheese Stick

The 2020 Creative Class of the Creative Robotics Education Program

Learning Robotics Programming with the Cheese Stick

General Managers

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- Robomation Co., Ltd.

About This Book

1. This book is the work of the Creative Robotics Education Program within the Distribution and Expansion of Intelligent Robots Project.
2. This book aims to facilitate learning in creative classes that use the Cheese Stick Starter Kit, an educational tool developed by Robomation Co., Ltd. (Robomation was chosen as the Educational Robotics Company for the 2020 Creative Class of the Creative Robotics Education Program.)
3. This book aims to serve as a workbook for creative classes using the Cheese Stick Starter Kit. Please cite the source if you use any information in this book.
4. This book was put together with the planning of the Korea Institute of Robot Industry Advancement and the research of the Daegu Association of Teachers for Computing.
5. For any inquiries about this book, please contact the Global Expansion Team at the Korea Institute of Robot Industry Advancement at 053-210-9673.

Contents

01 Playing the Piano

You can program the Cheese Stick to play the piano on your keyboard.

You can program the Cheese Stick to play the piano on your keyboard.

Let's learn the [sound blocks] of the Cheese Stick.

Let's get ready.

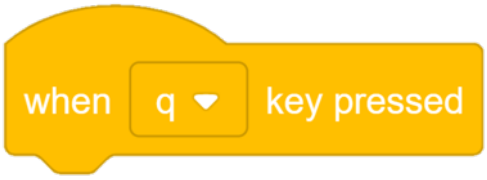
Desktop or laptop

Cheese Stick

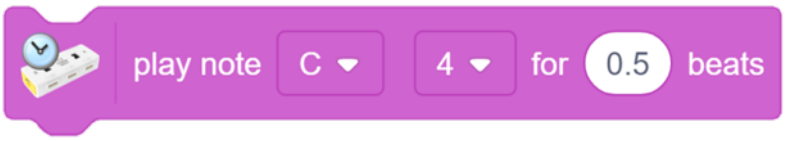
USB dongle

Let's learn the blocks for this chapter.

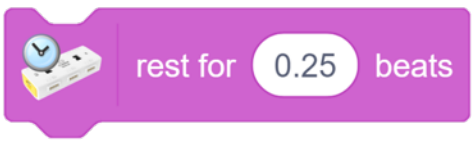
Clicking the  button runs the connected blocks.



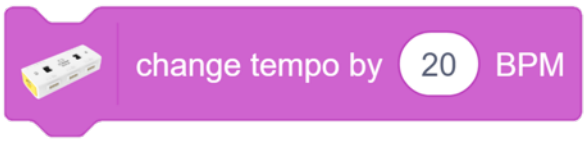
Pressing the assigned key runs the connected blocks.



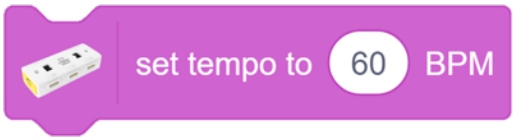
This block plays the given note for the given number of beats.



This block pauses the program for the given number of seconds.

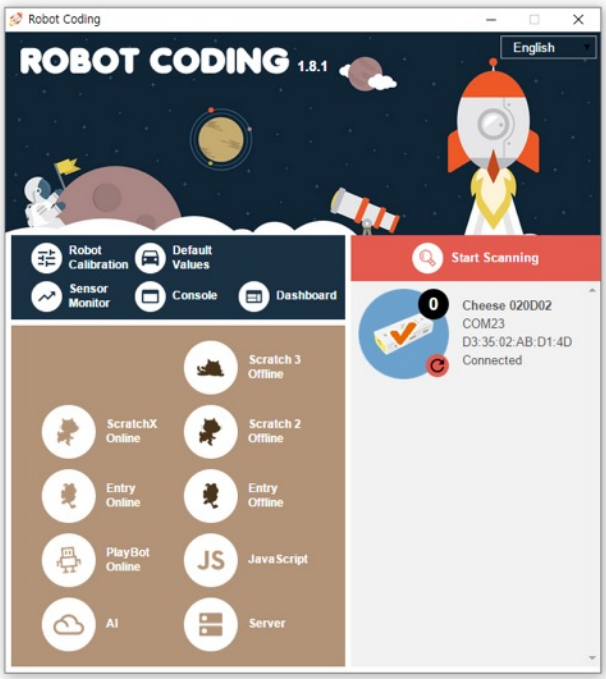


This block changes the tempo by the given BPM.



This block sets the tempo to the given BPM.

Now, let's install the Cheese Stick program.



Install and open the Robot Coding software on your computer. The Robot Coding software can be downloaded from http://hamster.school/ko/download/robotcoding_preview.jsp

Hamster Robot

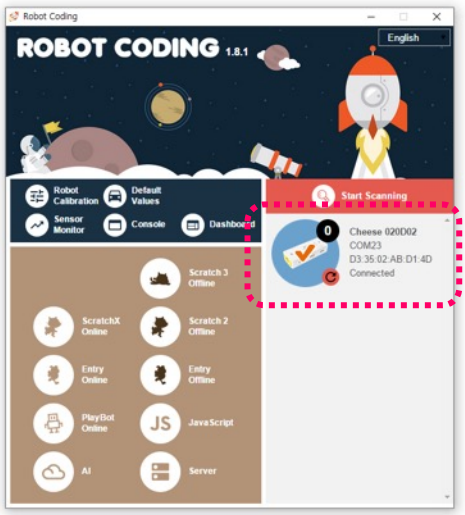
Turtle Robot

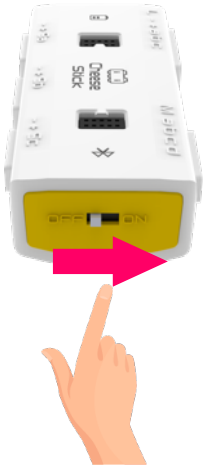
The Robot Coding software allows you to control not only the Cheese Stick but also the Hamster Robot and the Turtle Robot.

Let's connect the Cheese Stick to your computer.

Plug the USB dongle into the USB port on your computer.

Bring the Cheese Stick close to the USB dongle (within 20 cm) and flip its switch to ON.





If the Cheese Stick beeps and the Bluetooth connection indicator of the USB dongle and the Cheese Stick stays lit blue or flashes quickly, the Cheese Stick is successfully connected to your computer.

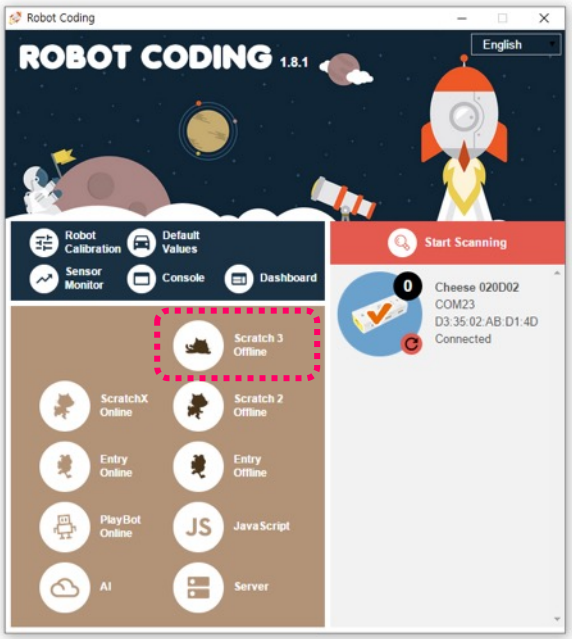
- Bluetooth Connection Indicator

Indicators	Meanings
slow blinking in blue	waiting for a Bluetooth connection
steady blue	connected to Bluetooth
fast blinking in blue	receiving data

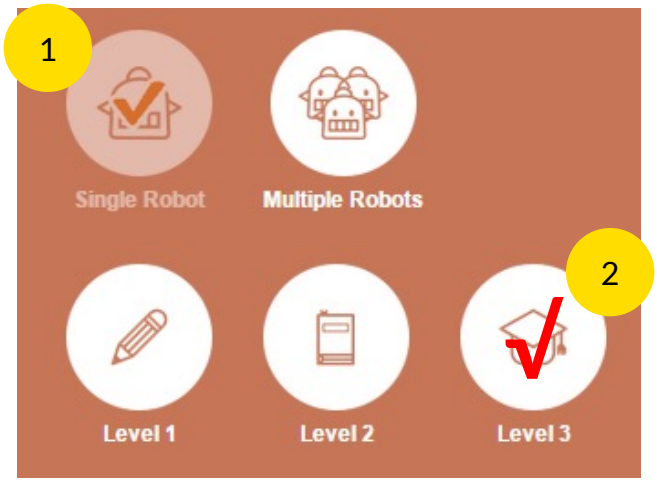
The USB dongle remembers the most recently paired Cheese Stick. Therefore, pairing only needs to be done once.

Let's start programming on the Robot Coding.

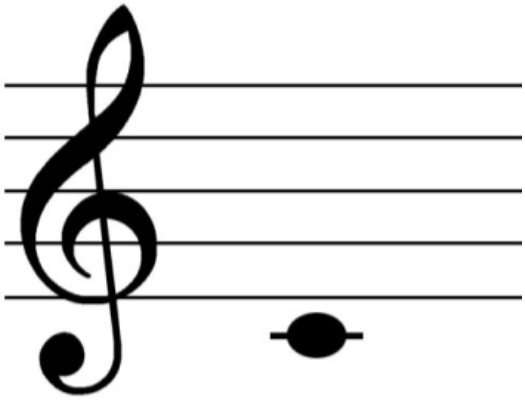
After connecting the Cheese Stick to your computer, click [Scratch 3 Offline].

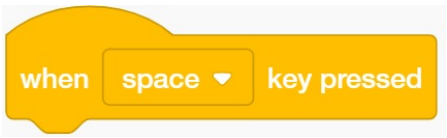


Click [Single-Robot], then click [Level 3].



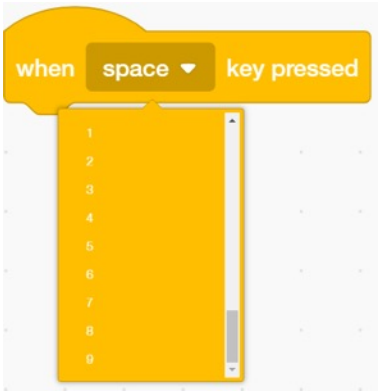
Let's program the Cheese Stick to play C when you press the 1 key on your keyboard.



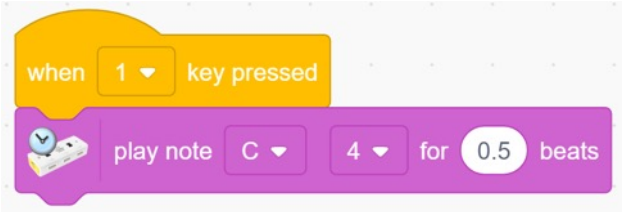


Events

Open [When clicking the space key] block under the [Events] tab.



Change [space] to [1].

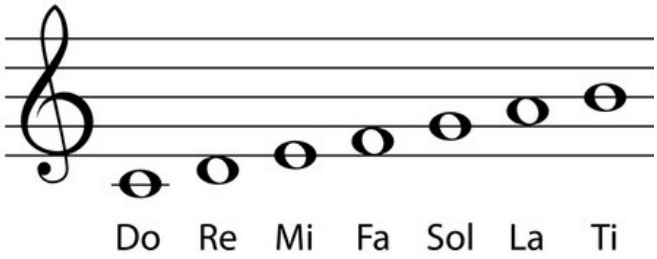


Cheese Stick

Connect [Play C4 for 0.5 beats] block under the [Cheese Stick] tab.

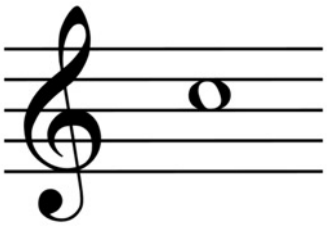
[Practice Assignment 1]

Play C, D, E, F, G, A, B with the 1-7 keys on your keyboard.

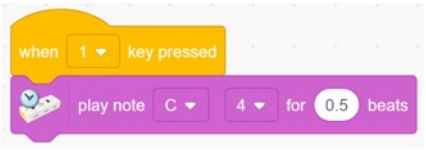


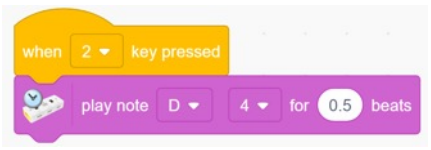
[Practice Assignment 2]

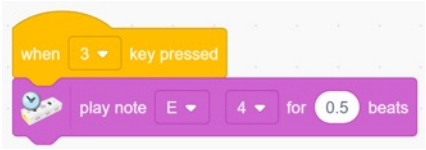
Play high C.

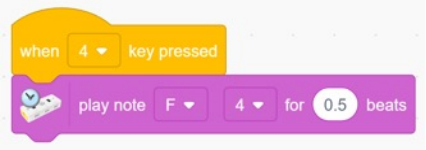


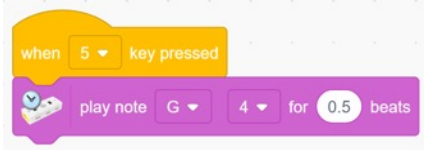
Practice Assignment 1

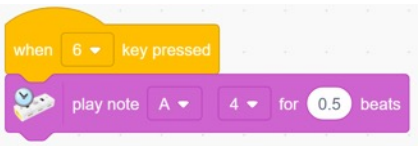


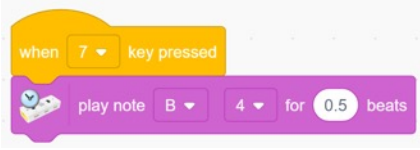




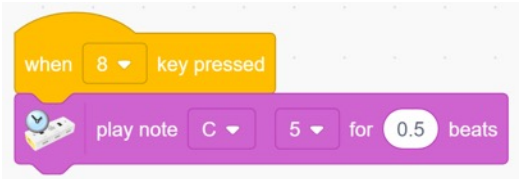




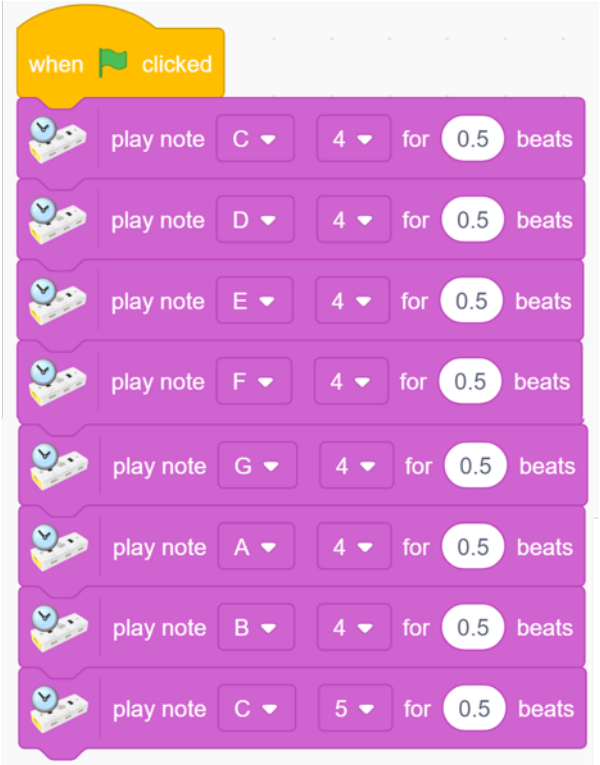




Practice Assignment 2



Let's program the Cheese Stick to play C, D, E, F, G, A, B, C when you click the start button.

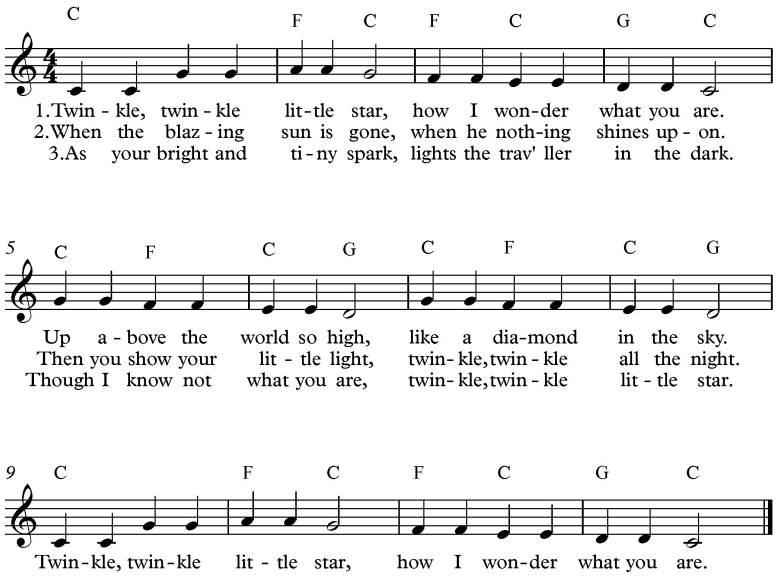


The following chart shows commonly used notes and rests.

Notes or Rests	Name	Beat(s)
	Eighth note	0.5 beats
	Quarter note	1 beat
	Dotted quarter note	1.5 beats
	Half note	2 beats
	Eighth rest	0.5 beats
	Quarter rest	1 beat

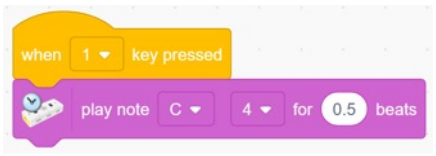
Review this chapter with the following assignment.

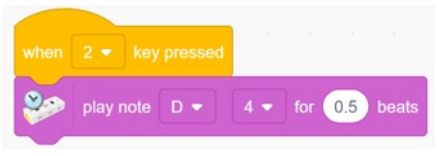
Twinkle, Twinkle Little Star

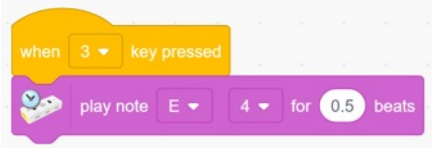


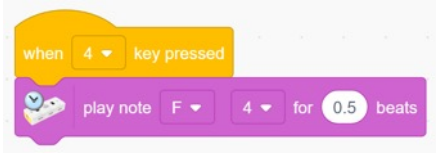
[Practice Assignment 1]

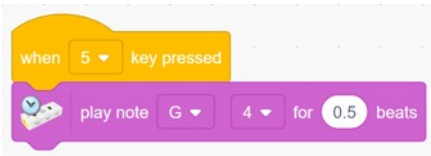
Enter the following commands to play this song.

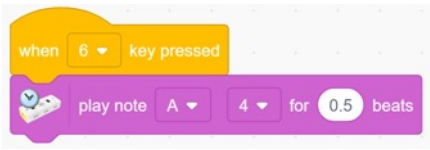


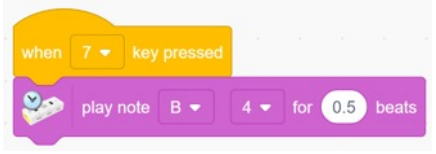


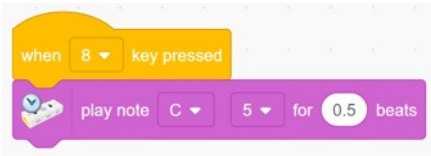




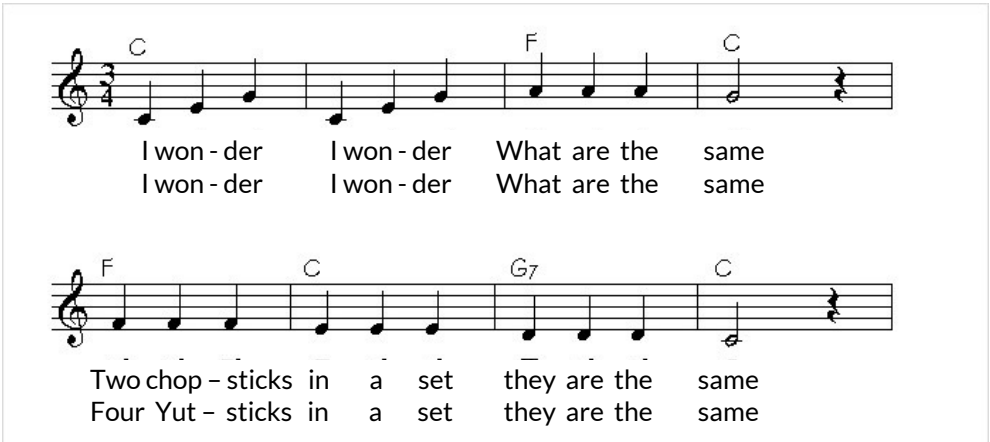




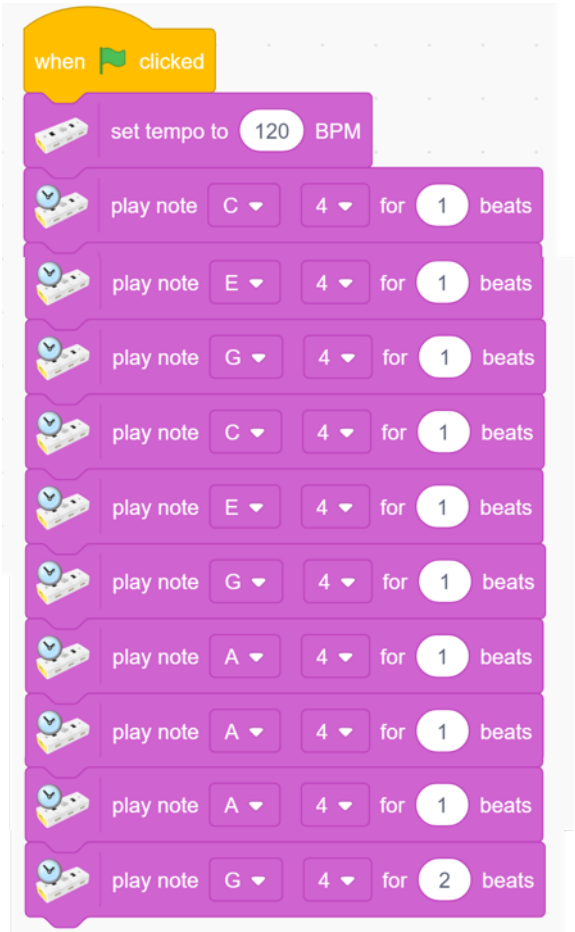




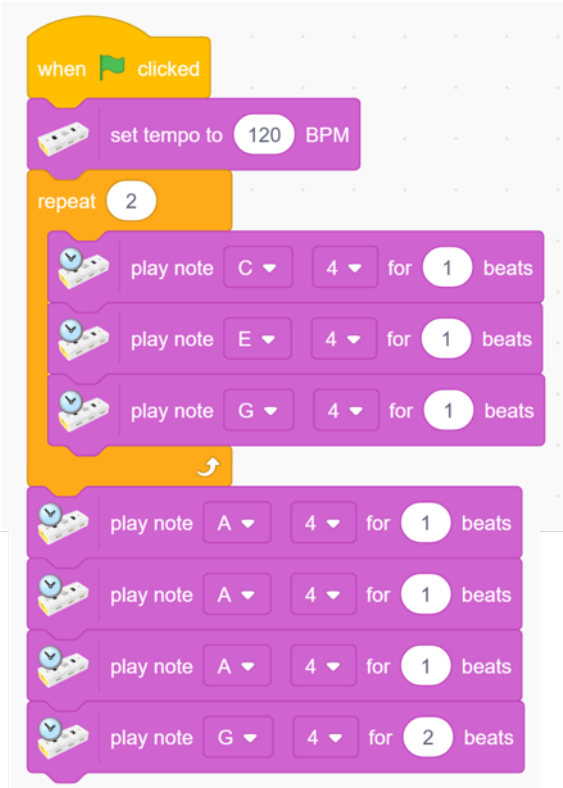
Here is another assignment.



[Practice Assignment 2] Enter the following commands and program the Cheese Stick to play this song when you click the start button.



You can also use [Repeat] block.



02 Making Yes or No Quiz Buttons

You can make Yes or No quiz buttons with a 5x5 LED Matrix.

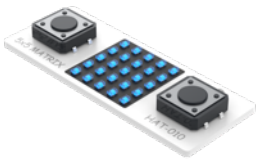
You can make Yes or No quiz buttons with two buttons on a 5x5 LED Matrix. Let's learn about a 5x5 LED Matrix.

Let's get ready.

Desktop or laptop

Cheese Stick

USB dongle

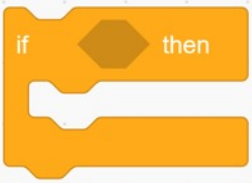


5X5 LED Matrix

Let's learn the blocks for this chapter.

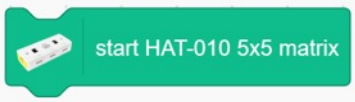
Clicking the  button runs the connected blocks.

This block infinitely repeats the blocks inside it.



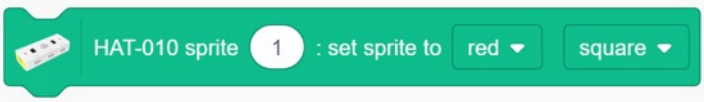
The blocks inside this block will run if the condition is true.

This block evaluates to true if both conditions are true.

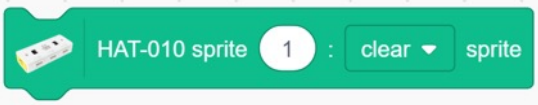


This block is needed to use the 5x5 LED Matrix.

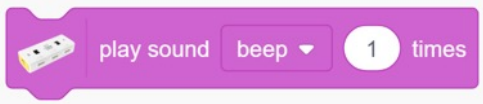
This block is needed to press the buttons on the 5x5 LED Matrix.



This block displays different figures on the 5x5 LED Matrix.

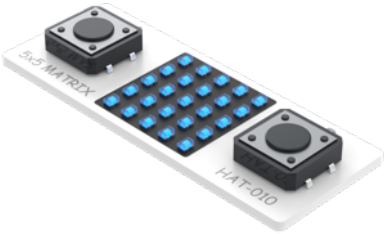


This block deletes the figures displayed on the 5x5 Matrix.

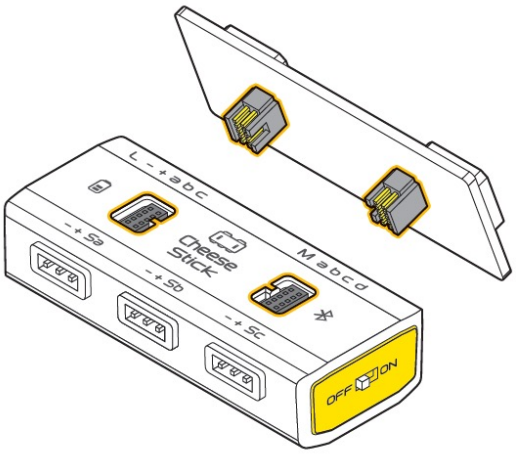


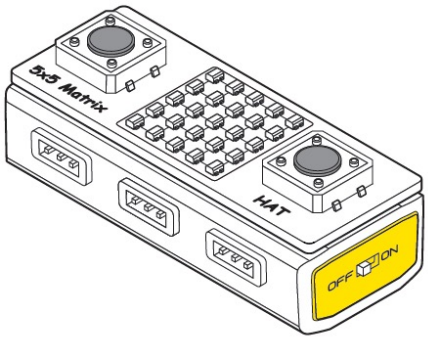
This block plays the given sound for the given number of times.

Let's connect the 5x5 LED Matrix.

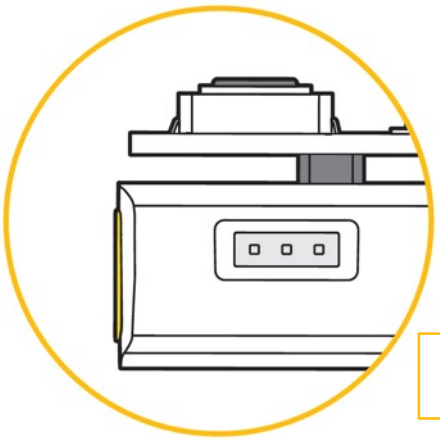


Plug the 5x5 LED Matrix into the HAT port on the Cheese Stick.





The 5x5 LED Matrix can be plugged into the Cheese Stick in any direction.



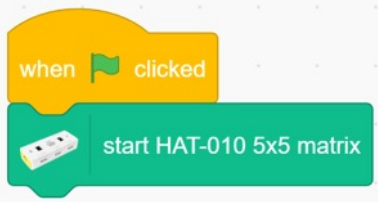
<Side view of the LED Matrix plugged into the Cheese Stick>

When the 5X5 LED Matrix is plugged into the HAT port, it is normal that there is a small gap between them.

Let's program the 5x5 LED Matrix to display a square.

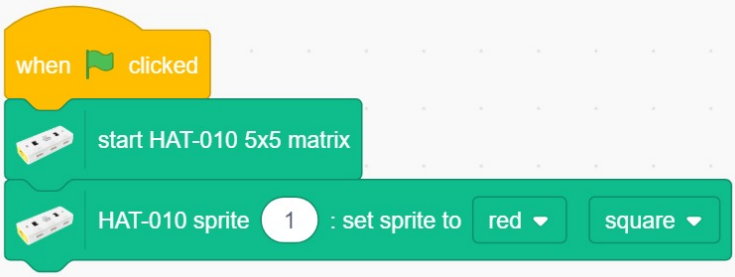
Events

Open [When clicked] block under the [Events] tab.



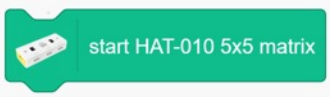
HAT-010

Connect [Start HAT-010 5x5 Matrix] block under the [HAT-010] tab.



HAT-010

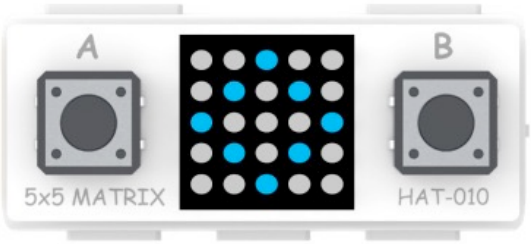
Connect [Set HAT-010 figure 1 to red square] block under the [Hardware] tab.

You need 

block to use the 5x5 LED Matrix.

[Practice Assignment 1]

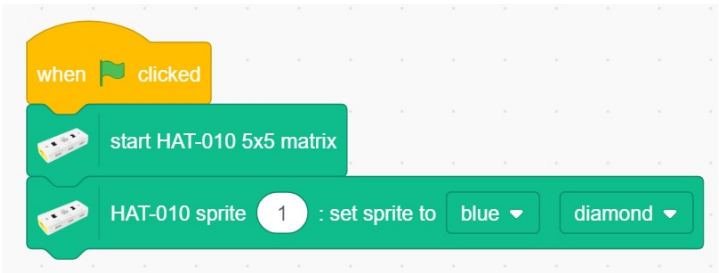
Display a blue diamond on the 5x5 LED Matrix.



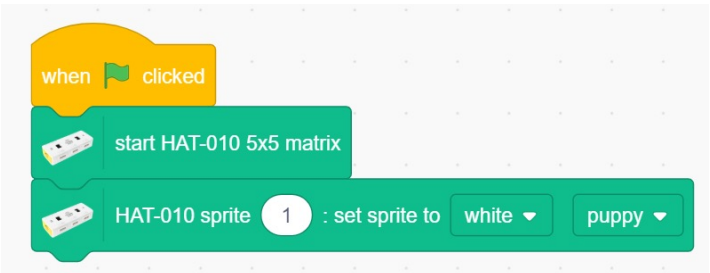
[Practice Assignment 2]

Display a white dog on the 5x5 LED Matrix.

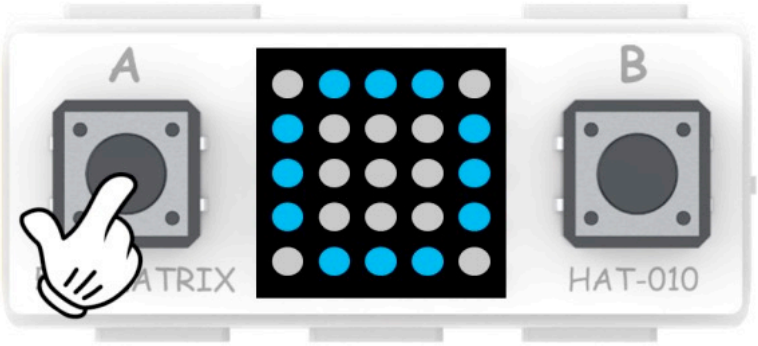
Practice Assignment 1

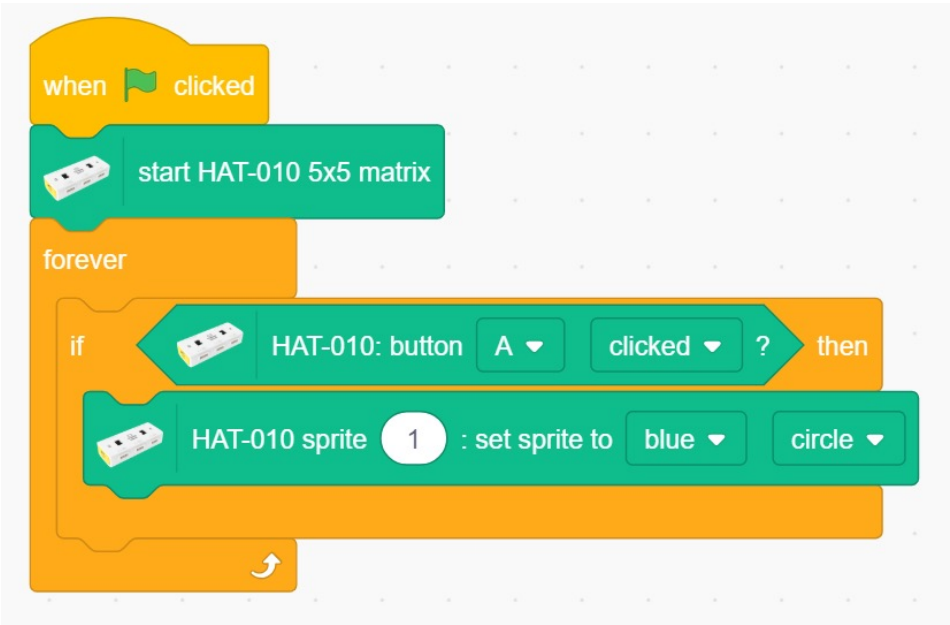


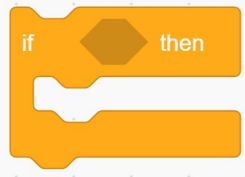
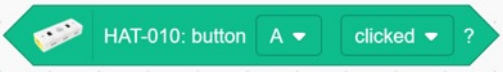
Practice Assignment 2



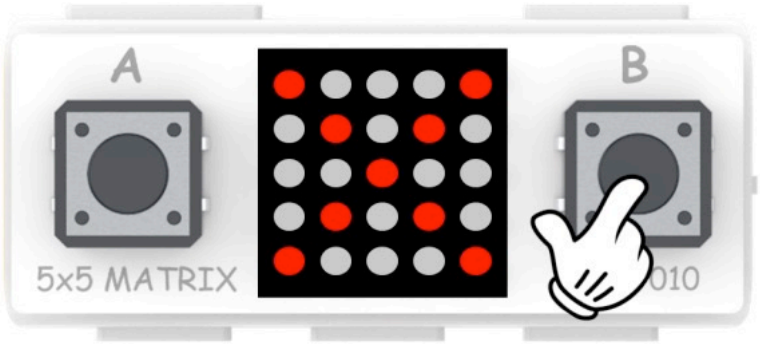
Let's program the LED Matrix to display a blue O when you press button A.

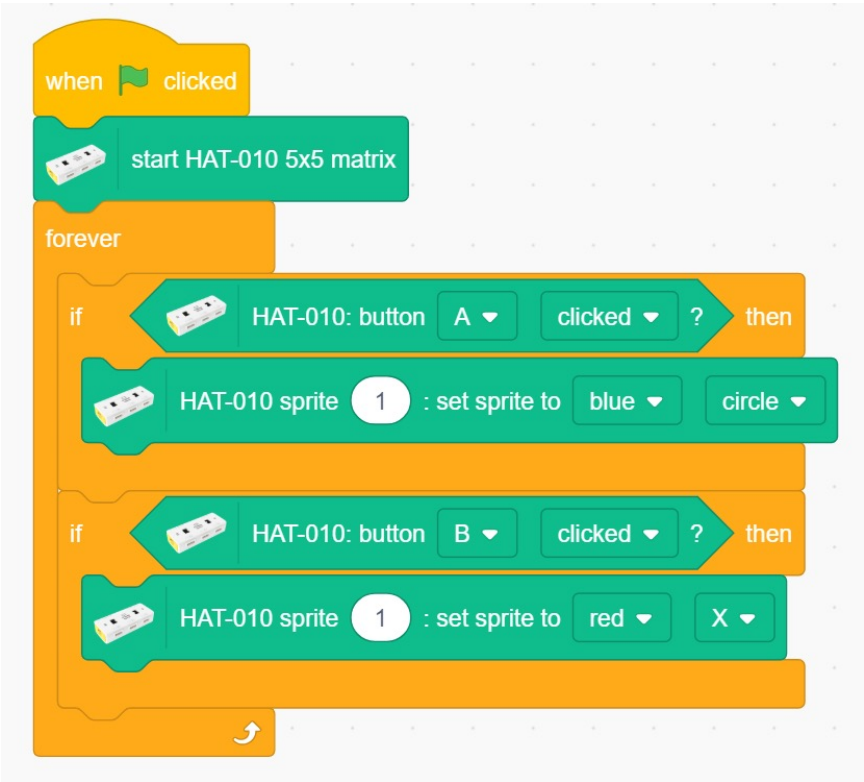


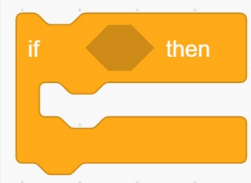
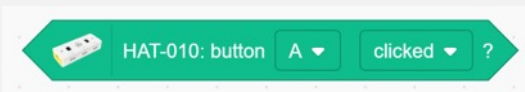


Use  and  blocks.

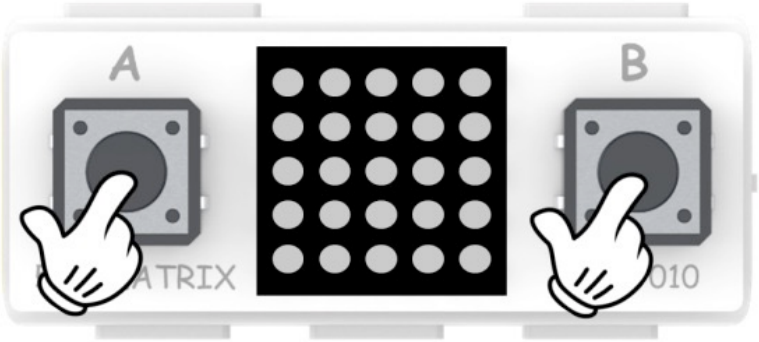
Let's program the LED Matrix to display a red X when you press button B.

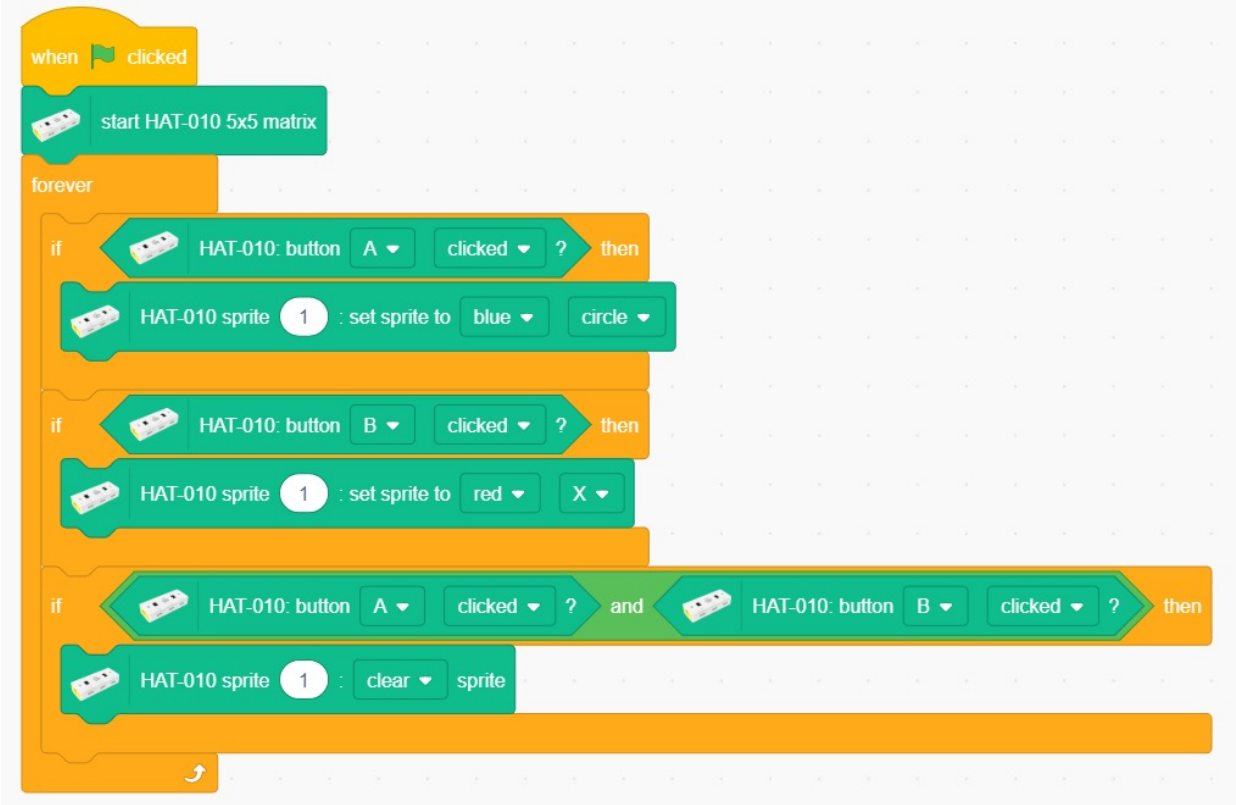


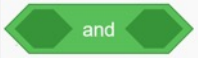


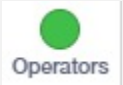
Use  and  blocks.

Let's program the 5x5 LED Matrix to remove the O or X when you press both buttons(A and B) together.



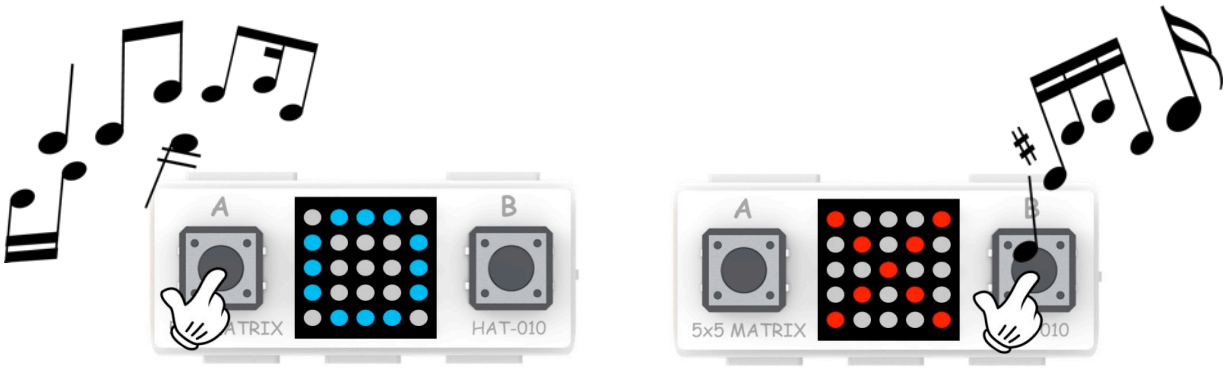


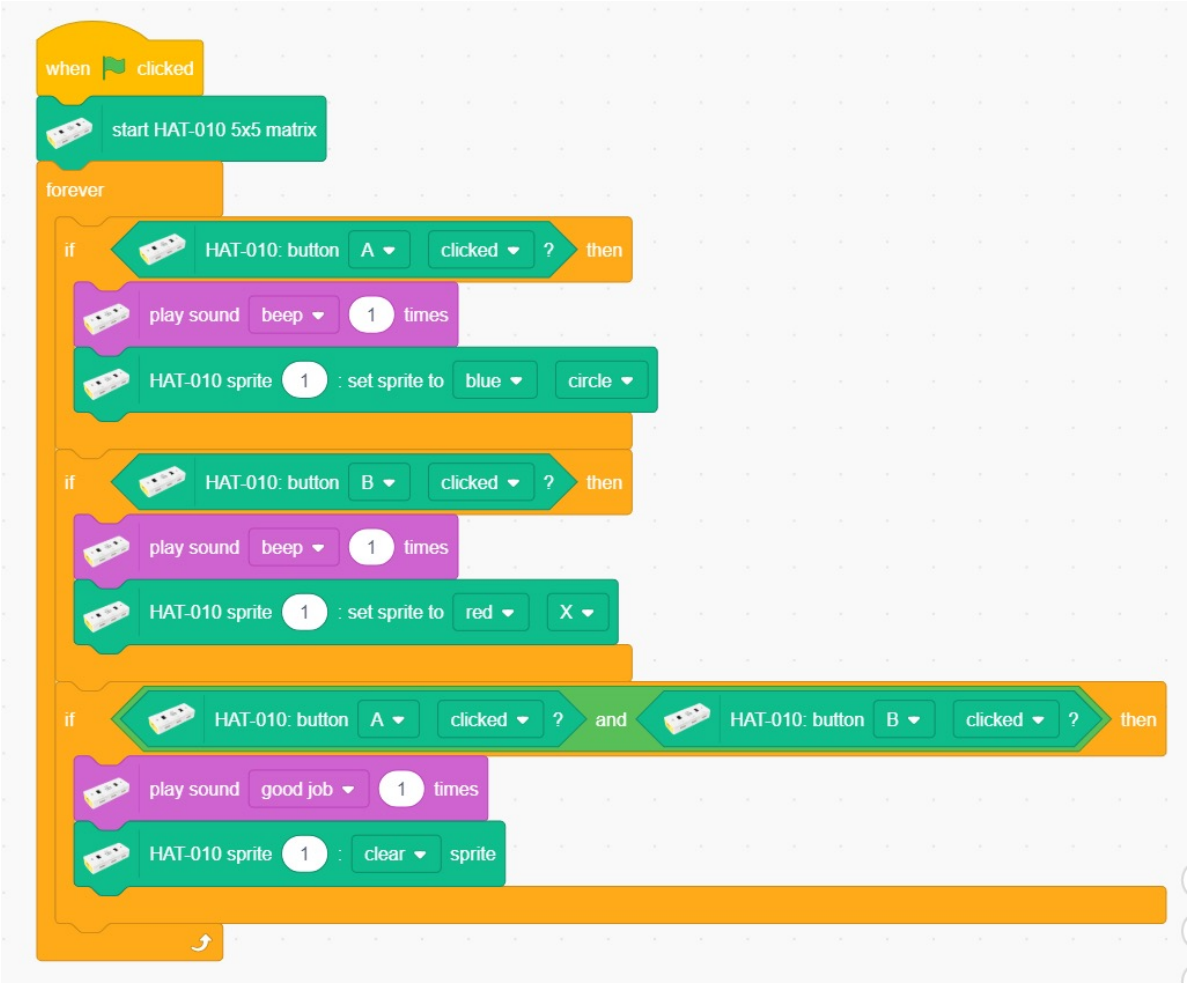
Use 

block under the 

tab.

