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12. Sound detection warning alarm

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Experiment 12: Sound detection warning alarm

Short Description

To create an early warning alarm with the help of a high detection sensor.

Extended Description

How many times have you wanted to know in time when someone comes home, parks in the yard or enters the garage. Whether it's parents who came home too early or a cat making a mess in the garage, with this project you'll be notified in a timely manner.

Note: We will do this project on a board and connect it with short wires. If we want the sensor to be in the garage, and the alarm in the house, we have to do the installation, which is not the subject of this manual. Another option is to explore connecting devices over the network, which is for more advanced users.

For this project, we need a buzzer and a high-sensitivity sound detection sensor.

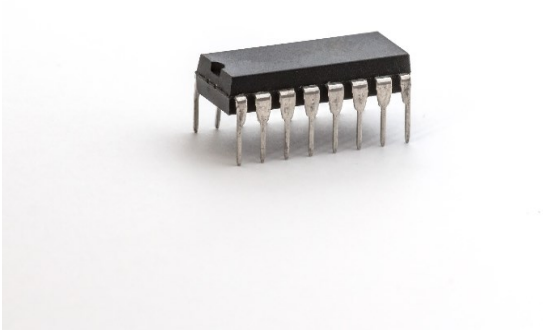
The operational principles of the high-sensitivity sound detection sensor

A High Sensitivity Sound Detection Sensor is an electronic component designed to detect and measure sound levels in its surrounding environment. It is commonly used in various applications such as noise monitoring, security systems, home automation, robotics, and audio equipment.

High sensitivity sound sensors are designed to detect even faint sounds. They can capture a wide range of sound frequencies, including both low and high frequencies.

The sensor incorporates a built-in microphone or sound transducer that converts sound waves into electrical signals. The microphone captures sound vibrations and converts them into corresponding voltage variations.

An integral part of most sensors are integrated circuits. What are integrated circuits?



Integrated circuits (ICs), also known as microchips or chips, are electronic components that contain a complex arrangement of interconnected electronic circuits fabricated on a single semiconductor material, typically silicon. They are a fundamental building block of modern electronics and are used in a wide range of electronic devices and systems.

Integrated circuits enable the miniaturization of electronic components by integrating numerous electronic devices, such as transistors, resistors, capacitors, and diodes, onto

a single chip. This miniaturization allows for increased functionality, reduced power consumption, and improved performance in electronic devices.

They can perform a variety of functions, ranging from simple tasks like amplification and switching to complex tasks like digital signal processing, memory storage, and microprocessor control. The specific functionality of an IC depends on its design and the arrangement of electronic components within it.

Integrated circuits are used in a wide range of applications, including consumer electronics, telecommunications, automotive systems, medical devices, industrial automation, aerospace and defense, and more. They are critical components in devices like smartphones, computers, digital cameras, televisions, automotive control systems, and IoT devices.

Objectives:

Through this activity, the user will experiment with Raspberry Pi Pico and various electronic components such as a buzzer, the High Sensitivity Sound Detection Sensor, and so on. By completing this project, the user will gain a deeper understanding of electronics, engineering, and programming, and also:

- Understand the working principle of the High Sensitivity Sound Detection Sensor
- Connect the circuit as shown in the picture and connect it to the Raspberry Pi Pico
- Write a program in Python or Blockly

Materials to be used:

- 1 x Raspberry Pi Pico
- 1 x Pico breadboard kit
- 1 x Full-size breadboard
- 1 x High Sensitivity sound detection sensor
- 1 x buzzer
- Jumper wires

Steps to be followed:

The main steps in the exercise are:

1. Connect the sound detection sensor to the Raspberry Pi Pico according to the connection diagram.

Raspberry Pi Pico Board:

- GP21: Connect to D0 pin of the sensor
- GND: Connect to GND rail of the breadboard
- GP18: Connect to Positive + pin of the LED

High Sensitivity Sound Detection Sensor:

- D0: Connect to GP21 of Raspberry Pi Pico board
- +: Connect to + rail of the breadboard
- GND: Connect to - rail of the breadboard

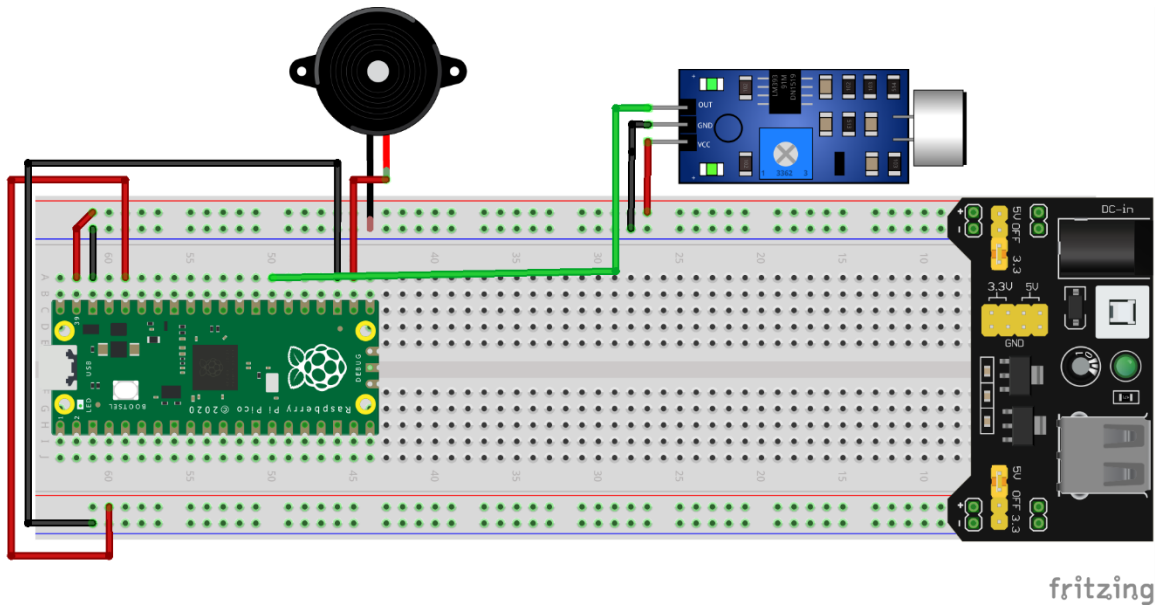
2. Connect the buzzer to the Raspberry Pi Pico

Buzzer:

- Positive leg: Connect to GP18 of Raspberry Pi Pico board

- Negative leg: Connect to - rail of the breadboard
- 3. Write a program that will turn on the buzzer when the high-sensitivity sound detection sensor is activated.

Wiring diagram



Code

```
from machine import Pin
from time import sleep

#define pins
sound = Pin(21, Pin.IN)
sleep(2)
led = Pin(18, Pin.OUT)

while True:
    if sound.value() == 0:
        print("Sound detected")
        buzzer.toggle()
        sleep(5)
    if knock.value() == 1:
        print("No sound detected")
        buzzer.low()
        sleep(0.01)
```



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Conclusion

In this exercise, we learned what integrated circuits are, and saw how a sound detection sensor works. For more specific projects where the sensor and the alarm system are far away, it is necessary to research topics such as electrical installations or wireless communication.