Block Directory

Contents

Getting Started

Physical Blocks

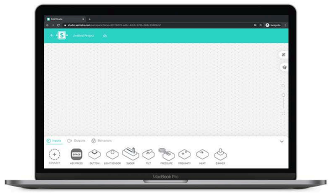
Software Blocks

Logic Blocks

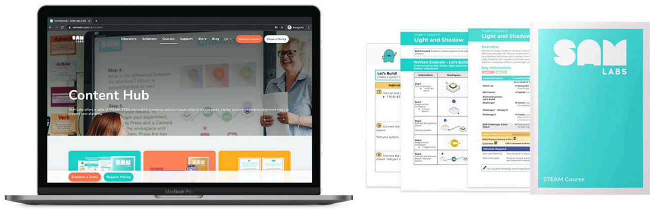

SAM
Design a Habitat
Overview
Key Information

Getting Started

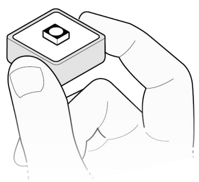
1 Access the SAM Space app from https://studio.samlabs.com/samspace



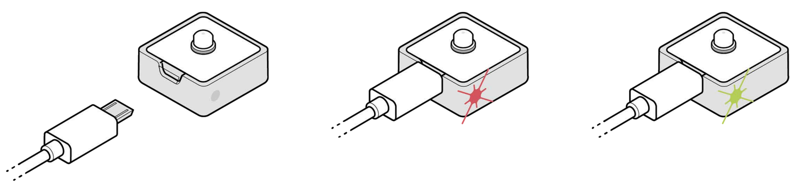
2 Download your lesson plans from https://samlabs.com/us/content



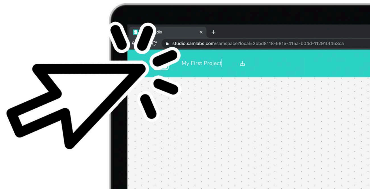
3 To turn on blocks, press the On button for 2-3 seconds (on the side of the block, located above the word SAM).



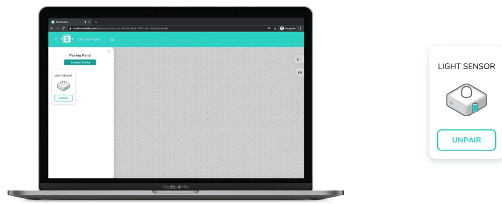
If a block is charged, you'll see a red light appear. If this *doesn't* happen, plug in the micro-USB charger to charge it. The light will remain red as the block is charging. It will turn green when fully charged.



4 Name your new project on the top left side of the SAM Space platform



5 Pair the blocks to the platform. Hold your blocks near your laptop or tablet and select 'CONNECT' on the bottom left side of the platform then select 'Connect Devices' under the Pairing Panel. If your blocks are on, they will appear in the pop-up window.



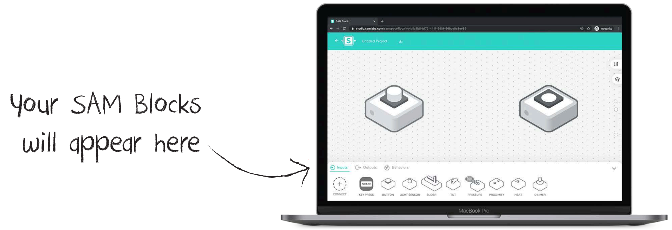
Click or tap on the block and select 'Pair' on the bottom right of the pop-up window. When you do this, the light on your block will turn white.

Your SAM Block will now appear under the 'Pairing Panel.' When you exit out of the Pairing Panel you will find your block under the 'Inputs' or 'Outputs' section on the bottom left of the platform.

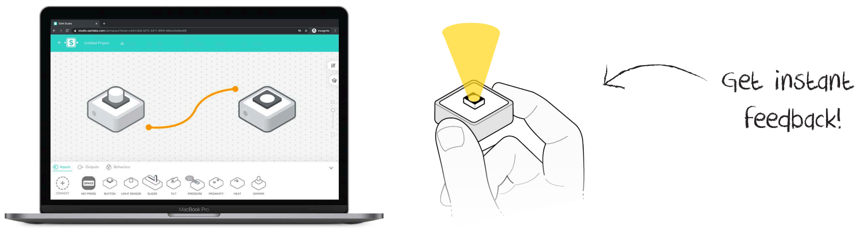
The blocks can be identi ied by the proximity identi ier on the screen - the more filled that bar is, the closer the block is to your device.

Getting Started

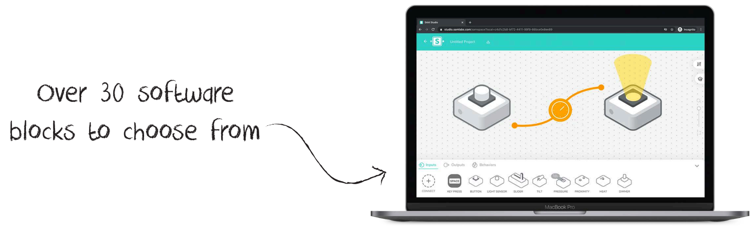
6 Once you have paired your blocks, drag them onto the dotted workspace on your screen.



7 Connect the blocks by drawing a line between them.

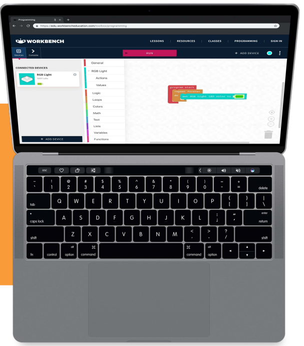


8 Drag software blocks onto the workspace to add to your system.



Now you're all set to start teaching STEAM & coding with SAM Labs.

To get started with **SAM Blockly**, find the instructions at **support.samlabs.com/knowledge/sam-studio**

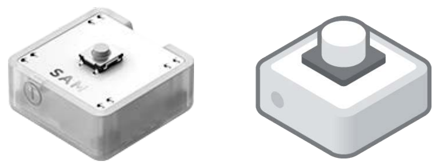


For help, email **support@samlabs.com**

Button

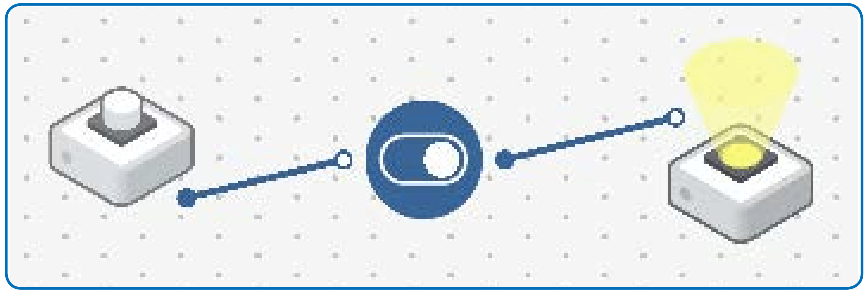
How It Works

The button is a simple switch. When pressed, it activates connected components.



Sample Connection

Connect the Button to an RGB LED to turn the light on and off while you're pressing the Button. Add a Toggle to turn it into a light switch that stays on or off.

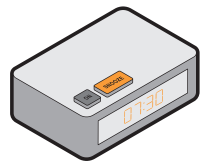


Quick Challenge

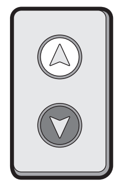
Design an interactive board game.

Real-World Comparison

Crosswalk Button



Snooze Button

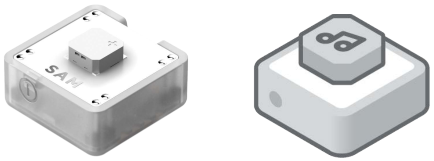


Elevator Button

Buzzer

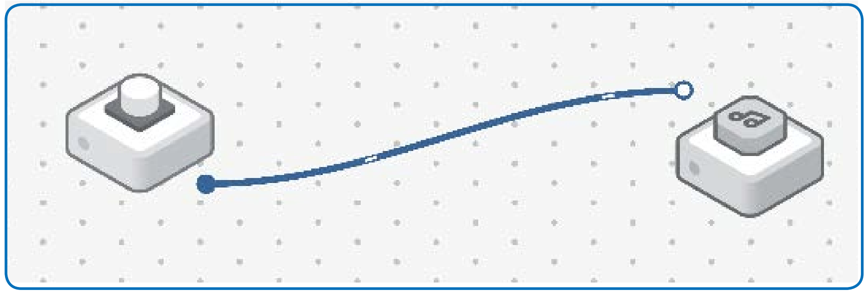
How It Works

The Buzzer converts a signal into a vibration creating a buzzing sound. You can specify the note and volume for this output.