Let's program the LED Matrix to play the given sound in addition to displaying an O or X.





Use play sound beep 1 times block under the Cheese Stick tab.

Let's review this chapter with the following assignment.

[Practice Assignment 1]

Play Yes or No quiz game with the Cheese Stick buttons.

<Learning Distancing Rules In Daily Life>

1. Go out when you have respiratory symptoms like fever, cough, mucus, and muscle pain.

NO — Stay home for three to four days.

2. Keep a distance of two arms' length between people.

YES — Keeping a distance of two meters between people reduces the infection rate as COVID-19 is mainly transmitted by droplets.

3. Wash your hands thoroughly and frequently and cough into your sleeve.

YES — Washing hands prevents the virus on your hands from entering your body, and coughing into your sleeve minimizes the transmission of COVID-19 through droplets.

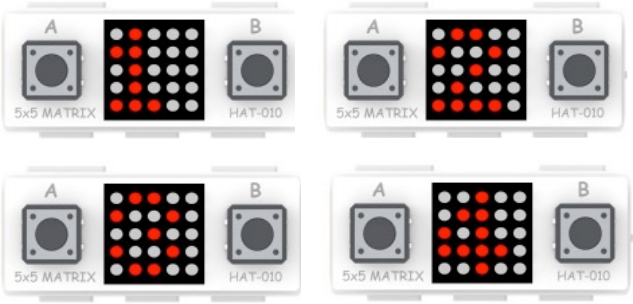
4. There is no need to ventilate and disinfect often.

NO — Ventilate at least twice a day and disinfect regularly.

5. Maintain physical distancing but remain connected.

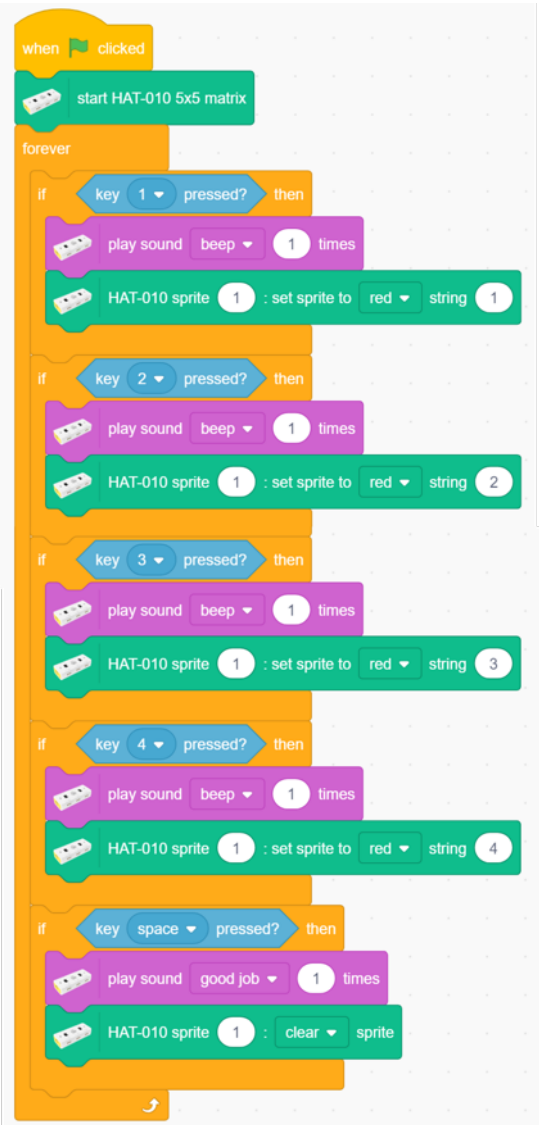
YES — Each and every one of us has a role to play in slowing down the spread of COVID-19.

Here is another assignment.



[Practice Assignment 2]

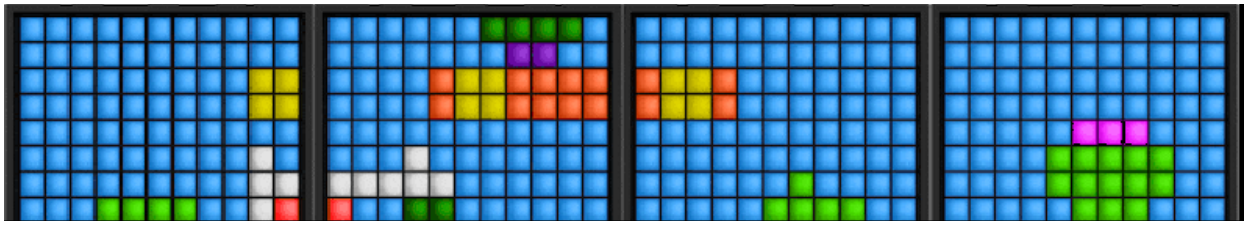
Enter the following commands to make multiple choice quiz buttons.



03 Creating Your Own Animation

You can create your own animation effects with the 5x5 LED Matrix.

You can create your own animation effects with the 5x5 LED Matrix.
Let's learn how to program the 25 LEDs.

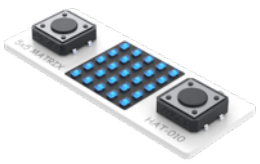


Let's get ready.

Desktop or laptop

Cheese Stick

USB dongle

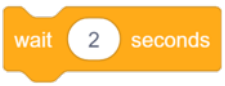


5X5 LED Matrix

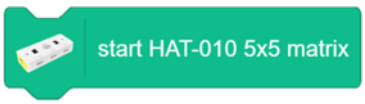
Let's learn the blocks for this chapter.

Clicking the button runs the connected blocks.

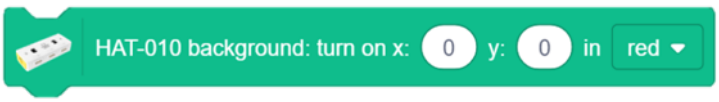
This block infinitely repeats the blocks inside it.



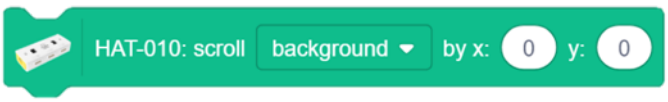
This block pauses the program for the given number of seconds before running the next block.



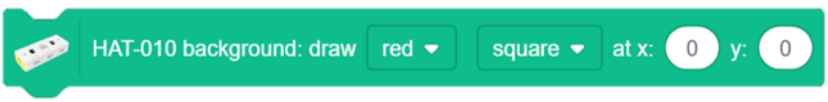
This block is needed to use the 5x5 LED Matrix.



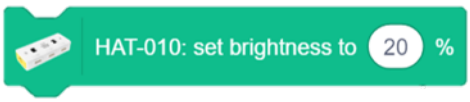
This block lights up the given x- and y-coordinates on the LED.



This block moves the background by the given x and y values.



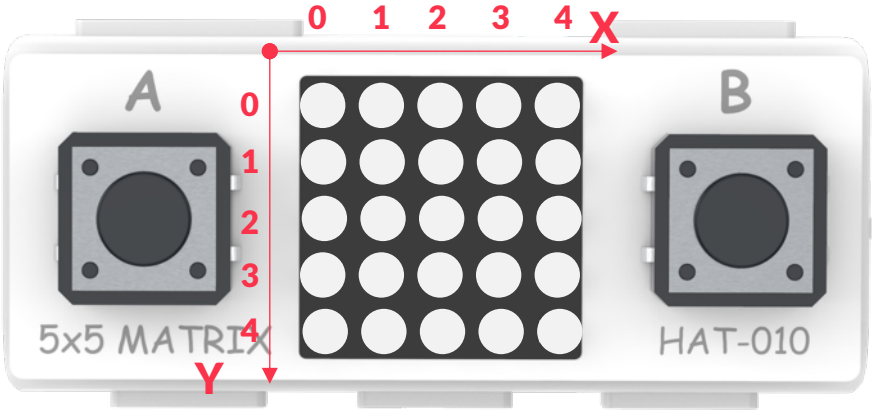
This block displays the given background at the given x- and y-coordinates.



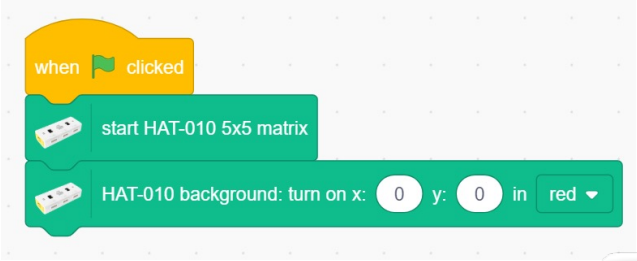
This block sets the brightness of the 5x5 LED Matrix to the given value.

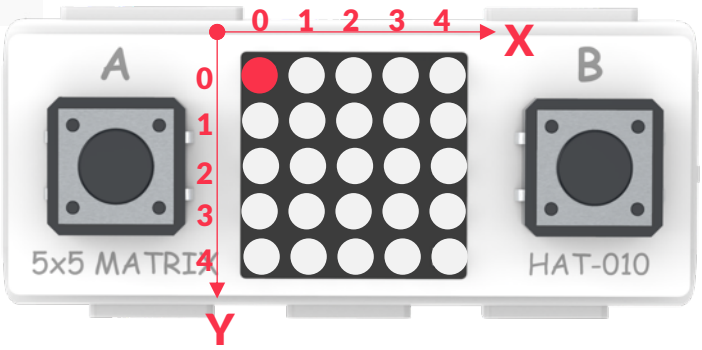
Let's program each LED individually.

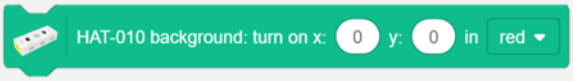
The 5x5 LED Matrix has 25 LEDs.



You can control the brightness and color of each of the 25 LEDs individually with its x- and y-coordinates.



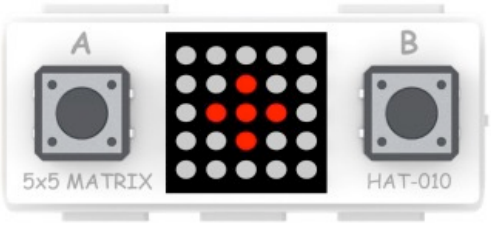




block can light up the given colour at the given x- and y-coordinates.

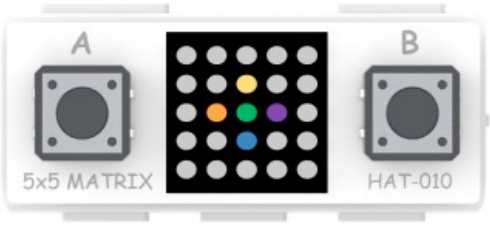
[Practice Assignment 1]

Program the 5x5 LED Matrix to display the following red figure.

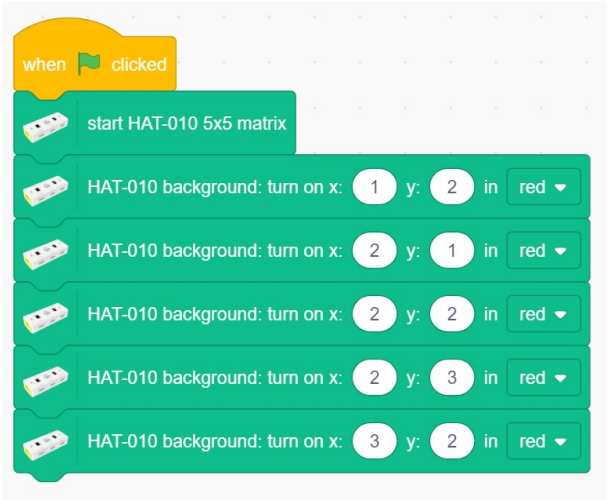


[Practice Assignment 2]

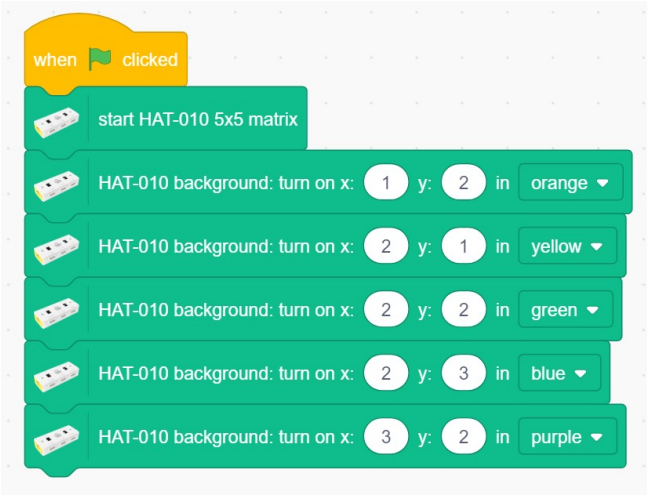
Program the 5x5 LED Matrix to display the following multi - colored figure.



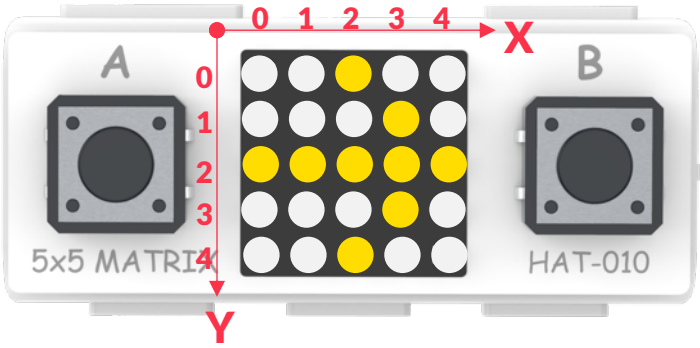
[Practice Assignment 1]

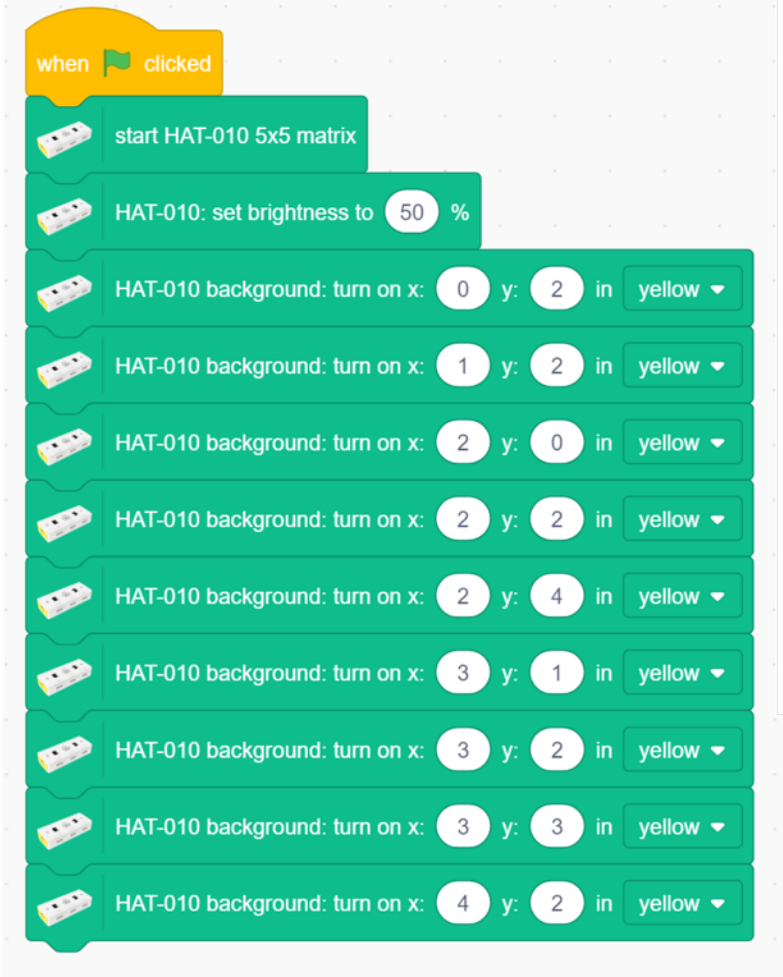


[Practice Assignment 2]

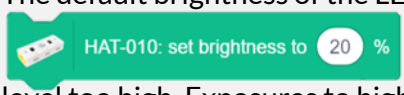


Let's display a right arrow on the 5x5 LED Matrix.



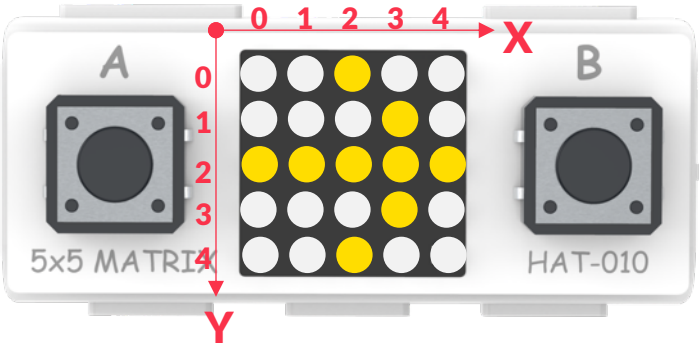


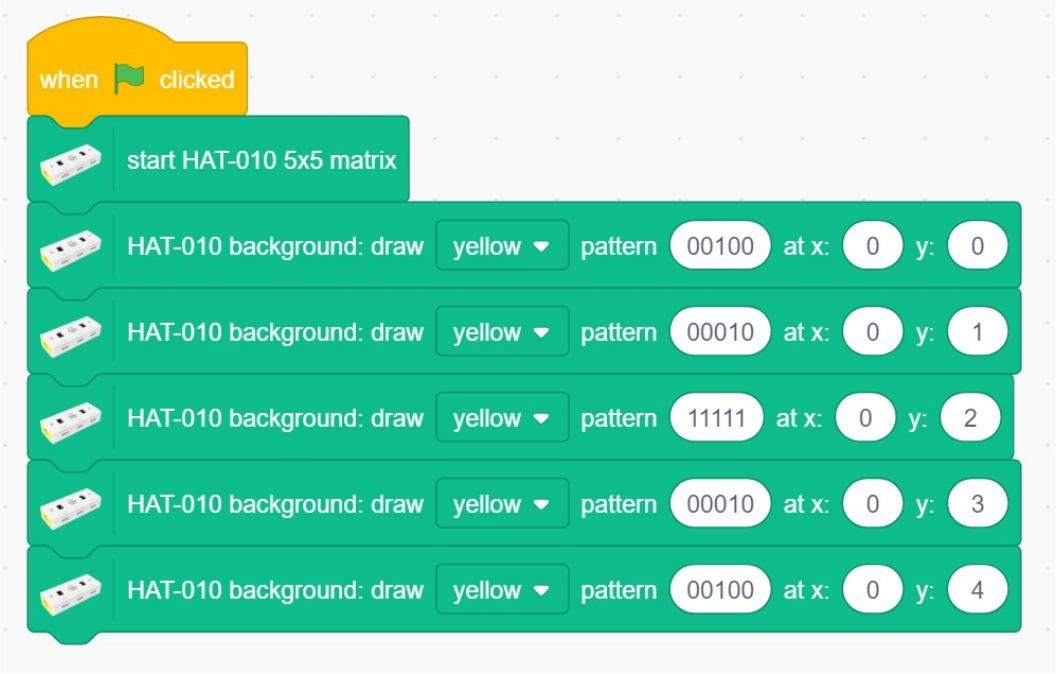
The default brightness of the LED is 20%. You can adjust the brightness with



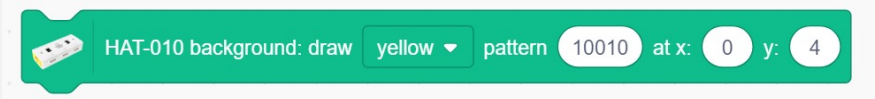
block. Make sure you are not turning up the brightness level too high. Exposures to high-intensity LED light can hurt your eyes.

Let's learn another way of displaying a right arrow on the 5x5 LED Matrix.

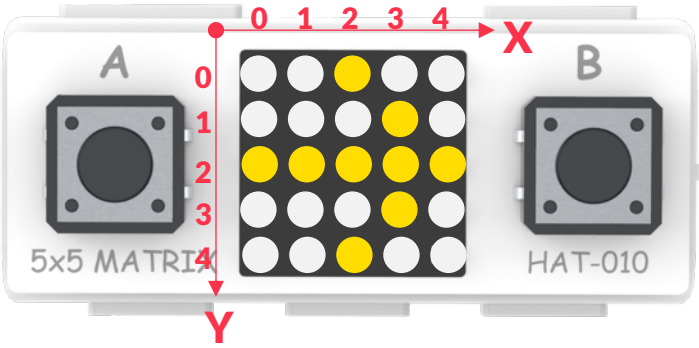


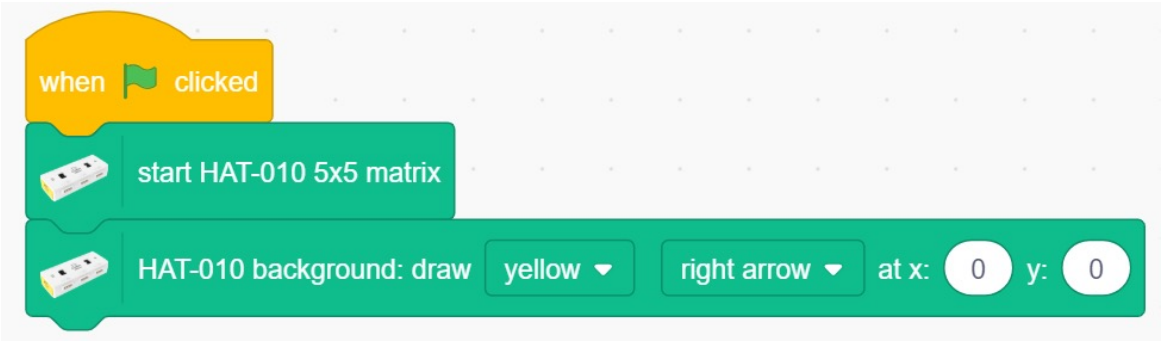


Pattern blocks can turn the LEDs on and off using the binary language of computers. Use five-bit binary numbers instead of x- and y-coordinates to display backgrounds.



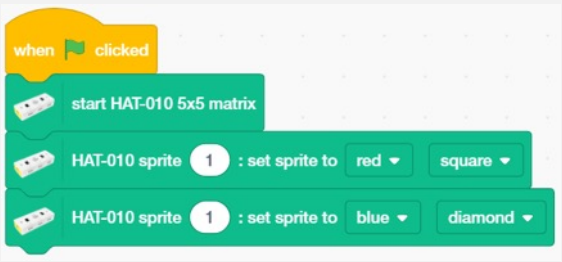
There is one more way of displaying a right arrow on the LED Matrix.



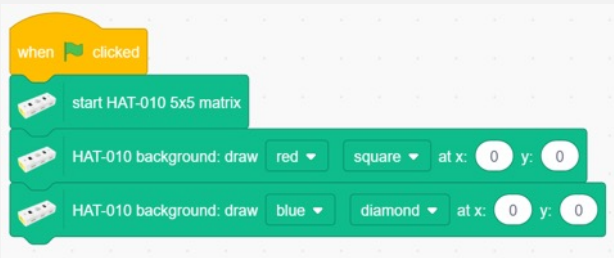


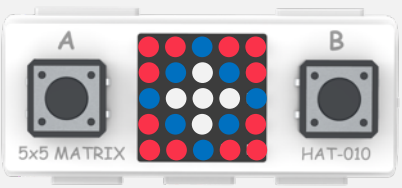
Unlike figure blocks, background blocks can overlap many backgrounds, or layers, and display them as a single image.

<figure blocks>

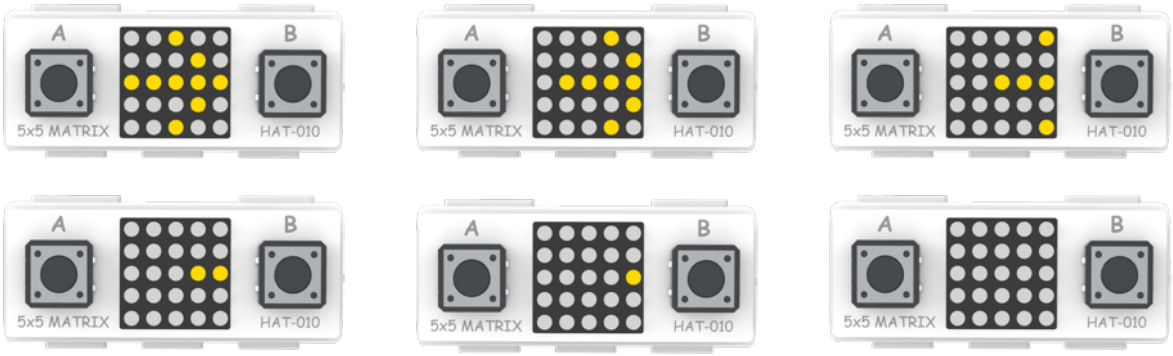


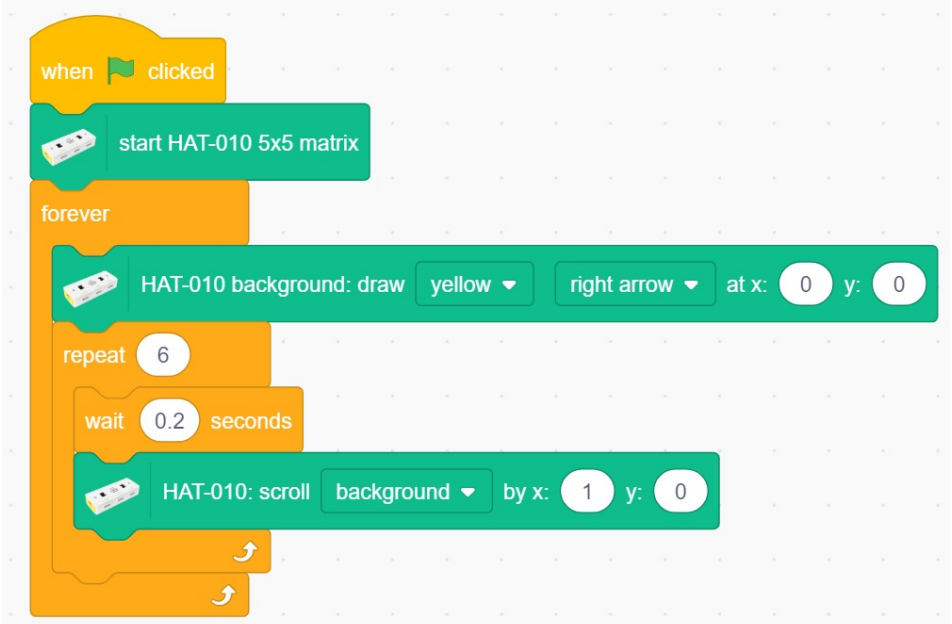
<background blocks>



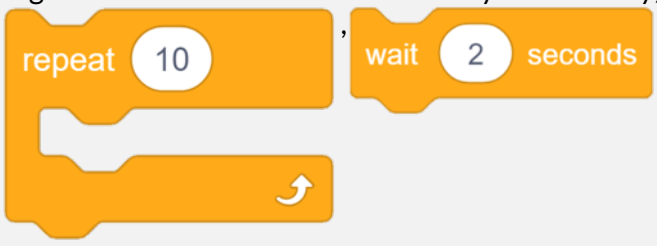


Let's program the 5x5 LED Matrix to display an emergency exit with a moving arrow.

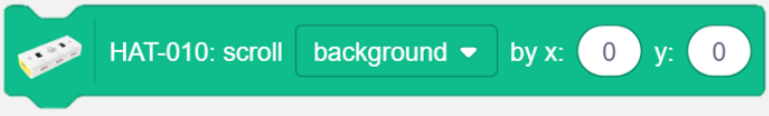




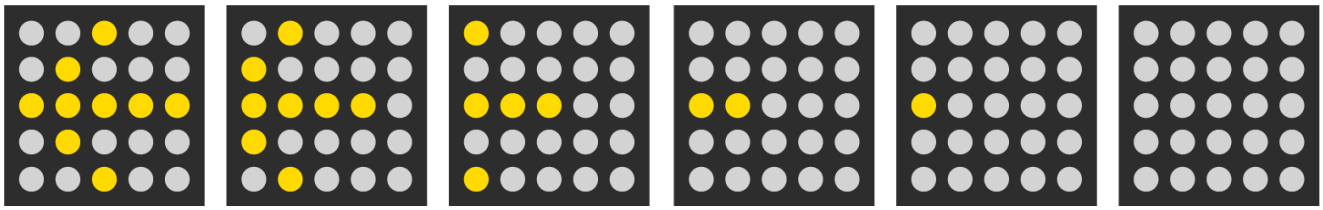
To program the arrow to move horizontally or vertically, Use



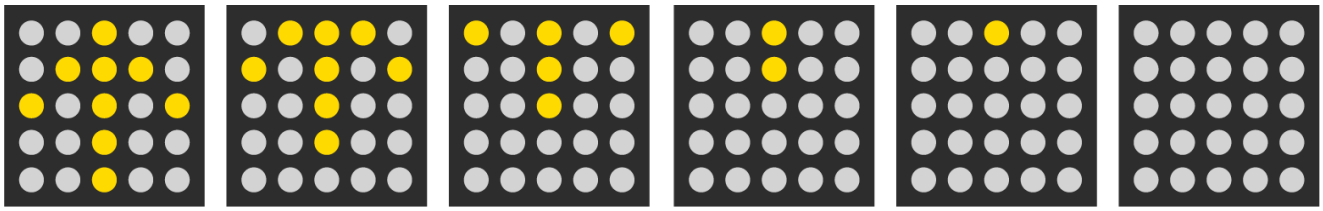
, and



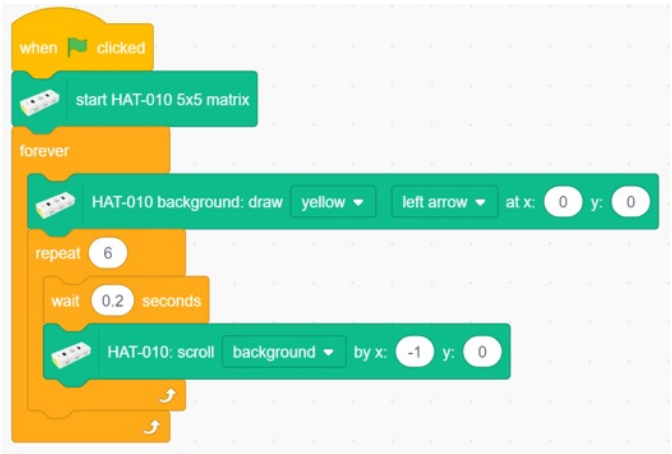
[Practice Assignment 1] Create an arrow moving left.



[Practice Assignment 2] Create an arrow moving upward.

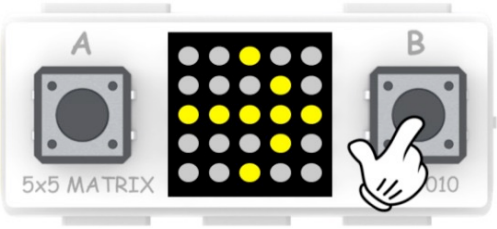


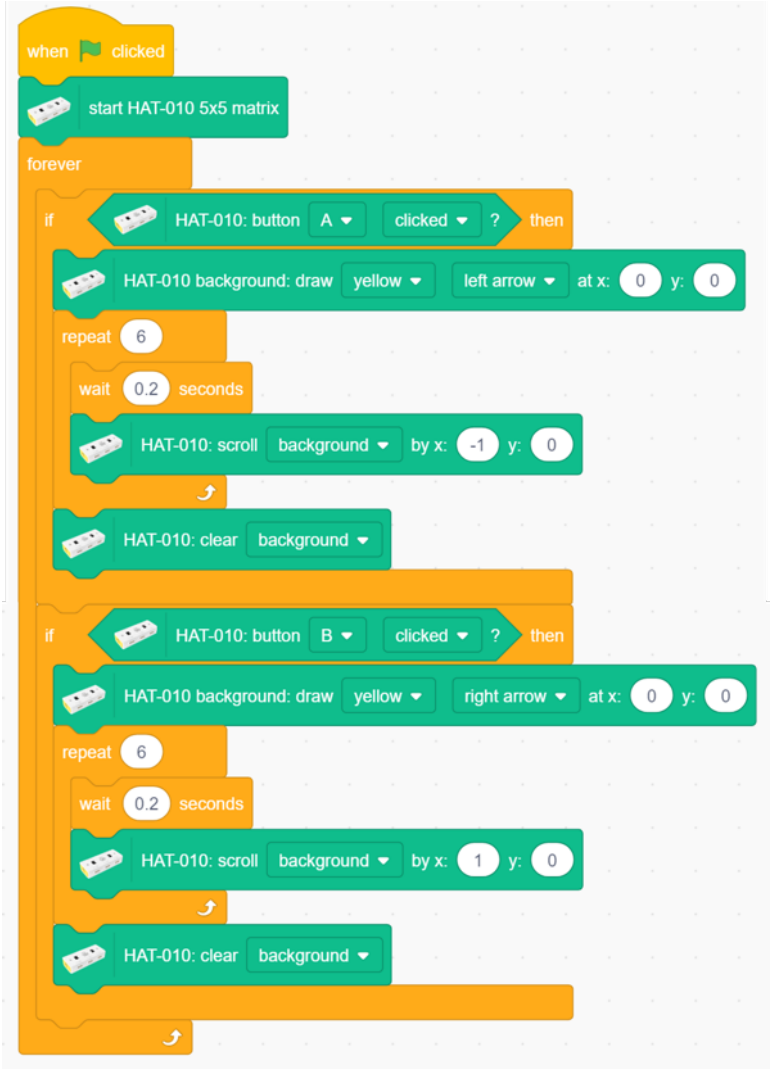
[Practice Assignment 1]

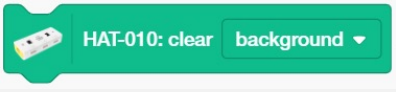


[Practice Assignment 2]

Let's program the 5x5 LED Matrix to move the arrow left when you press button A and right when you press button B.



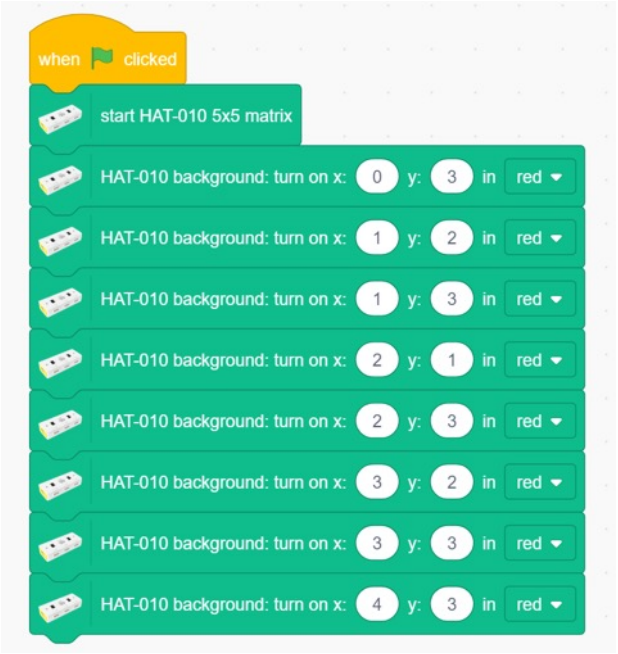


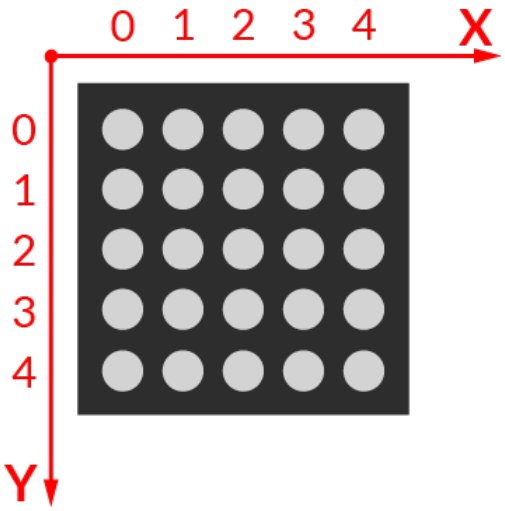
After displaying one arrow, use 

block to display another one.

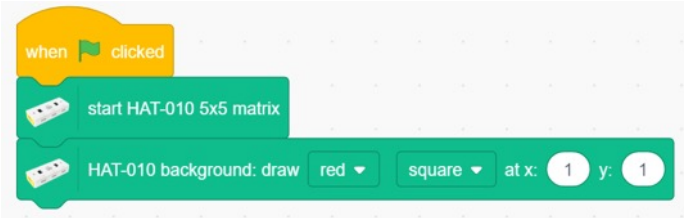
Let's review this chapter with the following assignments.

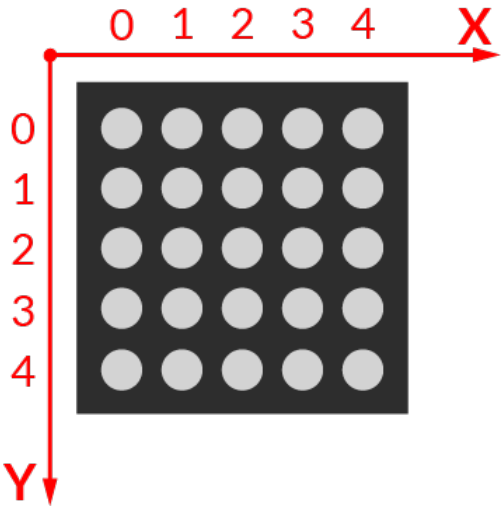
[Practice Assignment 1]
Enter the following commands and color the LEDs below.



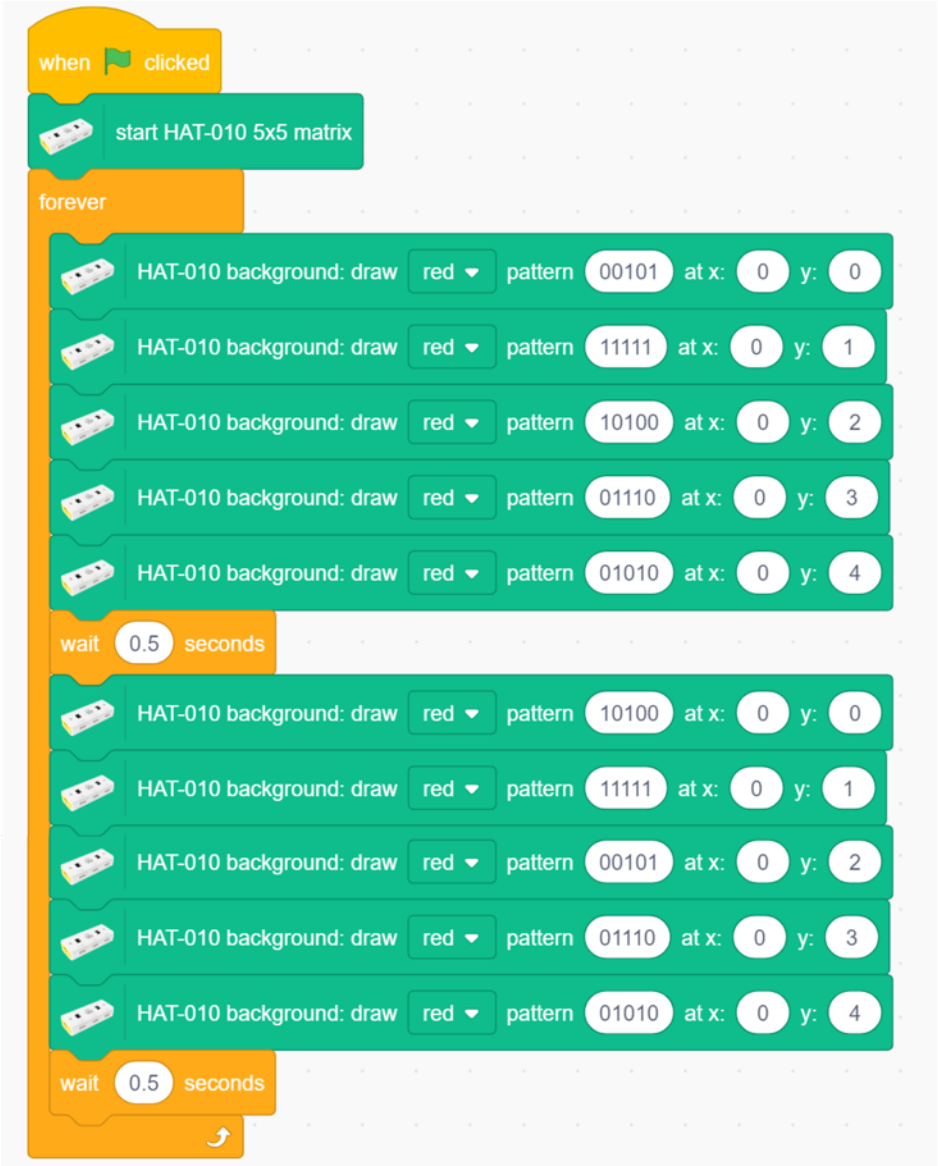


[Practice Assignment 2]
Enter the following commands and color the LEDs below.





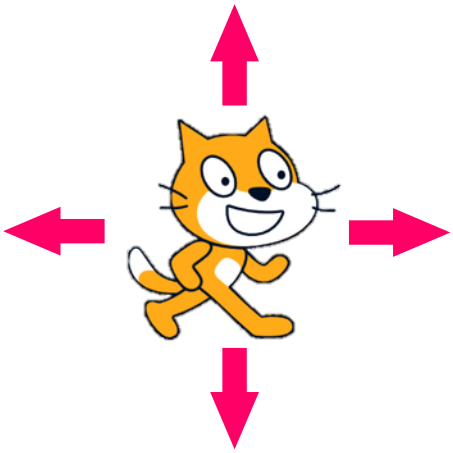
[Practice Assignment 3]
Enter the following commands to make a Tetris Game Dance.

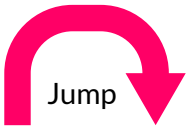


04 Making a Scratch Cat Controller

You can move the Scratch sprite with a joystick.

You can move the Scratch sprite with a joystick. Let's learn about joysticks.





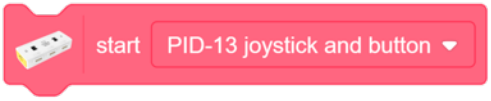
Jump

Let's get ready.

Cheese Stick

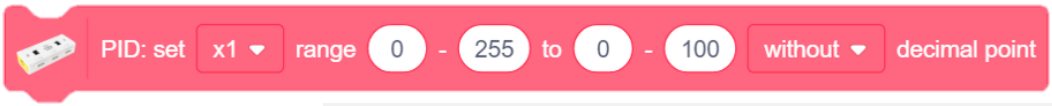
Joystick

Let's learn the blocks for this chapter.

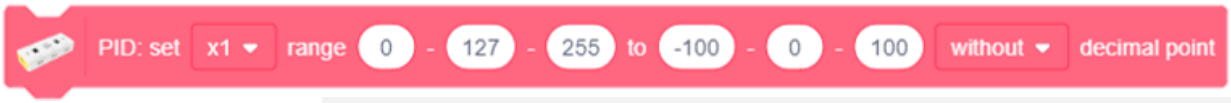


This block is needed to use a joystick.

