



2023

10. Smart clothes dryer

Project number: **2021-1-FR01-KA220-SCH-000031617**



 **Co-funded by
the European Union**

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SCRAPY Partnership
31/05/2023



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Experiment 10: Smart clothes dryer

Short Description

Create a smart clothes dryer that will warn us when it starts to rain.

Extended Description

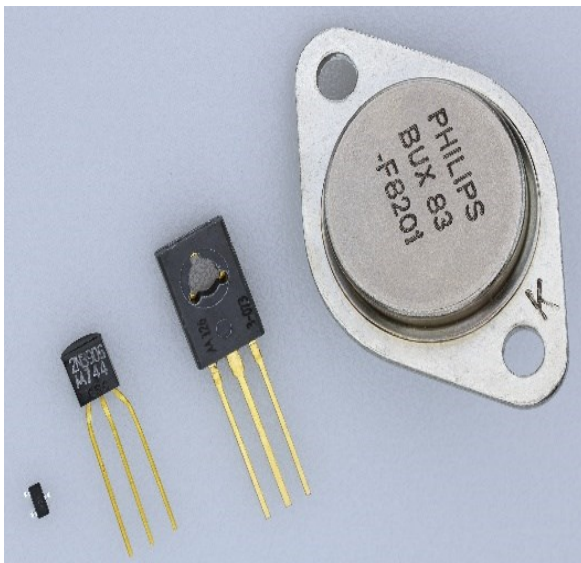
This simple example can be realized by using the Raspberry Pi Pico and the raindrop module. The Raindrop module consists of a board with copper lines and a signal amplifier.

A plate with copper lines is actually a plate that has copper tracks that are not in contact with each other and have a different potential. When the tracks are dry, no current flows and no signal reaches the amplifier. At the moment when the space between the tracks gets wet, the resistance decreases, and a small number of current flows, which we register on the amplifier.

The signal amplifier is located in an integrated circuit (a small chip on a circuit board). Its task is to amplify the signal difference so that we can more easily see the small signals that appear on the plate with copper lines. The basic building block of integrated circuits is transistors.

In Python, we will make a program that will turn on the buzzer, alarming us if it rains.

The operational principles of the transistors



Transistors are active electronic devices that are widely used in a variety of electronic circuits. They are often referred to as the "building blocks" of modern electronics due to their versatility and essential role in amplification, switching, and signal processing.

One of the key functions of transistors is signal amplification. By applying a small input signal to the transistor's input terminal (base or gate), it can amplify the signal to a higher power level at the output terminal (collector or drain). This enables transistors to boost weak signals, facilitating audio amplification, radio communication, and other applications.

Transistors can also operate as electronic switches. By controlling the input signal, the transistor can be turned "on" or "off," allowing or blocking the flow of current in a circuit. This switching ability is crucial in digital circuits, where transistors are 'employed' to create logic gates and perform computations.

Transistors play a fundamental role in modern electronics, and their applications range from audio amplifiers and radio receivers to digital logic circuits and microprocessors. They are essential components that enable the control and manipulation of electronic signals in various electronic devices.

Objectives:

Through this activity, the user will experiment with Raspberry Pi Pico and various electronic components such as buzzer and raindrop sensor.

By completing this project, the user will gain a deeper understanding of electronics, engineering, and programming, and also:

- Understand the working principle of the raindrop sensor.
- Make an electronic circuit that will connect the sensor to the Raspberry Pi Pico and the buzzer
- Program the Raspberry Pi Pico so that it emits sound signals if we get the sensor wet.