Sample Connection

Connect the Button to the Buzzer to play various notes.

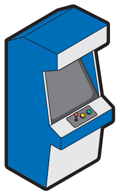


Quick Challenge

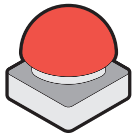
Construct a system using a Buzzer to write a secret message to your friends in Morse code.

Real-World Comparison

Kitchen Timer



Arcade Game

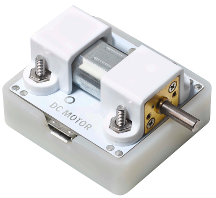


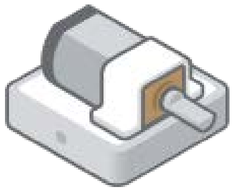
Quiz Show Buzzer

DC Motor

How It Works

The DC (Direct Current) Motor spins a shaft at a specified speed and direction.





Sample Connection

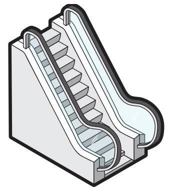
Connect the Light Sensor to the DC Motor to control the speed of the motor based on how much light is received by the sensor.

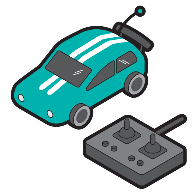
Quick Challenge

Design a futuristic car.

Real-World Comparison


Power Tools

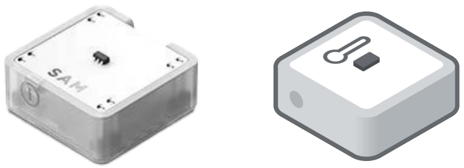

Escalator


Remote Control Car

Heat Sensor

How It Works

The Heat Sensor measures the current temperature in degrees Celsius. A new reading is displayed every time the temperature of the surrounding environment changes.



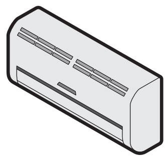
Sample Connection

Connect the Heat Sensor to the Log Findings block to track the temperature in your classroom.

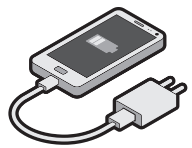
Quick Challenge

Design a weather detector that lets you know when it’s warm outside.

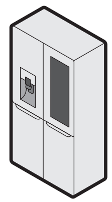
Real-World Comparison



Air Conditioner



Battery Chargers

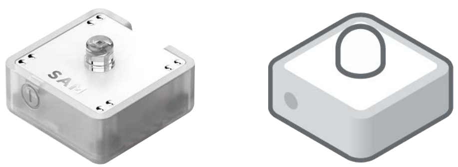


Smart Fridge

Light Sensor

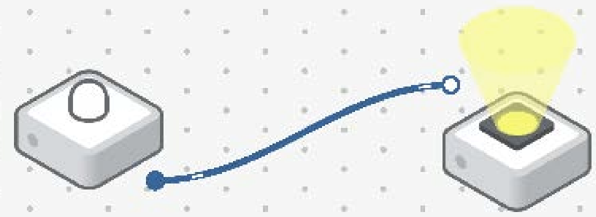
How It Works

The Light Sensor detects the brightness of the environment, sending out a value between 0 and 100. A low value indicates darkness and a high value indicates that there is a lot of light.



Sample Connection

Connect the Light Sensor to the RGB LED to change the RGB LED's brightness based on how much light is being received by the Light Sensor.



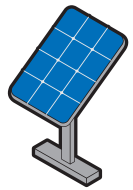
Quick Challenge

Invent a smart home lighting system.

Real-World Comparison

Phone Screen

Street Lights

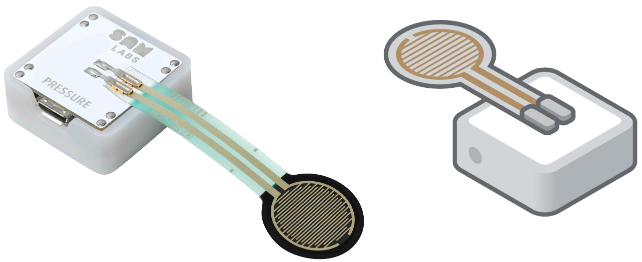


Solar Panels

Pressure Sensor

How It Works

The Pressure Sensor senses an amount of force. This yields a low value for low amounts of force or a high value for high amounts of force.



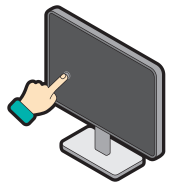
Sample Connection

Connect the Pressure Sensor to the Sound Player to control sound effects using pressure.

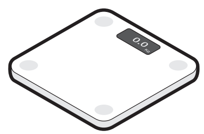
Quick Challenge

Create a kitchen scale to help you bake your favorite treat.

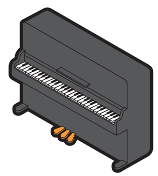
Real-World Comparison



Touch Screen



Bathroom Scale

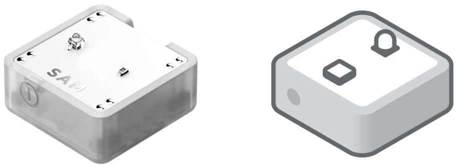


Piano Pedals

Proximity Sensor

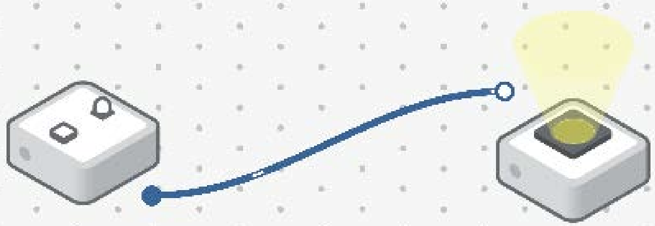
How It Works

The Proximity Sensor senses the presence of an object, sending a low value for a distant object or a high value for a close object.



Sample Connection

Connect the Proximity Sensor to the RGB LED to change the brightness of the light based on proximity.

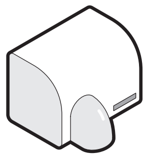


Quick Challenge

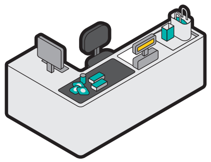
Invent a self-driving car that avoids obstacles.

Real-World Comparison

Contactless Payment



Automatic Hand Dryers

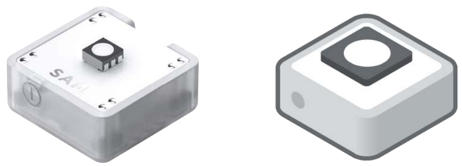


Supermarket Checkout

RGB LED

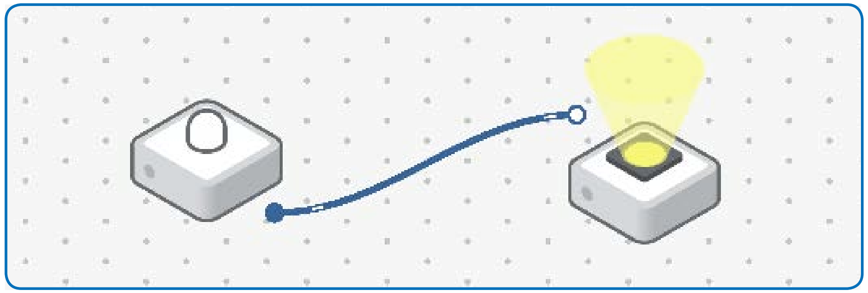
How It Works

The RGB LED is a light that can be assigned a color from combinations of Red, Green and Blue values. The brightness can be set with a numeric input where a low value sends a dimmer light than a high value.



Sample Connection

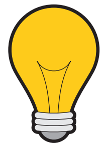
Connect the Light Sensor to the RGB LED to control the brightness level based on how much light is being received by the sensor.



Quick Challenge

Create a disco light with a rapid change of color.

