# Sony KOOV Let's Make a Traffic Signal Light Up!

Build a traffic signal with a red and green light and create code that includes loops.

KOOV



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### Lesson 003

# Let's Make a Traffic Signal Light Up

Difficulty:  $\star \star \star \star \star$ 

Learning time: 60 minutes

### **Creative activity**

Lesson flow

- Build a traffic signal with a red and green light
- Program traffic signal LEDs to turn on alternately

# Learning objectives

Become able to create code that includes loops

### Activity details



## **Development Example**

## 🛱 Know: 10 minutes

#### LED functions

LED is an abbreviation for light-emitting diode. In Japanese, it is called a "luminescent diode". An LED generates light when an electric current is passed through it, and has low energy consumption, long life, and various other benefits.



#### Role of traffic signals

Traffic lights ensure traffic safety and smooth traffic flow. The control system includes a centralized control system controlled by the traffic center, a push-button activated system controlled by a provided button, and an activation system controlled by sensors that detect vehicles, as well as other components.



Let's watch a video to observe how traffic signals light up! What role do traffic signals play? You might discover something new if you take note of the order that traffic signals light up.



What do you think your town's streets would look like if there weren't any traffic signals? What do you think traffic rules might be like?

# Building



make sure that the POWER LED is ON

# Programming

Mission

Let's make a traffic signal light up

# Set up connections for necessary electronic parts before programming



Select "Connection settings" from the menu

- 2. Select output.
  - V2: LED

V3: LED.

3. Press Set.

Create code that turns an LED ON



- 1. From Motion, select Turn LED V2 ON and connect under Start
- Push Test mode, select your Core and connect through Bluetooth
- 3. Enter the passcode
- 4. Press "Run"

The red LED lights up and then quickly goes OFF (The Wait • seconds block is not used so the program quickly ends and the LED goes OFF.) 2

### Create code that keeps the LED ON for 5 seconds



- 1. From Control, select Wait seconds and connect it under Turn LED V2 off
- 2. Enter 5 in  $\bigcirc$  and press the checkmark
- 3. Press "Run > "

- 1. Connect Turn LED V2 ON under Wait 5 seconds
- 2. Select OFF at the far right end of Turn LED V2 ON
- Connect Wait 

   seconds wait under Turn LED V2
   OFF and enter 0.3
- 4. Connect Turn LED V2 ON under Wait 0.3 seconds
- Connect Wait 

   seconds under Turn LED V2 ON and enter 0.3
- 6. Push "Run" 🕨

After the red LED lights for 5 seconds, it blinks 10 times



Create code that makes the LED lights flash after turning them ON



### Use Repeat • times to create code that makes the LED flash 10 times



- 1. Using Repeat times, surround the blocks after Turn LED V2 OFF
- 2. Enter 10 in O

3. Push "Run 📐

After the red LED lights for 5 seconds, it blinks 10 times

- Copy the red LED code and create code that turns on the green LED and makes it blink
- 1. Push and hold **Turn LED V2 ON** to copy
- 2. Connect to the bottommost part of the code
- 3. Change all V2 in the code just connected to V3

After the red LED lights for 5 seconds, it blinks 10 times. Next, the green LED also lights for 5 seconds and blinks 10 times, and during that time the red LED is still lighted.





When you just copy the code, LEDV2 and V3 light up together. Let's think about what we can do to make them light up alternately! Making the green and red LEDs not light up simultaneously



 Connect Turn LED V2 ON under the first Repeat 10 times, then select OFF at the far right end

> The red LED lights for 5 seconds and blinks 10 times, then the green LED is also lights for 5 seconds and blinks 10 times.



Using **Turn LED V2 OFF**, you were able to make the LEDs not light at the same time!

Repeat light on and light blinking just like real traffic signals.



1. Surround all blocks with Forever

The sequence of the red LED lighting for 5 seconds and blinking 10 times and then the green LED also lighting for 5 seconds and blinking 10 times is repeated indefinitely. (However, when the red LED lights, the green LED also lights.)

8 Make the green and red LEDs not

light up simultaneously



1. Connect Turn LED V2 ON at the bottom inside Forever, and set Turn LED V3 OFF

The sequence of the red LED lighting for 5 seconds and blinking 10 times and then the green LED also lighting for 5 seconds and blinking 10 times is repeated indefinitely. (Both LEDs turn OFF after blinking.)

#### Save your work

<b>Save your amazing creation!</b> Put a cool name to your robot and upload an image or video. Other worldwide creators may give you feedback with "Likes".
Next

- 1. Press "Finish"
- 2. Enter a name and description for your work
- 3. Take a picture to register

## 📴 Think: 15 minutes



Let's rewrite the code and create a push-button activated signal! The key is to combine the Repeat • times and If () then blocks.

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Let's learn how to use Repeat • times repeat and Forever.

The Repeat • times and Forever blocks repeat the same activity in the program. When using these blocks, if the right step is not taken for each loop, the program can execute unintended actions.

## 🔄 Review: 15 minutes



#### About loop structures

Repeated execution of a program is referred to as a loop structure. There are finite loops with a specified number of repetitions and endlessly repeating infinite loops.



#### Mechanism of actual traffic signals

Programs that can be used in traffic signals can be created using conditional branches and loop structures. Also, by combining conditional branches and loop structures, more complex LED traffic signal patterns can be created.



#### Let's think about signals of the future

With the arrival of self-driving vehicles and other new technologies, the world's traffic is changing rapidly. Let's consider issues with current signals and what can be improved.



#### What forms do traffic signals take?

For example, in countries with a lot of snow, signals are vertical. This prevents signals being buried under snow and breaking from the weight of the snow. This is an example of factors other than traffic rules that dictate the form of traffic signals. Let's see what forms traffic signals take.



#### Let's try to control many LEDs

Cities have many traffic signals. These signals are controlled to maintain the safety of the city. However, it is extremely difficult to control many signals as intended. Let's share traffic signals with friends to create a city together.



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# Quiz

You created a code that makes the LEDs blink like below.



- Q1. Which values should we change in order to extend the amount of time the lights are OFF?
  - A. (1) : Second block from the top Repeat times
  - **B.** (2) : Fourth block from the top Wait seconds
  - C.) ③ : Sixth block from the top Wait seconds
- Q2. Which values should we change to increase the blinking frequency?
  - (A, 1) : Second block from the top Repeat  $\bullet$  times
  - B. ② : Fourth block from the top Wait seconds
  - **C.** ③ : Sixth block from the top Wait seconds