This block sets the horizontal and vertical values of a joystick.



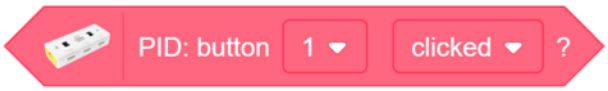
This block sets the range of joystick values as 0 to 100.



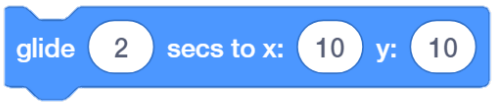
This block divides joystick values into three different ranges.

This block compares two values to run a command.

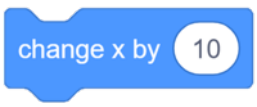
This block evaluates to true if one or both conditions are true.



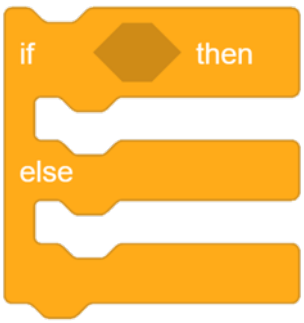
This block runs the command when the button is pressed.



This block moves the Sprites by the given x and y values for the given number of seconds.



This block changes the x-coordinate by the given value.

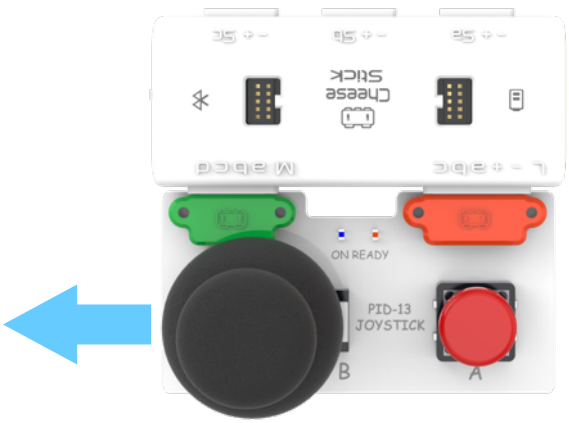


This block runs different commands depending on whether the condition is true or not.

Let's learn how to connect a joystick and check its value

Plug the joystick into the Cheese Stick as shown below.

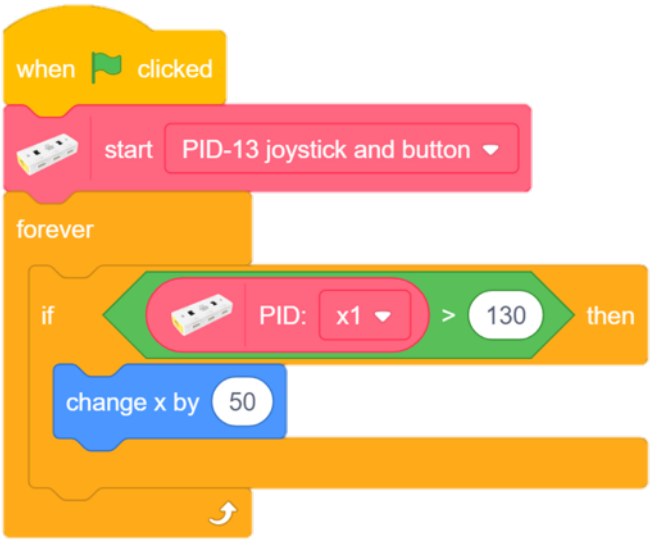
You can use the joystick and its button to control the Scratch sprite's motions and movements.

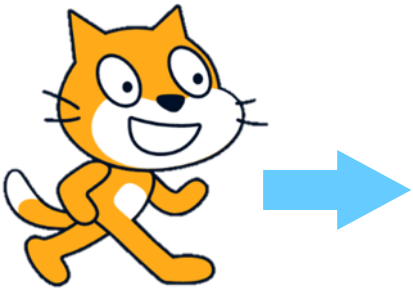


The X-coordinate gradually decreases to 0.

The X-coordinate gradually increases to 255. (The maximum value may vary for other devices.)

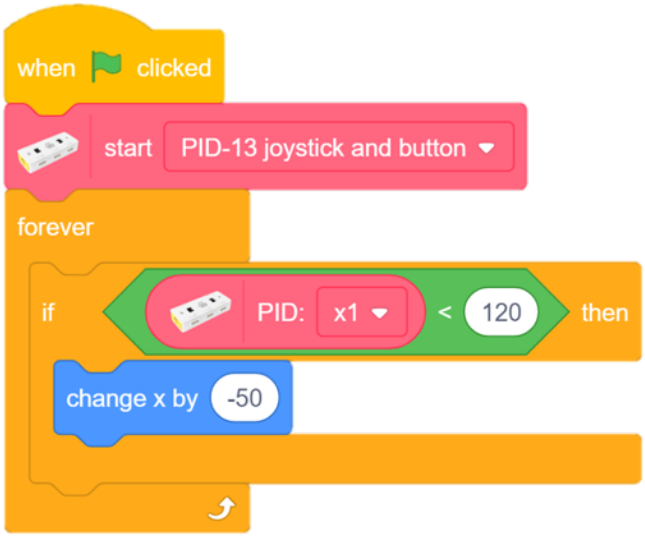
Let's move the Scratch Cat forward with a joystick.

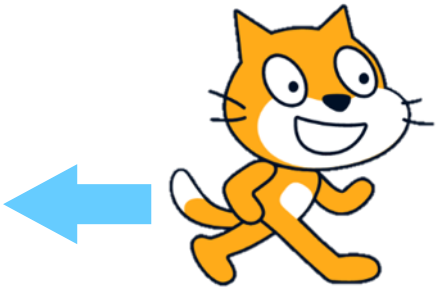




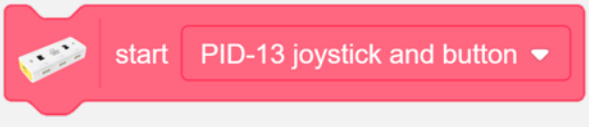
move forward

Let's move the Scratch Cat backward with a joystick.





move backward

You need 

block to use a joystick.

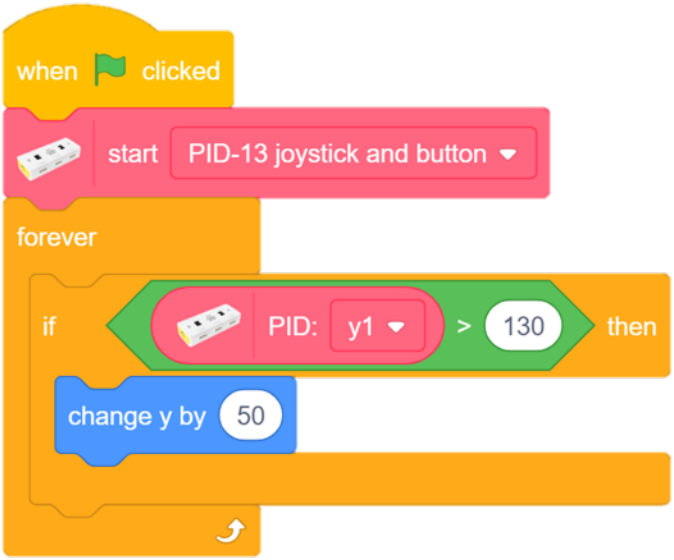
[Practice Assignment 1]

move upward

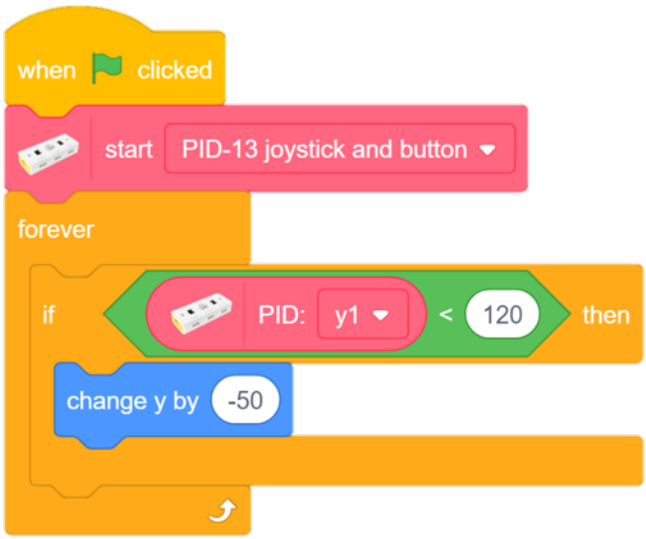
[Practice Assignment 2]

move downward

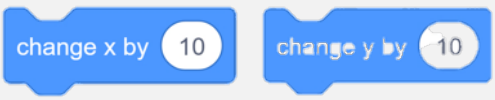
[Practice Assignment 1]



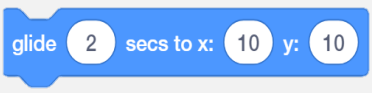
[Practice Assignment 2]



Make sure you know the difference between these two blocks.

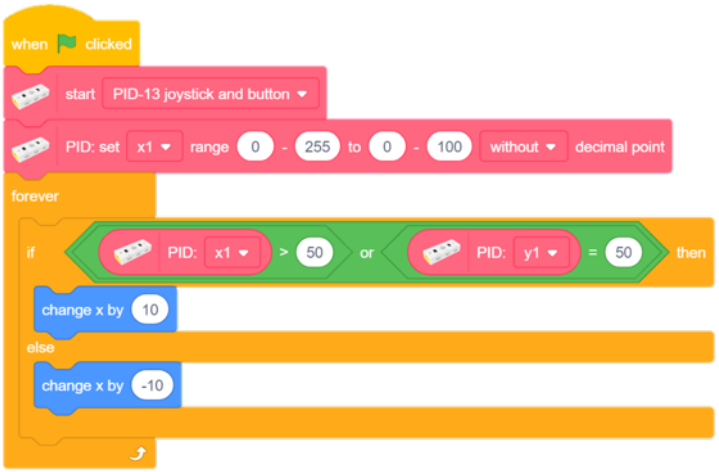


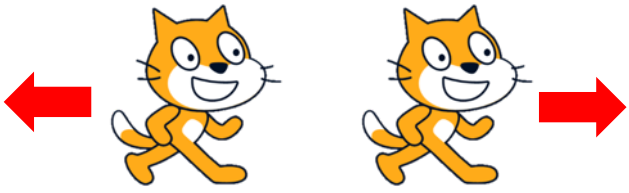
If the condition is true, this block moves the sprite horizontally by the given x value and vertically by the given y value for the given number of seconds.



If the condition is true, this block moves the sprite to the given x- and y- coordinates for the given number of seconds.

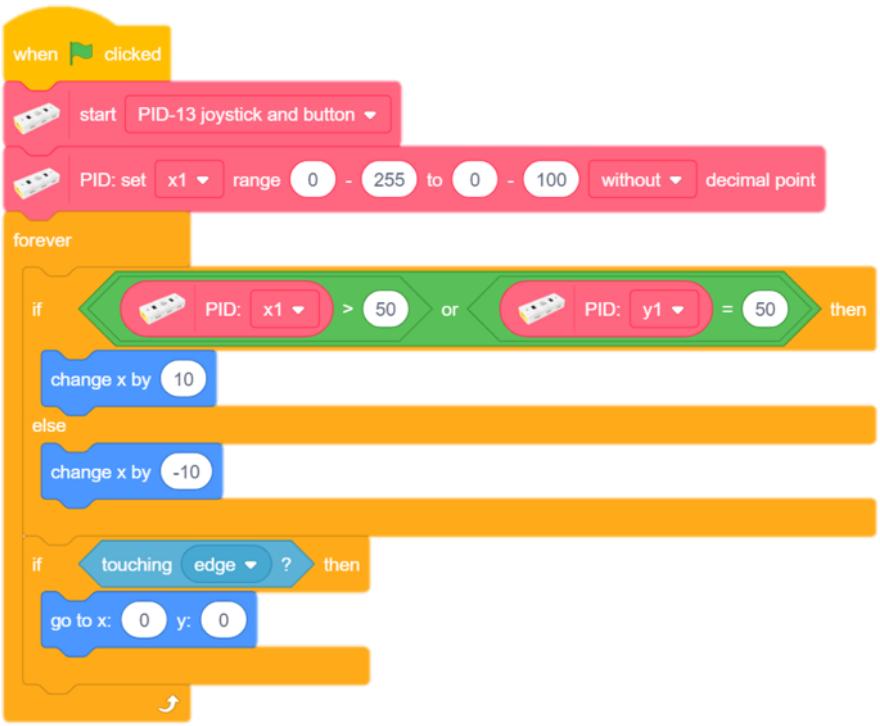
Let's program the joystick to move the Scratch Cat back and forth.

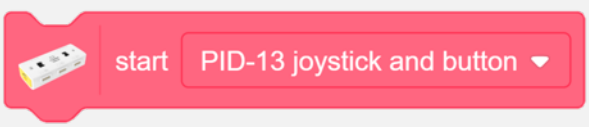




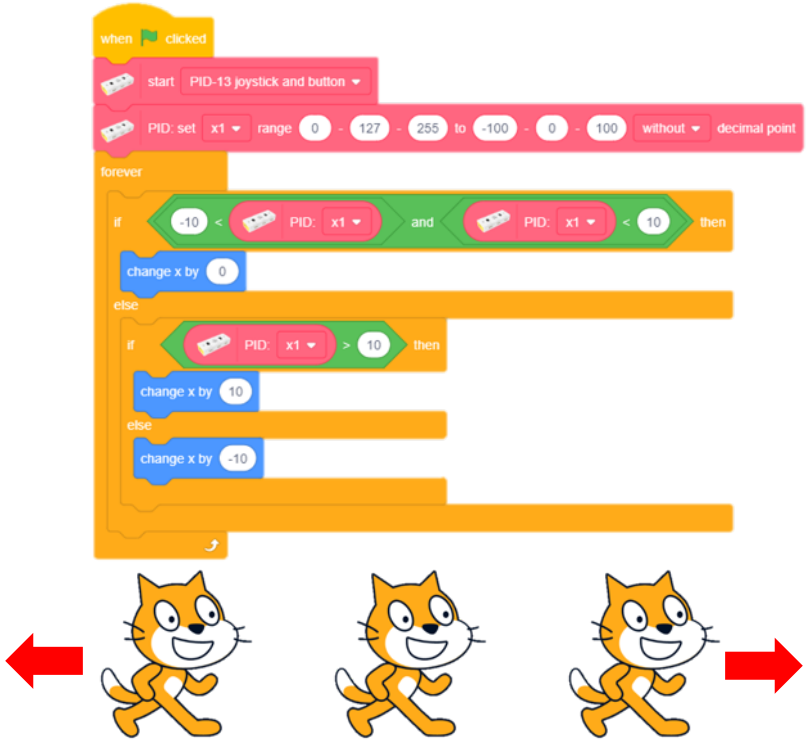
move backward move forward

Now, let's program the Scratch Cat to return to its starting position when it touches the screen borders.

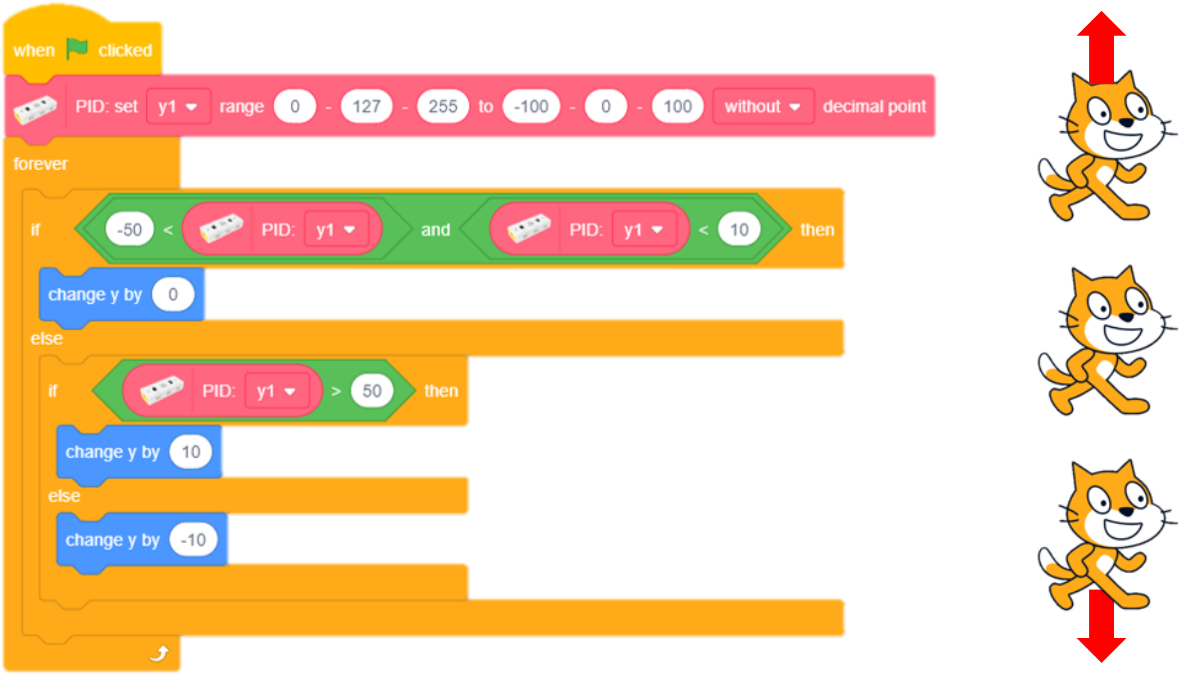


You need  block to use a joystick.

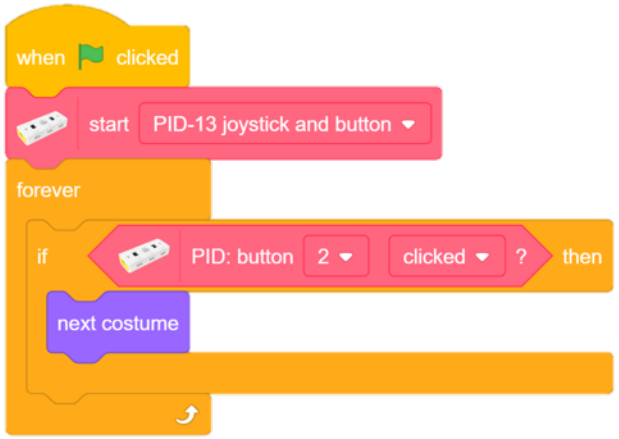
Let's program the joystick to move the Scratch Cat in three horizontal directions.

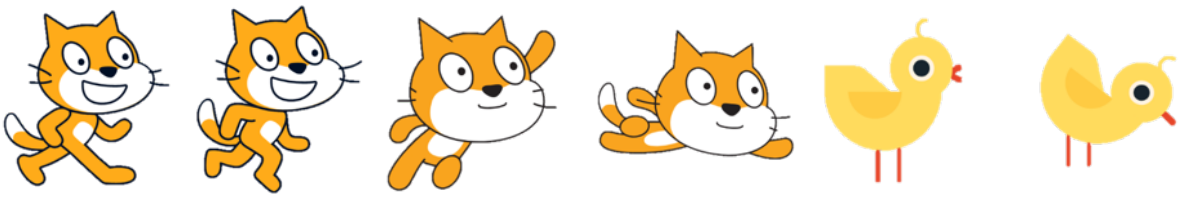


Let's program the joystick to move the Scratch Cat in three vertical directions.

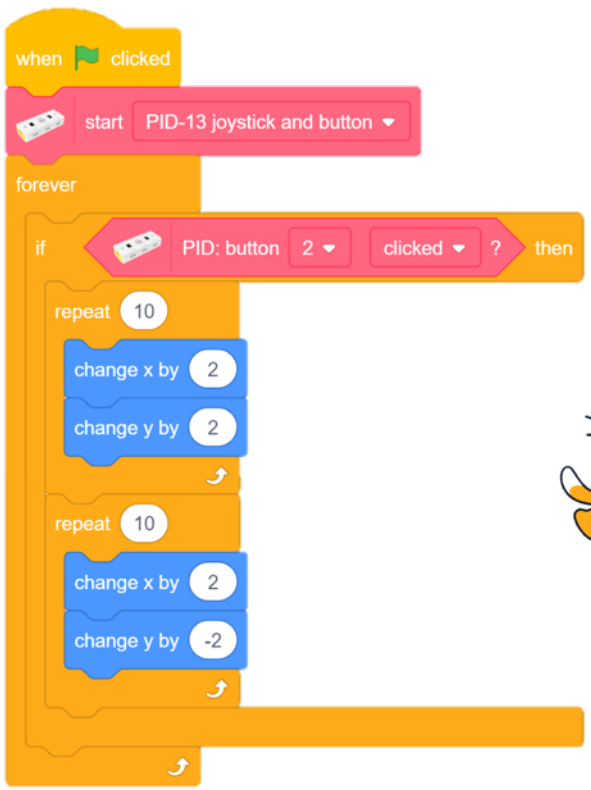


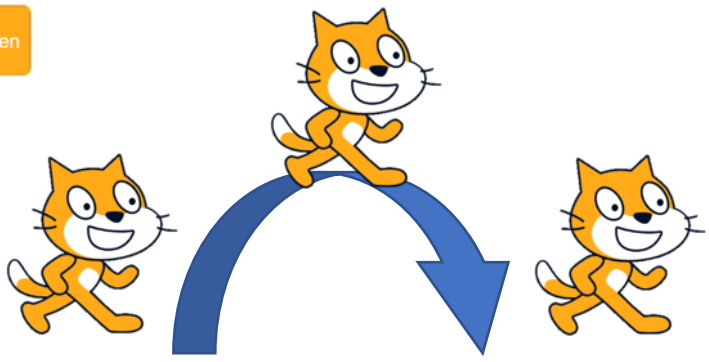
Let's program the joystick button to change the Scratch Cat's motions.



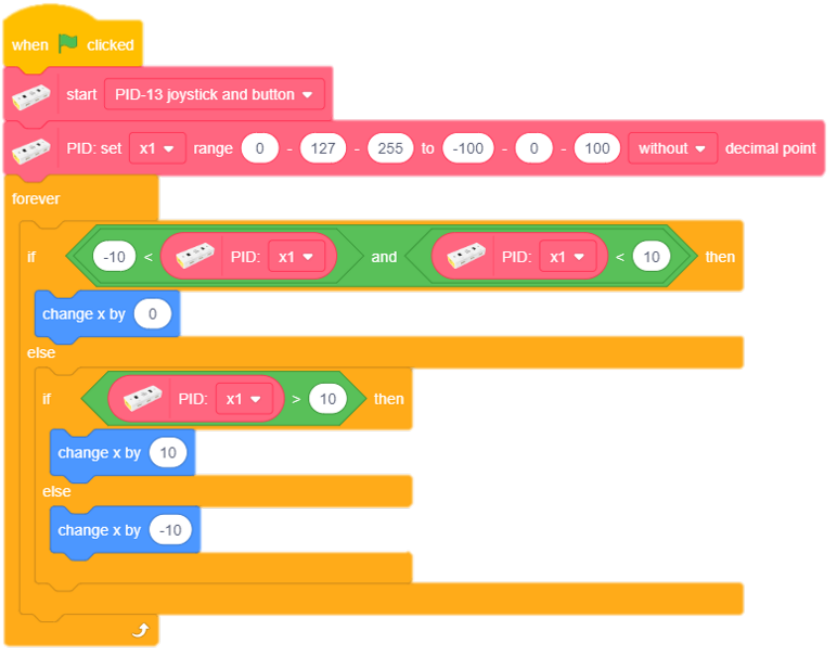


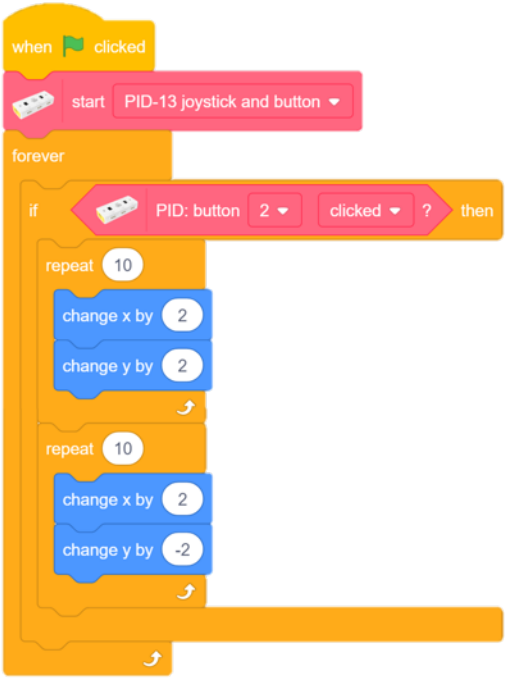
Let's program the joystick button to make the Scratch Cat jump.

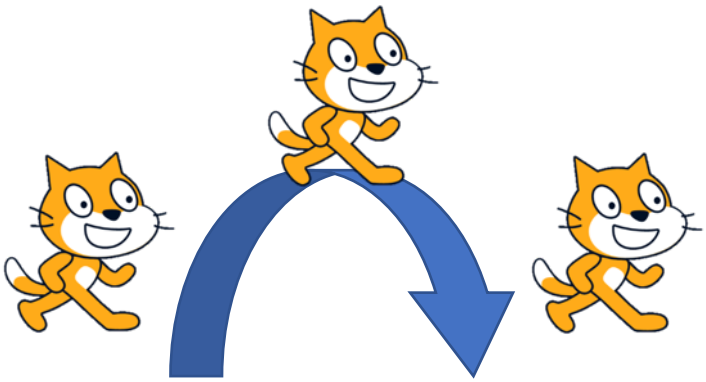




Let's program the joystick button to change the Scratch Cat's motions.





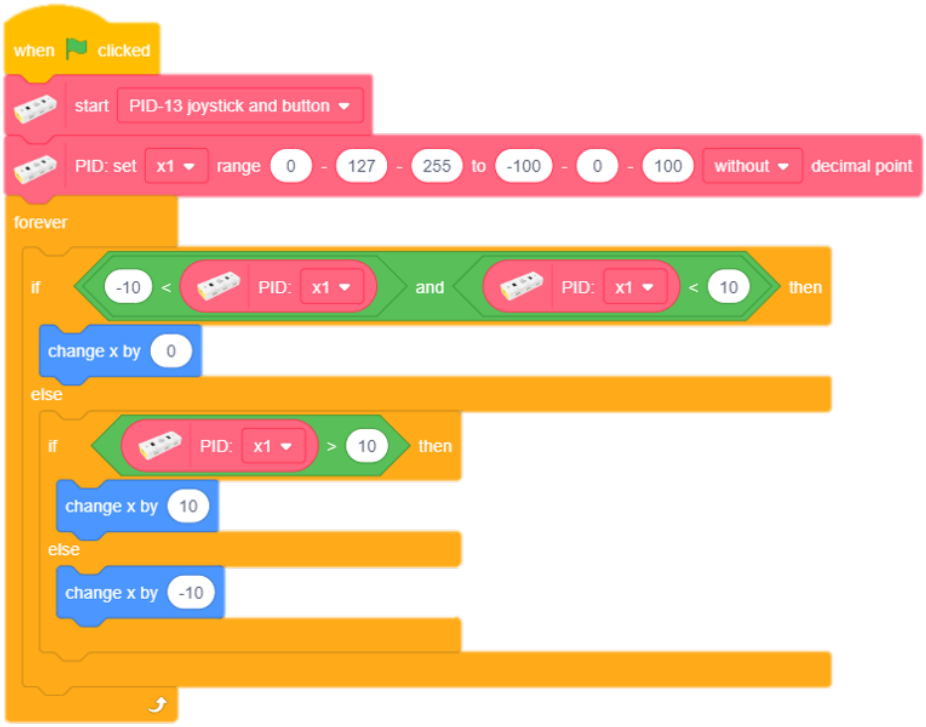


To run two commands simultaneously, both command blocks need to be connected to

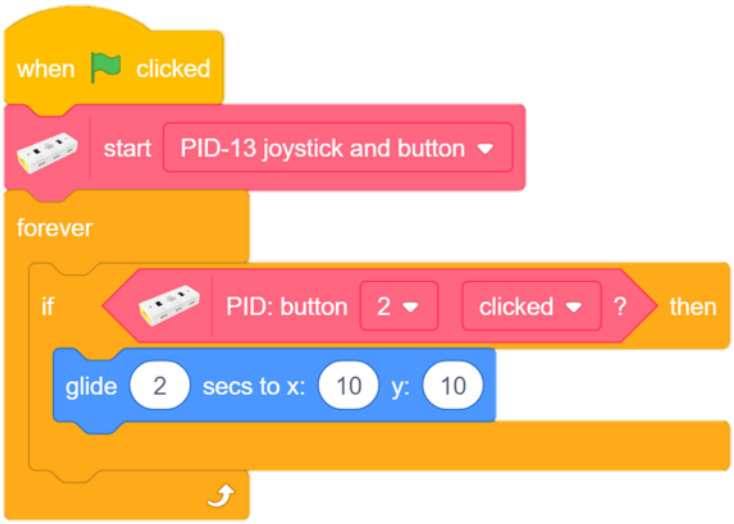
block.

Let's review this chapter with the following assignments.

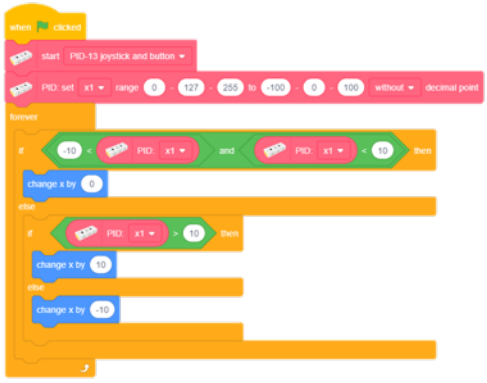
[Assignment 1] Enter the following commands. Then, write how the Scratch Cat moves.



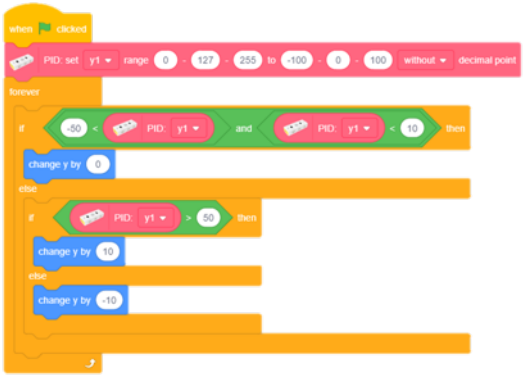
[Assignment 2] Enter the following commands. Then, write how the Scratch Cat moves.



[Assignment 3] You want to program the Scratch Cat to move back and forth and change its motions when you press the joystick button. Check the blocks you need to run these two commands simultaneously.



( )



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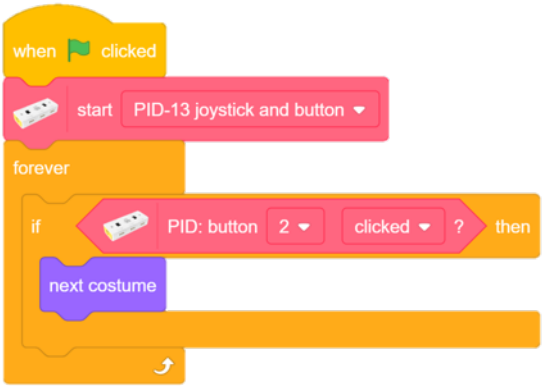

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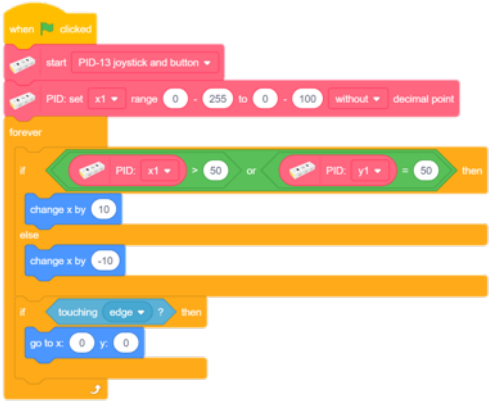
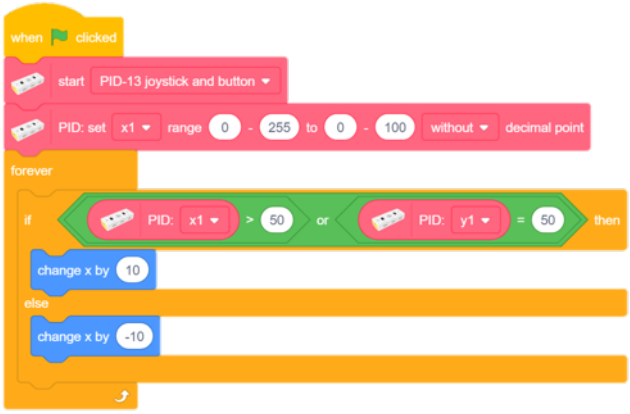


( )



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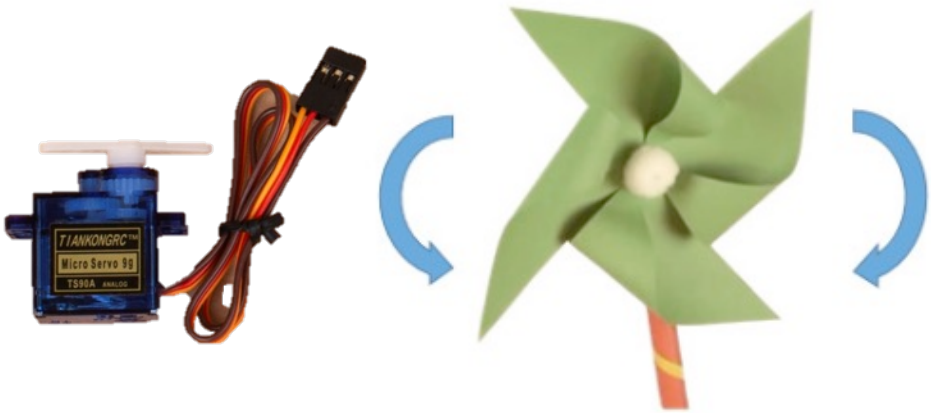
05 Changing the Direction of a Pinwheel

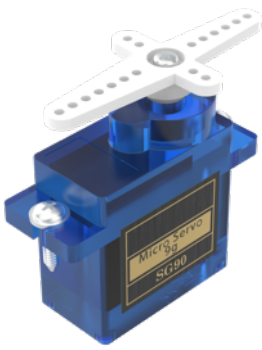
You can control a pinwheel with a joystick, a servo motor, and colored paper.

You can change the direction of a pinwheel with a joystick and a servo motor. Let's make a pinwheel with colored paper and connect it to a servo motor. Then, you can control it with a joystick.



Let's get ready.

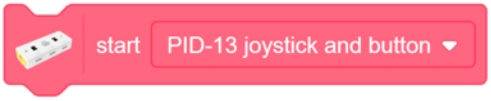
Joystick



Servo Motor

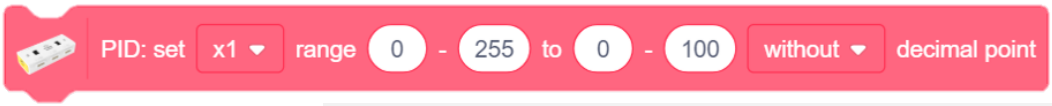
Cheese Stick

Let's learn the blocks for this chapter.

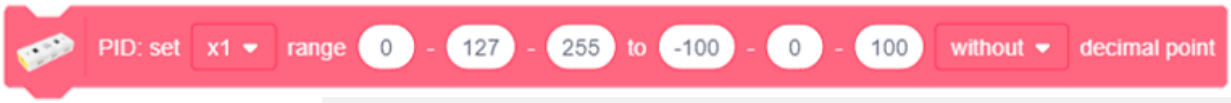


This block is needed to use a joystick.

This block sets the horizontal and vertical values of a joystick.

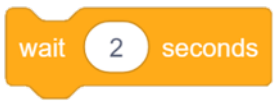


This block sets the range of joystick values as 0 to 100.

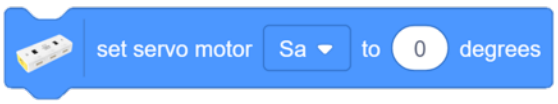


This block divides joystick values into three different ranges.

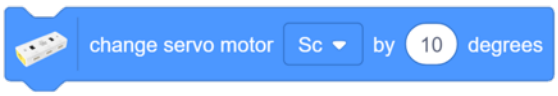
This block compares two values to run a command.



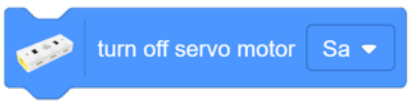
This block pauses the program for the given number of seconds before running the next block.



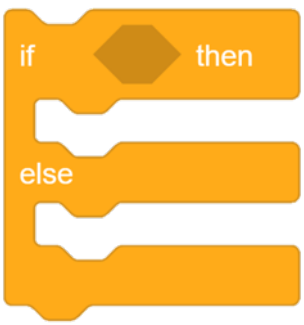
This block sets the angle of a servo motor.



This block changes the angle of a servo motor for the given number of seconds.

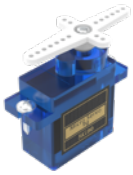


This block stops the running command given to a servo motor.



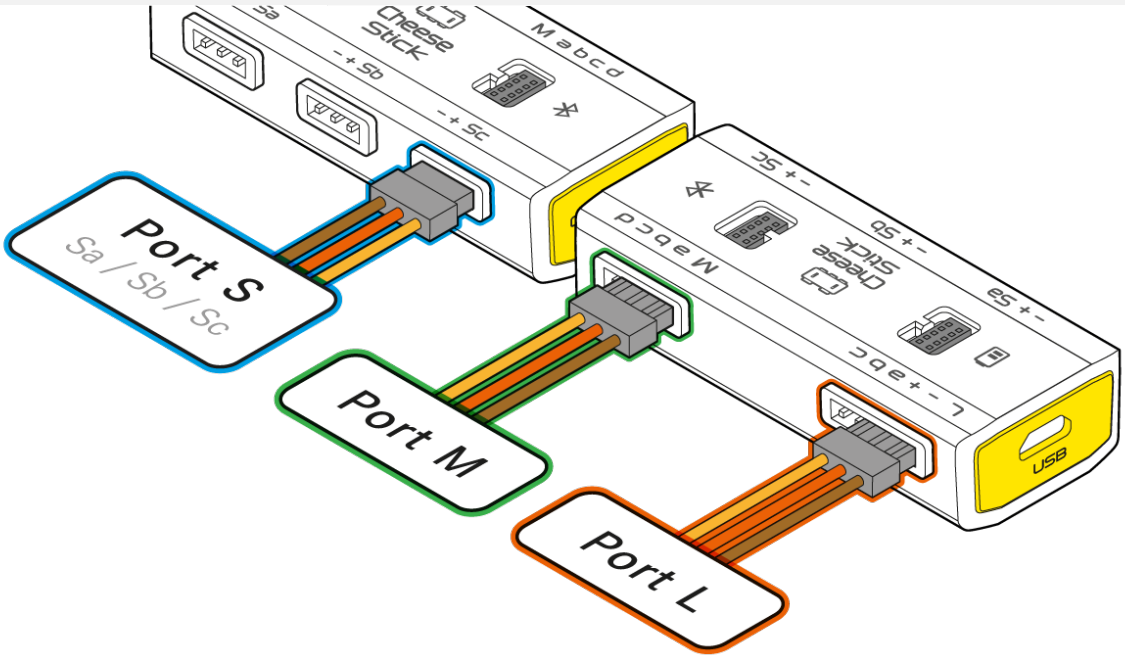
This block runs different commands depending on whether the condition is true or not.

Let's connect a joystick and a servo motor to the Cheese Stick.



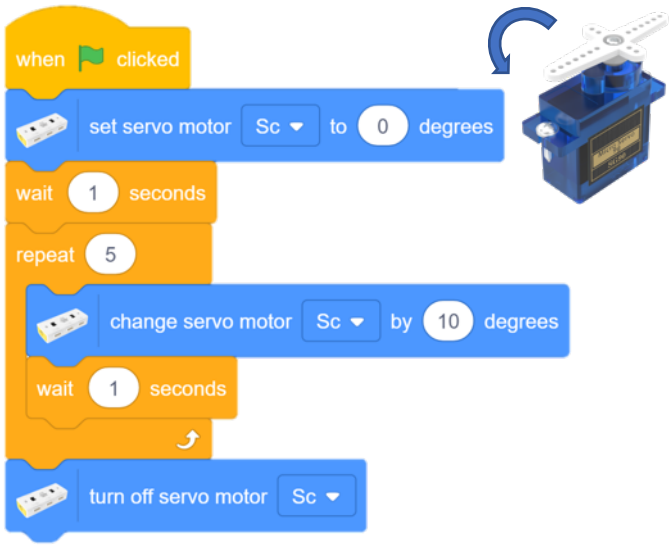
Plug the joystick into the Cheese Stick's L and M ports and the servo motor into any of its three ports (Sa, Sb, or Sc).

You can connect up to five servo motors to the Cheese Stick. With an expansion kit, a maximum of eight servo motors can be connected.

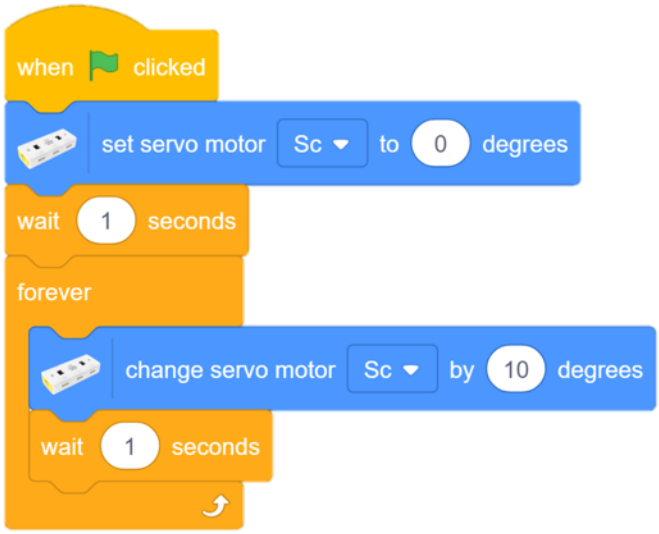


Plug the servo motor's brown cable into the negative side(-) of the Cheese Stick.

Let's program the servo motor to rotate five times.

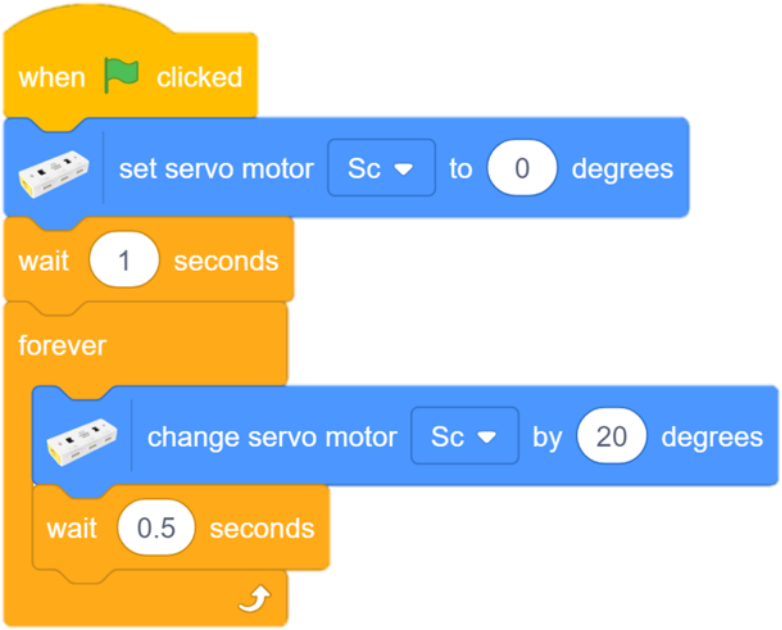


Let's program the servo motor to continue rotating.



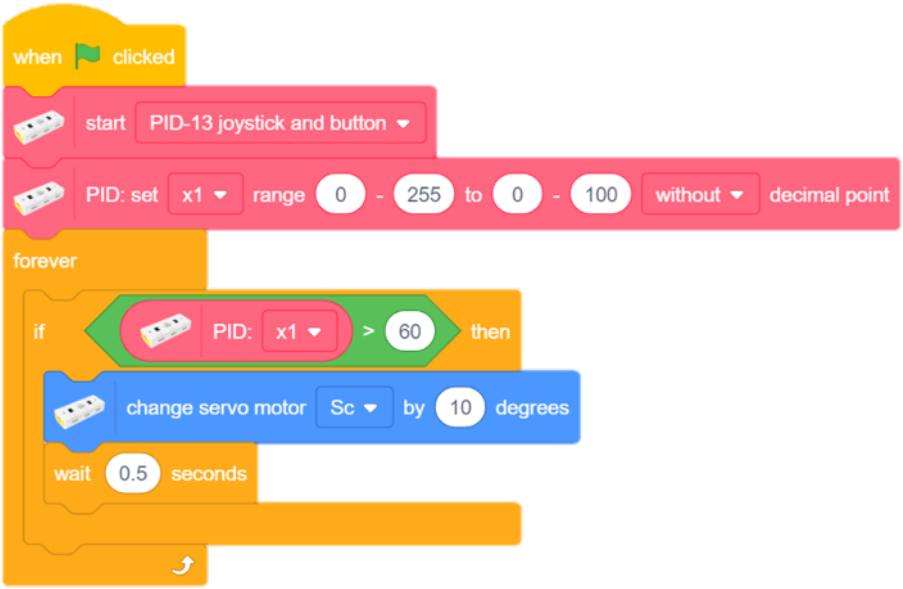
A servo motor rotates from 0 to 180 degrees.