Real-World Comparison



Lightbulb

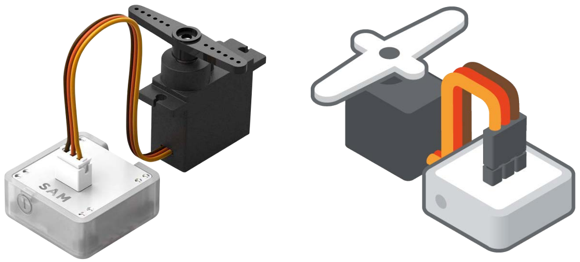
Police Car Light

Flashlight

Servo Motor

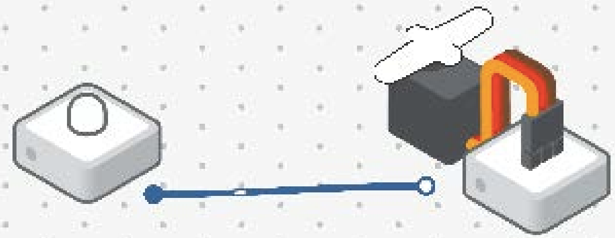
How It Works

The Servo is a motor with an arm that rotates between 0 and 180 degrees according to an input value.



Sample Connection

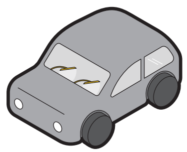
Connect the Light Sensor to the Servo Motor to vary the position of the motor's arm based on the amount of light in the room.



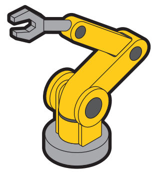
Quick Challenge

Invent an automatic pet feeder.

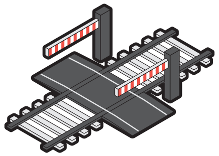
Real-World Comparison



Windshield Wipers



Robotic Arms

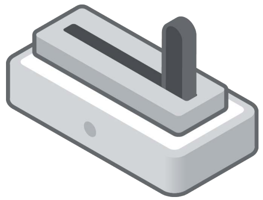


Train Track Barrier

Slider

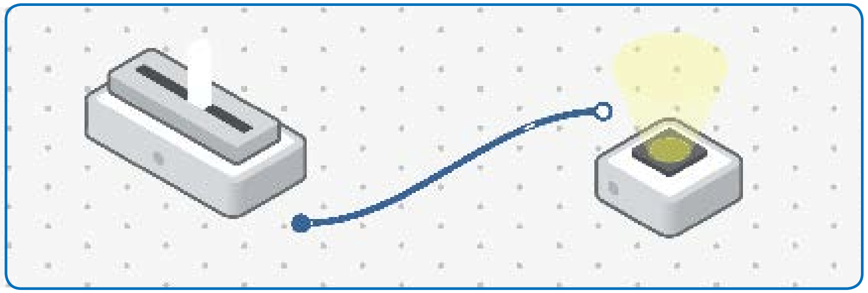
How It Works

The Slider has a handle that slides up and down representing values between 0 and 100 depending on where the handle is positioned.

Sample Connection

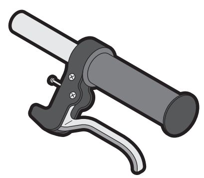
Connect the Slider to the RGB LED to control the brightness of the light.

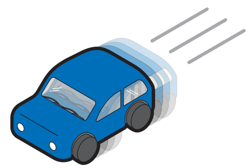


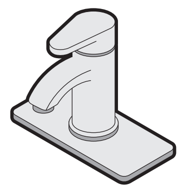
Quick Challenge

Create a dimmer for your household lighting.

Real-World Comparison


Bike Breaks

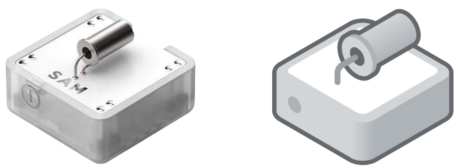

Car Acceleration


Faucet

Tilt Sensor

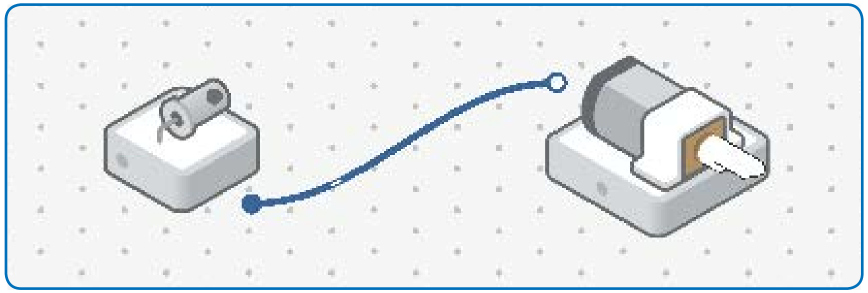
How It Works

The Tilt Sensor sends a true or false signal when the orientation of the device changes.



Sample Connection

Connect the Tilt Sensor to the DC Motor to turn the motor on and off.

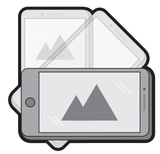


Quick Challenge

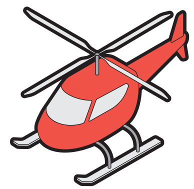
Code 21st century dice for your favorite board game.

Real-World Comparison

Step Counter



Phone Orientation

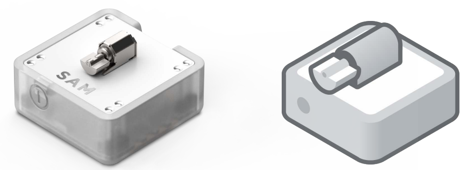


Helicopter

Vibration Motor

How It Works

The Vibration Motor creates different levels of vibration when it's spinning, based on an input value.



Sample Connection

Connect the Slider to the Vibration Motor to vary the level of the vibration.

Quick Challenge

Design a scarecrow for the 21st century.

Real-World Comparison

Electric Toothbrush

Phones

Wearable Fitness Tracker

Camera

How It Works

The Camera block enables you to take photos. When it receives a signal, it takes a picture using your device's default camera and saves it to the device.

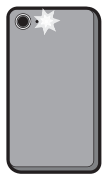
Sample Connection

Connect the Button to the Camera to take photos of your classroom experiments.

Quick Challenge

Invent a class pet selfie machine.

Real-World Comparison



Phone Cameras

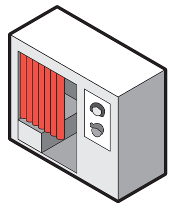
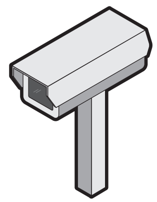


Photo Booth



Traffic Cameras

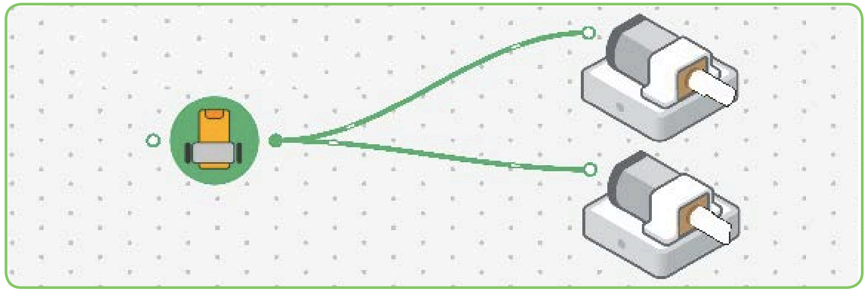
Car Controller

How It Works

The Car Controller block enables you to control a car using your tablet's built-in accelerometer.

Sample Connection

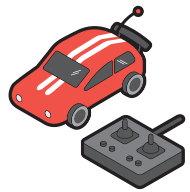
Connect the Car Controller to two DC Motors to control a moving car.



Quick Challenge

Design a mini Formula 1 race car that you can control with your tablet.

