

# Experiment 8 – Intrusion alert

## Instruction

Have you ever played any adventure games? They can always open the institutions when the enemy enters their private territory. How does this work? In fact, this is the role of intrusion alarms. Through this experiment, we will teach you how to make your own intrusion alarm, and quickly put it in your private space to protect your own space!

## Target

- Learn how PIR motion sensor works and use it to make an intrusion alarm with buzzer.
- Learn how to clear Micro:bit's matrix LEDs.

## Required Parts

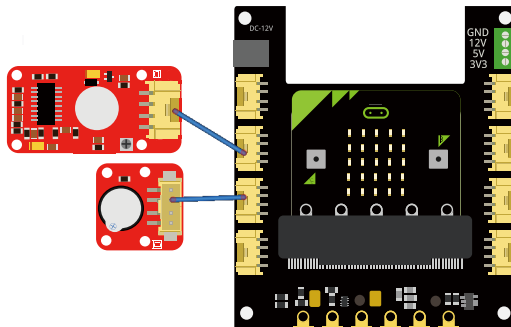
- Micro:bit x1
- Crowtail-Base shield for Micro:bit x1
- Crowtail-PIR Motion Sensor x1
- Crowtail-Buzzer x1
- Crowtail-Cable x2
- USB cable x1

## Hardware learning and connection

Crowtail- PIR Motion Sensor(Passive Infrared Sensor) can detect infrared signals caused by motion. If the PIR sensor notices the infrared energy, the motion detector will be triggered and the sensor outputs HIGH on its SIG pin. The detecting range can be adjusted by a potentiometer soldered on its circuit board, the max detecting range of it up to 6 meters. ***PO is a port with pull-down, please do not connect PIR motion sensor to this port! For the micro: bit, when the PIR module detects an object movement, it will change from low level to high level and output high level continuously for 5 seconds, which means you don't need to set extra delay.***



Connect Crowtail-PIR Motion Sensor and Crowtail-Buzzer to P2 and P1 ports of Crowtail-Base shield for Micro:bit. The hardware connections are as follows:



## Programming and note

```
forever
  if digital read pin P2 = 1 then
    digital write pin P1 to 1
    show icon
  else
    clear screen
    digital write pin P1 to 0
```

- **If/else:** In this case, when the value digital read from the PIR motion sensor is true(1), turn on the buzzer and show an angry icon for 5 seconds, otherwise, clear the micro:bit's matrix LEDs and turn off the buzzer.
- **Clear screen:** This `clear screen` block will clear all the information displayed on micro:bit's matrix LEDs when it runs. Here, we clear matrix LEDs when PIR motion sensor does not detect the movement of Infrared energy.
- **Download the program to micro:bit to see what happens.**

### Result

Wave your hand in front of the PIR motion sensor, and you will see an angry icon on the micro: bit matrix LED, and the buzzer will beep for 5 seconds. If you stop any movement, the icon will no longer be displayed and the buzzer will stop beeping.



*What does infrared energy mean? Can PIR motion sensor detect your pet's movement?*