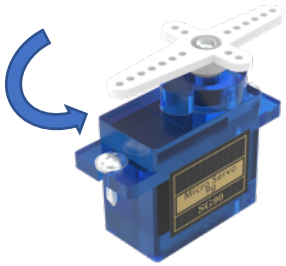
Let's program the servo motor to rotate faster.



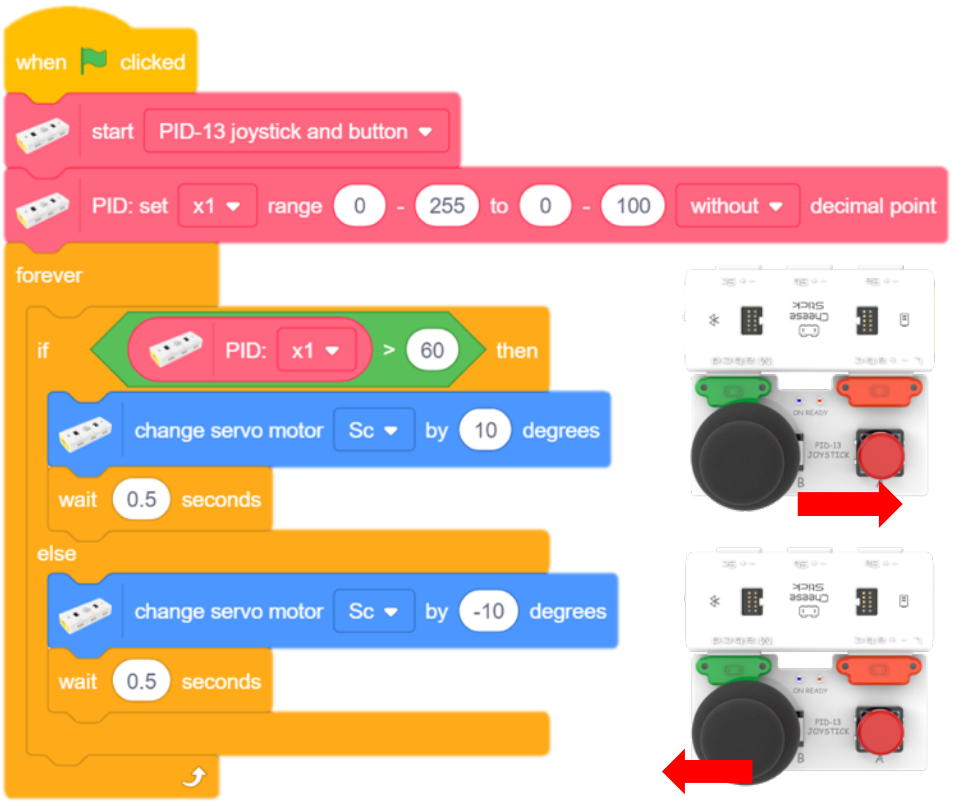
To increase the speed of the servo motor, you can either increase its angle or reduce waiting times between angle changes.

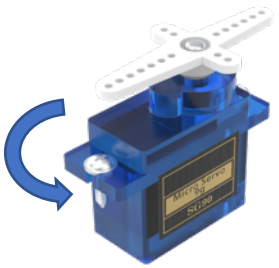
Let's program the servo motor to rotate in one direction with the joystick.

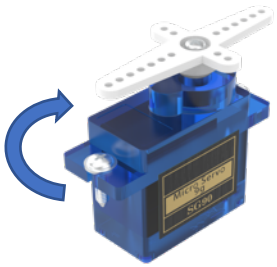




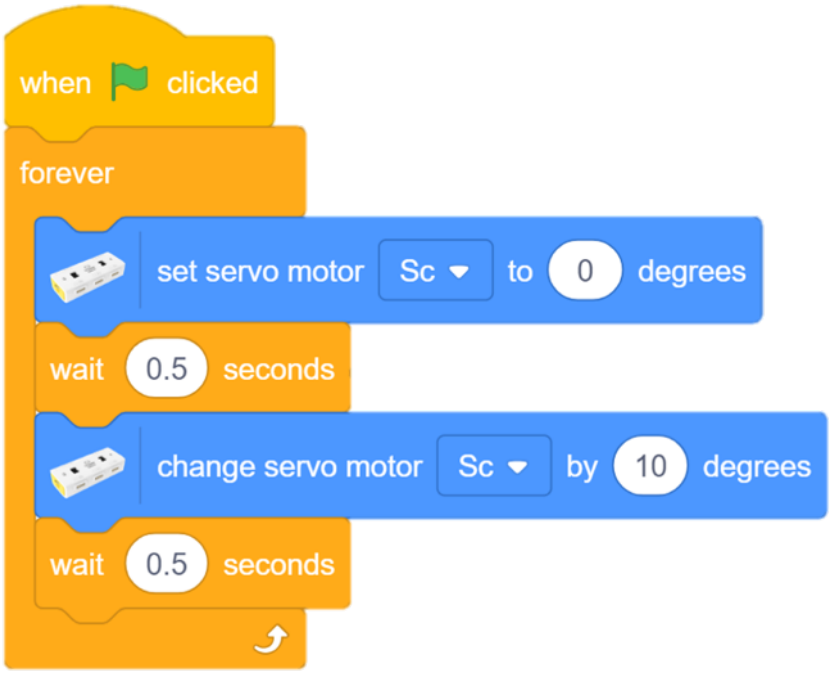
Let's program the servo motor to rotate in both directions with the joystick.

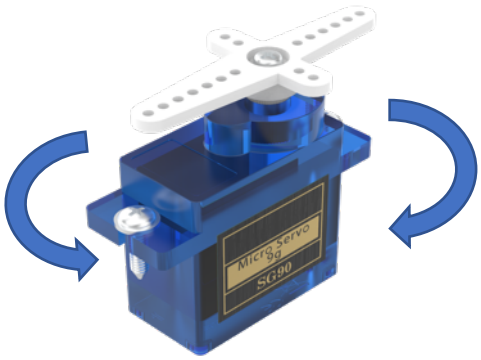




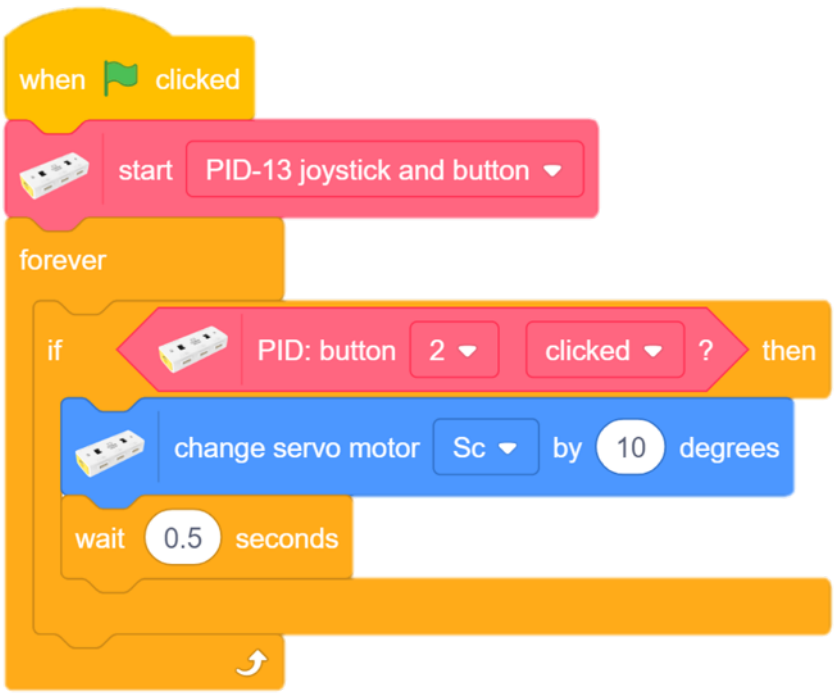


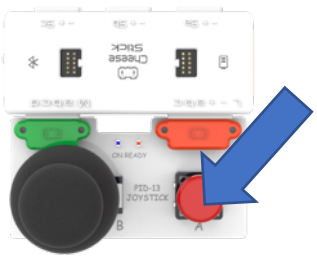
Let's program the servo motor to rotate in both directions without the joystick.

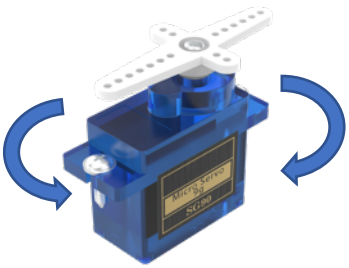




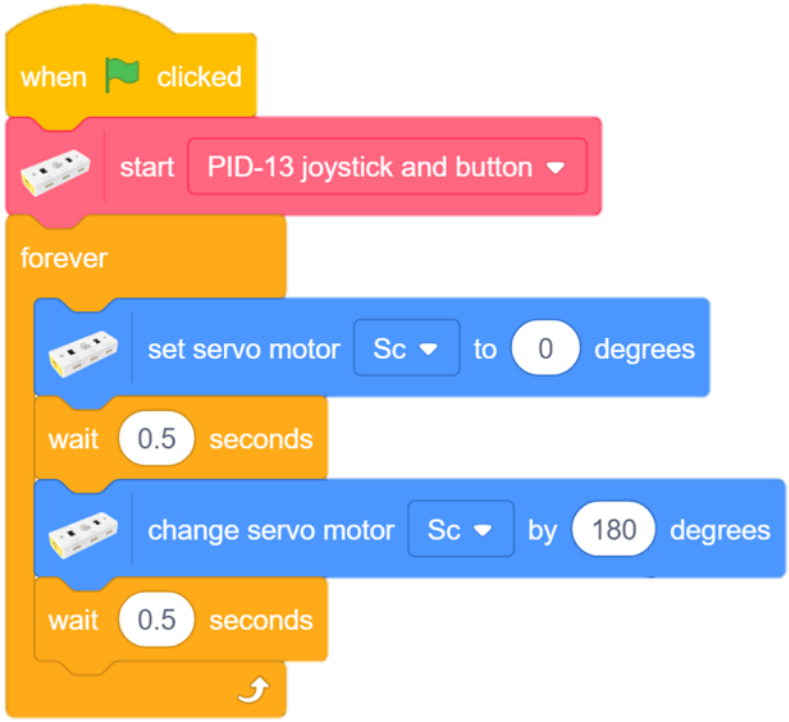
Let's program the servo motor to rotate with the joystick button.

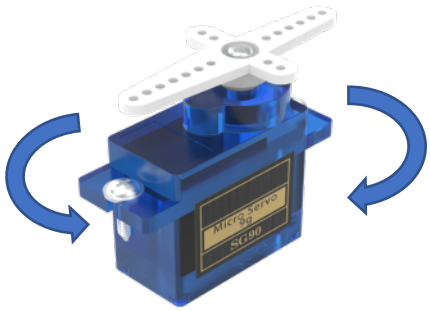


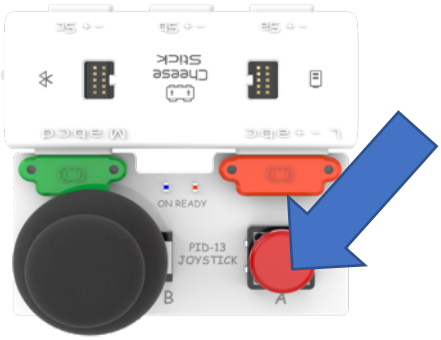


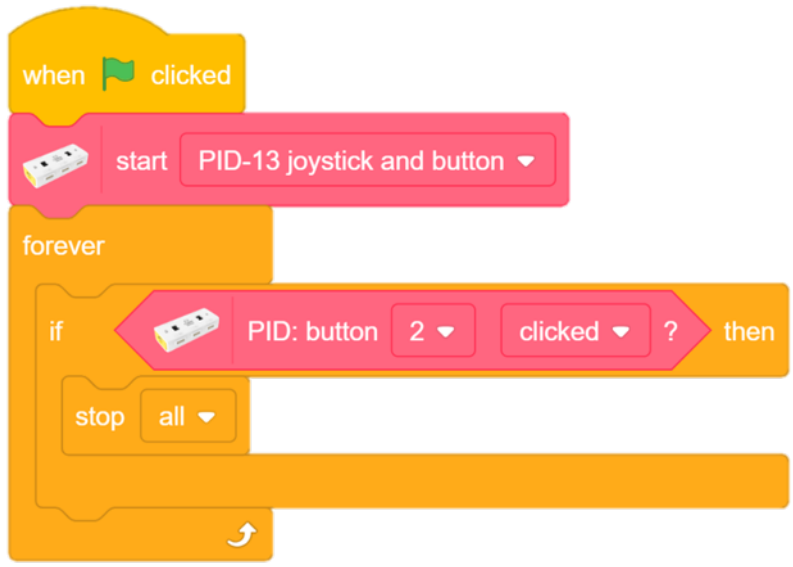


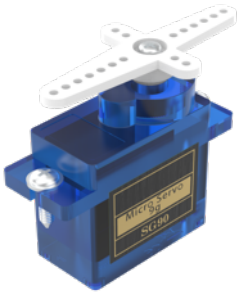
Let's program the servo motor to stop rotating when you press the joystick button.







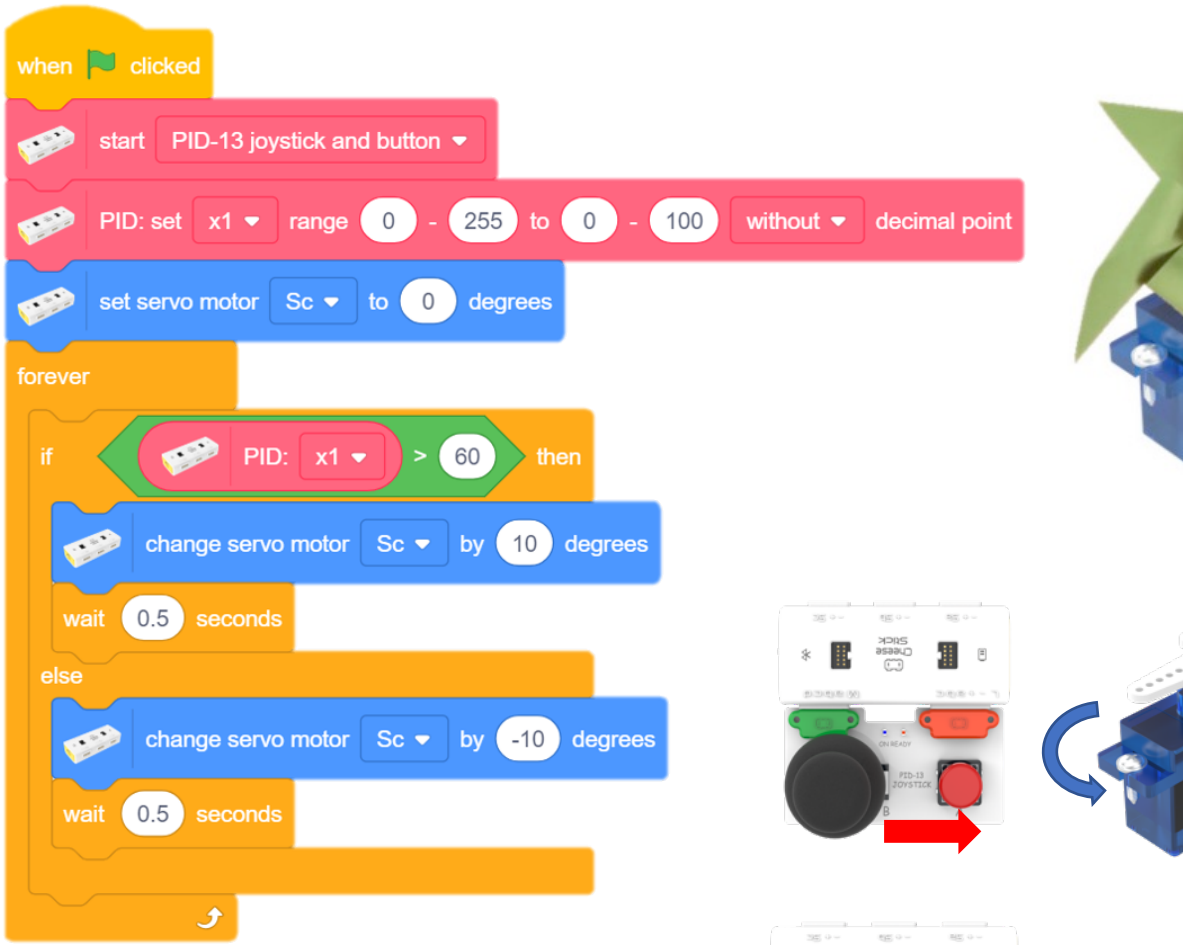


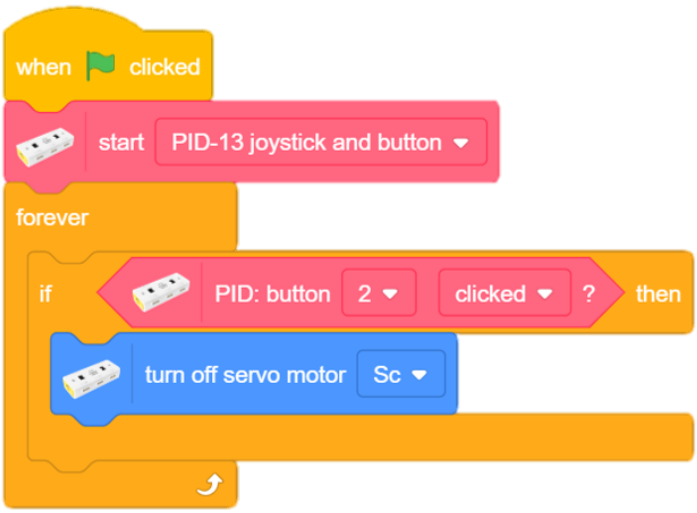


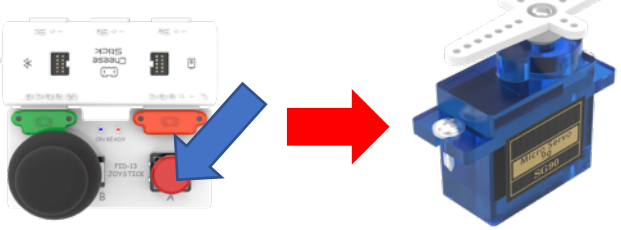
To run two commands simultaneously, both command blocks need to be connected to

block.

Let's connect the servo motor to a pinwheel. First, program the joystick to change the direction of the servo motor. Then, program the joystick button to stop the rotation of the servo motor. You can now control the pinwheel with the joystick and the joystick button.

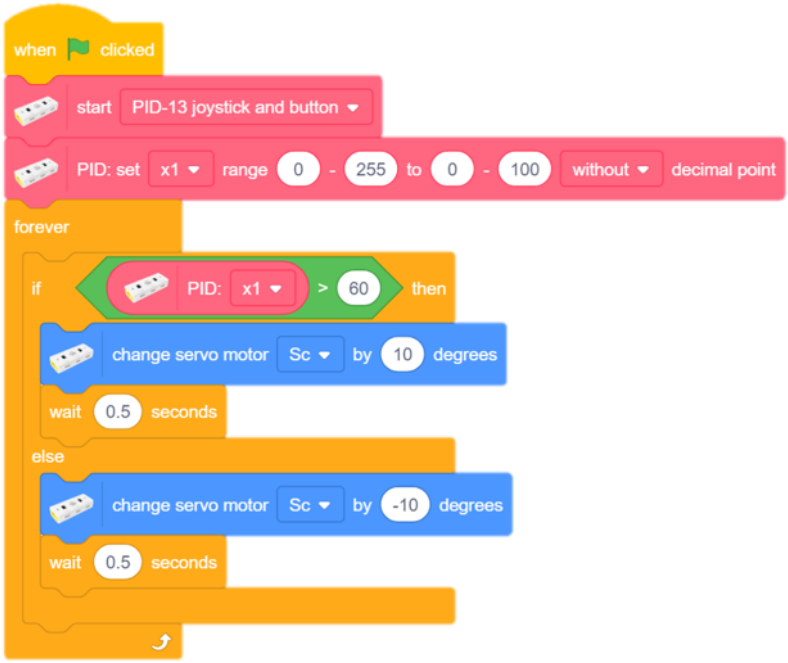




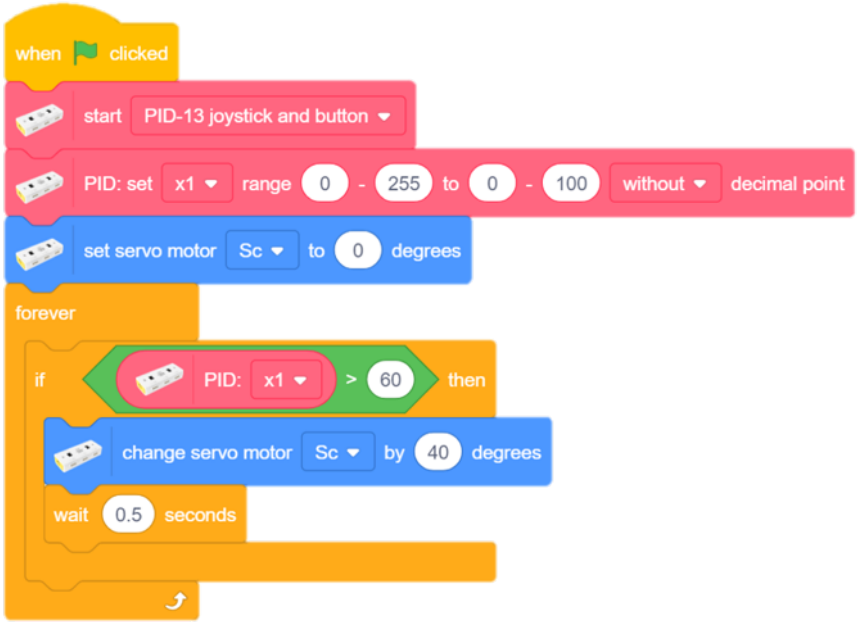


Let's review this chapter with the following assignments.

[Assignment 1] Write how the servo motor would rotate when you enter the following commands.

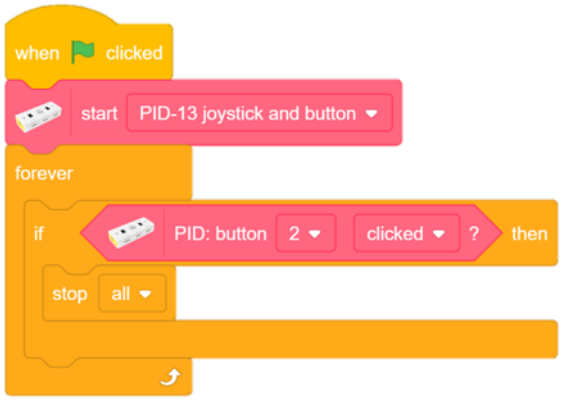


[Assignment 2] Write how the servo motor would rotate when you enter the following commands.



[Assignment 3] You want to change the rotation of the servo motor and also reset its value. Check the blocks you need to run these two commands simultaneously.

( )



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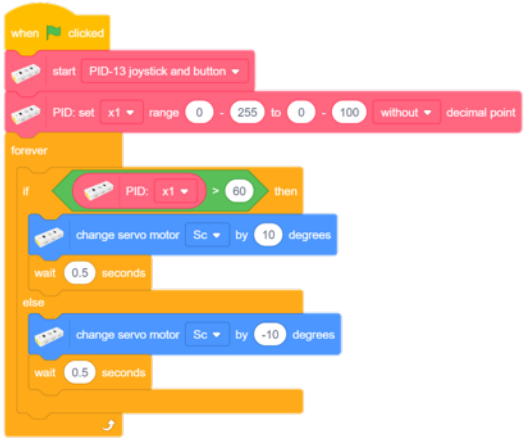

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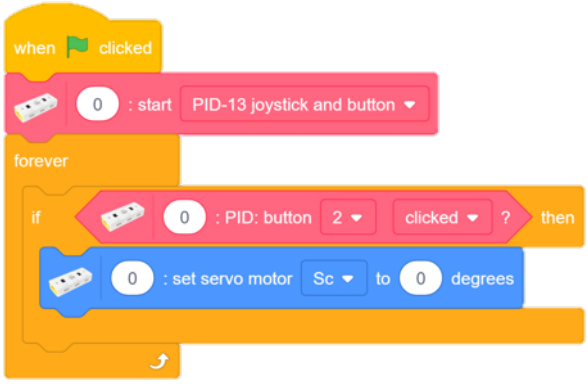

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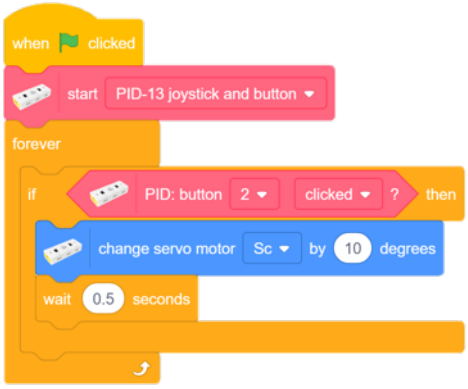

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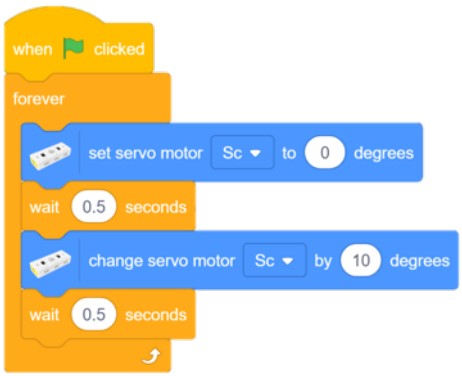

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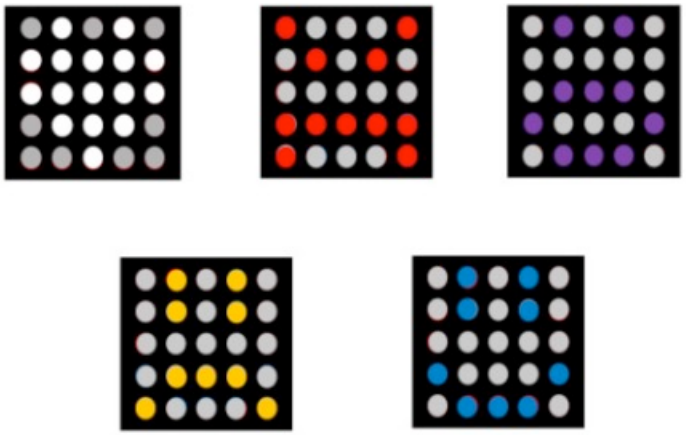
06 Building an Emotion Expression Program

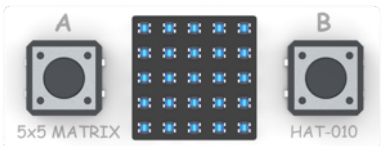
You can display different figures on the 5x5 LED Matrix with a joystick.

You can control the 5x5 LED Matrix with a joystick. Let's display different colors on the 5x5 LED Matrix.



Let's get ready.

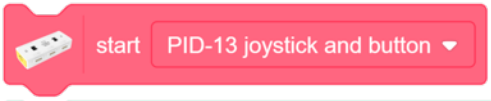
Joystick



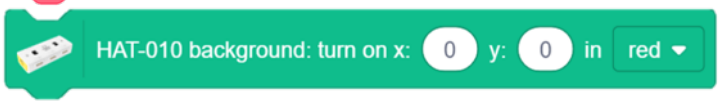
5x5 LED Matrix

Cheese Stick

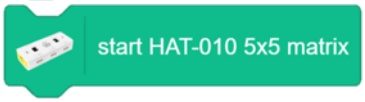
Let's learn the blocks for this chapter.



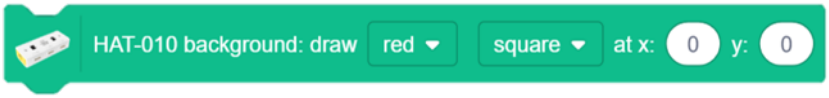
This block is needed to use a joystick.



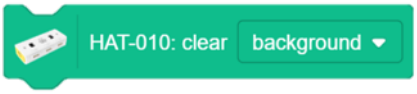
This block controls the LEDs on the 5x5 LED Matrix.



This block is needed to use the 5x5 LED Matrix.



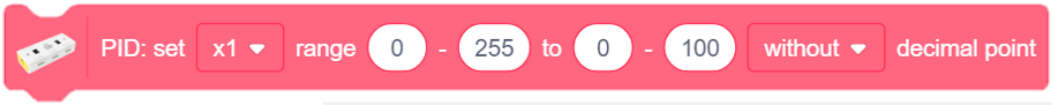
This block displays different figures on the 5x5 LED Matrix.



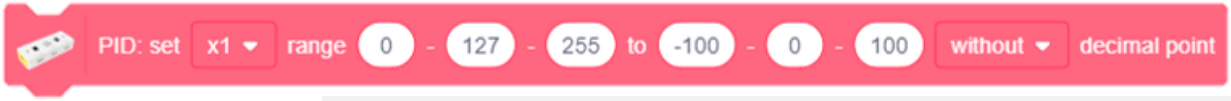
This block removes all backgrounds on the 5x5 LED Matrix.

This block sets the horizontal and vertical values of a joystick.

This block compares two values to run a command.

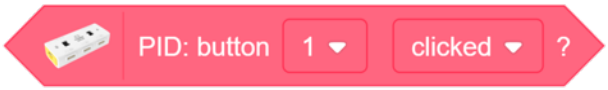


This block sets the range of joystick values as 0 to 100.

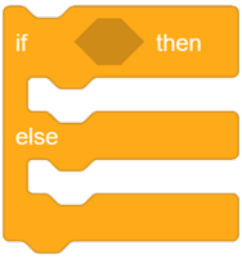


This block divides joystick values into three different ranges.

This block evaluates to true if one or both conditions are true.

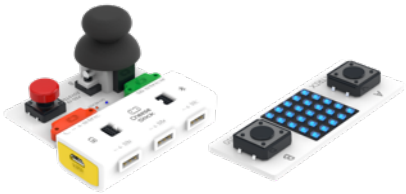


This block runs the command when the button is pressed.

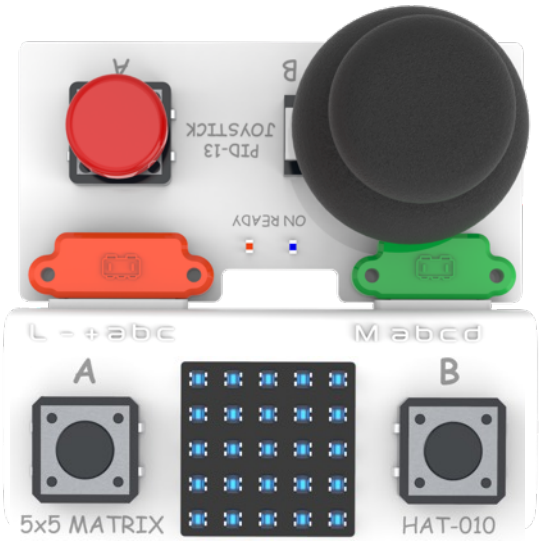


This block runs different commands depending on whether the condition is true or not.

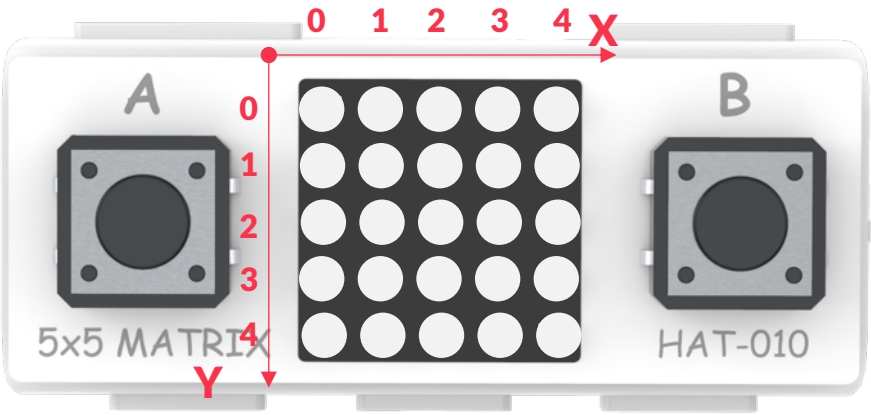
Connect a joystick and a 5x5 LED Matrix to the Cheese Stick.



Plug the joystick into the L and M ports on the Cheese Stick and the 5x5 LED Matrix into its top ports.

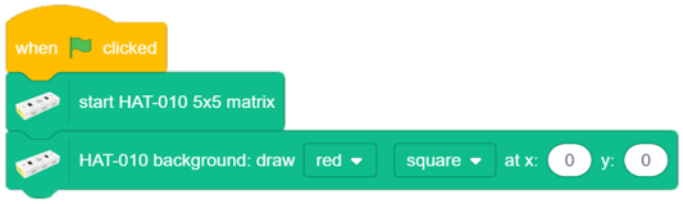


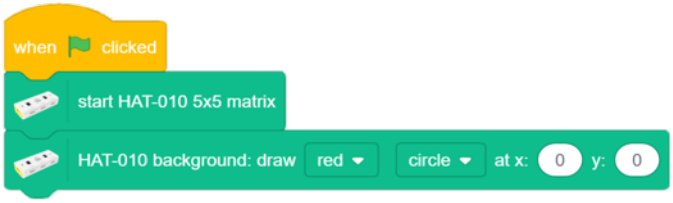
Push the 5X5 LED Matrix all the way into the Cheese Stick ports.

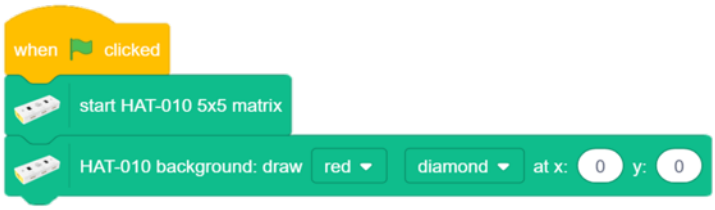


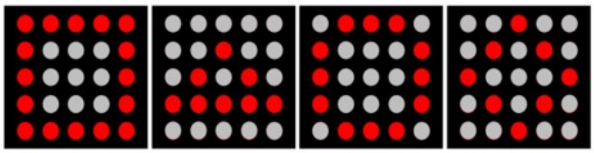
You can control the color and brightness of 25 LEDs using the 5x5 LED Matrix.

Let's program the 5x5 LED Matrix to display different figures.

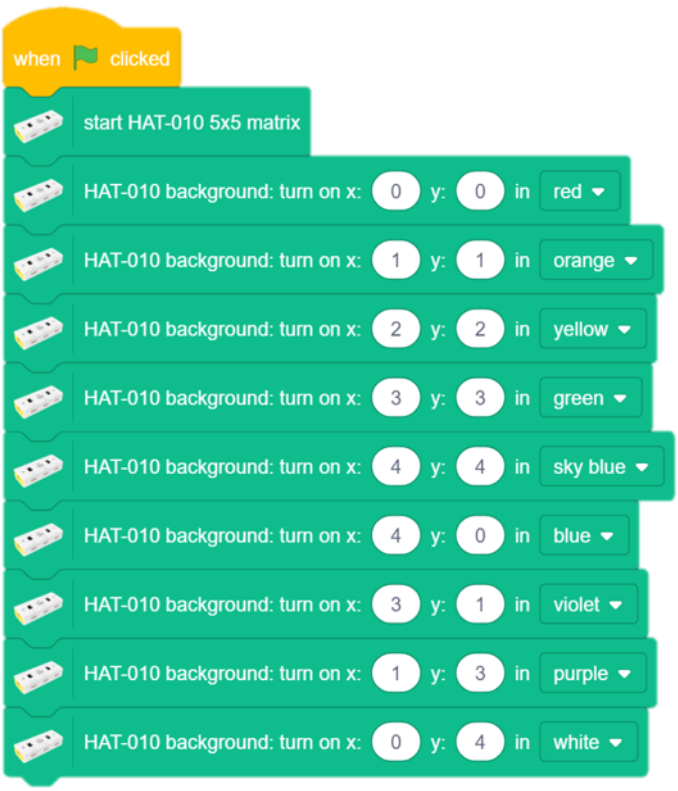


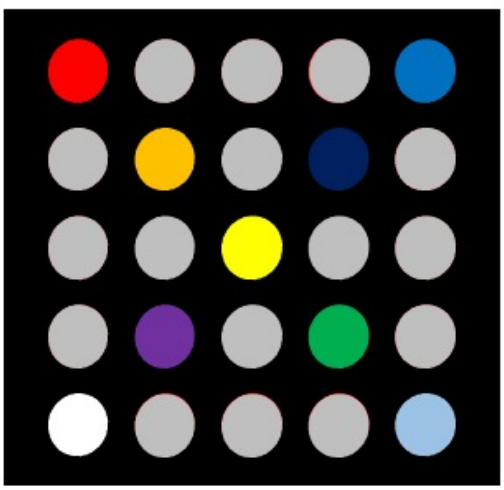




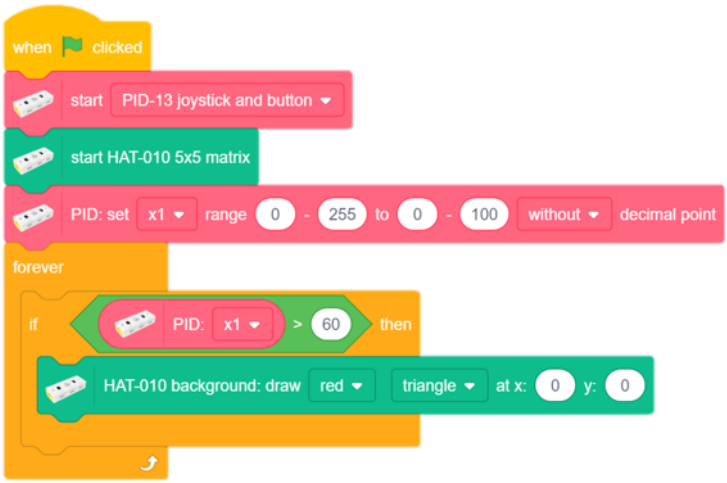


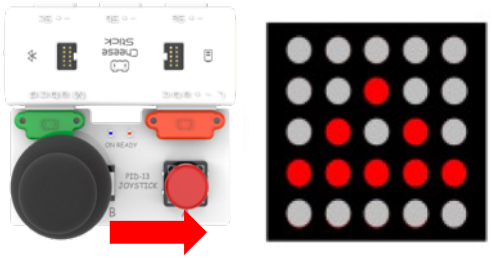
Let's program the 5x5 LED Matrix to display different colors.



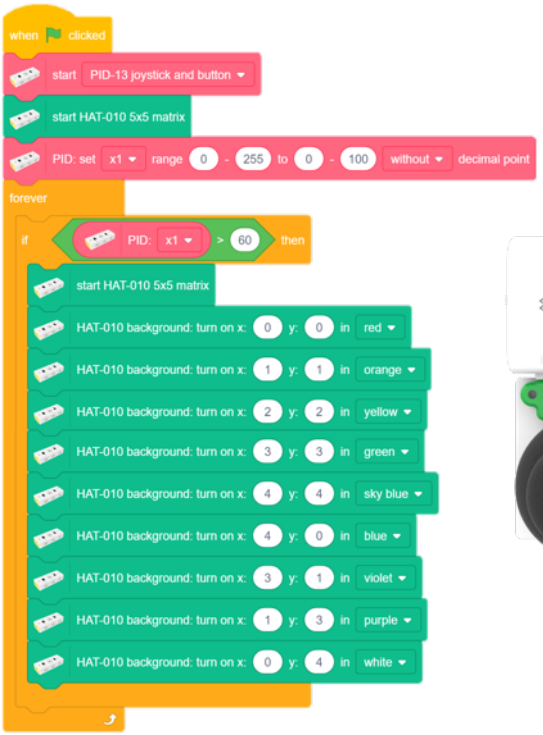


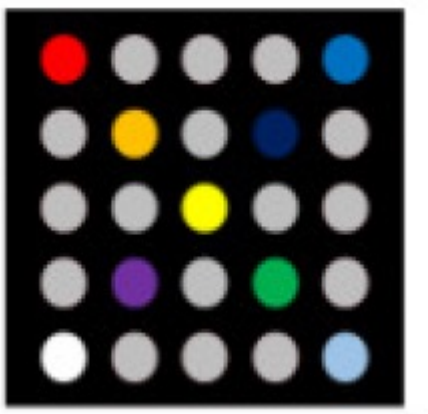
Let's program the joystick to display a triangle on the 5x5 LED Matrix.



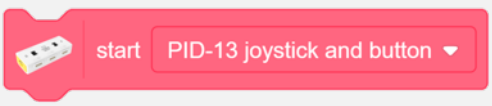


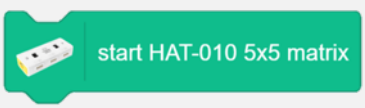
Let's program the joystick to display different colors on the 5x5 LED Matrix.





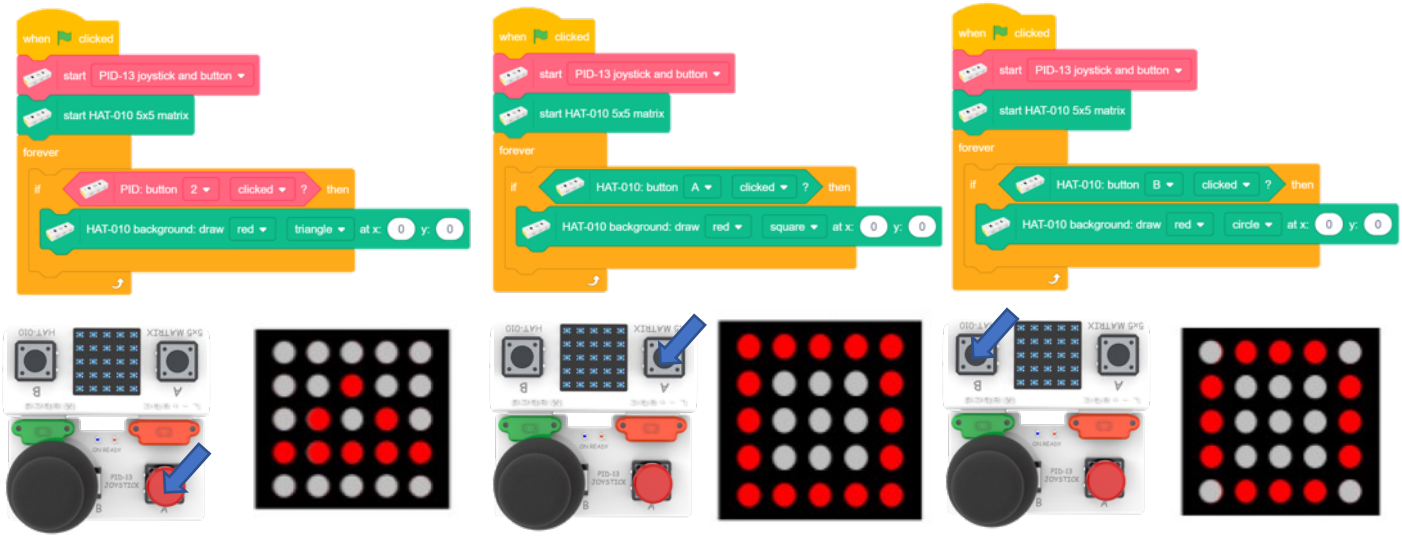
To program the joystick to give commands to the 5x5 LED Matrix, you need both



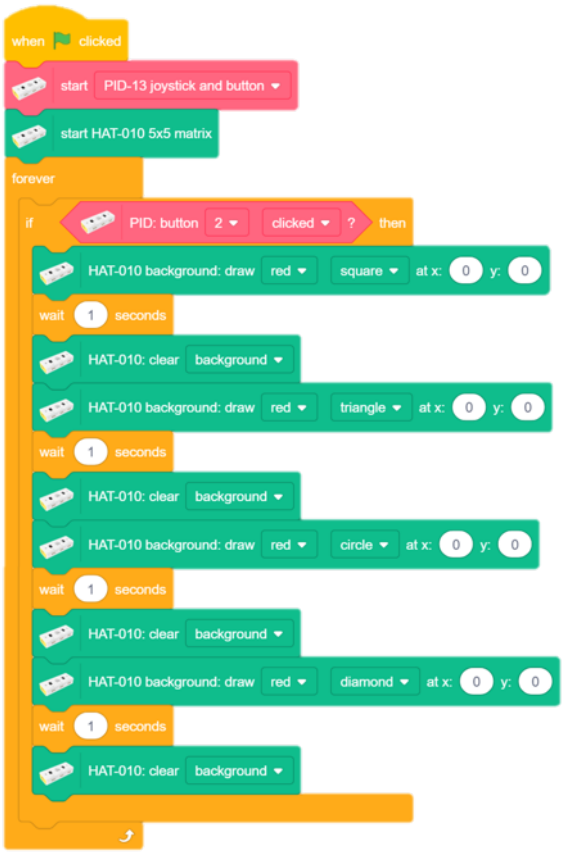


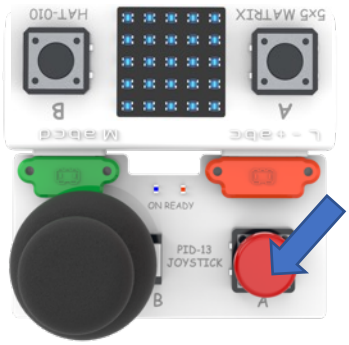
blocks.