Real-World Comparison



Remote Control Car Controller

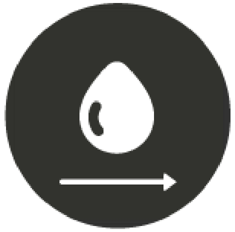
Game Controller

Drone Controller

Color

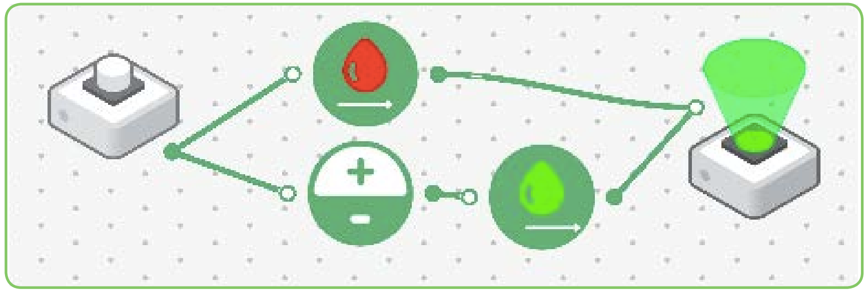
How It Works

The Color block enables you to choose and change the color of the RGB LED. When it receives a signal, the color of the RGB LED changes to the color you select.



Sample Connection

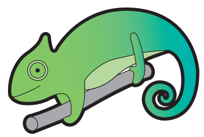
Connect a Button to a Color block and an Inverse. Connect a different colored Color block to the Inverse. Connect both Color blocks to an RGB LED. The RGB LED's color will change from one to the other.



Quick Challenge

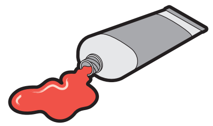
Design a timed traffic light.

Real-World Comparison



Chameleon

Leaves



Paint

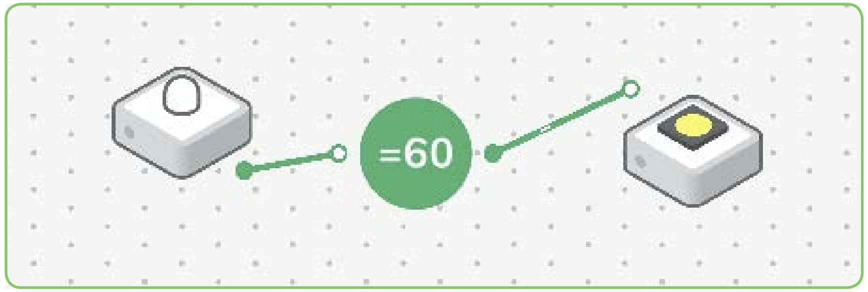
Compare

How It Works

The Compare Block allows you to compare incoming values against a predefined number.

Sample Connection

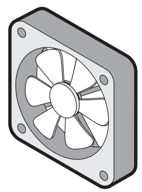
Connect a Light Sensor to a Compare block, and the Compare block to the RGB LED. The light will turn on and off based on the comparison you have defined.

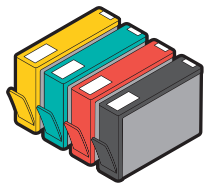


Quick Challenge

Design a smart beverage coaster that reminds you to drink water.

Real-World Comparison


Computer Fan

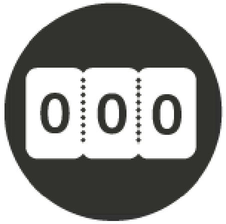

Printer Ink


Hot Plate

Counter

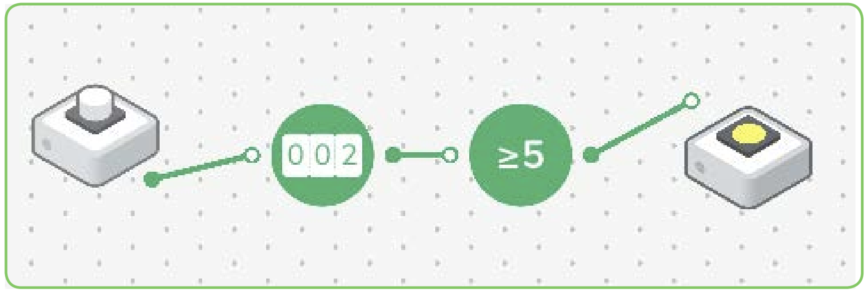
How It Works

The Counter Block counts numbers every time it is activated.



Sample Connection

Connect a Button to a Counter, the Counter to the Compare block (≥5), and the Compare block to the RGB LED. Press the Button 5 times and the light will turn on.

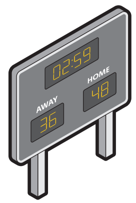


Quick Challenge

Invent a game that involves players clicking on buttons a certain number of times to win.

Real-World Comparison

Kitchen Timer



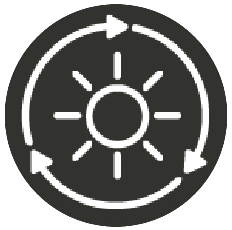
Scoreboard

Stopwatch

Cycle Brightness

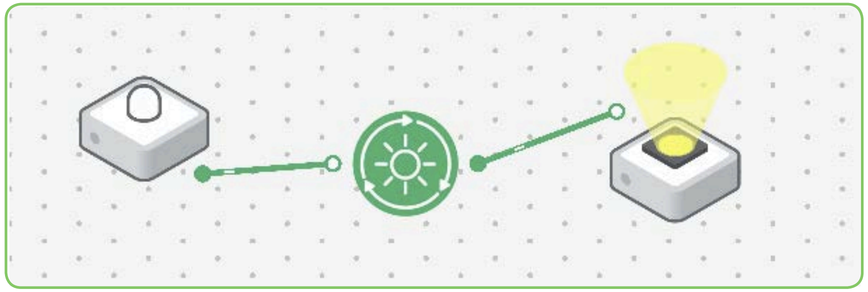
How It Works

The Cycle Brightness block rotates between levels of brightness. Every time time this block receives a signal it will cycle between 3 percentages: 0%, 50% and 100%.



Sample Connection

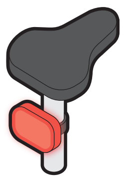
Place the Cycle Brightness block between the Light Sensor and an RGB LED. Vary the amount of light being received by the Light Sensor to see the brightness change on the RGB LED.



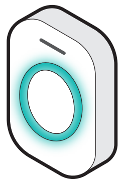
Quick Challenge

Create a simulated sunrise or sunset effect.

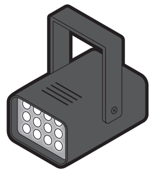
Real-World Comparison



Bike Lights



Doorbell for Hearing Impaired



Strobe Light

Cycle Colors

How It Works

The Cycle Color Block cycles between Red, Green and Blue each time it is activated.

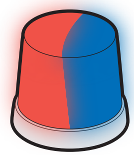
Sample Connection

Place the Cycle Colors block between a Light Sensor and an RGB LED. Vary the amount of light being received by the Light Sensor to see the colors change on the RGB LED.

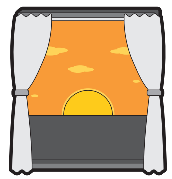
Quick Challenge

Create a dance party! Design a lighting effect to the beat of your favorite song.

Real-World Comparison


Police Light


Holiday Lights


Sunrise and Sunset

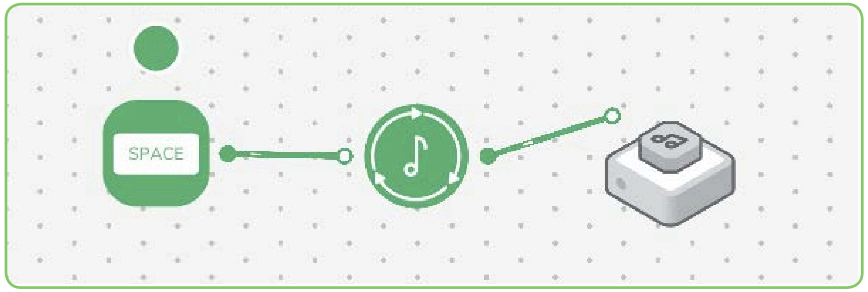
Cycle Frequency

How It Works

The Cycle Frequency block cycles between frequency (pitch) levels. Every time this block receives a signal it will cycle between 3 preset buzz pitch levels.

Sample Connection

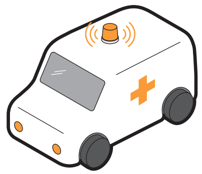
Connect a Key Press block to a Cycle Frequency block, and the Cycle Frequency block to a Buzzer. Press the key assigned to Key Press block and notice the Buzzer frequency change for every key press.



Quick Challenge

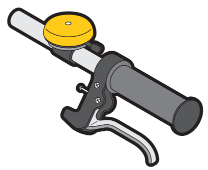
Invent a creative time that cycles in frequency.

