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## 6. Object detection

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## Experiment 6: Object detection

### Short Description

Create an Object Detection System with Raspberry Pi Pico and an Infrared IR sensor.

### Extended Description

In this experiment, we aim to explore the capabilities of the Raspberry Pi Pico microcontroller and the IR infrared sensor to create a simple yet effective object detection system.

The IR sensor used in this experiment emits infrared light and detects the reflection of it. When an object comes within the proximity of the sensor, it reflects the emitted infrared light back to the sensor. By measuring the intensity of the reflected light, the sensor can determine the presence of an object. Then the system will change its status from 1 to 0 (see code below).

By combining the Raspberry Pi Pico's processing power and the sensitivity of the IR sensor, we can create a reliable object detection system. This experiment serves as an excellent introduction to the world of infrared technology and its practical applications in various fields, such as robotics, automation, and security systems.

Through this experiment, you will gain hands-on experience in connecting and configuring the IR sensor with the Raspberry Pi Pico. Furthermore, you will learn how to write and execute a Python script to read the sensor data and determine the presence of an object.

### Objectives:

Through this activity, the user will experiment with building an object detection system using the Raspberry Pi Pico board and an infrared IR sensor. The user will acquire knowledge on:

- The physics of infrared light and how it can be used to detect an object.
- The basics of programming in Python and how to write code to control the Raspberry Pi Pico board.
- The principles of circuit design and how to wire components together on a rapid prototyping board to create a functional object detection system.

By completing this project, the user will better understand electronics, engineering, and programming. They will also have a practical and useful device that they can use to make parking their car safer and more convenient.

### Materials to be used:

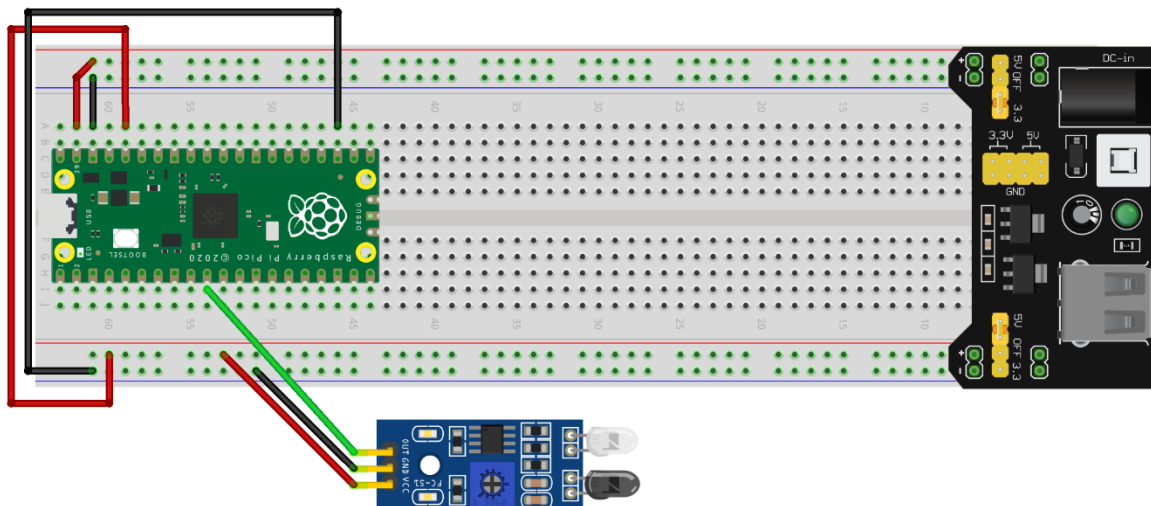
- 1 x Raspberry Pi Pico

- 1 x Pico breadboard kit
- 1 x Full-size breadboard
- 1 x Infrared IR sensor module KY-032
- Jumper wires

### Steps to be followed:

1. Connect the Infrared IR Sensor Module KY-032 to the Raspberry Pi Pico as follows:
  - Connect the VCC pin of the sensor module to the 3V3 pin of the Raspberry Pi Pico.
  - Connect the GND pin of the sensor module to the GND pin of the Raspberry Pi Pico.
  - Connect the OUT pin of the sensor module to pin GP7 (GPIO 7) of the Raspberry Pi Pico.
2. Write a Blockly / MicroPython program to control the Raspberry Pi Pico board and the IR sensor.
3. Run the code and see if the green light is on or off and see on the screen if the IR sensor state is 0 or 1.
4. Move an object close to the sensor to see if the green light and the IR sensor state change their values.

### Wiring diagram



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## Code

```
import machine
import time

# Define the pin number for the IR sensor output
ir_pin = machine.Pin(7, machine.Pin.IN)

# Loop forever
while True:
    # Read the state of the IR sensor output
    ir_state = ir_pin.value()
    # Print the state of the IR sensor output
    print("IR Sensor State:", ir_state)

    # Wait for 0.5 seconds
    time.sleep(0.5)
```