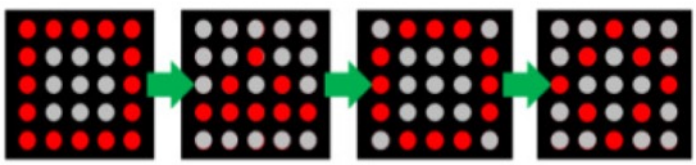
Let's program the joystick button and the 5X5 LED Matrix buttons to display various figures.



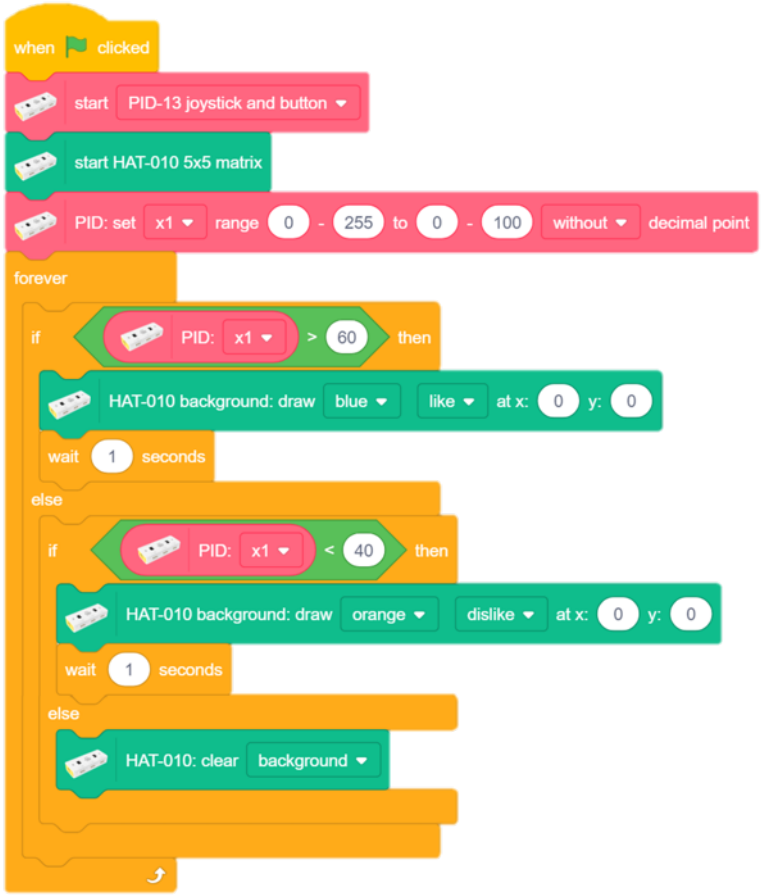
Let's program the joystick button to display various figures in the given order on the 5x5 LED Matrix.

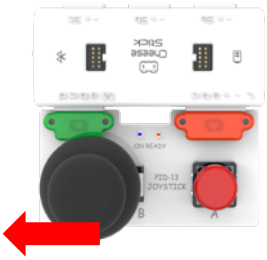


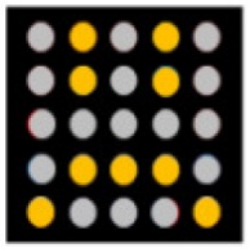


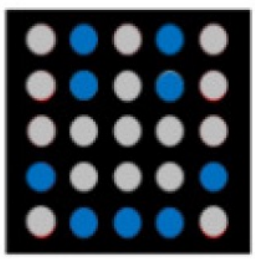


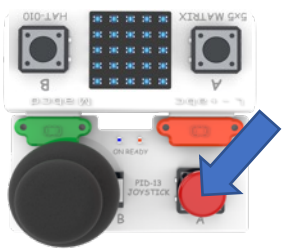
Let's program the joystick to display three facial expressions on the 5x5 LED Matrix.

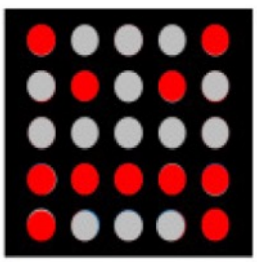




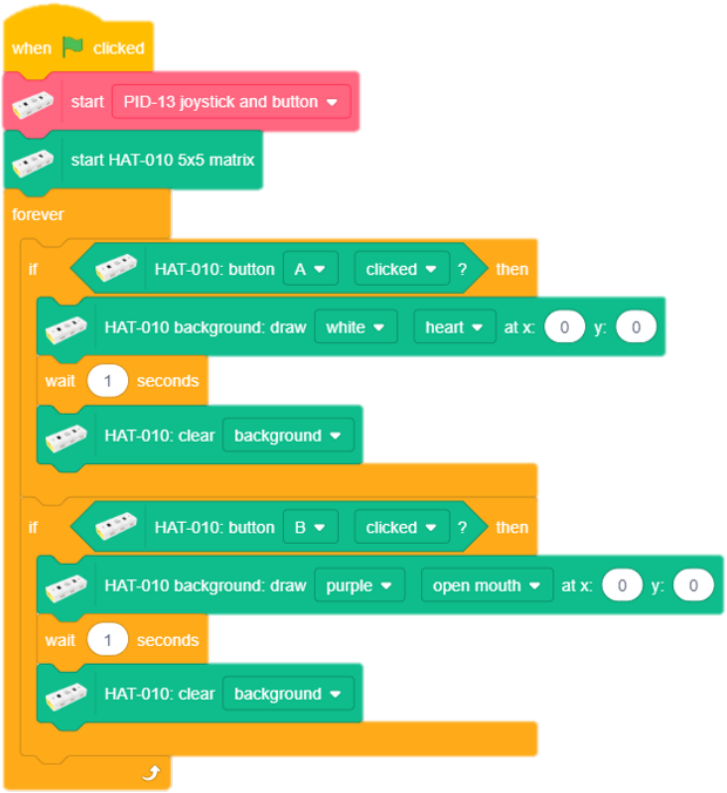


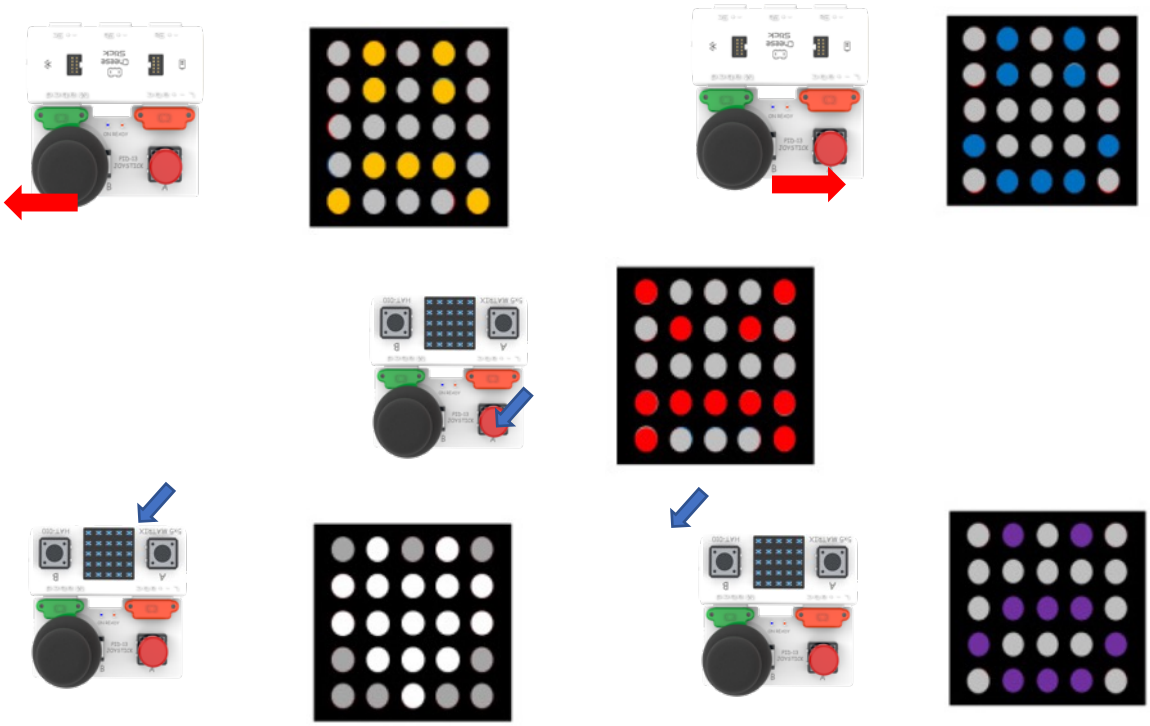






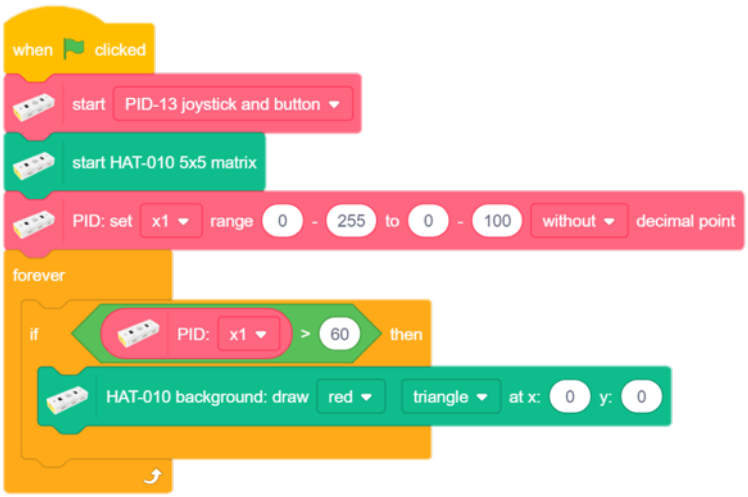
Let's give additional commands to the joystick to display five facial expressions on the 5x5 LED Matrix.

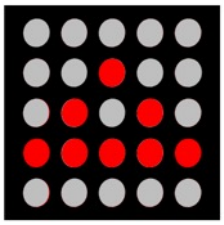




Let's review this chapter with the following assignments.

[Assignment 1] Enter the following commands. Check the figure displayed on the 5x5 LED Matrix.





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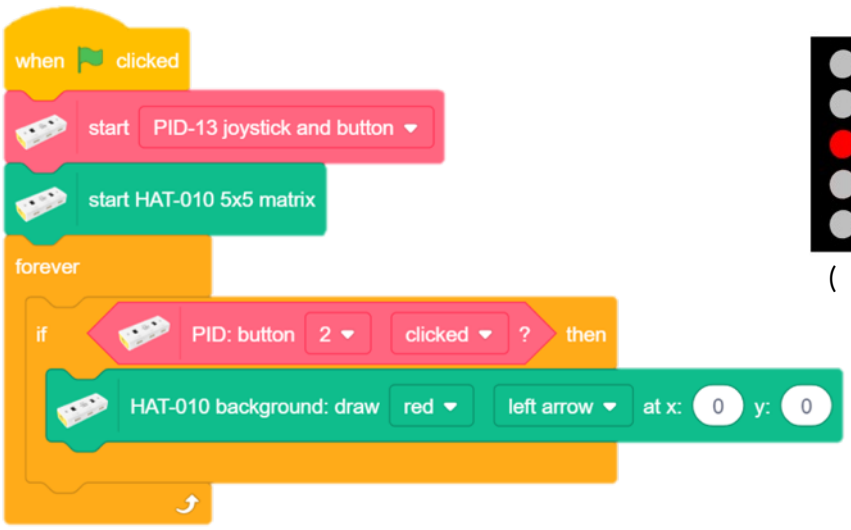
[Assignment 2] Enter the following commands and press the joystick button. Check the figure displayed on the 5x5 LED Matrix.



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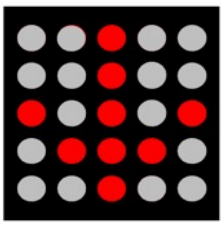

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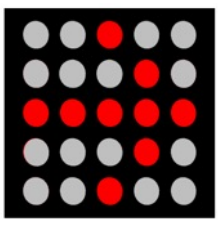

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[Assignment 3] You want to program the joystick and the 5x5 LED Matrix buttons to display five facial expressions on the LED Matrix. Check the command blocks you need for this.

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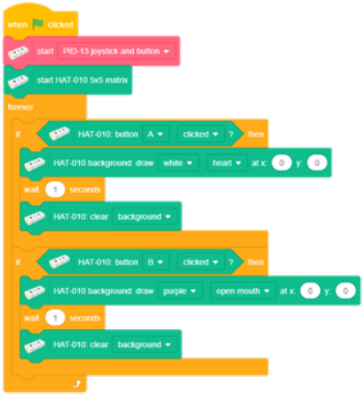

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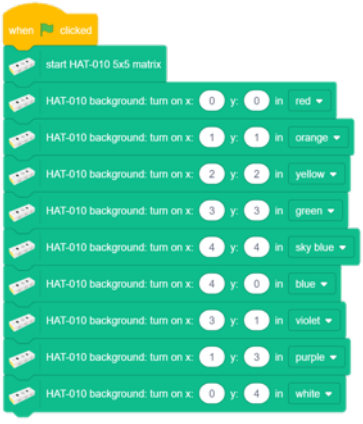

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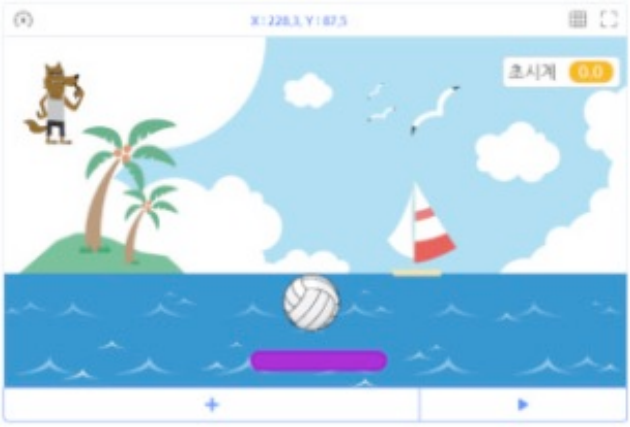
07 Making a Bouncing Ball Game

You can use the Cheese Stick and a potentiometer to make a bouncing ball game.

A potentiometer is a type of sensor that changes its value when you turn its knob. In this chapter, we will learn about a potentiometer and use it to program a bouncing ball game.

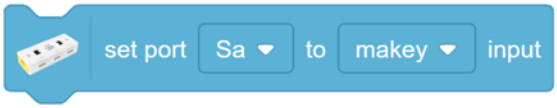


Let's get ready.

Potentiometer

Cheese Stick

Let's learn the blocks for this chapter.

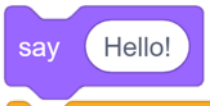


This block sets input and output devices of Sa, Sb, and Sc ports.

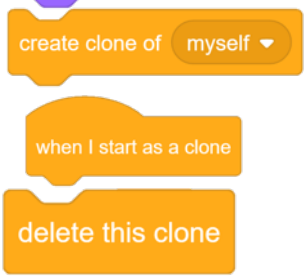
This block saves the input and output device values of Sa port.

This block changes the range of input and output device values of Sa port to the given range.

This block shows or hides the sprite.

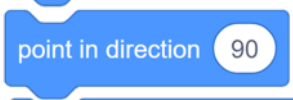


This block allows the sprite to speak through speech bubbles.

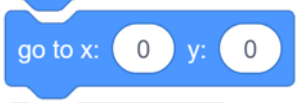


These blocks create and delete the sprite duplicates.

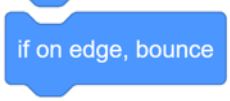
This block moves the sprite in the given direction.



This block rotates the sprite in the given direction.



This block moves the sprite to the given x- and y- coordinates.



This block bounces the sprite off the screen borders when it touches them.

This block generates a random number from the given range.

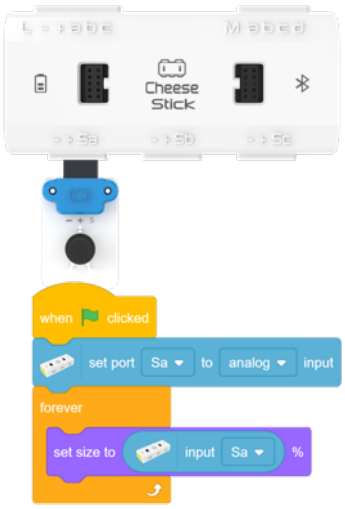
This block checks whether an sprite/Sprite touches the screen borders or other sprites.

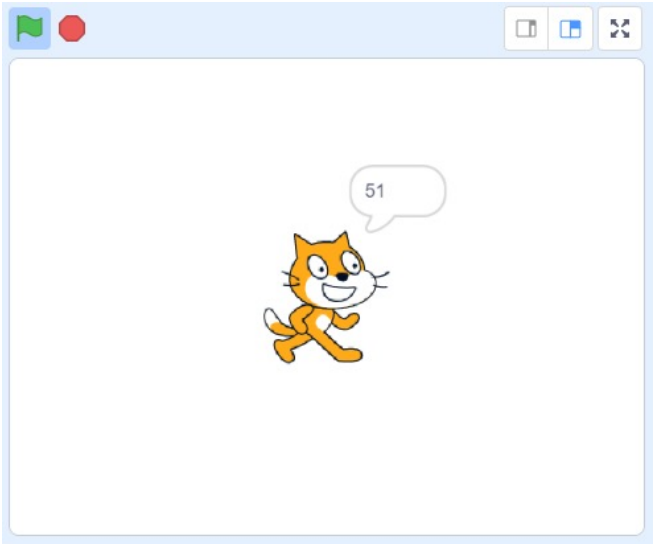
This block compares two values to run a command.

Let's connect a potentiometer to the Cheese Stick.

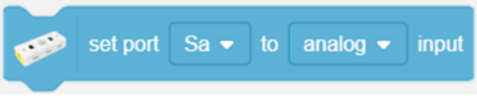
Plug the potentiometer into any of the three ports (Sa, Sb, or Sc) on the Cheese Stick. You can also plug it into L port in the following terminal order: -+a.

You can change the value of the potentiometer by turning its knob. Let's program the Scratch Cat to display the potentiometer value. Play with the knob and observe changes in the value.





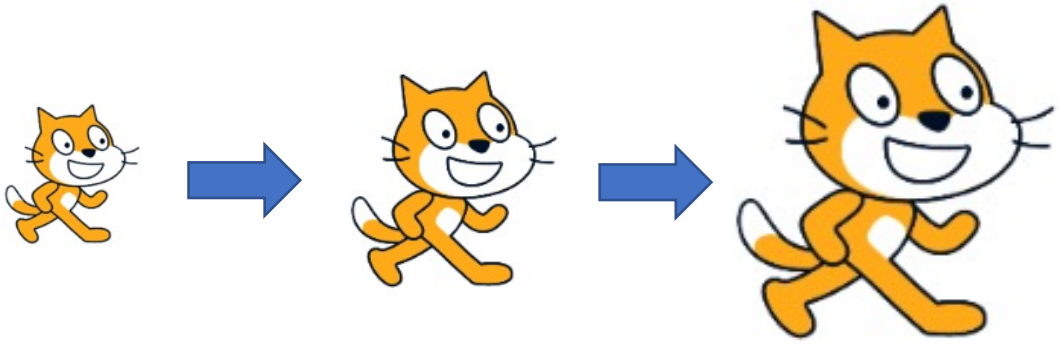
A potentiometer is an analog input device. To use this device, you need



block.

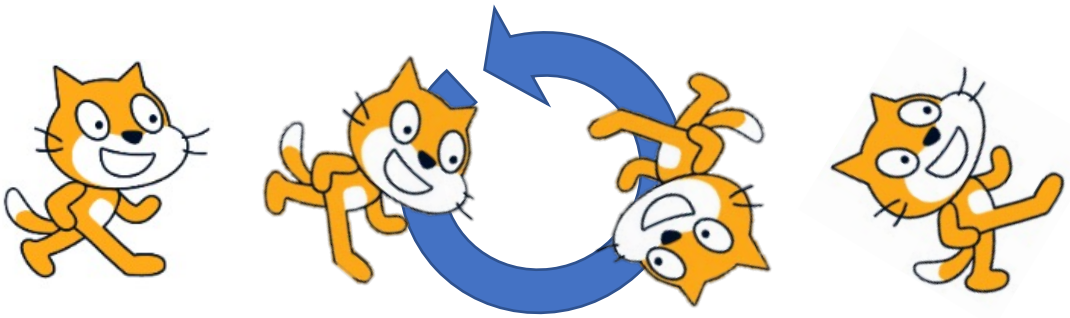
[Practice Assignment 1]

Program the potentiometer to enlarge and reduce the size of the Scratch Cat.

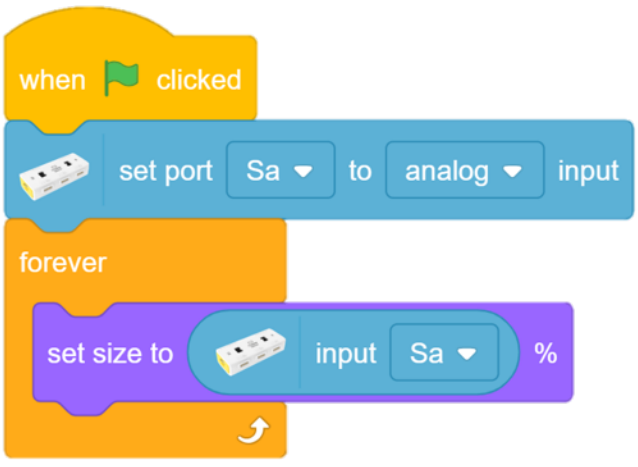


[Practice Assignment 2]

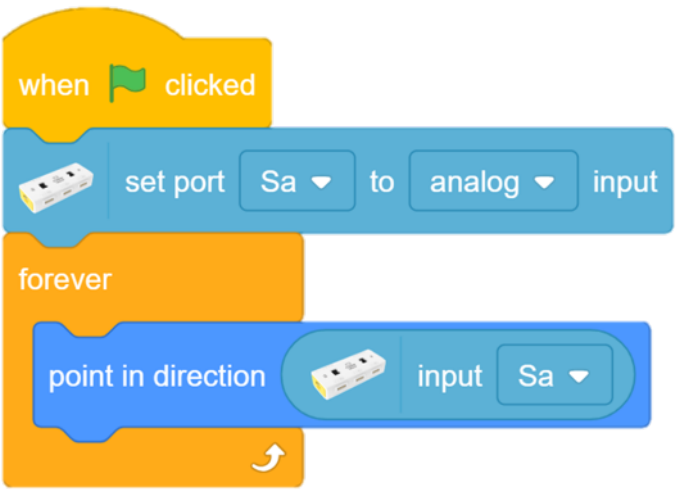
Program the potentiometer to rotate the Scratch Cat.



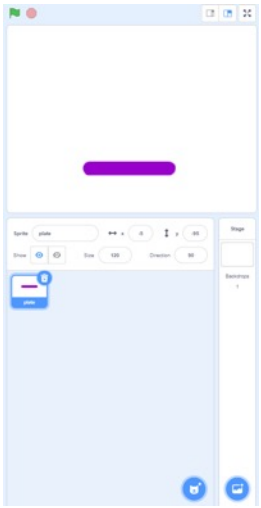
[Practice Assignment 1]



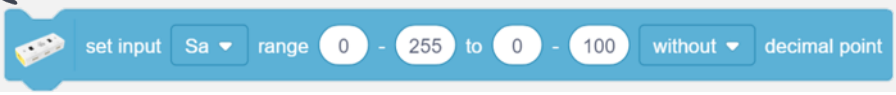
[Practice Assignment 2]



Let's program a bouncing ball game. First, make a bar that moves as you turn the knob of the potentiometer. Add the [board] sprite and enter additional commands.

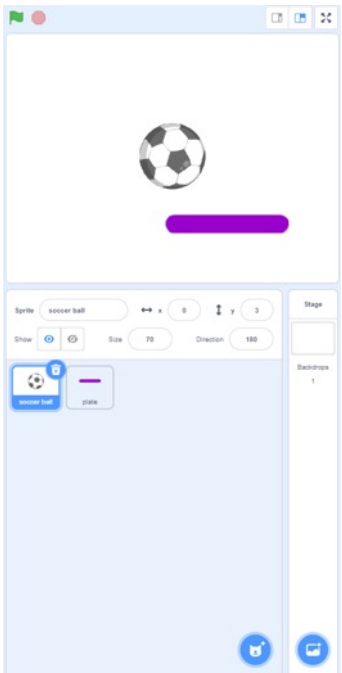


The potentiometer values are between 0 and 1023. But to make a ball bounce, the x-coordinate has to be between -240 and 240. Therefore, you need

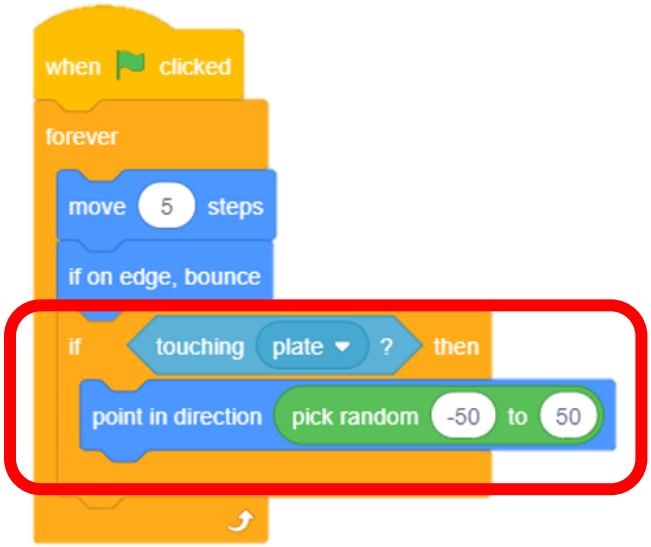


block to change range of the potentiometer value.

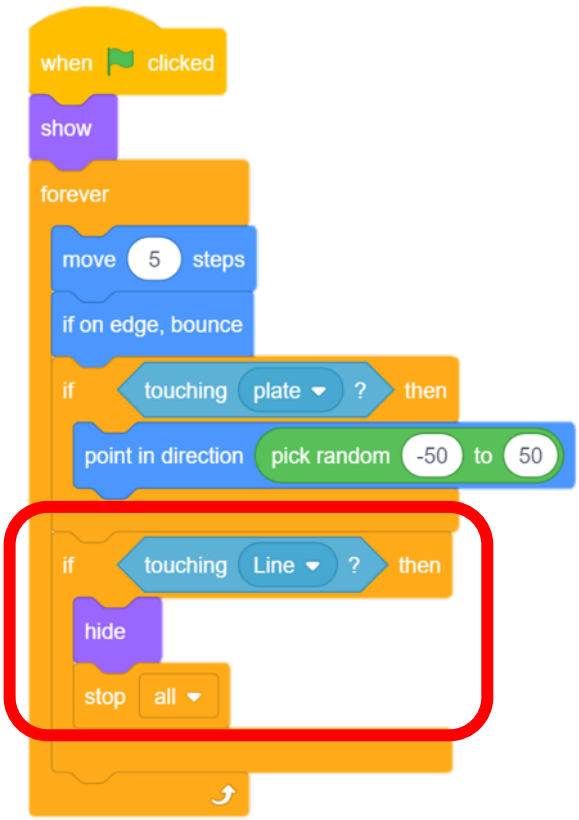
Add the [ball] sprite. Then, let's program it to move with the sprite. Let's also program it to bounce off the screen borders when it touches them.

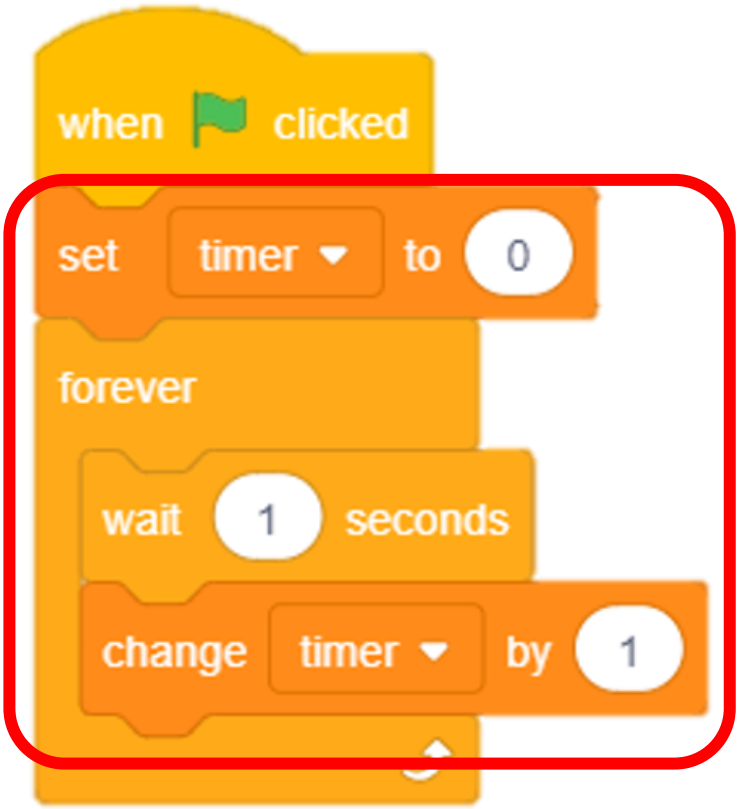


It's not much fun if the ball only bounces up and down, is it? Let's program it to bounce in random directions when it touches the [Board] sprite.

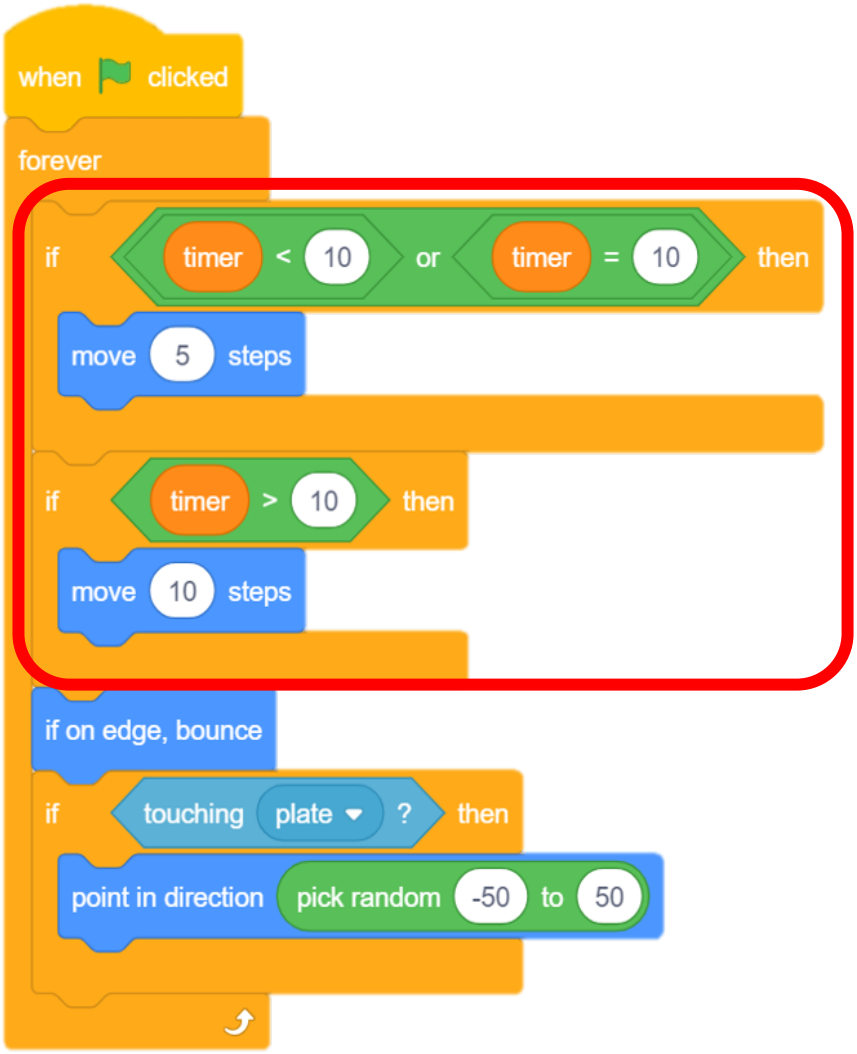


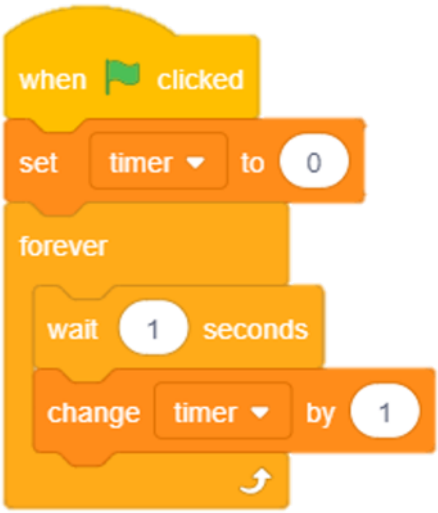
Let's first program the timer to start. Then, program the timer to stop and the ball to disappear when the ball touches the screen borders.





Let's add a little challenge to the game. Program the ball to move slowly in the first ten seconds then increase its speed.



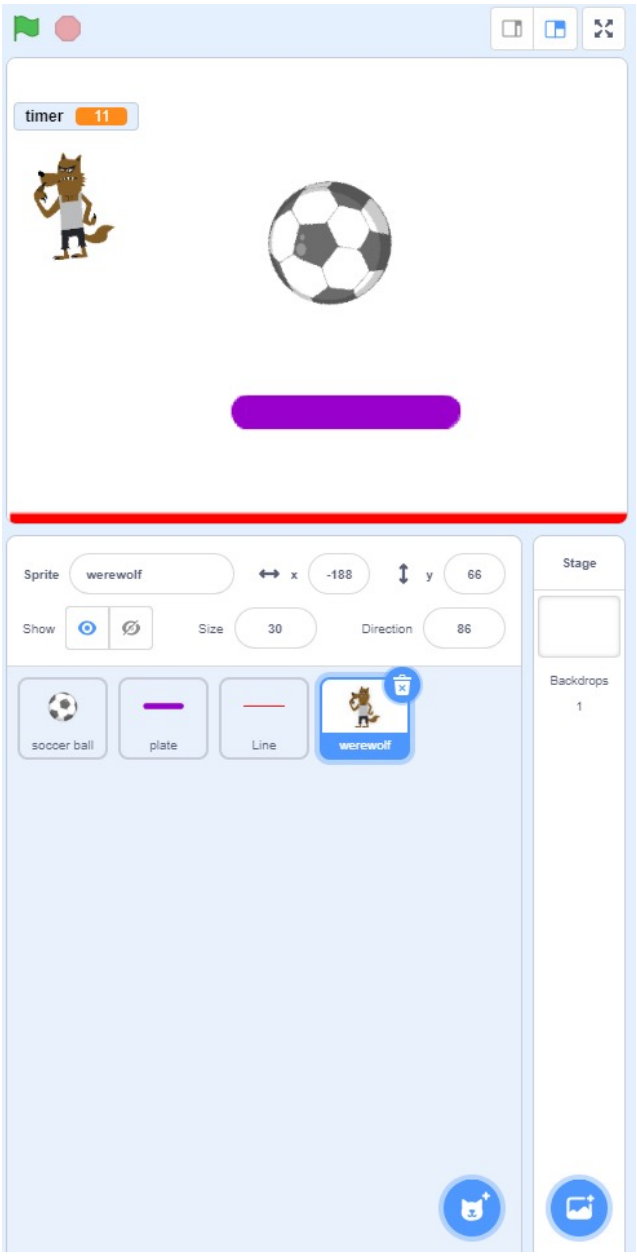


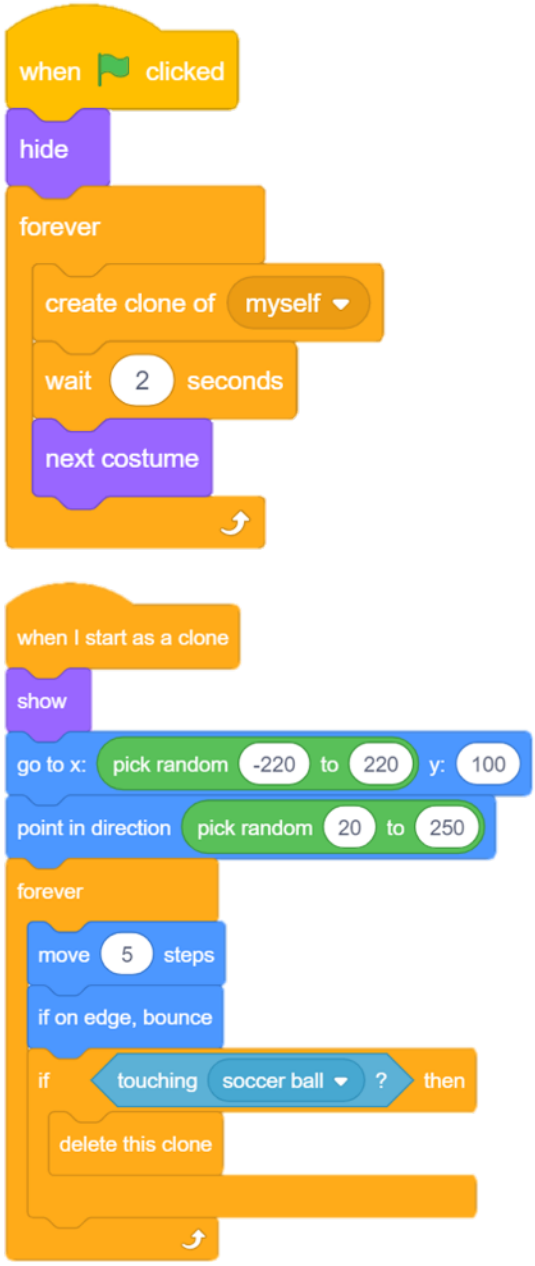
You can make the timer variable to change the speed of the ball. Let's program the ball to move at the speed of 5 in the given direction for the first 10 seconds and double its speed after 10 seconds. Try changing the time and the speed of the ball.

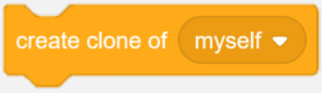
my variable block is under the Variables tab,

and 10 > 10 block is under the Operators tab.

Catching a monster with the bouncing ball would add some extra fun. Add the [Werewolf] sprite. Then, program the werewolf to disappear when the bouncing ball touches it.



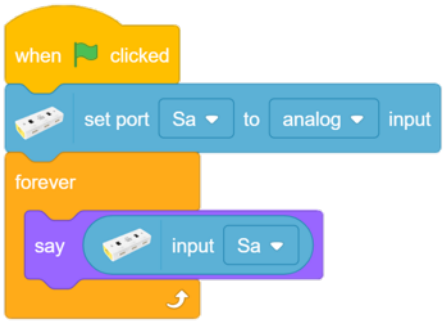


You need  block to program the monster to pop up on the screen.

Think about the function of each command block.

Let's review this chapter with the following assignments.

[Assignment 1] Connect the potentiometer as shown below and enter the following commands. Check what the ScratchCat displays on the screen.



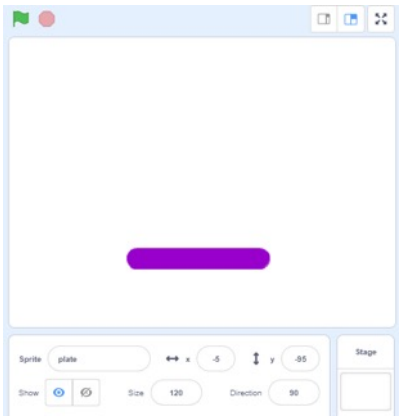
① Potentiometer value

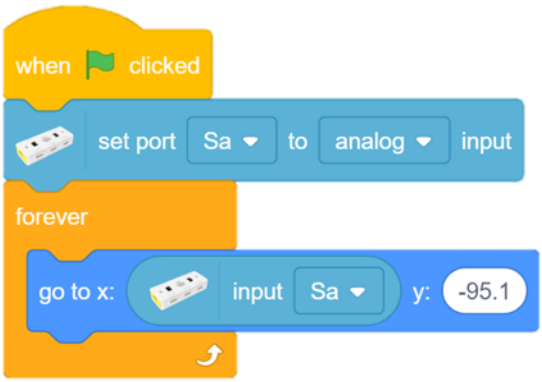
② Scratch Cat's angle of rotation

③ Size of the Scratch Cat

④ Battery of the Cheese Stick

[Assignment 2] You programmed the [Board] sprite to move as you change the potentiometer value. Check the problem that might occur when you enter the commands as shown below.





① The board would not move.

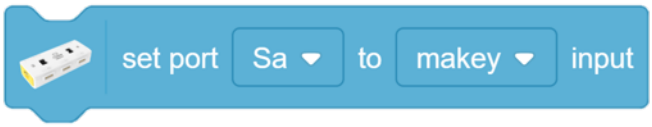
② The board would move up and down.

③ The board would go out of the screen.

④ The board would move slowly.

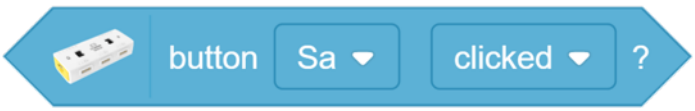
[Assignment 3] You want to change the range of your potentiometer value. Check the block you need for this.

( )



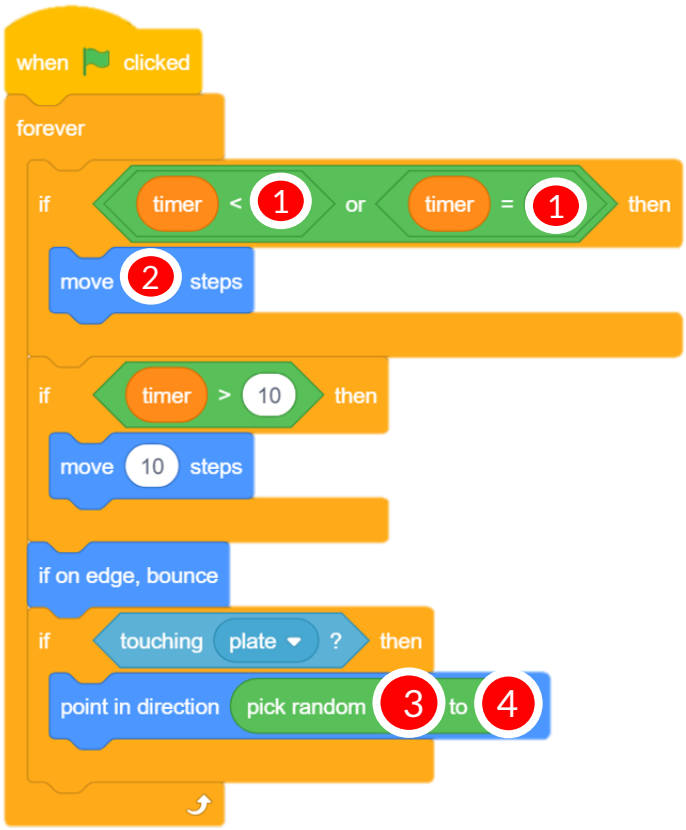
( )

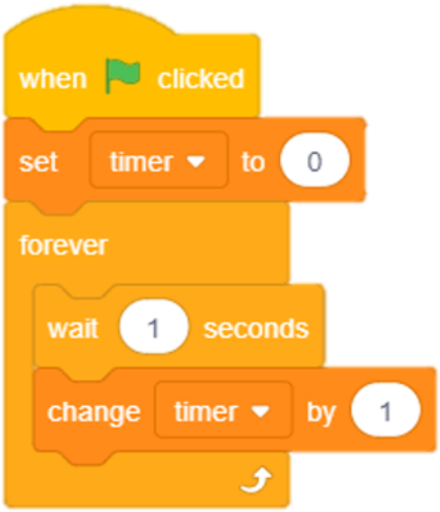
( )



( )

[Assignment 4] You want to control the speed of the ball in a bouncing ball game. Check the block you need to change for this.





08 Adjusting the Brightness of a Lamp

With a potentiometer and an LED, you can make a lamp and adjust its brightness.

Let's program a potentiometer and an LED to make a lamp with adjustable brightness.

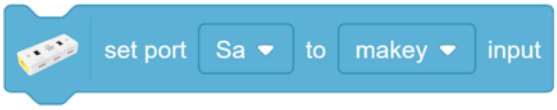
Let's get ready.

Potentiometer

LED

Cheese Stick

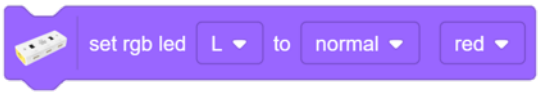
Let's learn the blocks for this chapter.



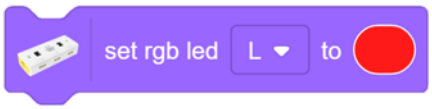
This block sets input and output devices of Sa, Sb, and Sc ports.

This block saves the input and output device values of Sa port.