Real-World Comparison



Ambulance Siren

Phone Ringtone

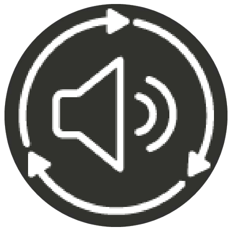


Bicycle Bell

Cycle Volume

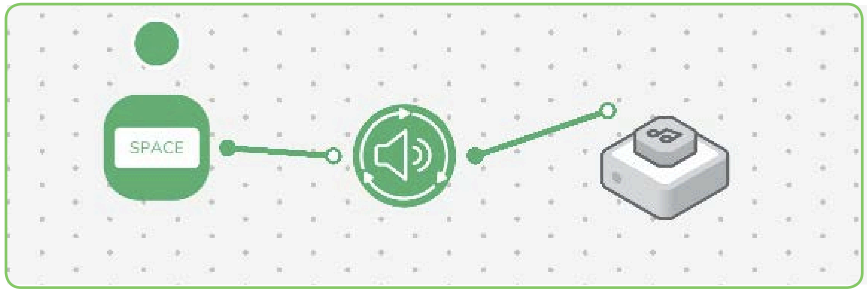
How It Works

The Cycle Volume Block cycles between 15%, 45% and 70% volume each time it is activated.



Sample Connection

Connect a Key Press block to a Cycle Volume block, and the Cycle Volume block to a Buzzer. Press the key assigned to Key Press block and notice the Buzzer volume change for every key press.



Quick Challenge

Create an alarm clock that will sound louder every minute until it reaches maximum volume.

Real-World Comparison

Police Car Siren

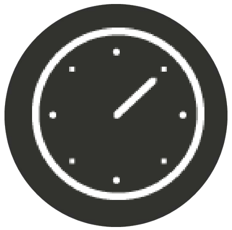
Musical Doorbell

Hearing Test

Delay

How It Works

When the Delay block receives a signal, it waits a specified amount of time before actioning the desired behavior.



Sample Connection

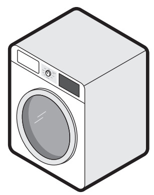
Connect a Button to a Delay block and the Delay block to a Buzzer. Set a delay by defining a length of time in the Delay's settings to create a delay before the Buzzer buzzes.

Quick Challenge

Create a prank that will surprise your friend 10 seconds after they walk into a room.

Real-World Comparison

Sprinkler



Washing Machine

Smart Heating

Direction

How It Works

The Direction Block is used to control the direction of a DC Motor. A positive input indicates the motor should rotate in one direction and a negative input indicates the other direction.

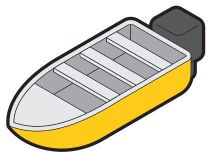
Sample Connection

Connect the Direction block to both a Key Press and a DC Motor to control the direction of the motor.

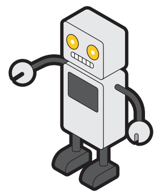
Quick Challenge

Design an animation flipbook that uses two DC Motors to flip through the story.

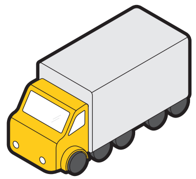
Real-World Comparison



Boat



Robot

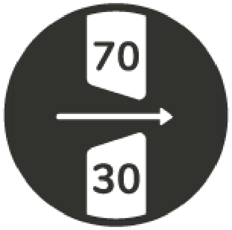


Truck

Filter

How It Works

The Filter block only allows certain values through. It identifies a set of two numbers which define the boundaries of what will receive a signal.



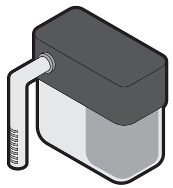
Sample Connection

Connect the Light Sensor to a Filter block and DC Motor. When the light level is within a certain brightness boundary, the DC Motor will move.

Quick Challenge

Design a kettle that makes a warm drink at the optimal temperature.

Real-World Comparison



Fish Tank Filter

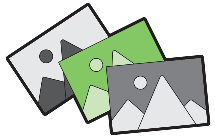
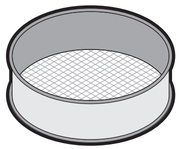


Photo Filter

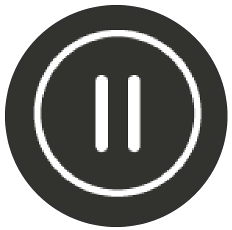


Kitchen Sifter

Hold

How It Works

The Hold block extends a value for a specified amount of time and then turns off.



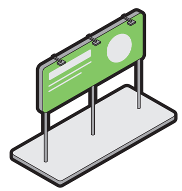
Sample Connection

Connect the Button to the Hold block and the Hold block to the DC Motor. The DC Motor will move for the amount of time you set in the settings of the Hold block.

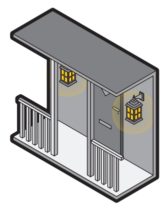
Quick Challenge

Build an automatic sliding door.

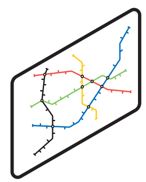
Real-World Comparison



Advertising Billboard



Porch Light



Subway System

Interval

How It Works

The Interval Block toggles on and off at fixed time increments.

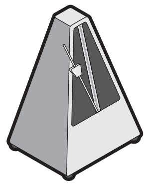
Sample Connection

Connect the Button to the Toggle, the Toggle to the Interval, and the Interval to the Sound Player. Set the interval time to hear the Sound Player play at your specified intervals.

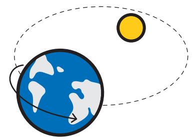
Quick Challenge

Build a creative cuckoo clock.

Real-World Comparison



Metronome



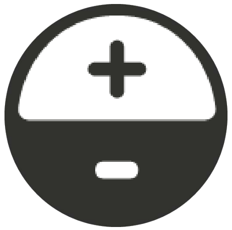
Rotation of the Earth

Ocean Waves

Inverse

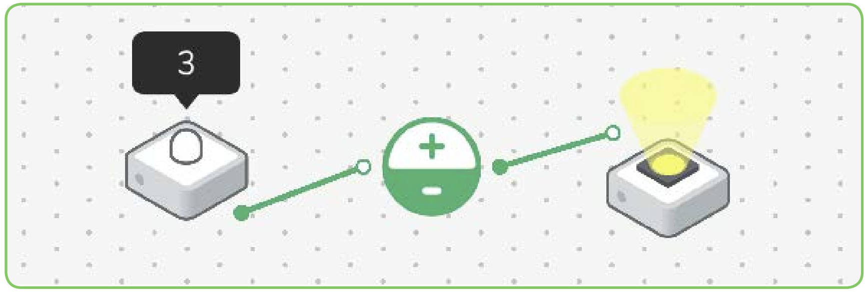
How It Works

The Inverse block converts any value it receives into the opposite.



Sample Connection

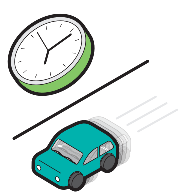
Connect the Inverse block between the RGB LED and the Light Sensor to create a smart light that turns on when it's dark.



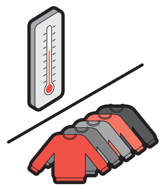
Quick Challenge

Design an urban planning system that includes street lights that turn on in the evening.

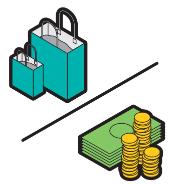
Real-World Comparison



Speed vs Time



Sweater Sales vs Temperature



Spending Money vs Buying Products

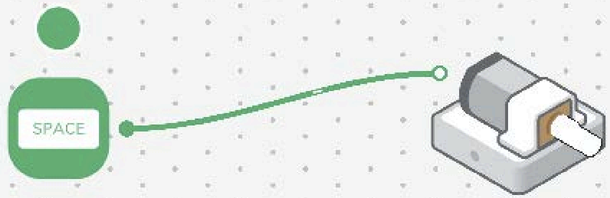
Key Press

How It Works

The Key Press block allows you to use your keyboard keys as buttons if you are using a device with a keyboard. It can be used with a virtual key when using a tablet.

Sample Connection

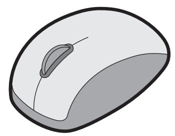
Connect the Key Press to the DC Motor to turn it on by pressing the circle above the block on your screen.