Materials to be used:

- 1 x Raspberry Pi Pico
- 1 x Pico breadboard kit
- 1 x Full-size breadboard
- 1 x Raindrop sensor
- 1 x Buzzer
- Jumper wires

Steps to be followed:

The main steps in the exercise are:

1. Connect the raindrop sensor to Raspberry Pi Pico

Raspberry Pi Pico Board:

- 3v3 : Connect to + pin of the raindrops sensor
- GP1: Connect to D0 pin of the raindrop sensor
- GND: Connect to GND pin of the raindrop sensor
- GP17: Connect to Positive + pin of the buzzer
- GND: Connect to - pin of the buzzer

Raindrop sensor:

- D0: Connect to GP1 of Raspberry Pi Pico board
- +: Connect to 3V3 of Raspberry Pi Pico board
- GND: Connect to GND of Raspberry Pi Pico board

2. Connect buzzer to Raspberry Pi Pico

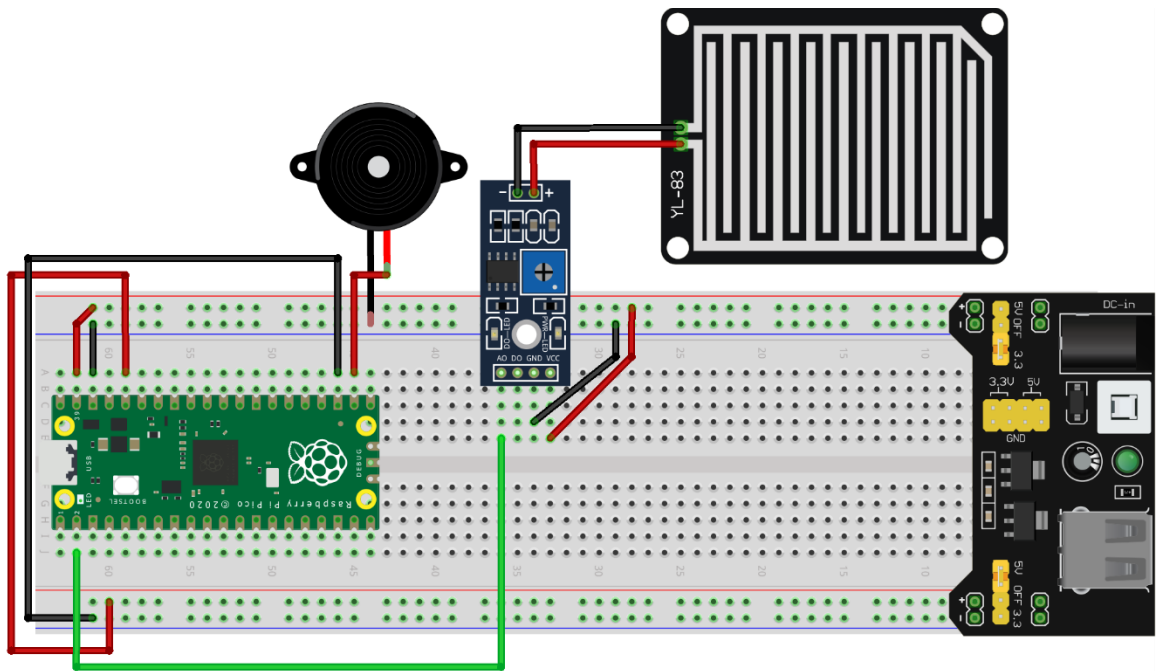
Buzzer:

- Positive leg: Connect to GP17 of Raspberry Pi Pico board
- Negative leg: Connect to GND of Raspberry Pi Pico board

Green LED:

3. Program the Raspberry Pi Pico

Wiring diagram



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Code

```
from machine import Pin
from time import sleep

buzzer = Pin(17, Pin.OUT)
rain_sensor = Pin(1, Pin.IN)

while True:
    if rain_sensor.value() == 0:
        buzzer.high()
        sleep(1)
    if rain_sensor.value() == 1:
        buzzer.low()
        sleep(1)
```

Conclusion

In this project, we have shown how technical knowledge can be applied in a simple way in real life. Through a few simple lines of code, we made our everyday life easier and at the same time learned the basics about transistors and circuits.

For more advanced projects, it is recommended to explore the soil moisture sensor and soil irrigation automation.