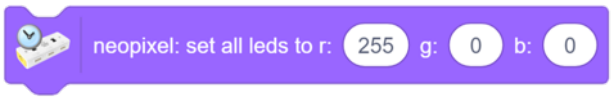
This block changes the range of input and output device values of Sa port to the given range.



This block sets the color and brightness(dark, standard, and bright) of the LED.

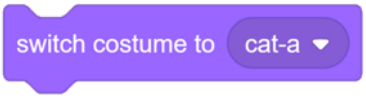


This block sets the LED color by adjusting the brightness(luminance), saturation, and color(hue).



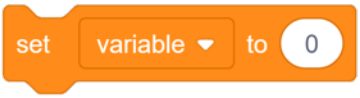
This block changes the LED color by adjusting the RGB value.

This block allows the sprite to speak through speech bubbles.



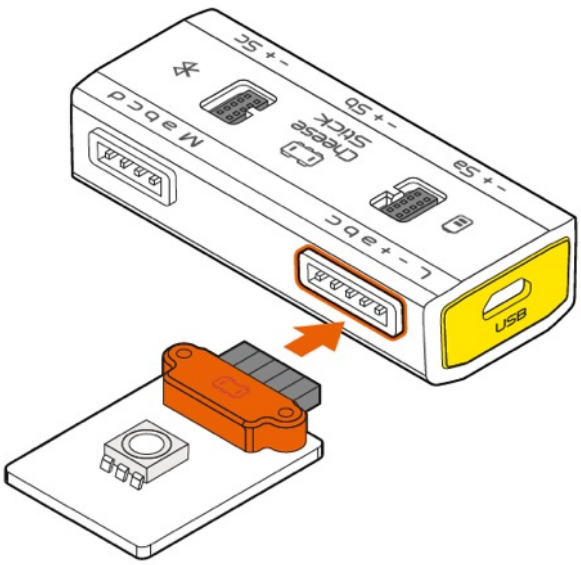
This block changes the Sprite's motions.

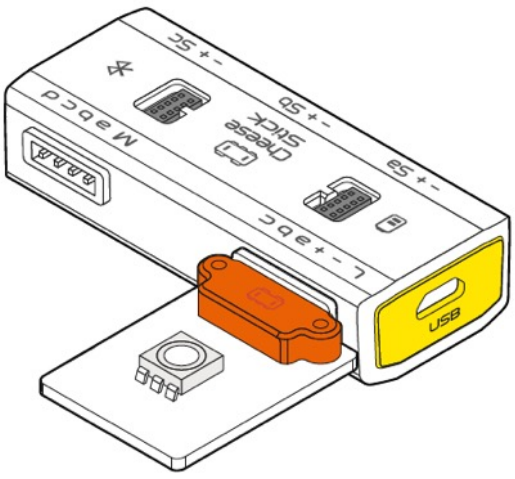
This block compares two values to run a command.



This block assigns a value to the variable.

Let's connect the potentiometer and the LED to the Cheese Stick. Plug the potentiometer into Sa port and the LED into L port.

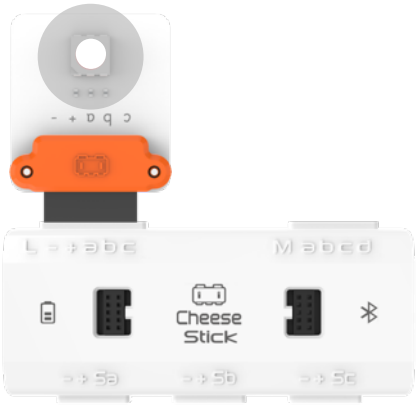


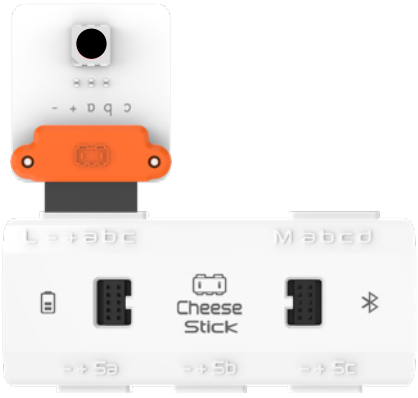


Exposures to high-intensity LED light can hurt your eyes. Keep the LED at low intensity or cover the LED with a paper cup.

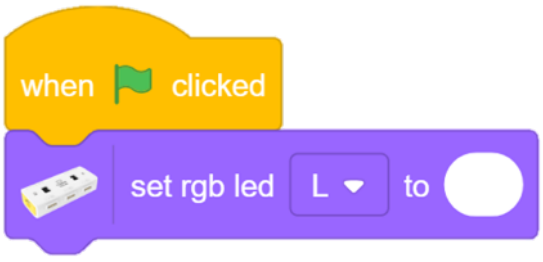
[Practice Assignment 1] Let's program the LED to light up white.

[Practice Assignment 2] Let's program the LED to blink white.

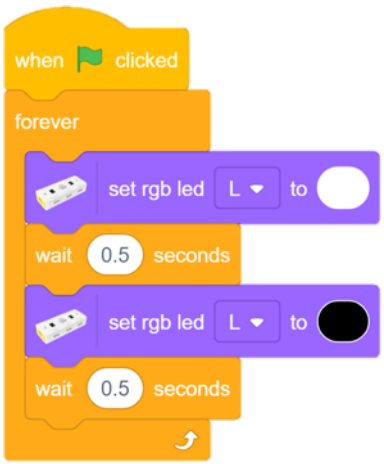




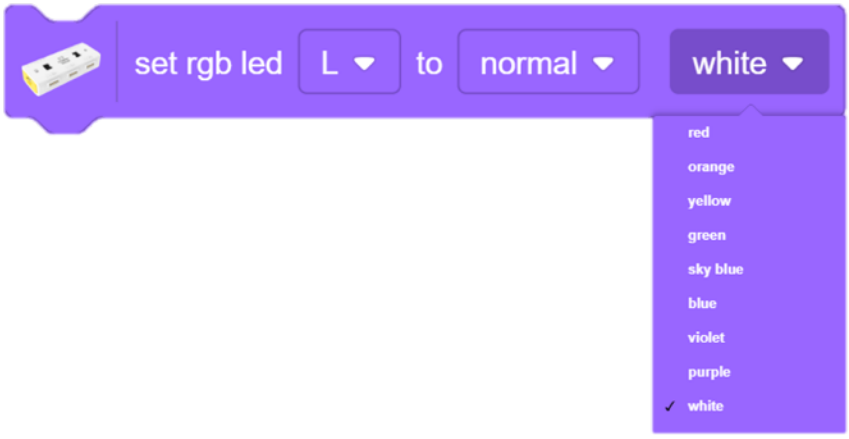
Practice Assignment 1

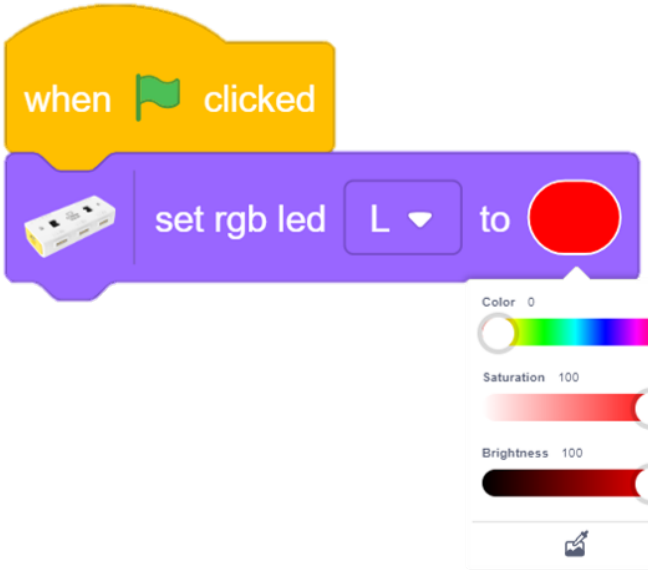


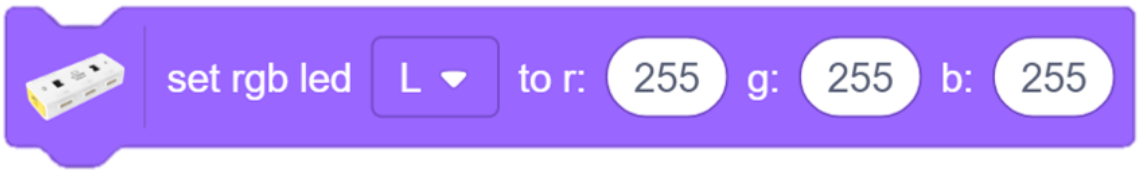
Practice Assignment 2



Let's learn different ways of programming the LED to light up white.

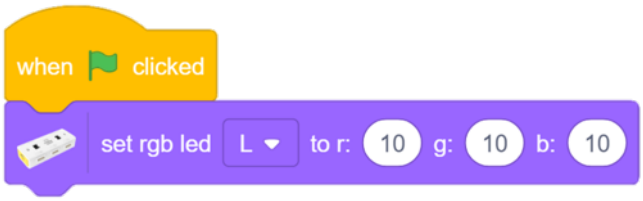


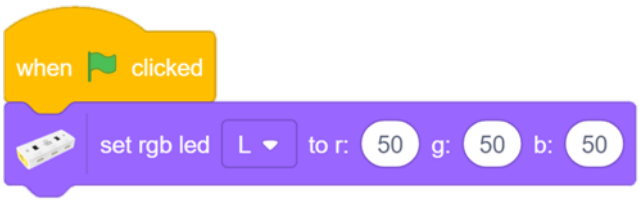


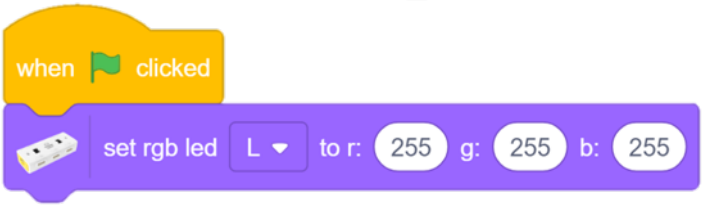


Adjust the brightness of the R, G, and B to create different colors. Entering the same value for R, G, and B produces white. Each of the three colors has a minimum value of 0 and a maximum value of 255.

Let's enter commands to set the LED color to white and adjust its brightness.

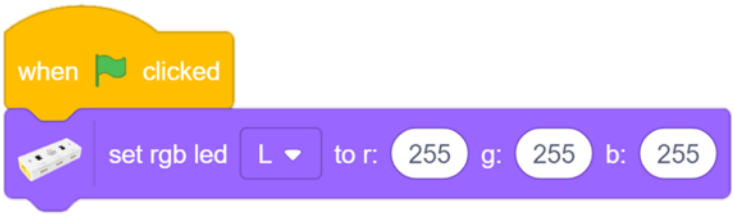




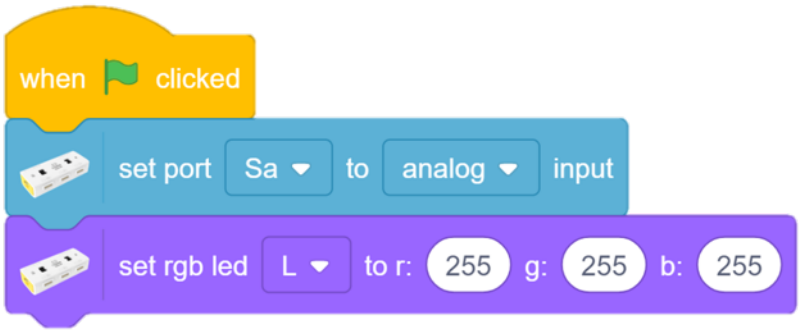


Try entering the same value for R, G, and B and observe how the same white light gets brighter as you enter greater numbers.

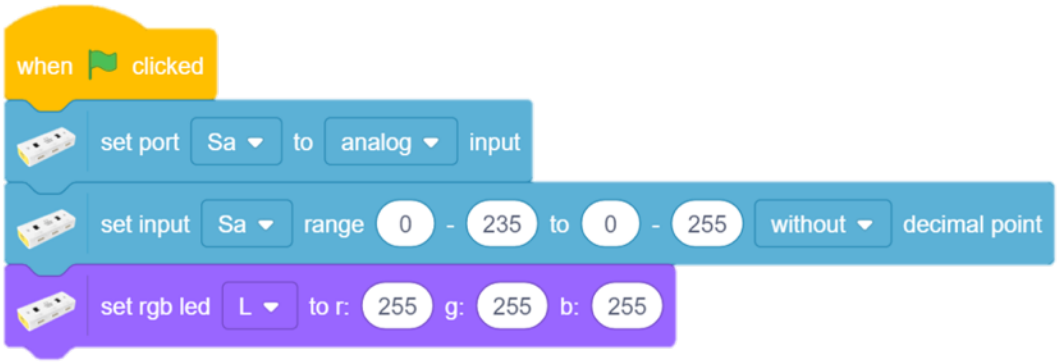
Let's add the [Lamp] sprite and program the LED to light up white.



Let's program the LED to change its light intensity when you turn the potentiometer's knob. Give commands to the LED to take the potentiometer values.

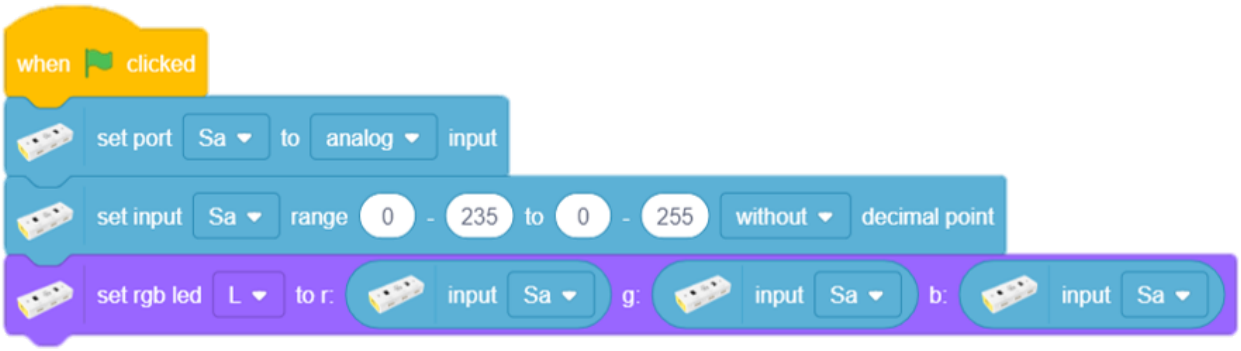


Change the range of the potentiometer values to the range of the RGB values.

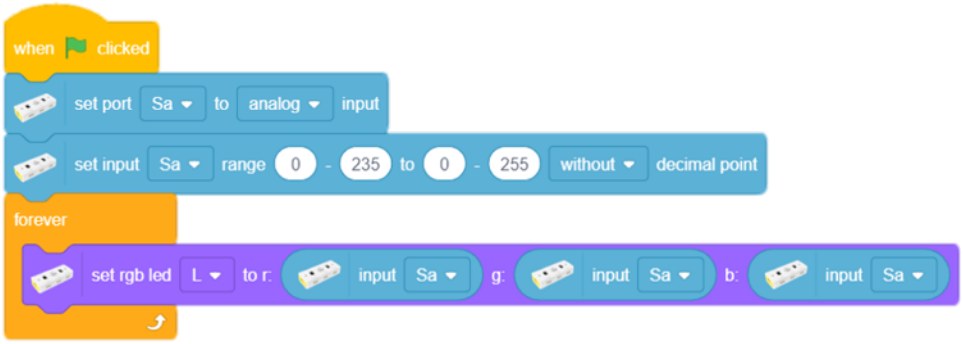


Potentiometer and RGB values range from 0 to 1023 and from 0 to 255, respectively. Therefore, the range of the potentiometer values has to be adjusted to fit the range of the RGB values.

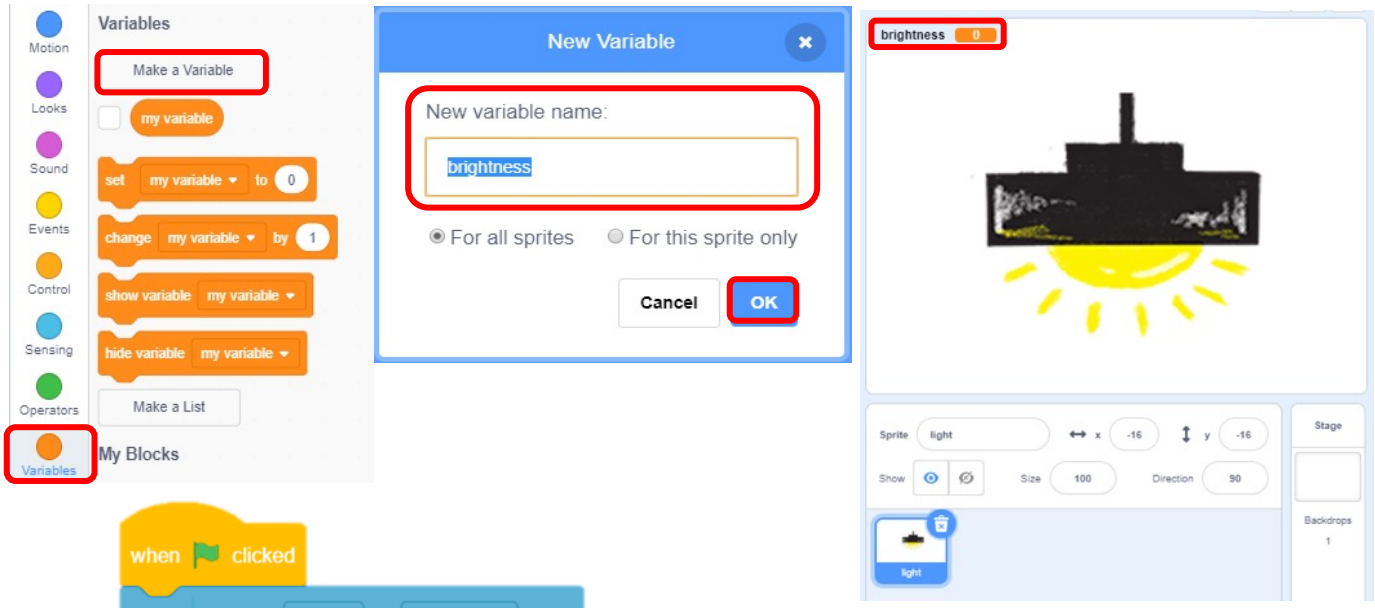
Program the potentiometer value to be entered in the RGB LED block.

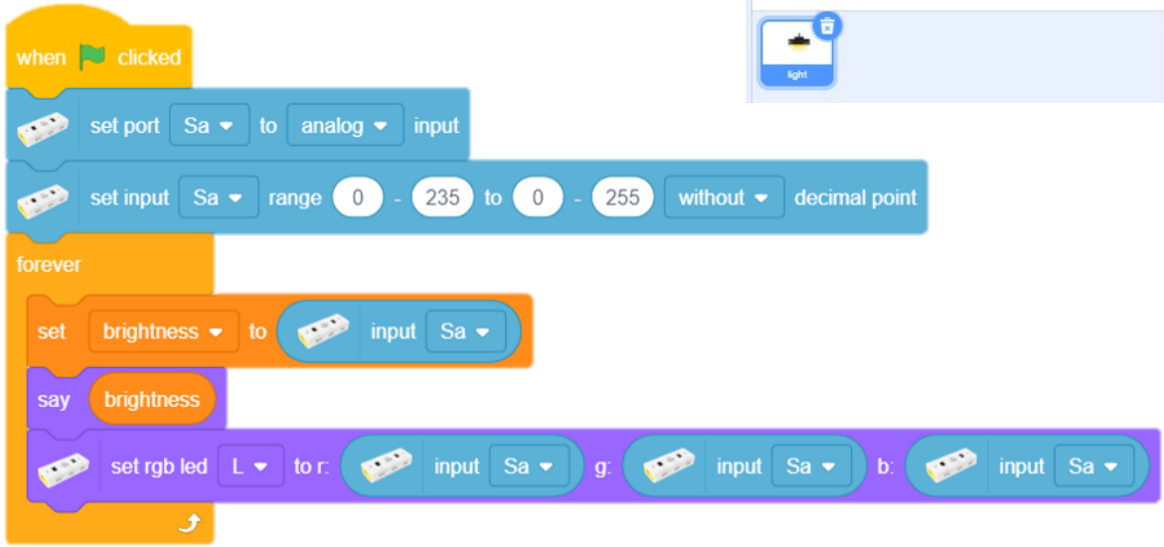


Let's use [Repeat] block to continue adjusting the brightness.

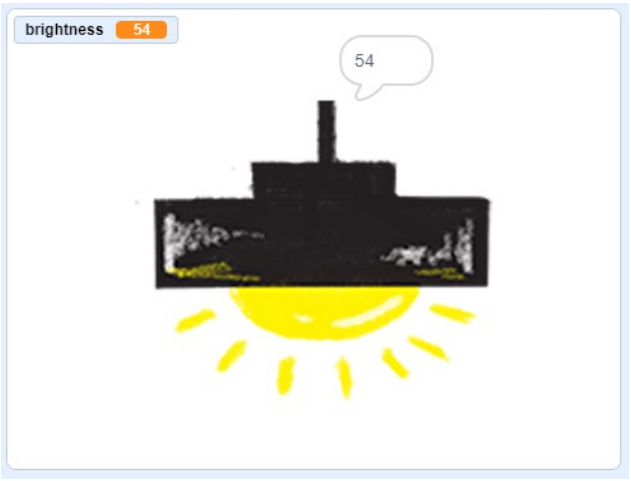


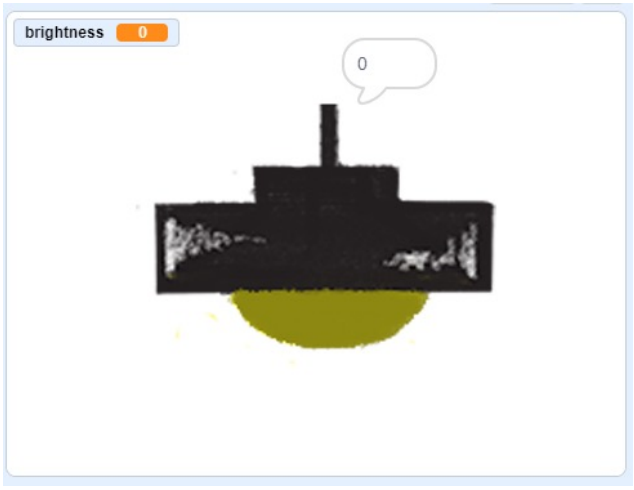
Let's display the brightness level on the screen. Create a variable and name it brightness.

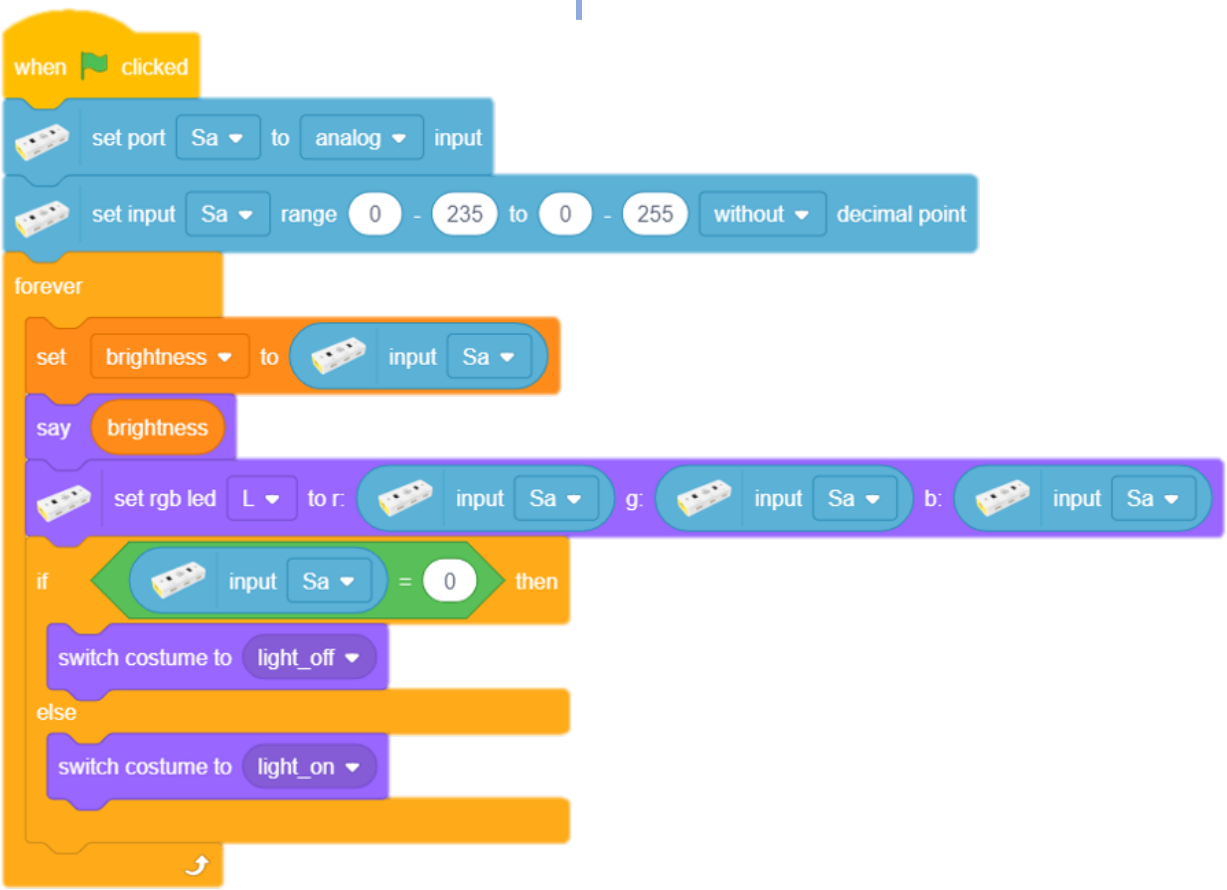




Let's program the lamp to turn on and off on the screen.



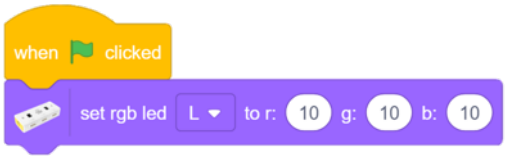


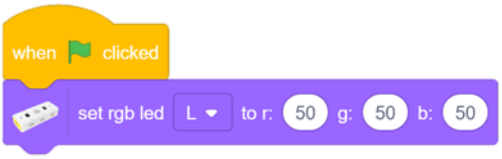


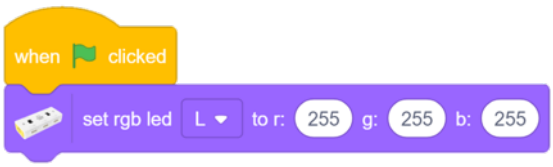
See how the lamp brightens and dims depending on the value of the potentiometer. The lamp is off when the potentiometer value is 0.

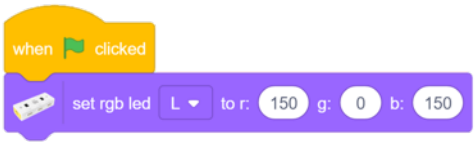
Let's review this chapter with the following assignments.

[Assignment 1] Check the command that does not program the LED to light up white.

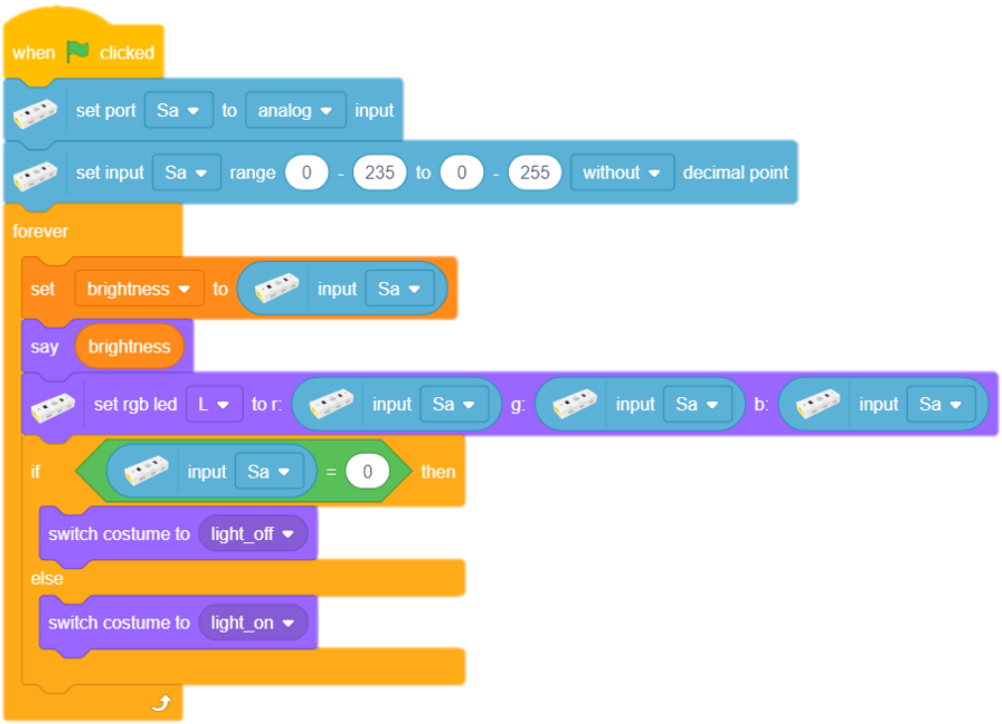
① 

③ 

③ 

④ 

[Assignment 2] You want to program the LED to light up white and adjust its brightness with the potentiometer. You ran the program as shown below but were unable to adjust the brightness. Figure out which block you need to change to fix this problem.



09 Making Paper Cups Dance

You can use a potentiometer, a servo motor, and paper cups to make dancing paper cups.

You can make fun toys with a potentiometer and a servo motor. Let's program paper cup characters to dance.

Source : http://sblog.i-scream.co.kr/platon1026/168?sso=ok#none

Let's get ready.

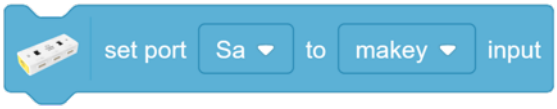
Potentiometer

Servo Motor

Paper Cup

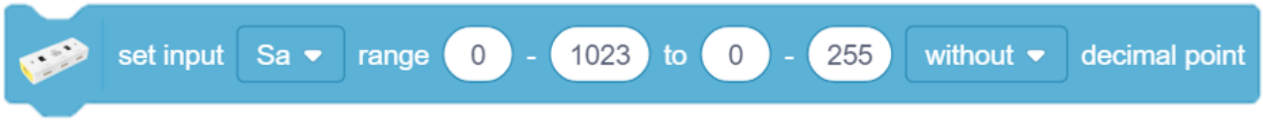
Cheese Stick

Let's learn the blocks for this chapter.



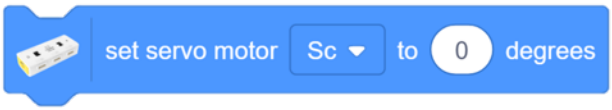
This block sets input and output devices of Sa, Sb, and Sc ports.

This block saves the input and output device values of Sa port.



This block changes the range of input and output device values of Sa port to the given range.

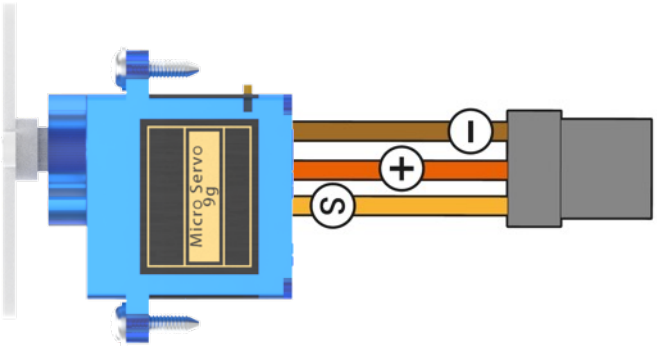
This block allows the sprite to speak through speech bubbles.

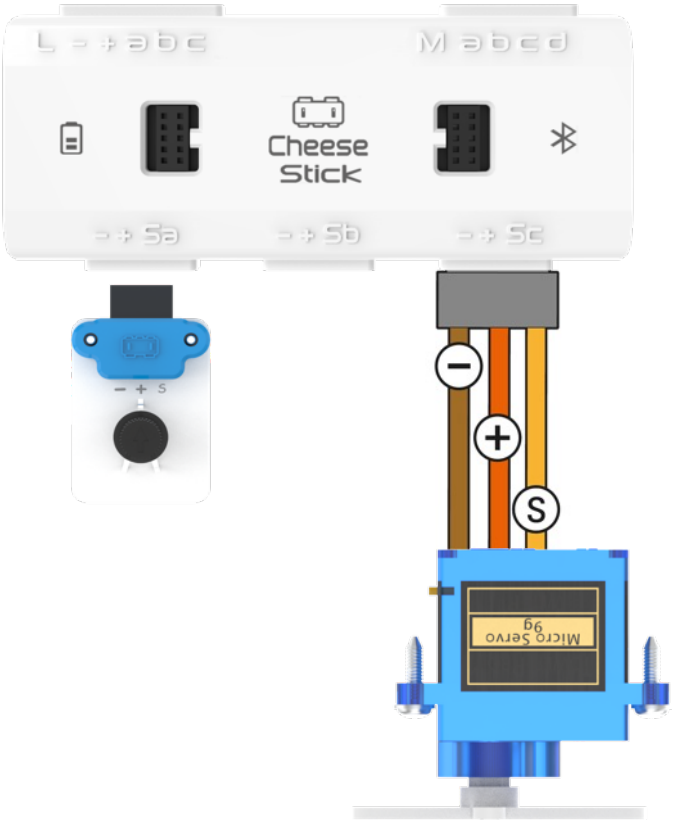


This block sets the angle of a servo motor.

This block pauses the program for the given number of seconds before running the next block.

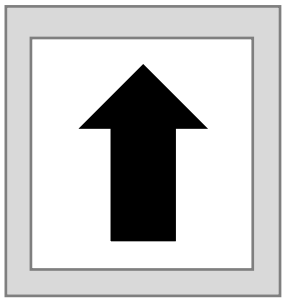
Let's connect the potentiometer and servo motor to the Cheese Stick.

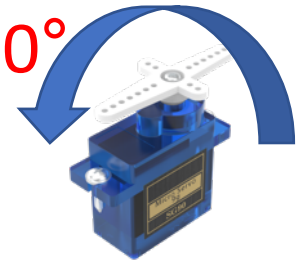


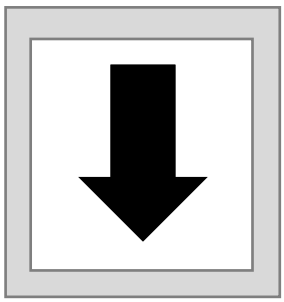


Connect the servo motor to one of the three S ports. Check the servo motor's cable colors before plugging it into the Cheese Stick. Using multiple servo motors can lead to a power shortage and cause the servo motor to malfunction.

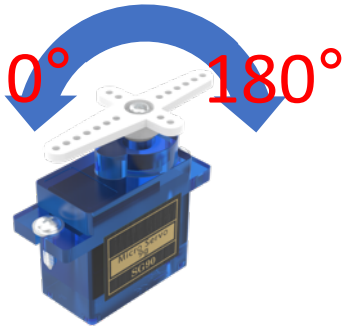
[Practice Assignment 1] Let's rotate the servo motor. Program it to rotate by 0 degree when you press the upward arrow and by 180 degrees when you press the downward arrow.





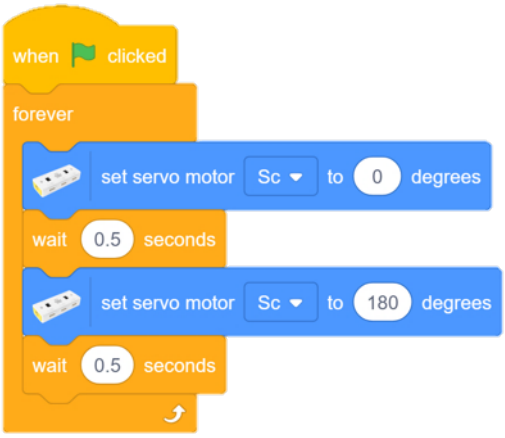


[Practice Assignment 2] Let's program the servo motor to repeat its rotation between 0 and 180 degrees.

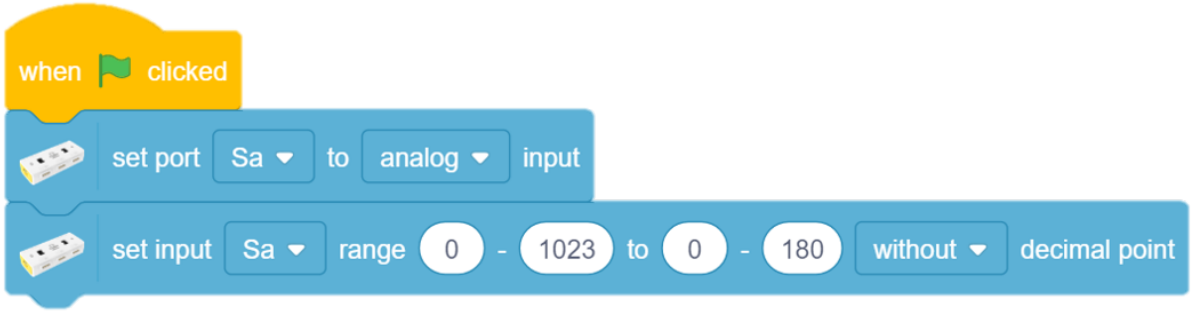


[Practice Assignment 1]

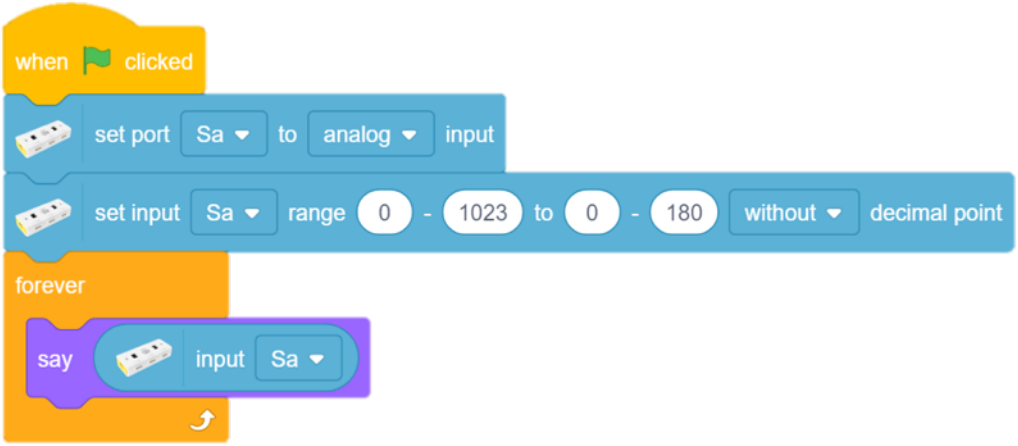
[Practice Assignment 2]



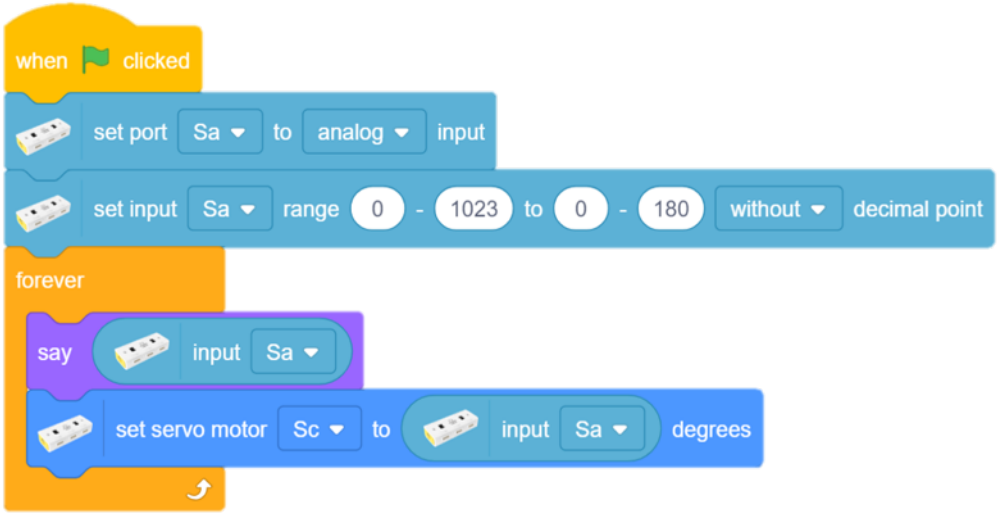
Change the range of the potentiometer values to the range of the servo motor values.



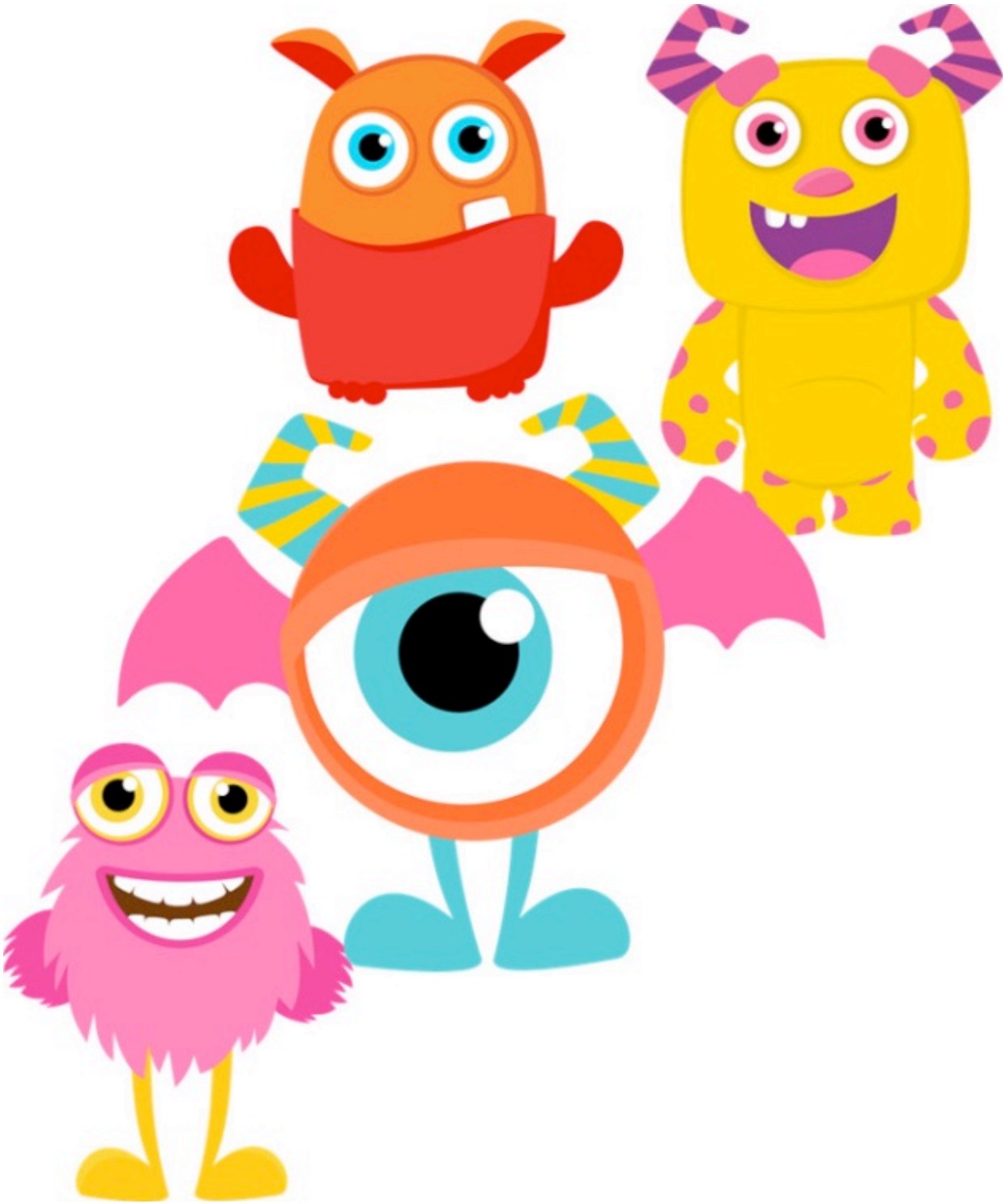
Enter the following commands to display the changed value of the potentiometer.



Enter the following commands to set the servo motor's angle to the potentiometer value.