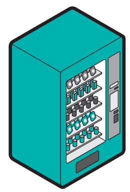
Quick Challenge

Create a polling system to decide what movie to see.

Real-World Comparison



Computer Mouse



Vending Machine

TV Remote Control

Log Findings

How It Works

The Log Findings block automatically records data and information in a spreadsheet format that you can download as a CSV file.

Sample Connection

Connect the Heat Sensor to the Interval, and the Interval to the Log Findings block to record the changing temperature throughout the day.

Quick Challenge

Measure and log the speed of a race car.

Real-World Comparison


Class Register

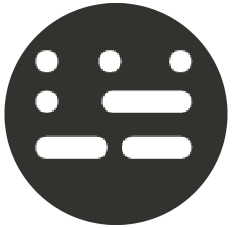

Excel Spreadsheets


Lab Report

Morse Code

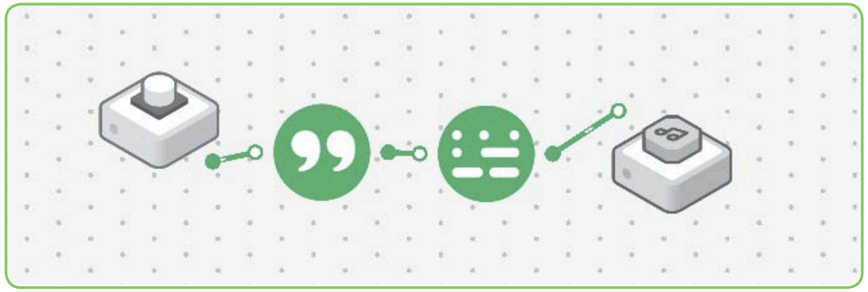
How It Works

The Morse Code block converts a value to Morse code. It processes any received value to text, and then converts that text to Morse code.



Sample Connection

Connect the Button to the Text block, the Text block to the Morse code block, and the Morse Code block to a Buzzer to hear the output in Morse code.

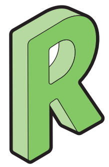


Quick Challenge

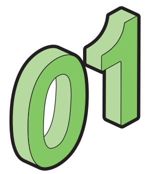
Send your classmate a secret message in Morse code.

Real-World Comparison

SOS Signal



R (Roger) Signal



Binary

Note

How It Works

The Note Block sends a single musical note to connected Buzzer blocks. A numeric input will select the note that is played.

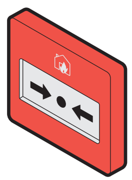
Sample Connection

Connect a Key Press block to a Note block, and the Note block to a Buzzer. Press the key assigned to the Key Press block to send a note to the Buzzer.

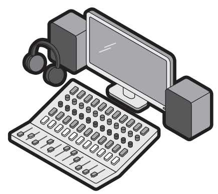
Quick Challenge

Create a simple piano using 3 or more keys on the keyboard. Every time a key is pressed a different note will play on the Buzzer.

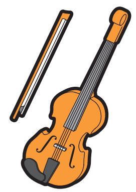
Real-World Comparison



Fire Alarm



Music Production



Violin

Number

How It Works

The Number block will convey a number that you specify when it receives a signal.

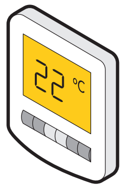
Sample Connection

Connect a Button to the Number block and set the value to any number between 1 and 100. Connect the Number block to an RGB LED to control the brightness of the light based on your input.

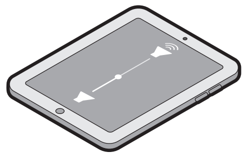
Quick Challenge

Design a unique car and control its speed.

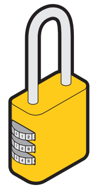
Real-World Comparison



Thermostat



Volume Control on iPad



Combination Lock

On/Off

How It Works

An On/Off Block converts any input into a button that turns any connected blocks on or off.

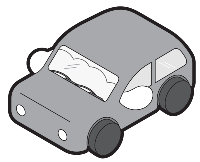
Sample Connection

Connect the Light Sensor to the On/Off block and then to the RGB LED. If the value of the Light Sensor is greater than zero, the light will turn on.

Quick Challenge

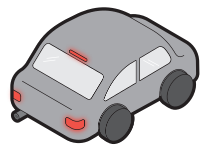
Create a motion-detecting light for the entrance to your home.

Real-World Comparison



Passenger Airbag

Electronic Scale

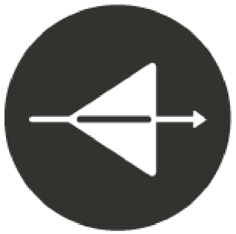


Brake Lights

Scale

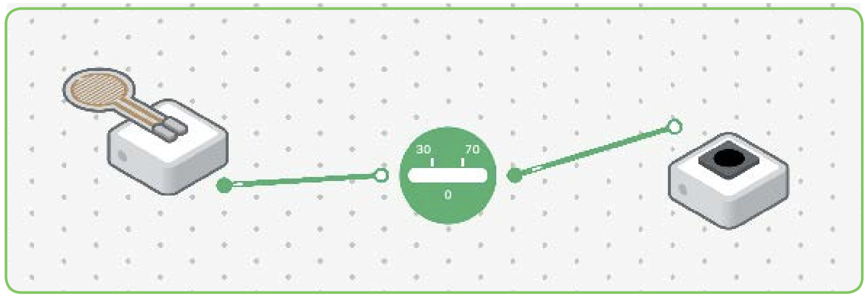
How It Works

The Scale block remaps numbers within a configured range to another range of 0-100. For example, an input value of 10 within a range of 0-50 would become 20 when remapped to a range of 0-100.



Sample Connection

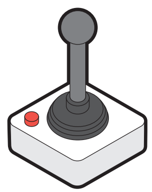
Connect the Pressure Sensor to the Scale and the Scale to an RGB LED. Edit the range to 30-60. When you press the Pressure sensor, the light will change based on whether it's below, within or above the range.



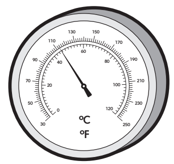
Quick Challenge

Build a modern volume controller.

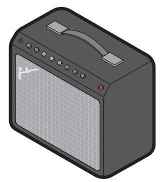
Real-World Comparison



Joystick



Temperature Dial



Music Amplifier

Sequencer

How It Works

The Sequencer block allows you to compose a series of musical notes together in a specific order to create a melody.

Sample Connection

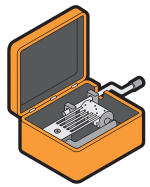
Connect a Button to a Sequencer and the Sequencer to a Buzzer. Select a sequence of notes, press and hold the Button to play the tune.

Quick Challenge

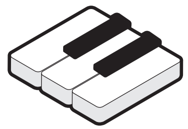
Make a birthday card that plays the Happy Birthday melody when you open it.

Real-World Comparison

Password



Music Box



Do-Re-Mi

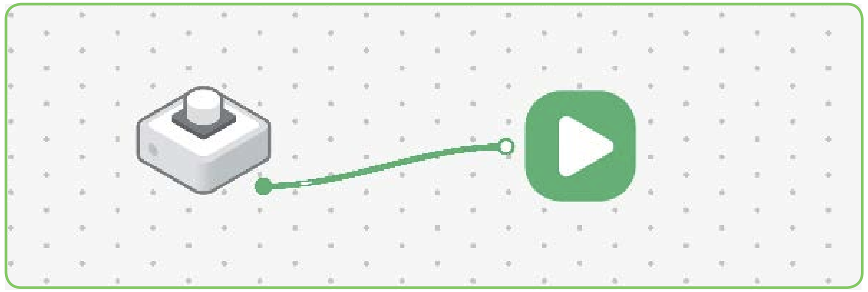
Sound Player

How It Works

The Sound Player block enables you to select an audio file to play. When it receives a signal, it produces sound.

Sample Connection

Connect the Button to the Sound Player to play your favorite sound effect.



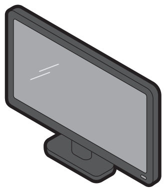
Quick Challenge

Prank your friends by creating a system that screams when they walk through the door.

Real-World Comparison

Synthesizer

Phone Speaker



TV

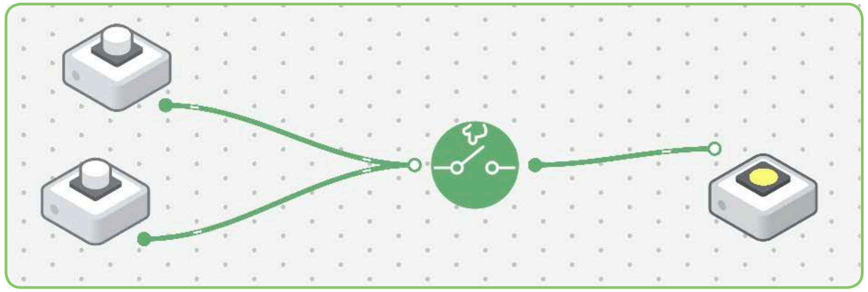
Switch

How It Works

The Switch block acts like a gate that allows information to flow through or not. If a condition is true, you can pass information through it.

Sample Connection

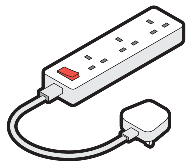
Connect two Buttons to a Switch block and the Switch block to an RGB LED. In the Switch settings, assign one button as the input. This button will now complete the circuit, allowing the other Button to turn the light on.



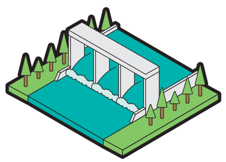
Quick Challenge

Create an example of an electrical circuit using the Switch block.

Real-World Comparison



Power Socket Module



Water Dam

Crossing Guard

Switch Direction

How It Works

The Switch Direction block enables you to flip the current direction of the DC Motor.

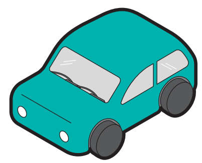
Sample Connection

Connect a Button to the DC Motor. Connect the Button to the Switch Direction and then the Switch Direction block back to the DC Motor. When you press the Button, the DC Motor will change its direction.

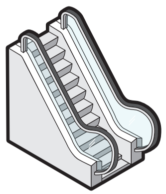
Quick Challenge

Design a Mars rover that can explore the planet by moving forward and backward.

Real-World Comparison



Car



Escalator

Bike

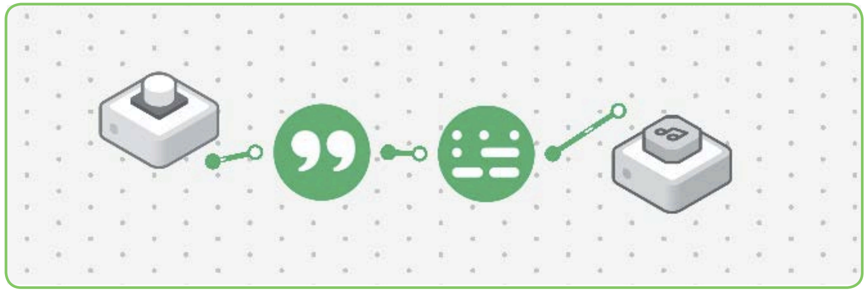
Text

How It Works

The Text block enables you to enter and send text. When it receives a signal, it will send the specified text value.

Sample Connection

Connect the Button to the Text block, the Text Block to the Morse Code block, and the Morse Code block to the Buzzer to send a custom message via Morse Code.

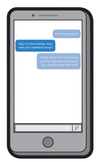


Quick Challenge

Build a system that logs the word "Hot" when it reaches a certain temperature.

Real-World Comparison

Email



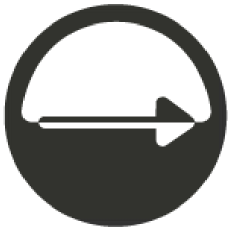
Text Message

Word Processing Document

Threshold

How It Works

The Threshold Block sends a signal when an input passes a given limit.



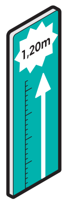
Sample Connection

Connect a Light Sensor to the Threshold block. Connect the Threshold to the RGB LED. Define the number threshold to turn the light on and off.

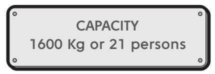
Quick Challenge

Build a fort that includes a notification system if anyone is approaching.

Real-World Comparison



Roller Coaster Height Limit



Elevator Weight Limit

Payment for Goods

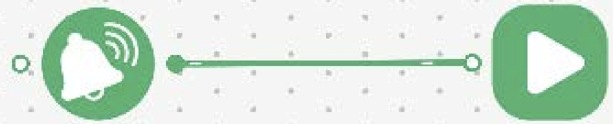
Time Trigger

How It Works

The Time Trigger block activates connected blocks at a specified date and time.

Sample Connection

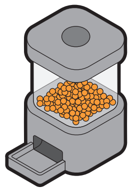
Connect a Time Trigger to a Sound Player. Set the Time Trigger by selecting a future time and wait to hear the sound play at that time.



Quick Challenge

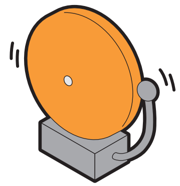
Create a smart alarm clock system that incorporates sound and light.

Real-World Comparison



Cat Feeder

Phone Reminders

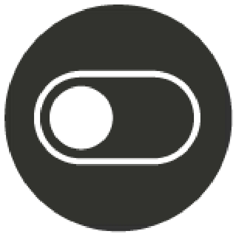


School Bell

Toggle

How It Works

A toggle is a switch that flips between on and off when activated.



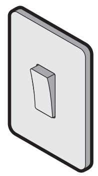
Sample Connection

Connect a Button to an RGB LED and place the Toggle in between. This will enable the light to stay on or off without needing to continuously hold down the button.

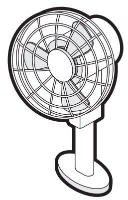
Quick Challenge

Design a conveyor belt for a car factory.

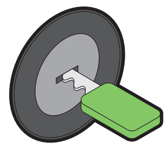
Real-World Comparison



Light Switch



Electric Fan

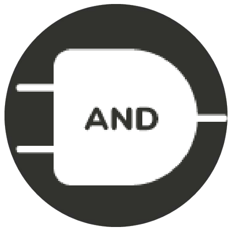


Car Ignition

AND

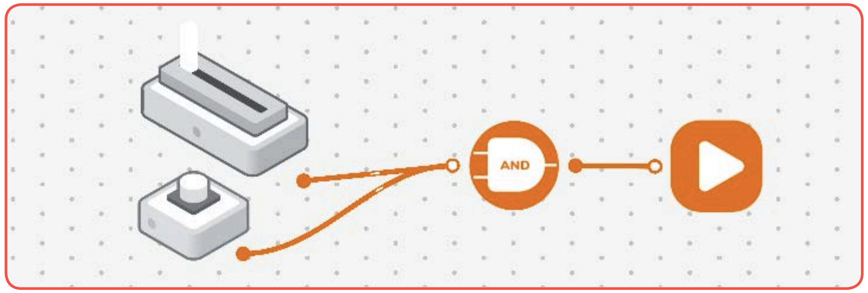
How It Works

The AND block is a logic gate that is active when all inputs are active.



Sample Connection

Connect both a Button and a Slider to an AND block. Connect the AND block to a Sound Player. The Sound Player will play only when the Button is pressed and the Slider is set to 100.

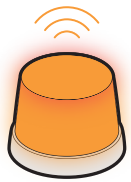


Quick Challenge

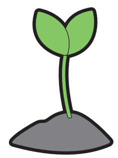
Create a passcode system that turns off a security alarm if the right combination of inputs are entered.

Real-World Comparison

Cooking with Multiple Ingredients



Natural Disaster Warning Systems

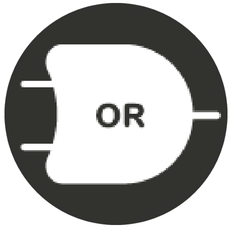


Growing Plants

OR

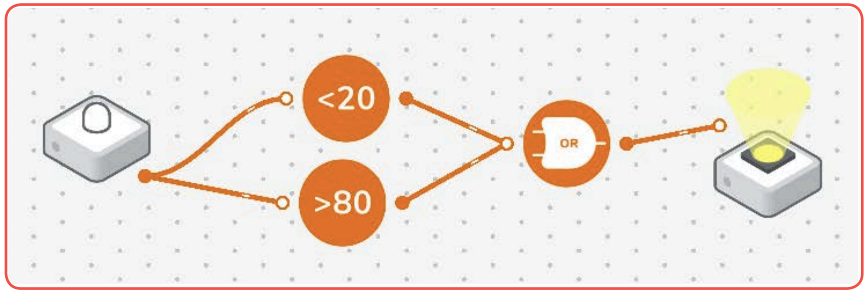
How It Works

The OR block is a logic gate that is active when any input is active (one, multiple or all).