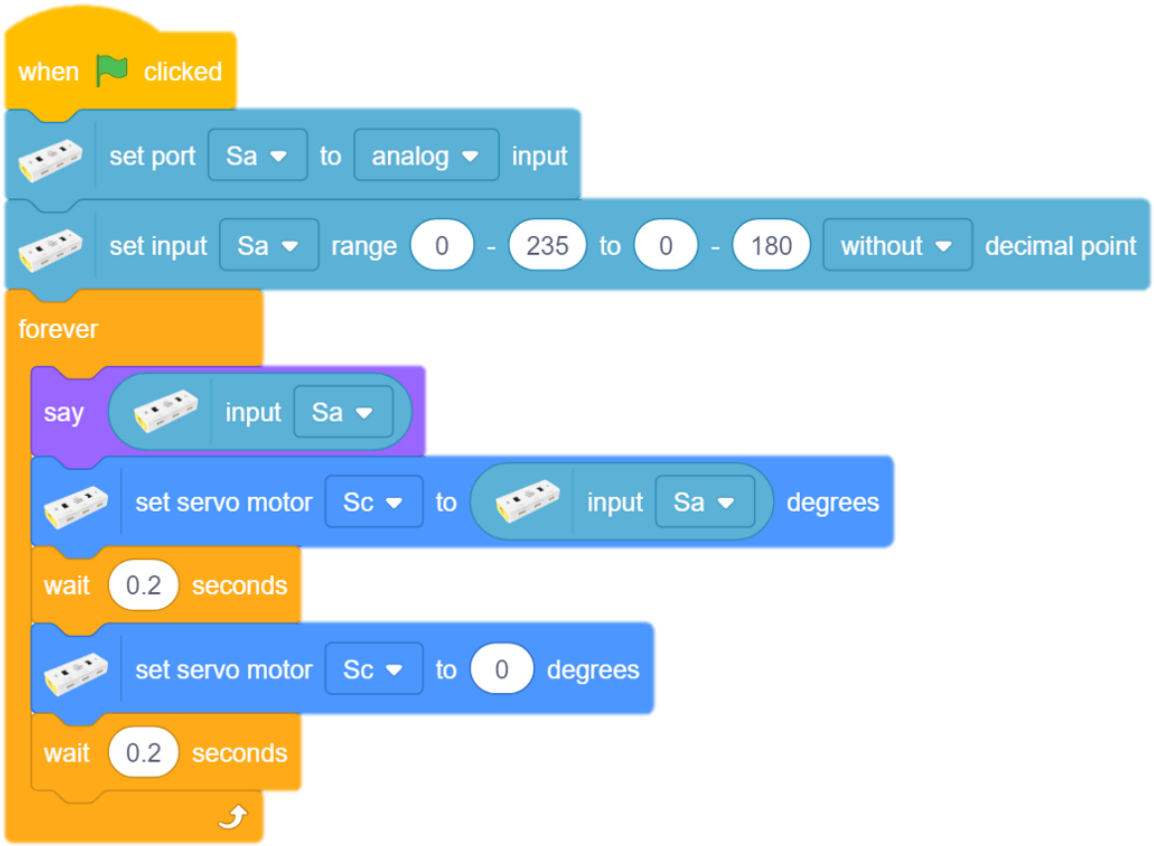


Let's make toys with paper cups. Feel free to use the images in the <Appendix>.



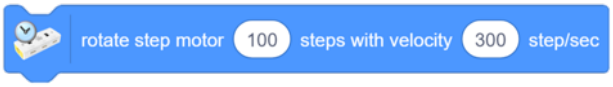
Let's connect the servo motor to the paper cup toy and run the program.

Let's program the servo motor to have small or large rotation angles depending on the potentiometer value.

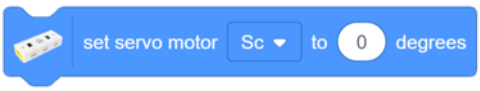


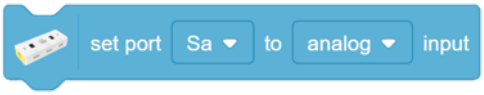
Let's review this chapter with the following assignments.

[Assignment 1] You want to change the range of your input sensor values to a different range. Check the command block you need.

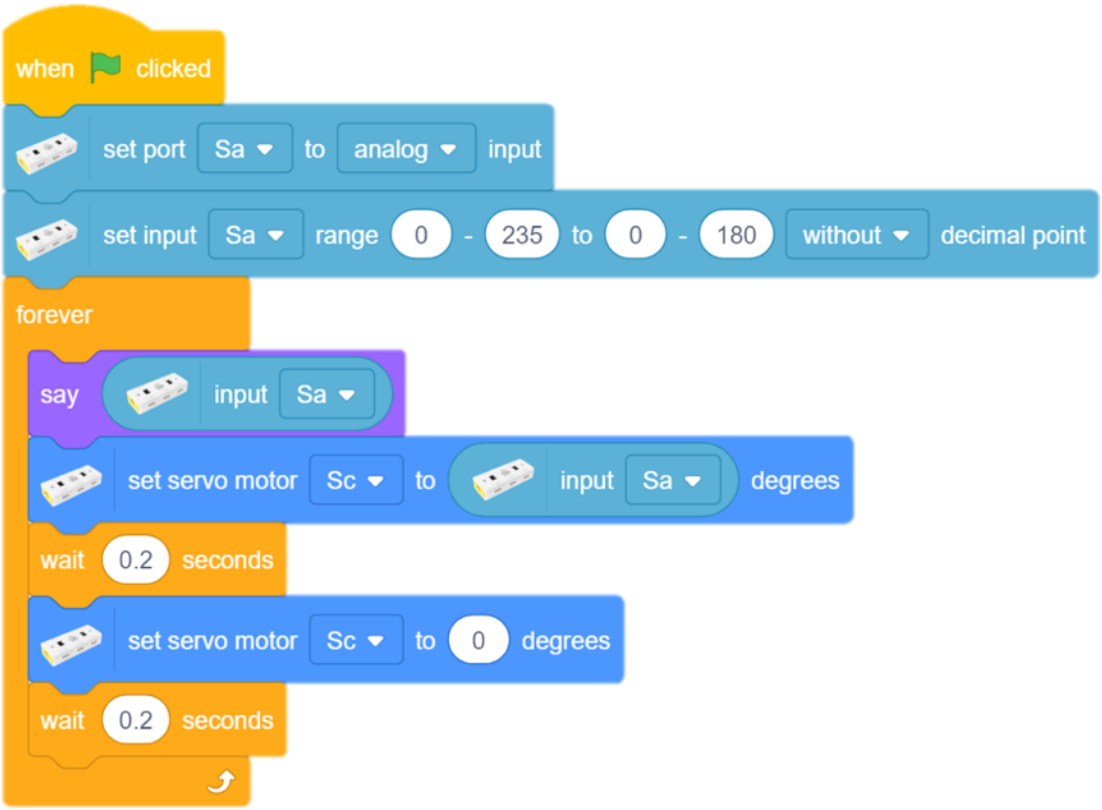
① 

② 

③ 

④ 

[Assignment 2] You want to increase the rotational speed of the servo motor. See the following commands and figure out which block needs to be changed.



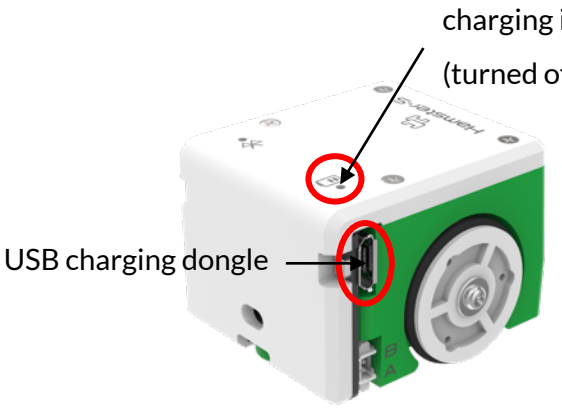
10 Learning about the Hamster Robot

You can connect the Hamster Robot to your computer and use it to program.

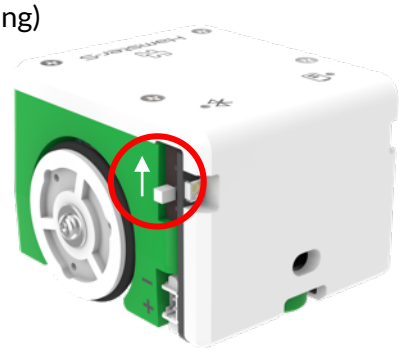
Let's learn about the Hamster Robot.

It can program 10 sensors, 2 LEDs, and 2 DC motors.

Charge the Hamster Robot and turn on the power button.

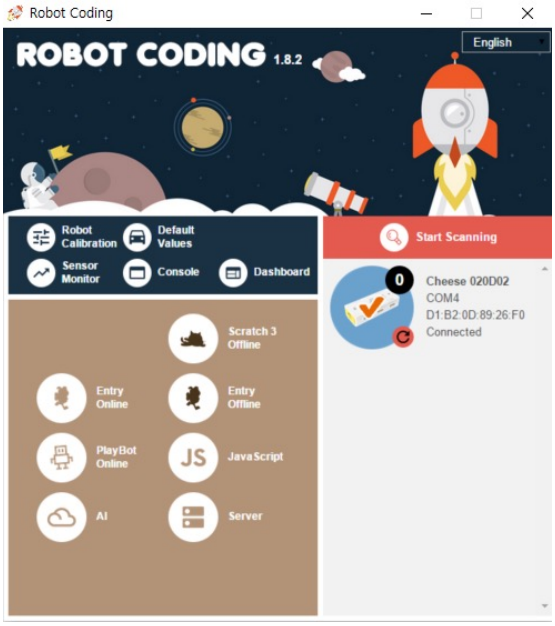


Use a micro USB cable to charge.



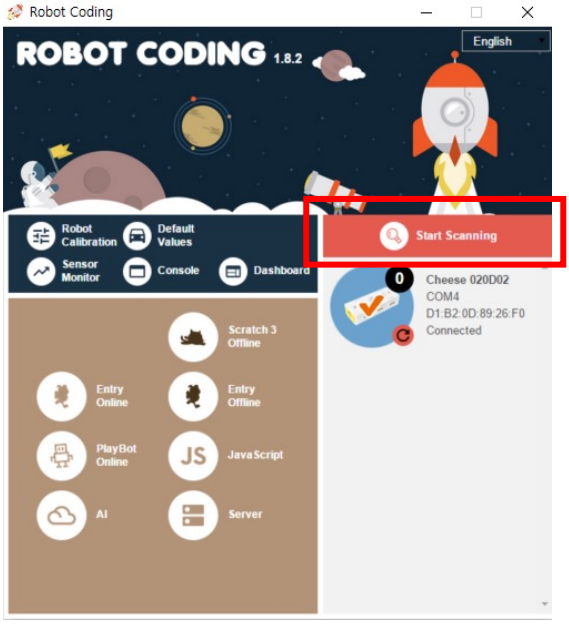
Turn on the power by flipping up the switch and off by flipping down.

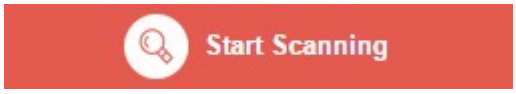
Let's connect the Cheese Stick and the Hamster Robot to the Scratch.



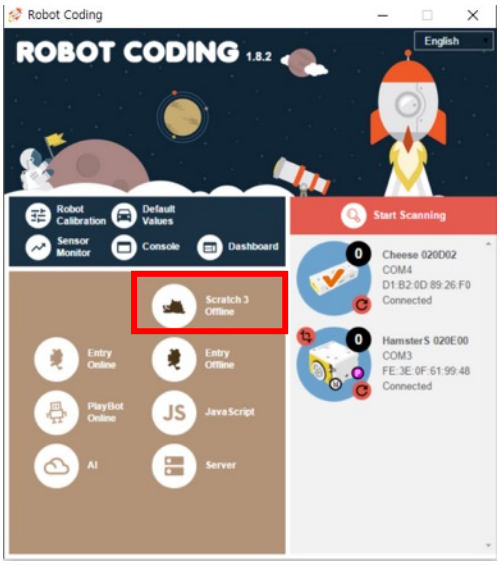
Connect the Cheese Stick to your computer using the Robot Coding software.

Plug another USB dongle into your computer and turn on the Hamster Robot.

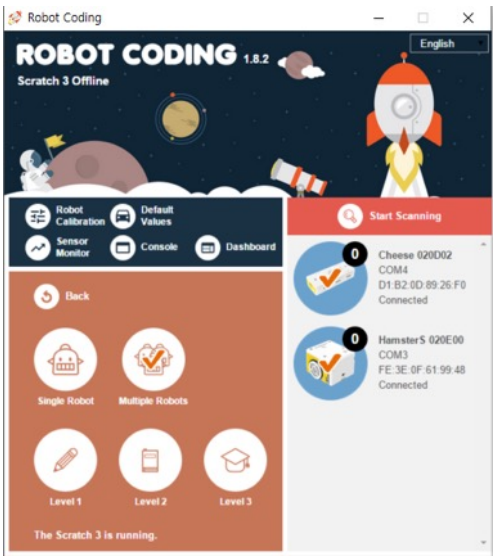


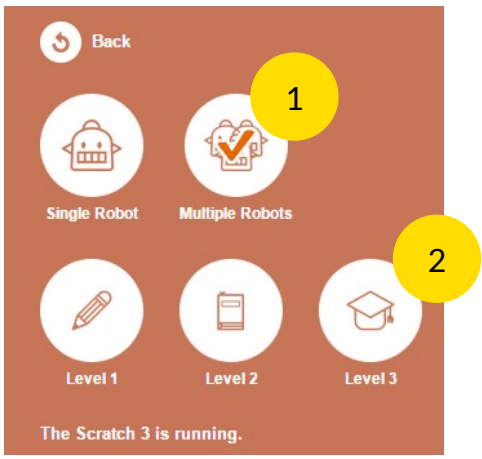


Click [Start Scanning].

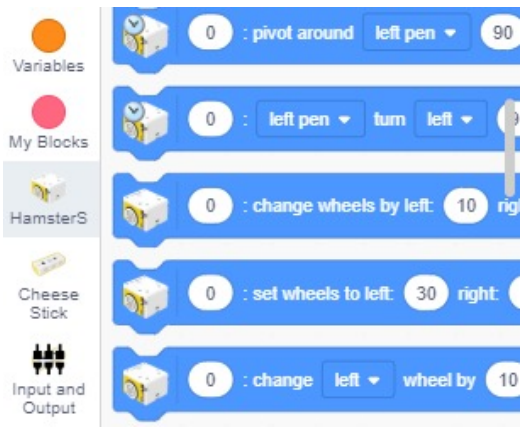


Once the Cheese Stick and the Hamster Robot are connected to the Scratch Cat, click [Scratch 3 Offline].



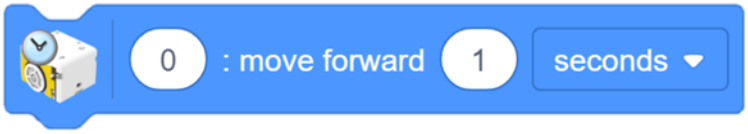


Click [Multi-Robots] then [Level 3].

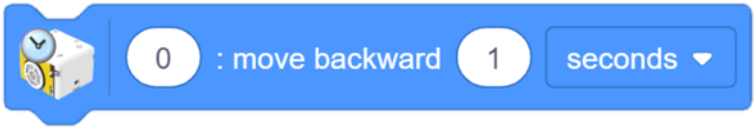


Check that both [Cheese Stick] and [HamsterS] tabs are created.

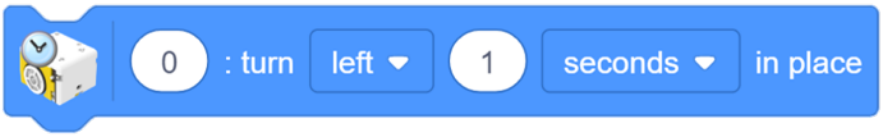
Let's learn the blocks for this chapter.



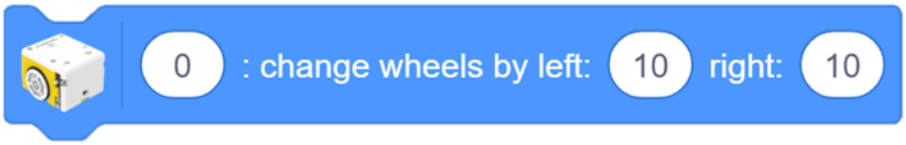
This block moves the Hamster forward for 1 second.



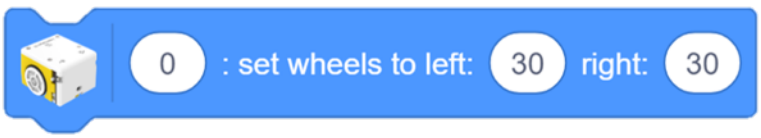
This block moves the Hamster backward for 1 second.



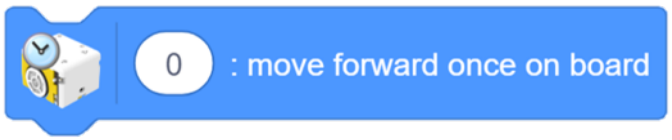
This block turns the Hamster left(right) for 1 second.

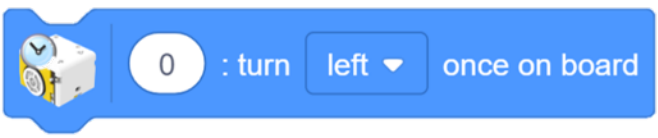


This block changes the speed of the Hamster's wheels. Positive numbers move the Hamster forward and negative numbers backward.



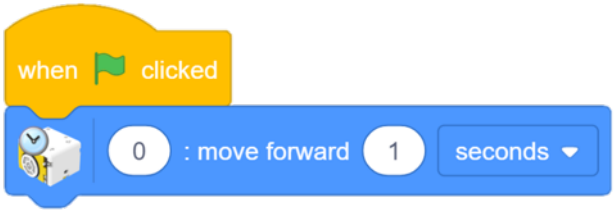
This block sets the speed of the Hamster's wheels. Positive numbers move the Hamster forward and negative numbers backward.

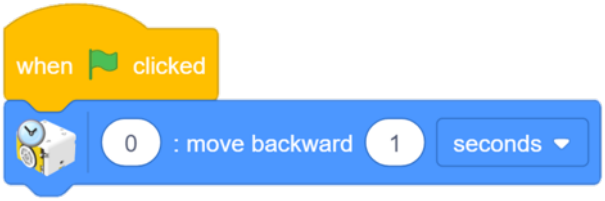


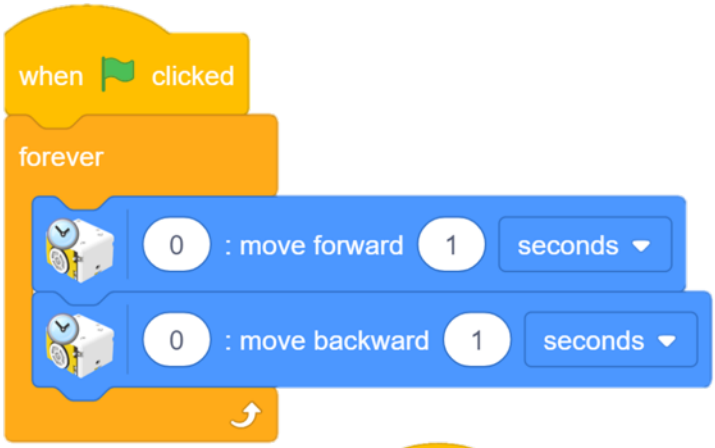


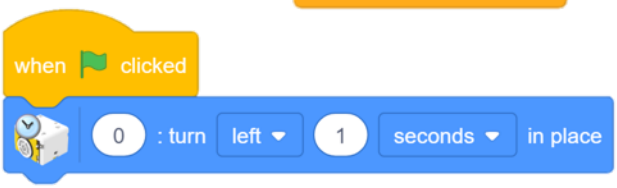
The Hamster is programmed to recognize one block as the distance between two dots on black grid lines. You can draw a grid with a marker or sharpie.

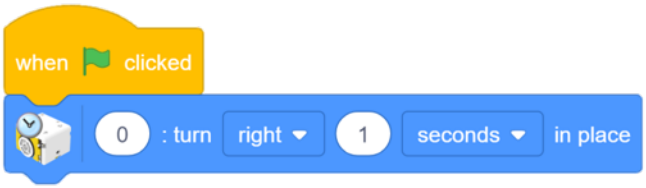
Let's program the Hamster to move.



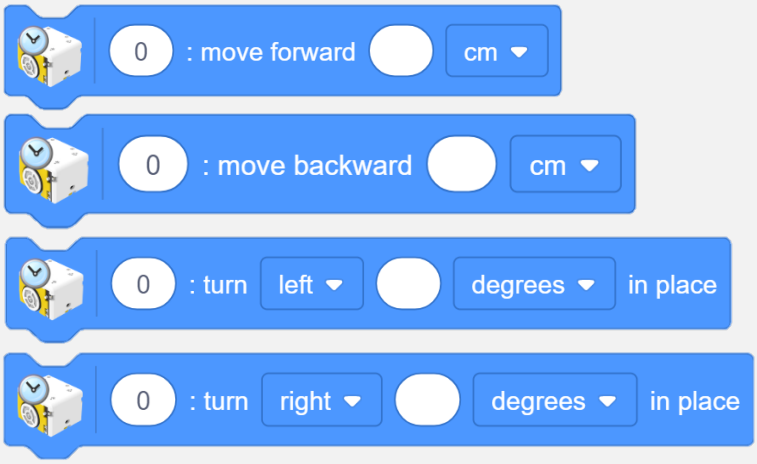




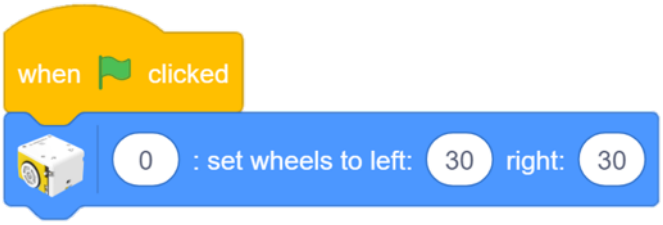


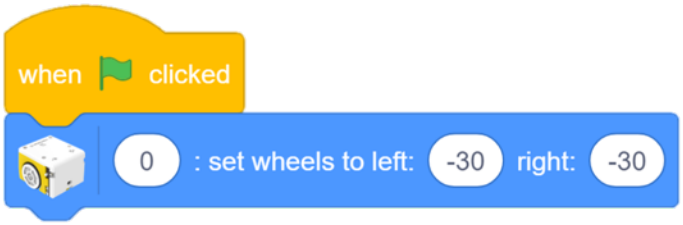


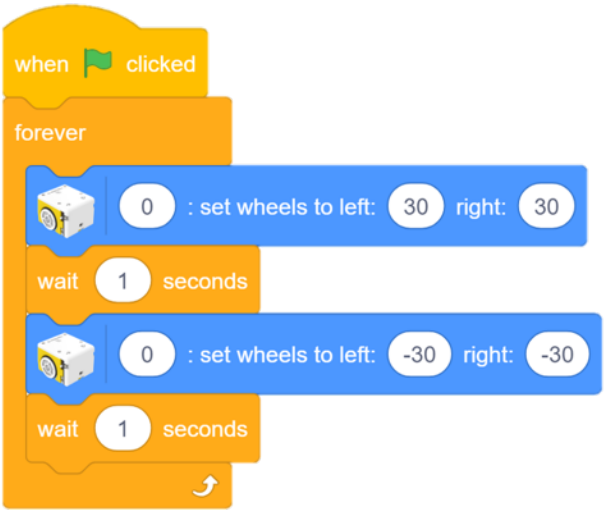
You can move the Hamster with following blocks.

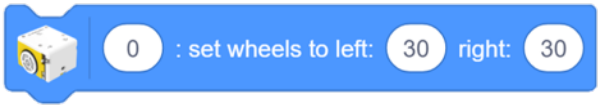


However, you can't control the speed of the Hamster with this block.

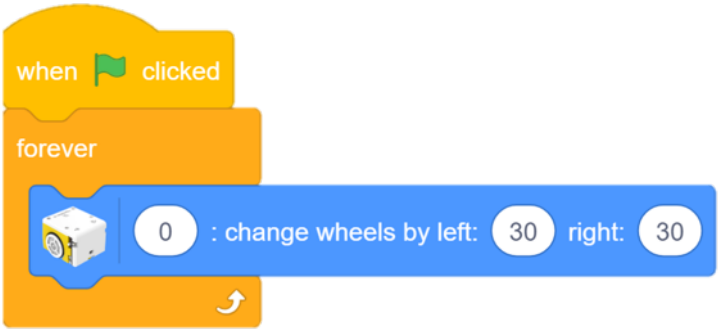


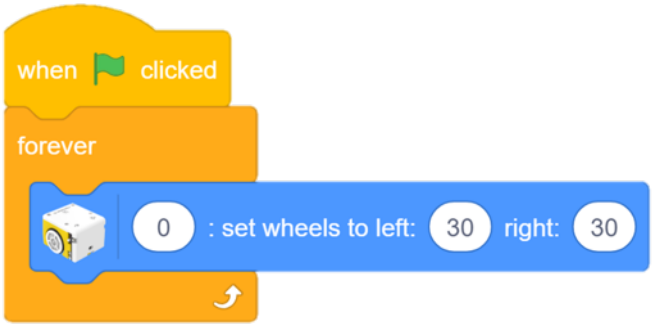


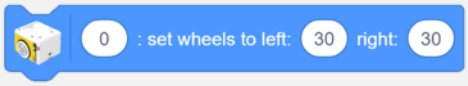


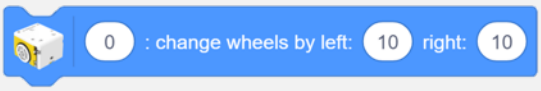
Use  button to change the Hamster's speed.

To control the time, use  block.

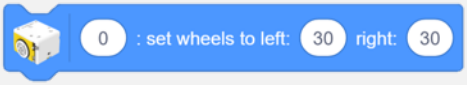


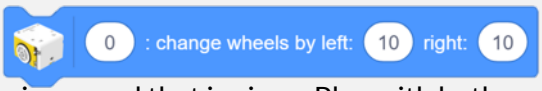




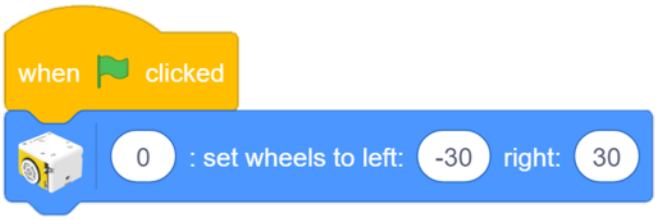
and 

blocks have different functions.

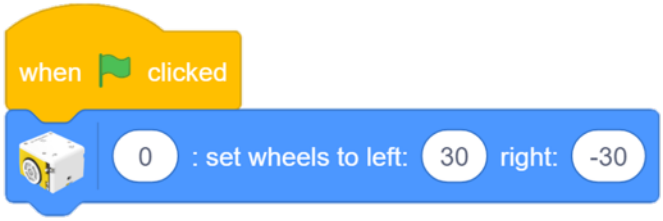


block maintains the Hamster's speed at the given value, while 

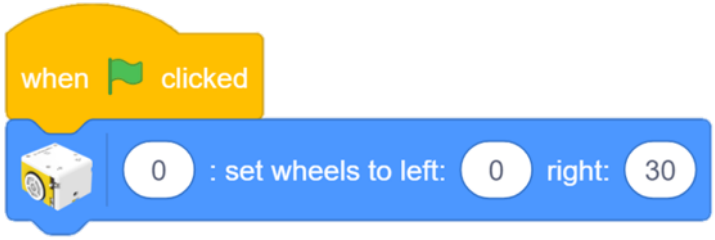
block moves the Hamster at a steadily increasing speed that is given. Play with both commands and learn how they are different.



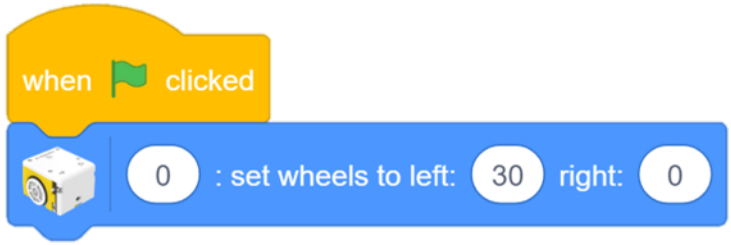
rotate left in place about the center



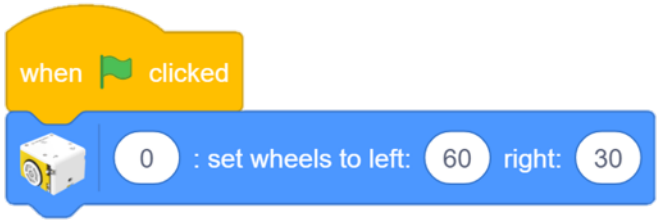
rotate right in place about the center



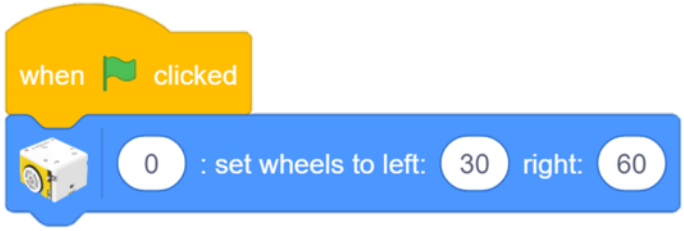
rotate in place about the left wheel



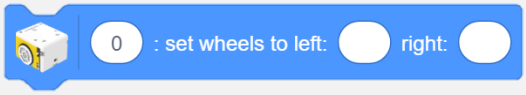
rotate in place about the right wheel



rotate right while moving forward



rotate left while moving forward

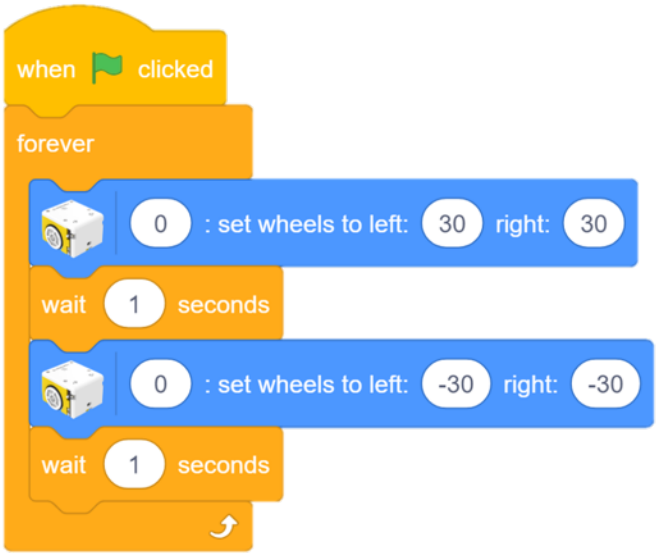
Play with 

block and learn different ways of rotating the Hamster.

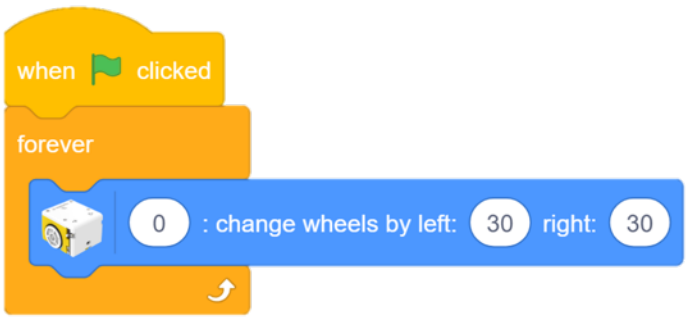
Let's review this chapter with the following assignments.

[Assignment 1] Write how the Hamster would move when you run the following commands.

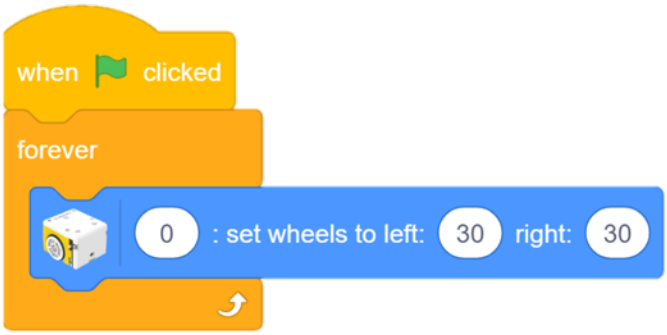
①



②



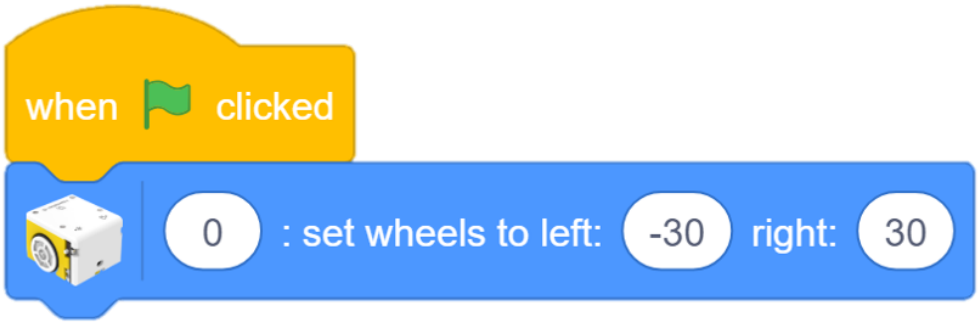
③



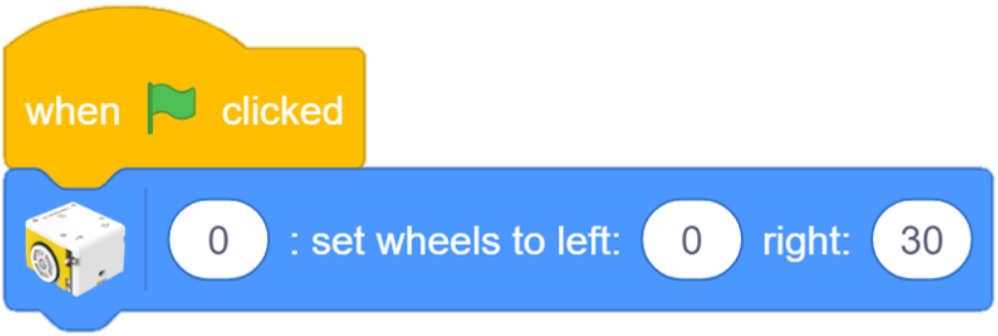
Here is another assignment.

[Assignment 2] Write how the Hamster would move when you run each of the following commands.

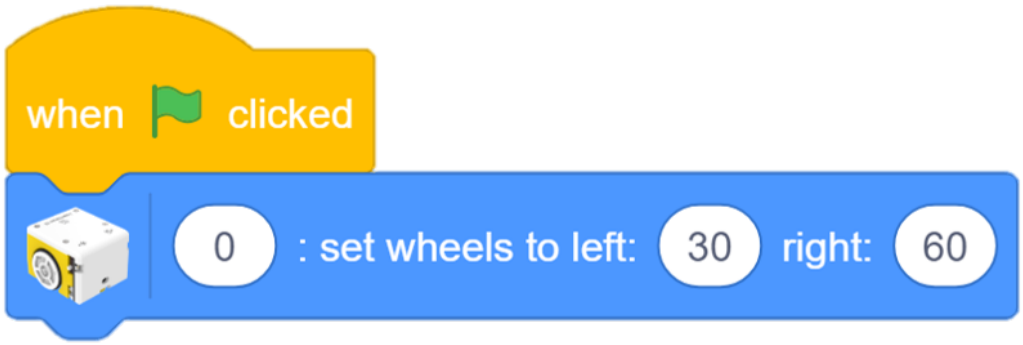
①



②



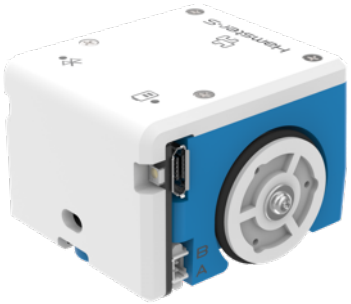
③



11 Making a Hamster Robot Controller

You can program the Hamster Robot with a joystick.

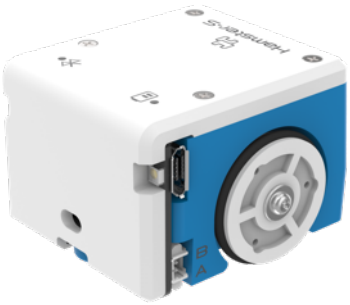
You can move the Hamster in different directions with a joystick.



Let's get ready.

joystick

Cheese Stick

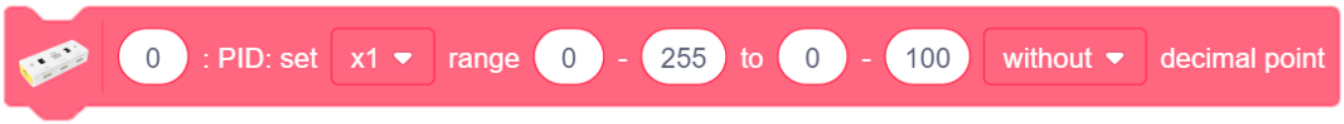


Hamster Robot

Let's learn the blocks for this chapter.

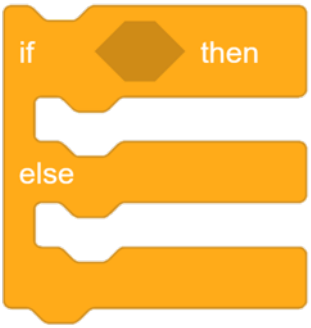
This block is needed to use a joystick.

This block sets the horizontal and vertical values of a joystick.



This block sets the range of joystick values as 0 to 100.

This block compares two values to run a command.

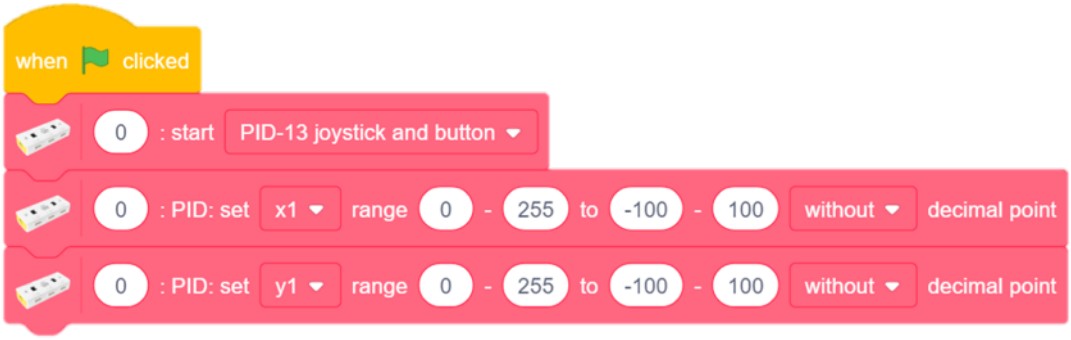


This block runs different commands depending on whether the condition is true or not.

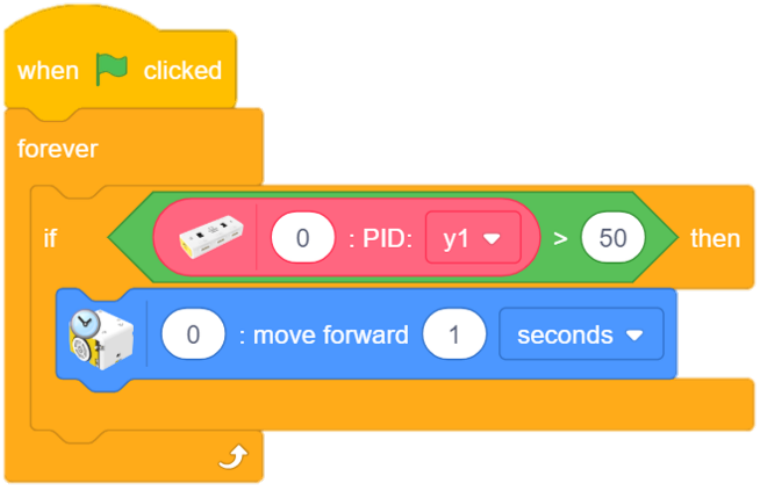
This block maintains the running command for the given number of seconds.

This block allows the sprite to speak through speech bubbles.

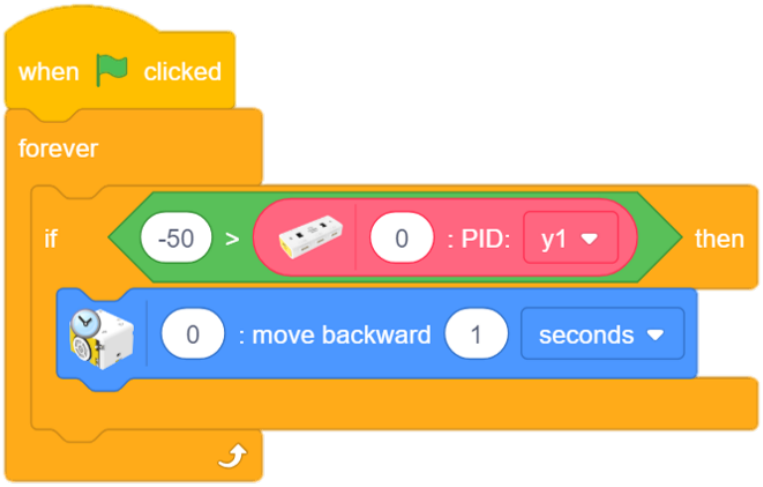
Let's use the joystick to move the Hamster.



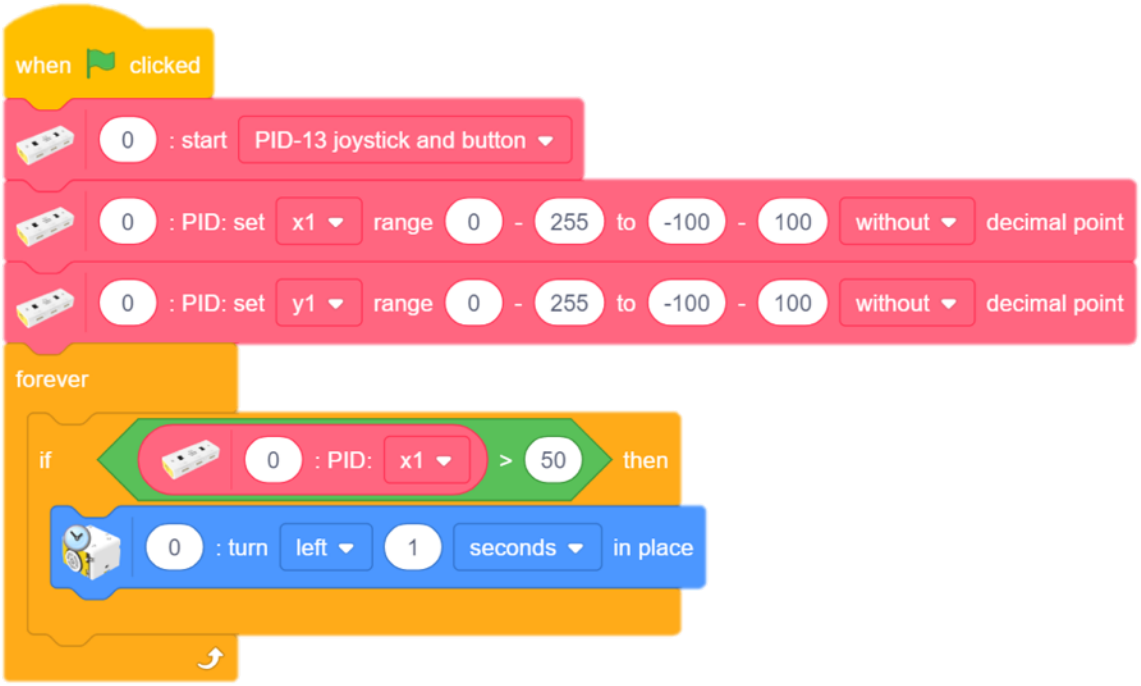
x1 and y1 each refers to the horizontal and vertical range of joystick values.



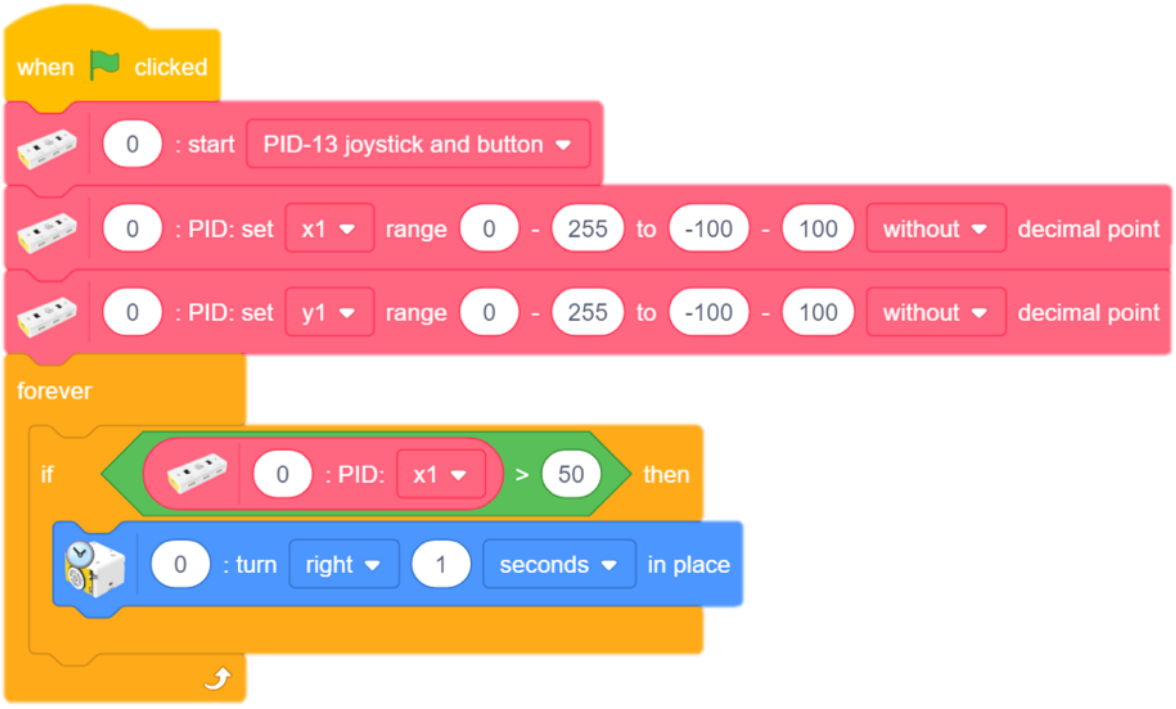
Let's program the Hamster to move forward for one second when you move the joystick up.