Sample Connection

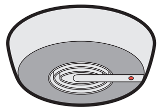
Connect a Light Sensor to two Compare blocks, one set to < 20 and the other > 80. Connect both to OR and the OR block to an RGB LED. If the reading on the Light Sensor is < 20 or > 80, the light will turn on.



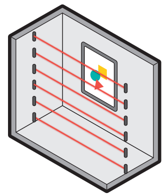
Quick Challenge

Create a night light that is either turned on with a button or automatically when it gets dark.

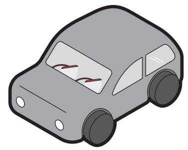
Real-World Comparison



Smoke Detecting
Fire Alarms



Museum
Security Systems

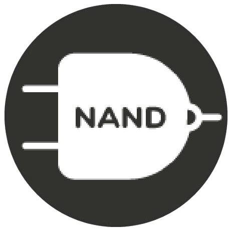


Automatic
Windshield Wipers

NAND

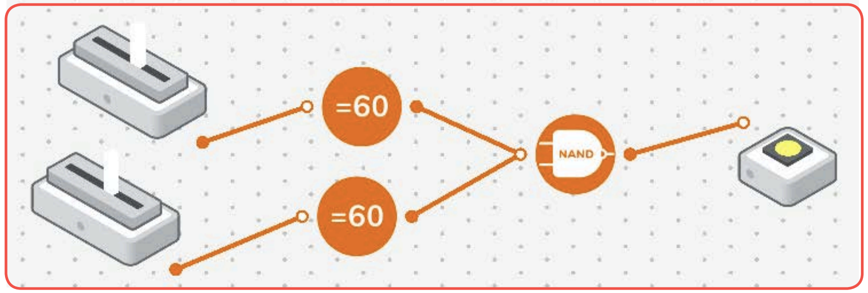
How It Works

The NAND block is a logic gate that is not active only if both inputs are active.



Sample Connection

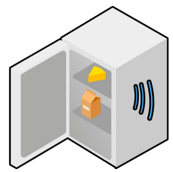
Connect a Slider block to one Compare block, set to =60. Repeat this step with another Slider. Connect both Compare blocks to an NAND block and connect the NAND block to an RGB LED. If both Sliders are =60 the light will turn off.



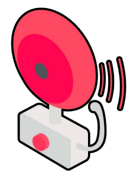
Quick Challenge

Create a burglar alarm that only turns off if 2 safety buttons are pressed.

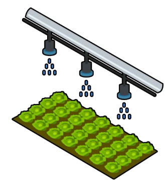
Real-World Comparison



Freezer Warning Buzzer



Burglar Alarm



Automatic Watering System

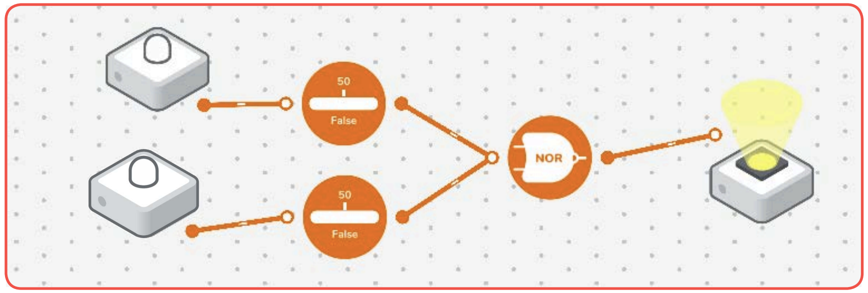
NOR

How It Works

The NOR block is a logic gate that's active only when no inputs are active. This is the opposite of the OR block. So x NOR y is true precisely when neither x nor y is true—i.e. when both x and y are false.

Sample Connection

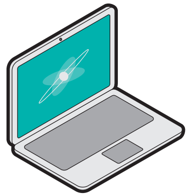
Connect a Light Sensor to a Threshold and the Threshold to a NOR block. Do this again. Connect the NOR blocks to an RGB LED. If it's darker than a certain level that is read by both sensors, the light will turn on.

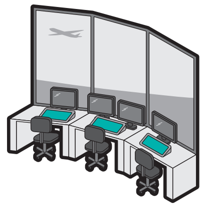


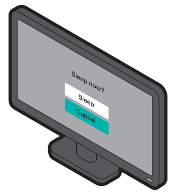
Quick Challenge

Invent a printer paper feeder that sends an alert if there is no paper and no ink.

Real-World Comparison


Screensaver

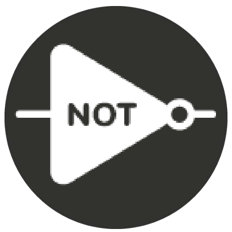

Airport Traffic Control


TV Sleep Mode

NOT

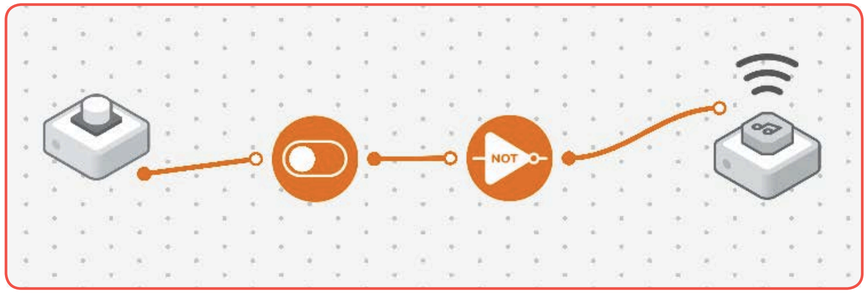
How It Works

The NOT block is a logic gate that is not active when an input is true and active when an input is false.



Sample Connection

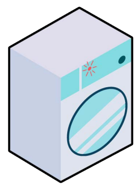
Connect a Light Sensor to two Compare blocks, one set to < 20 and the other > 80. Connect both to OR and the OR block to an RGB LED. If the reading on the Light Sensor is < 20 or > 80, the light will turn on.



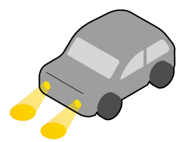
Quick Challenge

Create an alarm that sounds in a car when someone's seatbelt is not fastened.

Real-World Comparison


Oven Cooking Timer


Backup Generator


Automatic Car Headlights

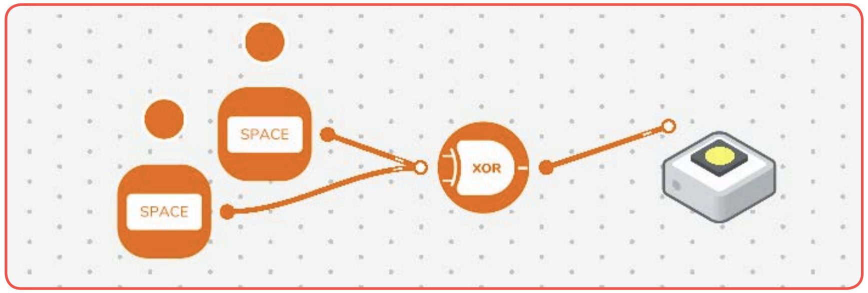
XOR

How It Works

The XOR block is a logic gate that outputs true only when inputs differ (one is true, the other is false). This could be written as “A or B, but not both A and B.”

Sample Connection

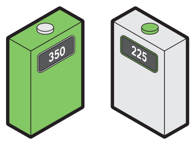
Connect two Key Presses to the XOR block and the XOR block to an RGB LED. The light will only turn on when either one of the Key Press buttons are pressed.



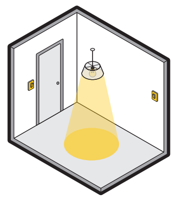
Quick Challenge

Create a board game where players move forward if a light turns on or sound goes off, but not both at the same time.

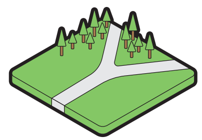
Real-World Comparison



2 Buzzers for Game Show Contestants



2 Light Switches Connected to One Light Fixture



Fork in the Road

SAM LABS

For help, email **support@samlabs.com**