Let's program the Hamster to move backward for one second when you move the joystick down.

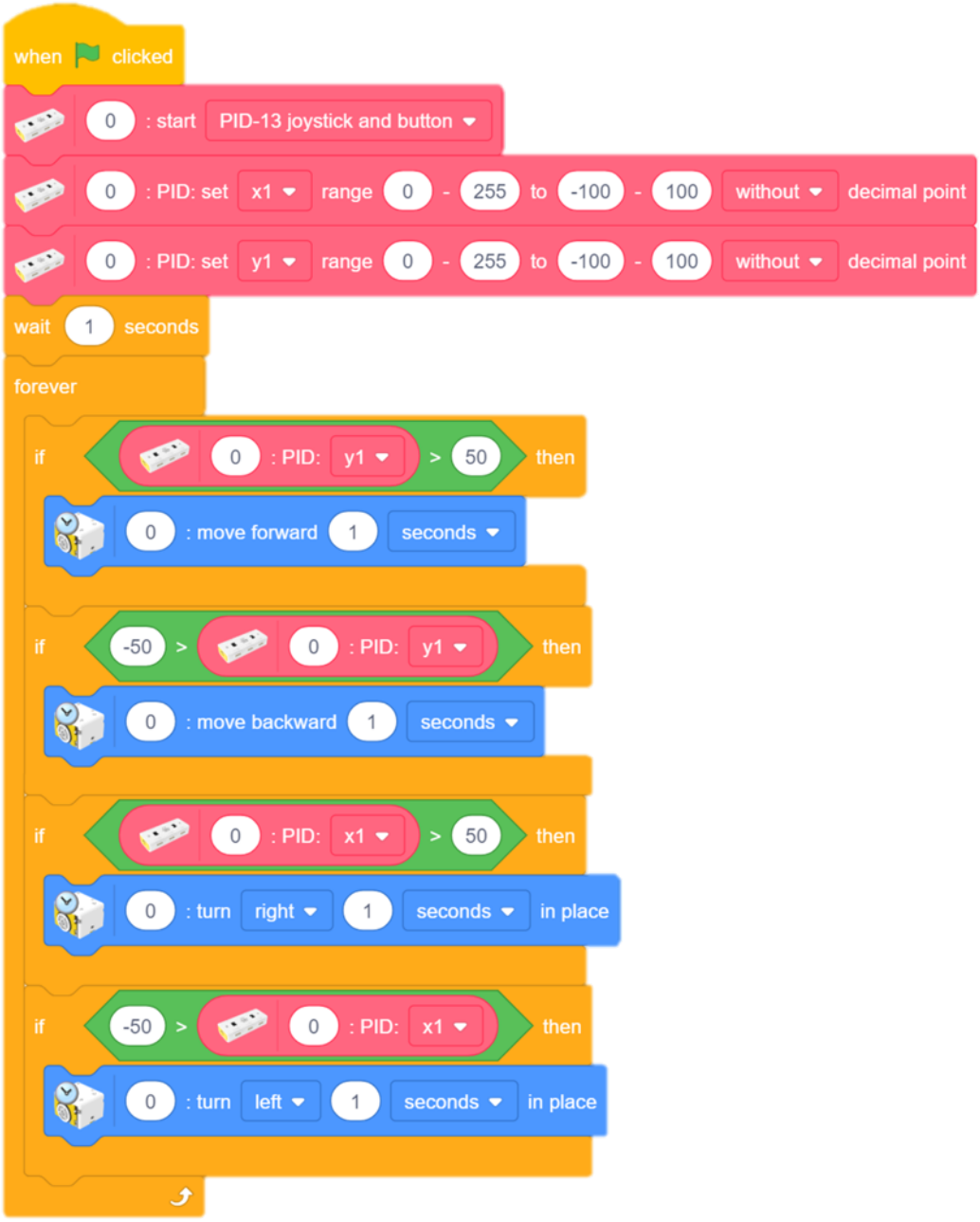


Let's program the Hamster rotate left for one second when you move the joystick left.

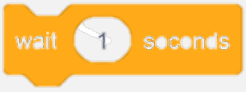


Let's program the Hamster to rotate right for one second when you move the joystick right.

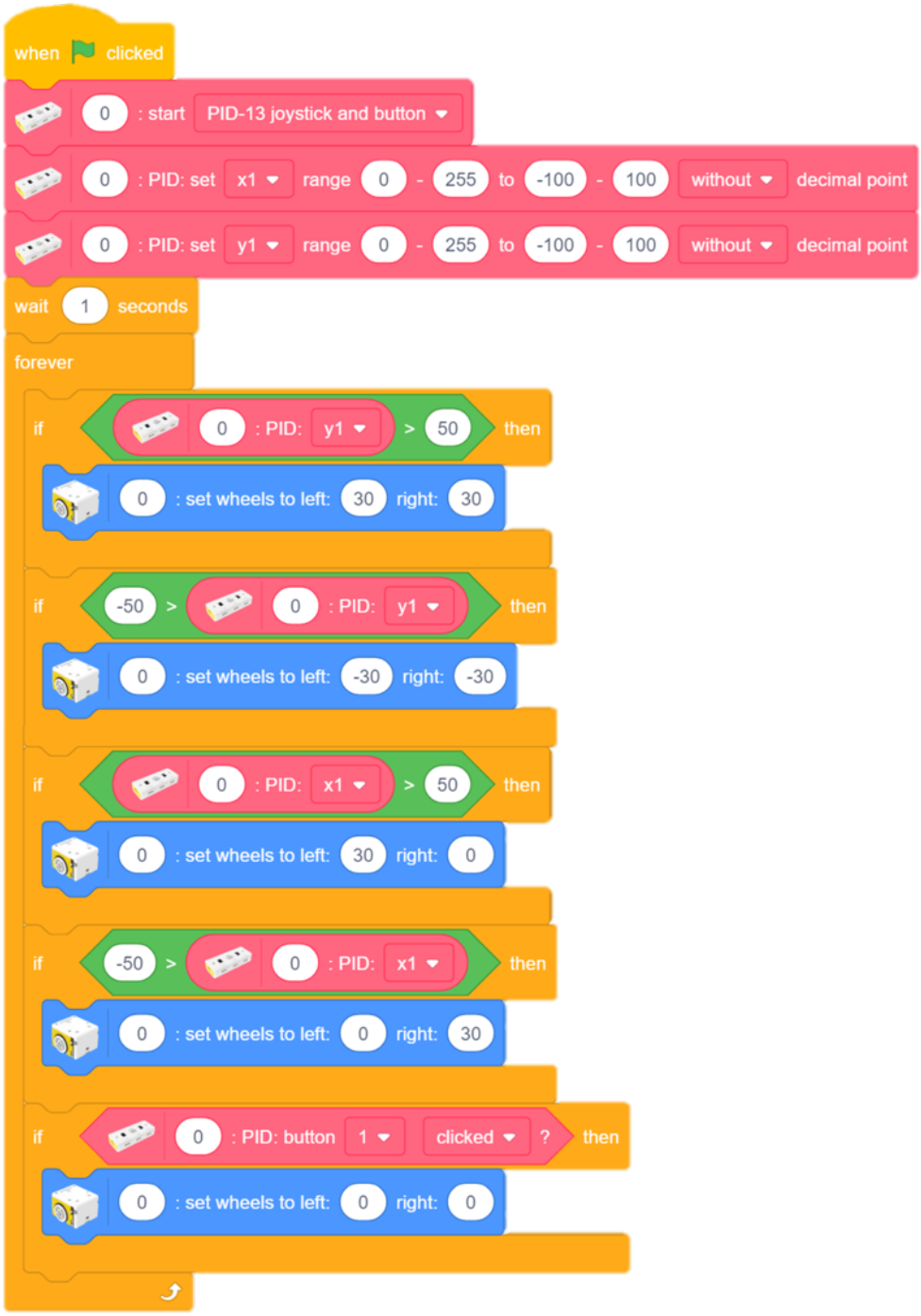
Use the joystick to move the Hamster left, right, forward and backward.



When you click the start button, some machines calculate the joystick's value as -100 for a brief moment. In order to prevent the Hamster from moving at this speed, use



block before adding other blocks.

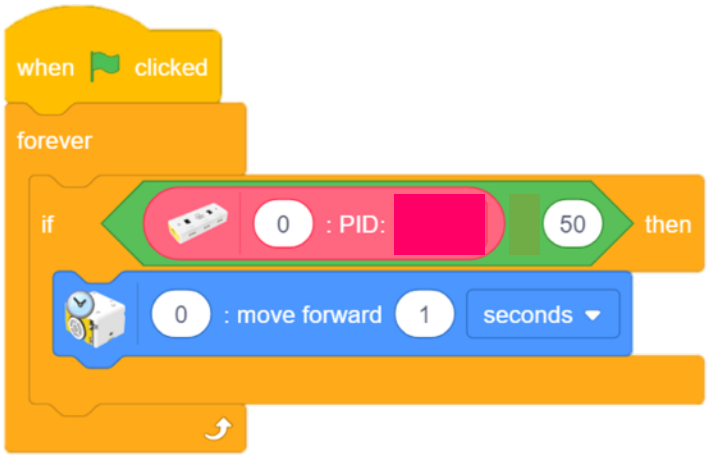


Add a command to stop the Hamster before changing the speed of its wheels. You can stop the Hamster by setting the speed of both wheels to 0.

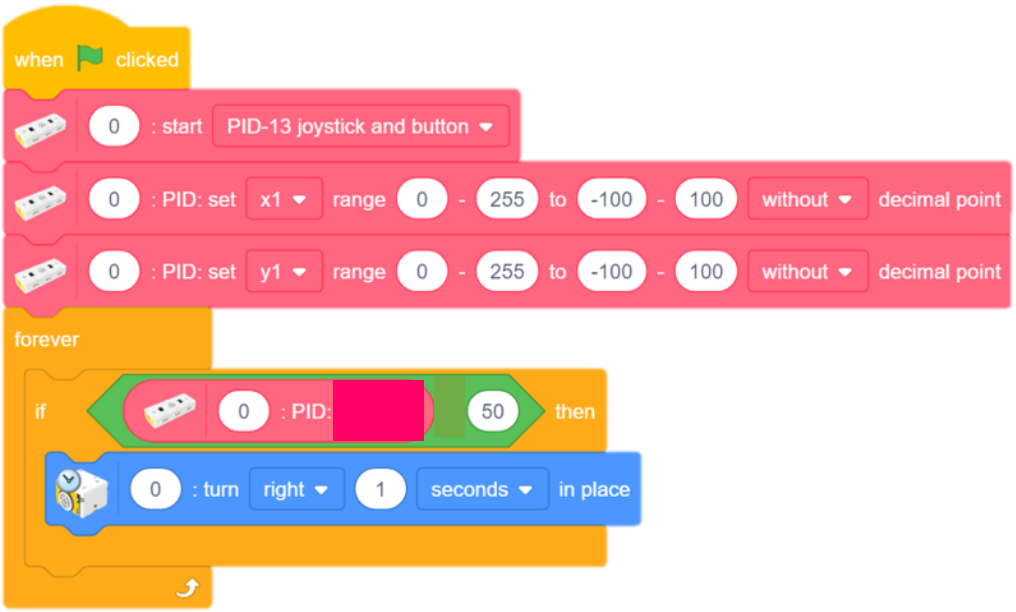
If you program the Hamster to move for the given time, it can only run a single command at a time. However, if you program it to move at the given speed, you can run multiple commands.

Let's review this chapter with the following assignments.

[Assignment 1] You want to program the Hamster to move forward when you move the joystick up. Fill in the blank with the command you need.

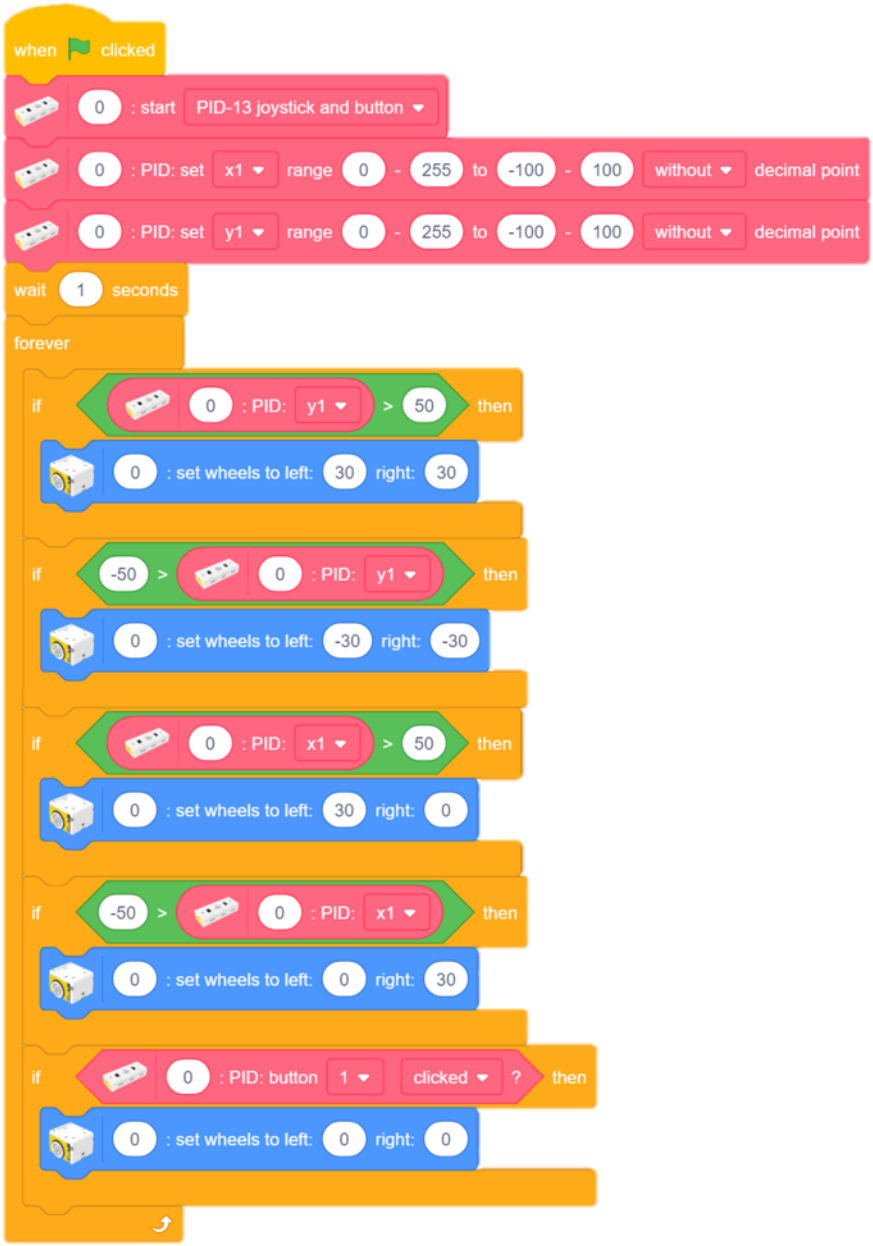


[Assignment 2] You want to program the Hamster to rotate right for one second when you move the joystick right. Fill in the blank with the command you need.



Here is another assignment.

[Assignment 3] When you click the start button, some machines calculate the joystick's value as -100 for a brief moment. Because of this, the Hamster might move at this speed. Figure out how to resolve this issue.



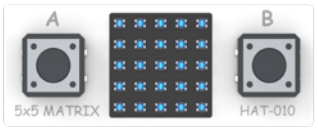
12 Making a Landmine Detecting Robot

The Hamster Robot has floor and proximity sensors.
You can turn the Hamster into a landmine detecting robot.

Let's control the Hamster Robot with the Cheese Stick and a potentiometer.

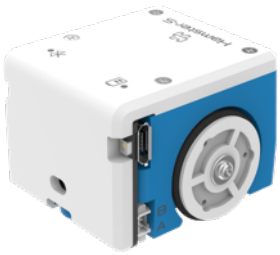
Let's get ready.

joystick



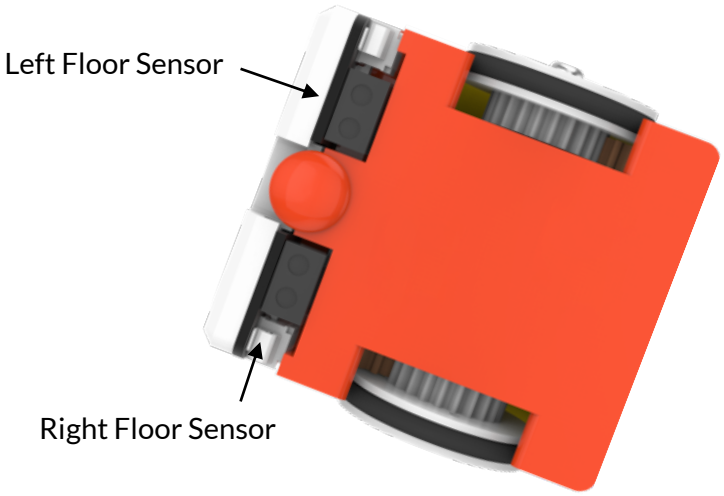
5x5 LED Matrix

Cheese Stick

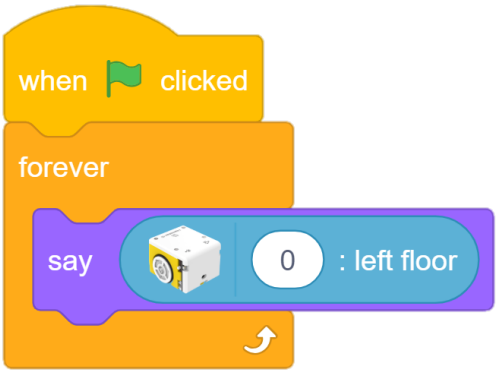


Hamster Robot

Let's learn about the Hamster's floor sensors.



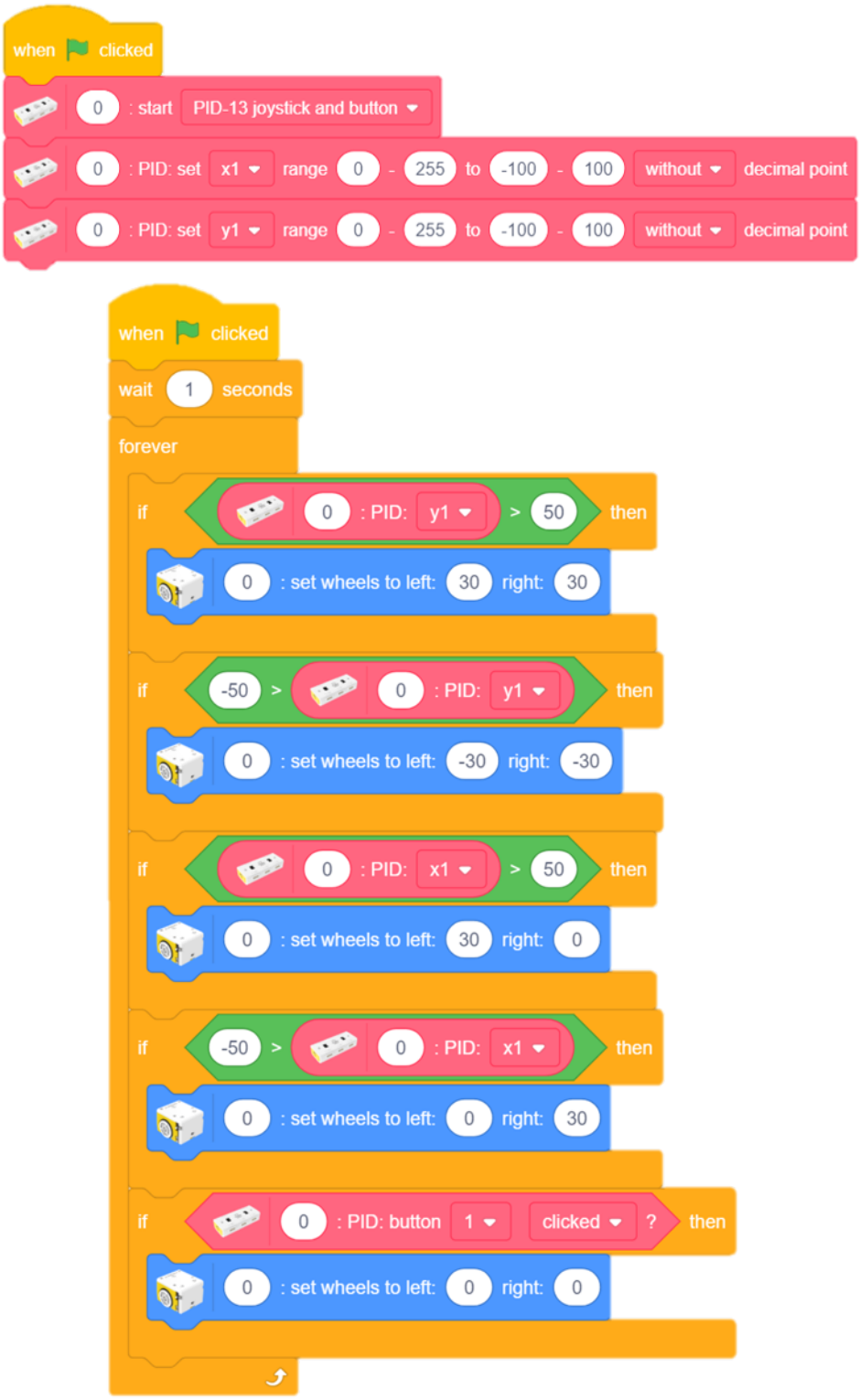
The Hamster's floor sensors use the infrared(IR) light to detect levels from 0 to 255. On a piece of paper, draw landmines with a black marker and see how the floor sensors detect the landmines and the blank space on the paper differently.



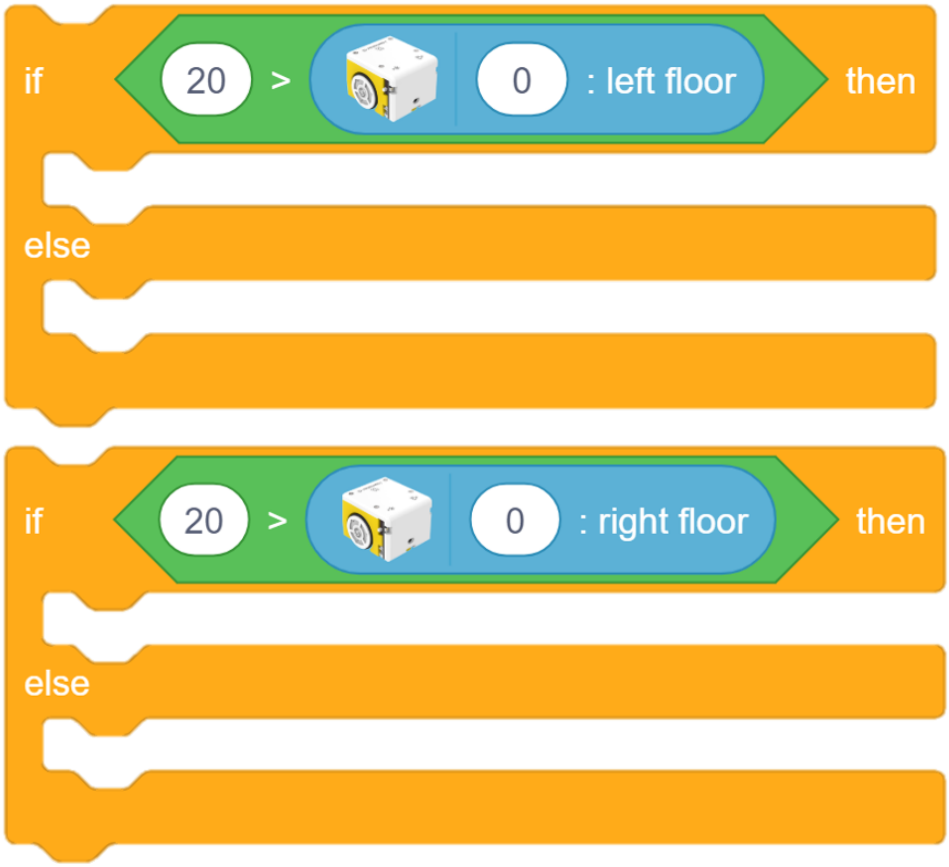
On the blank space

On the landmines

Let's build a program to control the Hamster with a joystick.



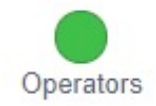
Let's program the Hamster to detect landmines.



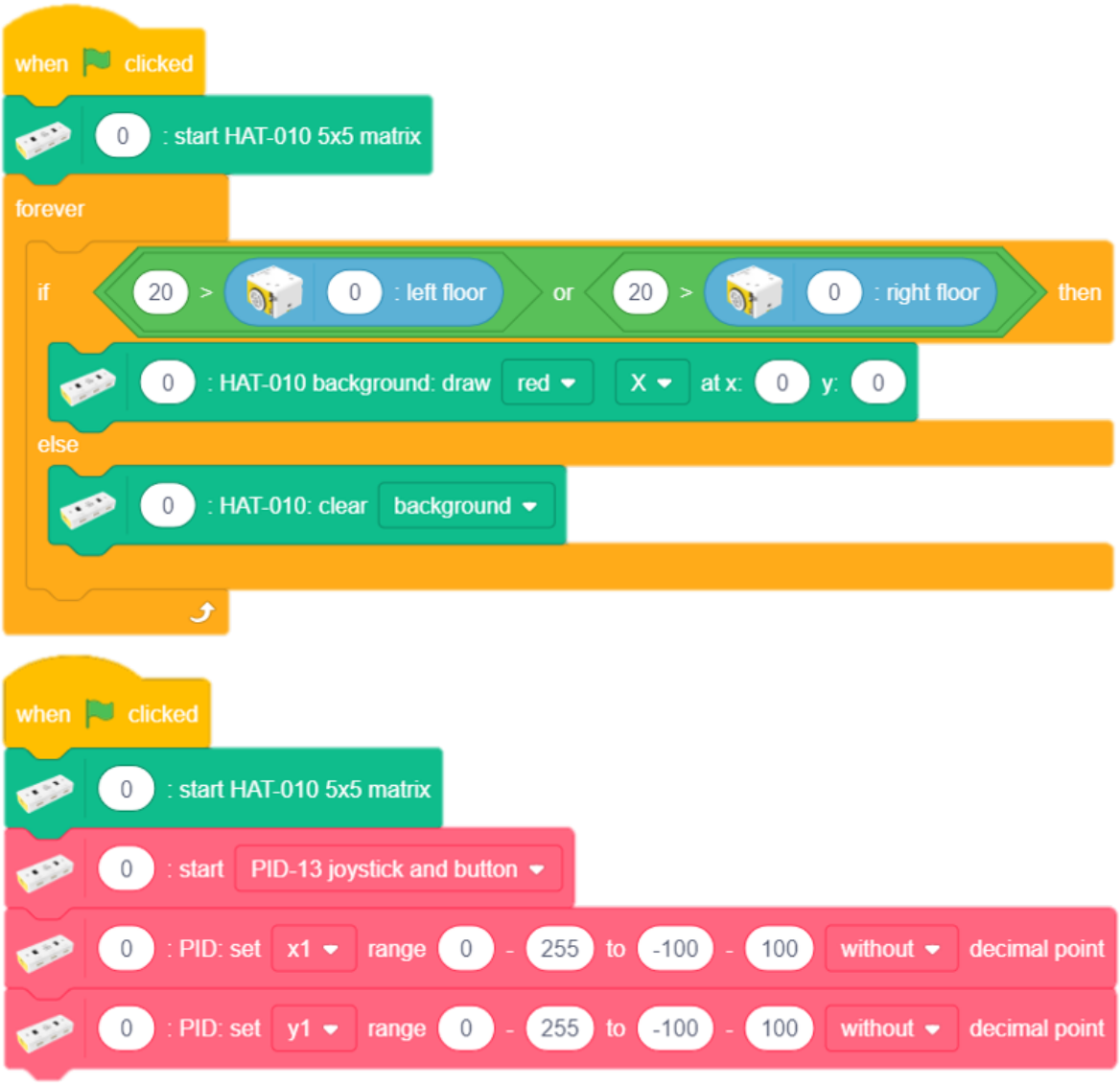
The Hamster should be able to run commands even when only one of its wheels detects landmines.

Enter the commands as shown above.

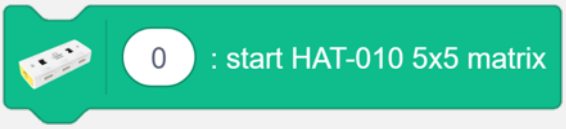
You can combine two commands into one with 

block under the 

tab.

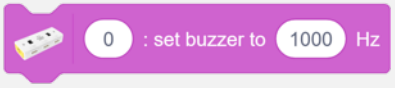


To program the LED Matrix to display an X when the Hamster detects landmines, you need



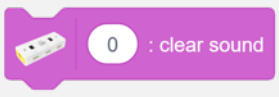
block.

If you want a warning sound with the O and X on the LED Matrix, use

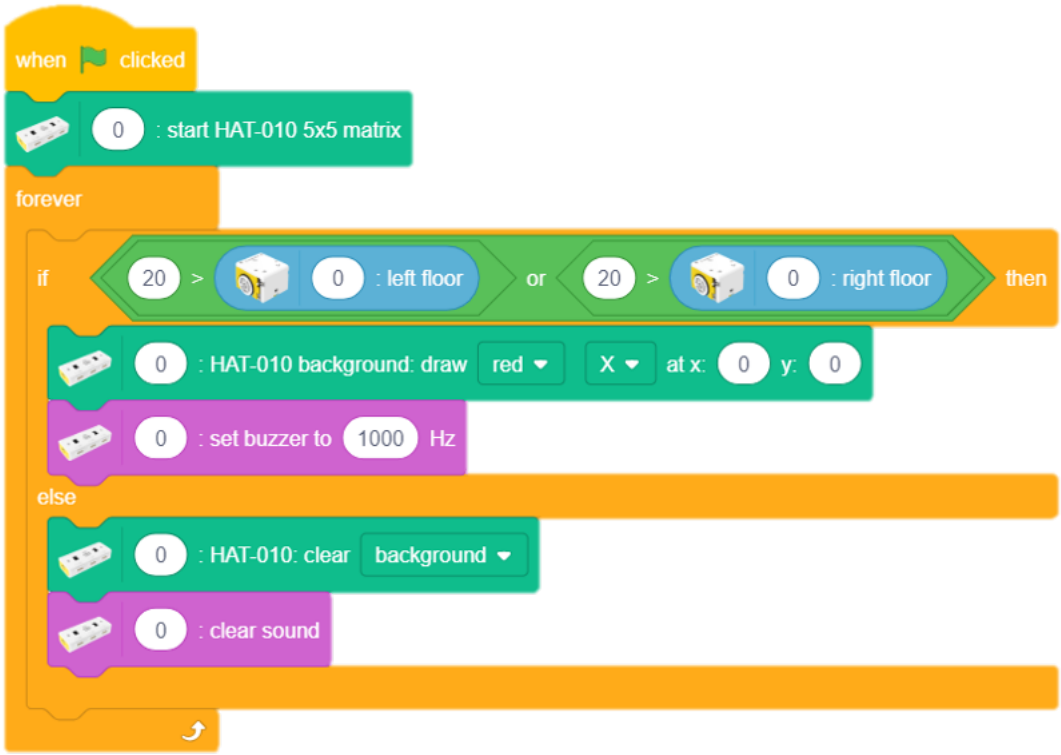


block.

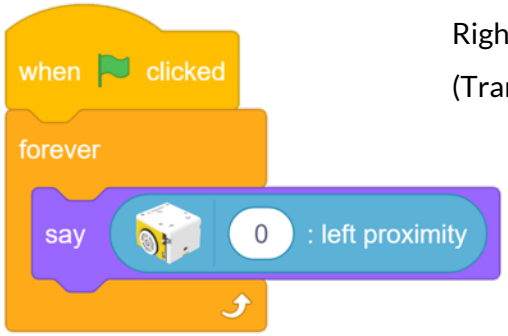
Use

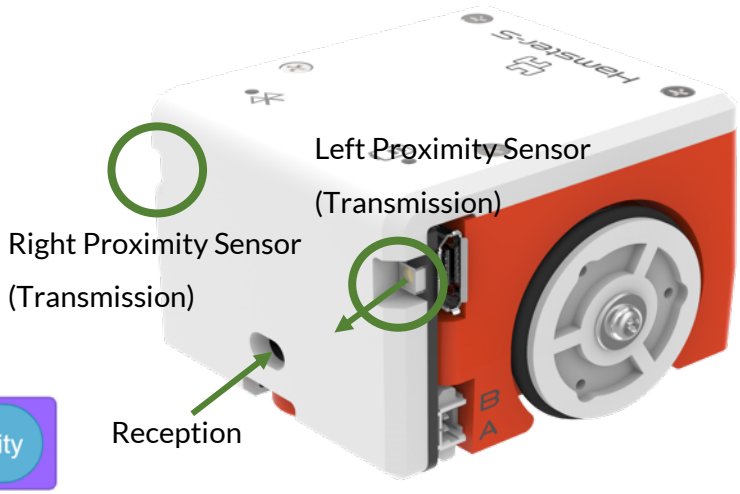


block to turn the sound off when you are away from the landmines.



Let's learn about the Hamster's proximity sensors.





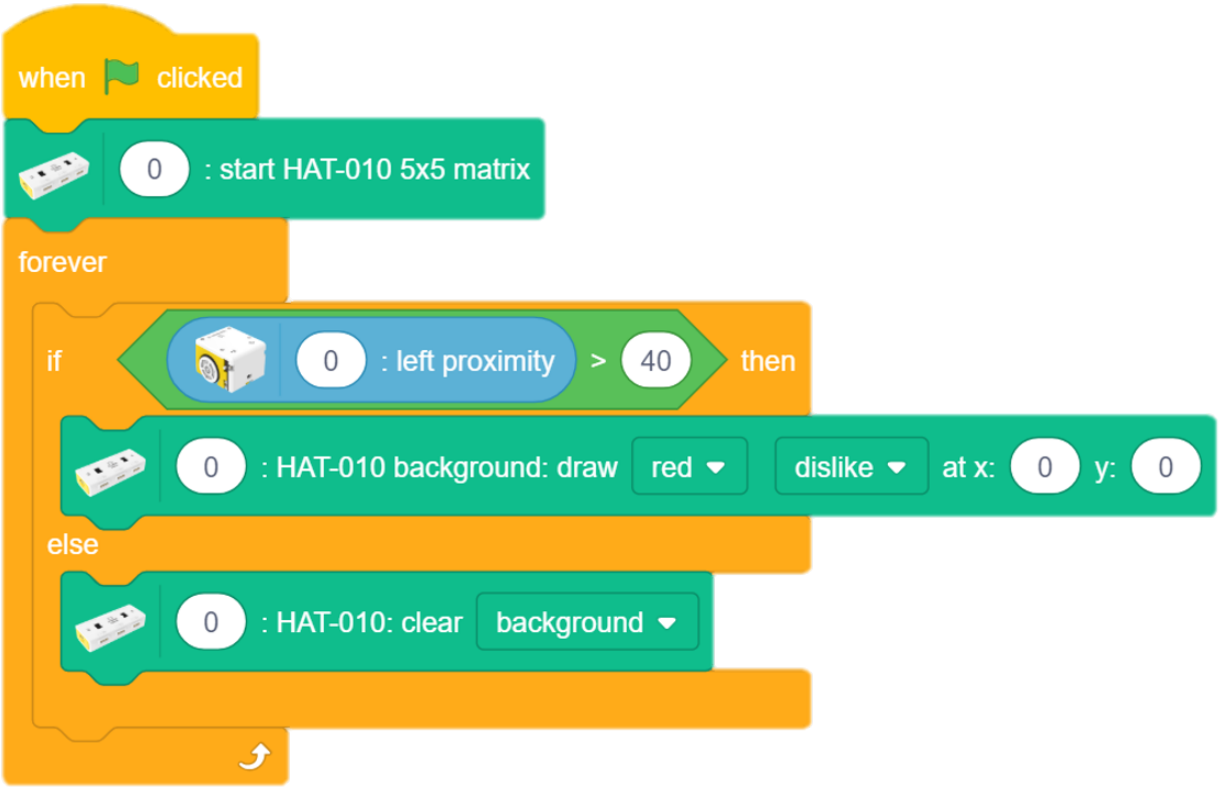
The proximity sensors can detect obstacles with the IR lights within the distance of 1-30mm. Play with the proximity sensors by bringing your hand close to them and learn how they detect obstacles.

When obstacles are far away

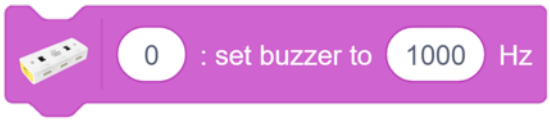
When obstacles are near

When obstacles are too close

Let's build a program to prevent collision.



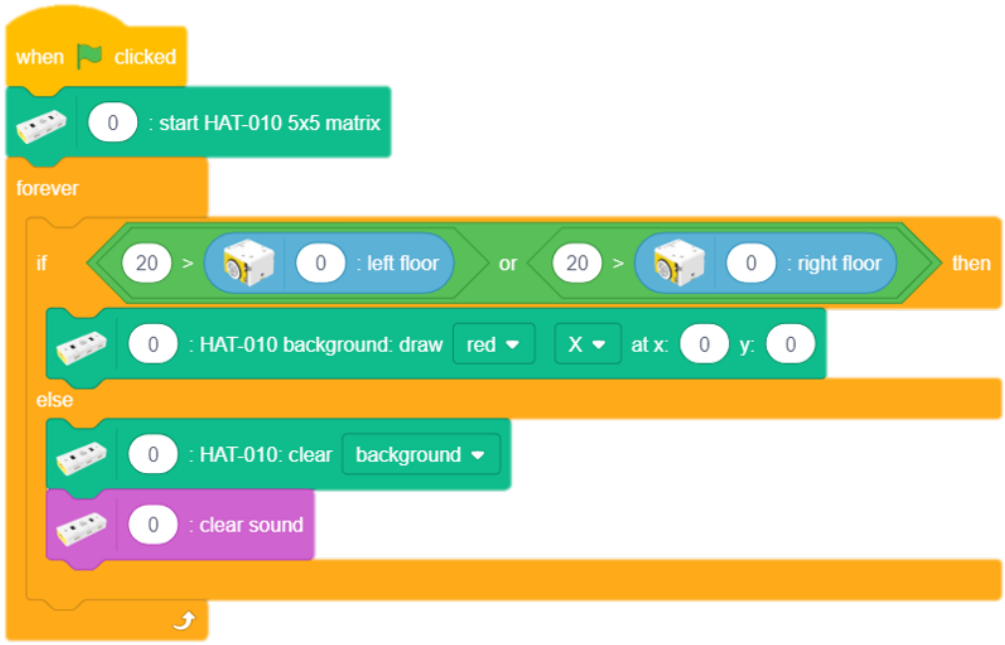
Program the 5x5 LED Matrix to display a hatred facial expression when the obstacle is close to the Hamster. You can also use

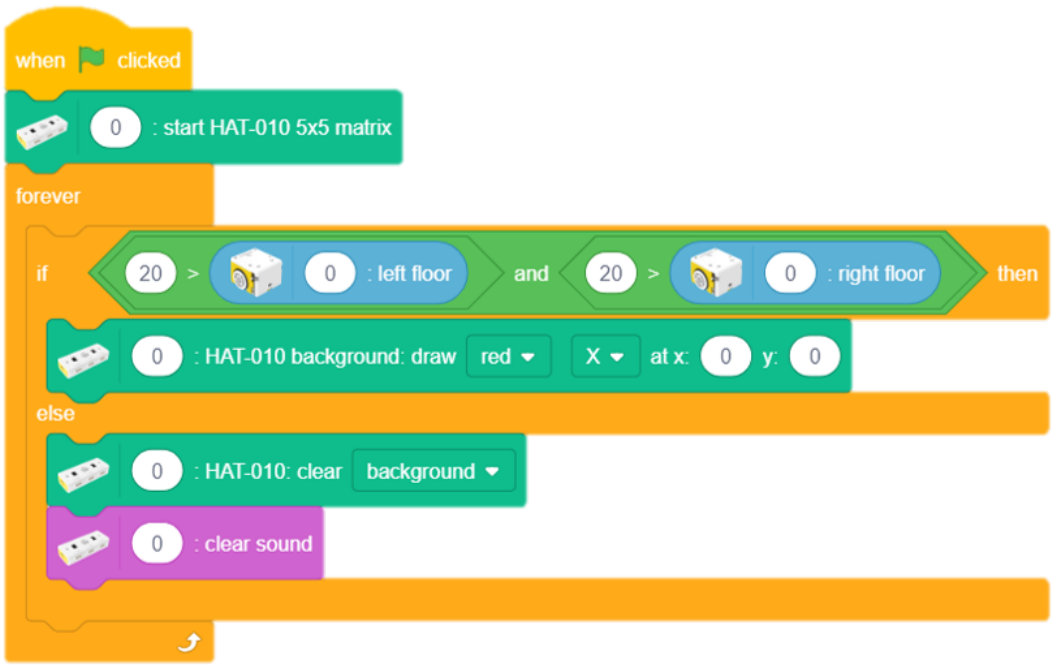


block.

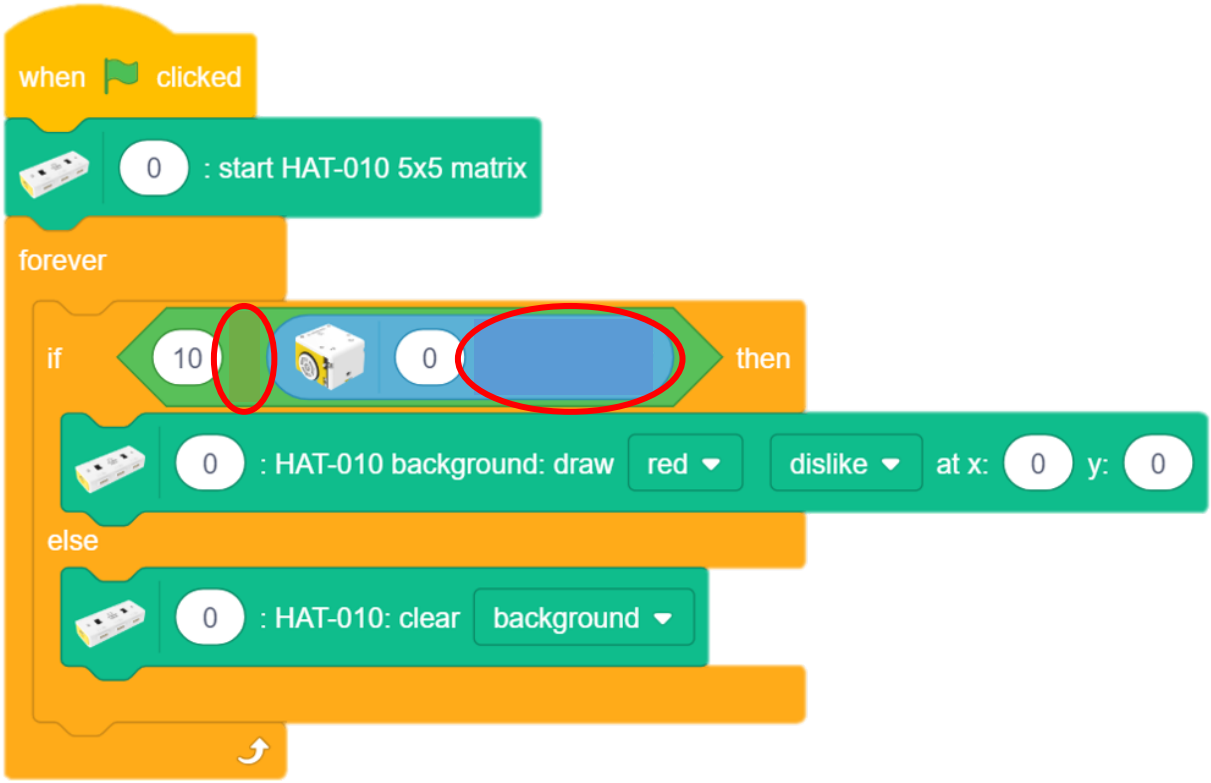
Let's review this chapter with the following assignments.

[Assignment 1] Write the difference between running these two command blocks.





[Assignment 2] You want to program the 5x5 LED Matrix to display a hatred facial expression when the Hamster detects an obstacle. Fill in the blanks with the commands you need.



[Assignment 3] You want program the Cheese Stick to make a warning sound when the Hamster detects landmines or obstacles. Check the block you need.