



جامعة مولاي إسماعيل  
 UNIVERSITÉ MOULAY ISMAÏL



كلية العلوم  
FACULTÉ DES SCIENCES

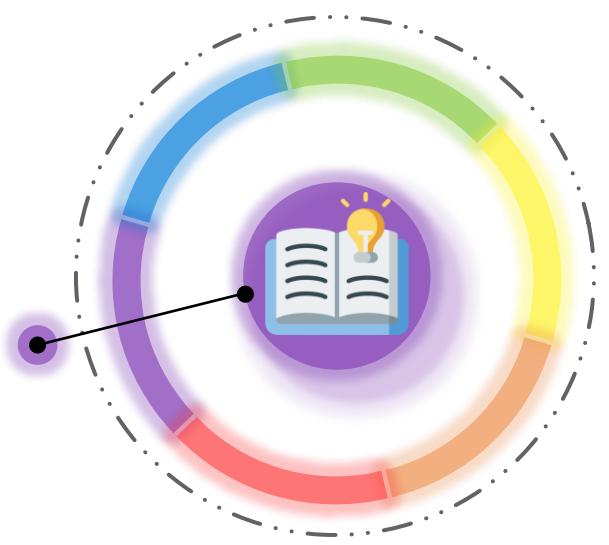
# Smart Plant Watering

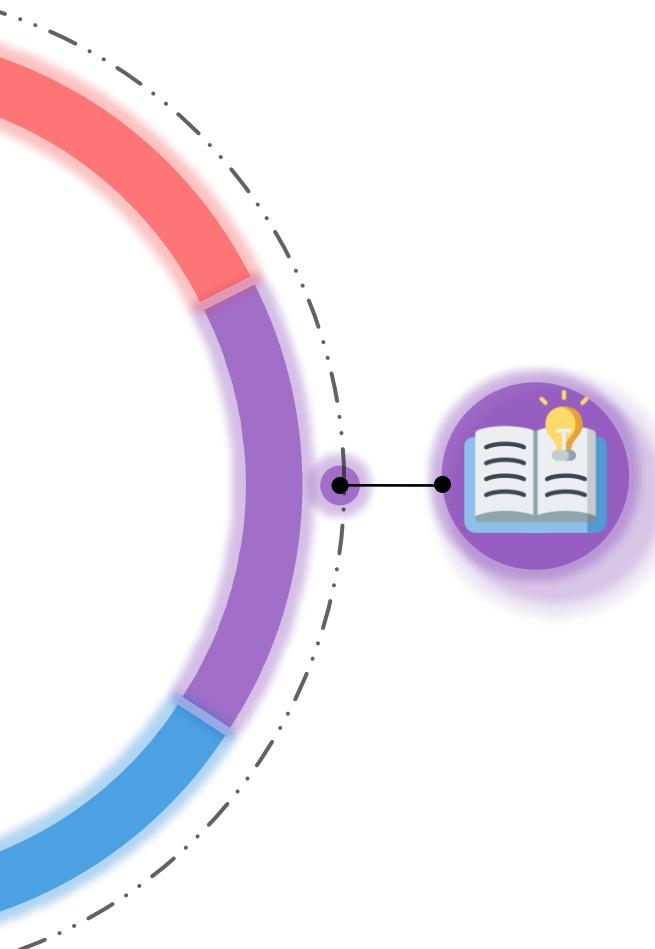
## IoT -App-Agriculture

ALHAOUIL Abdessamad

Pr. MyAli BEKRI

July 2024





# Introduction



# Introduction

## Problematic

Mohamed is a professional wrestler who loves taking care of his big garden at home.

He spends a lot of time training and doesn't know much about watering plants the right way.

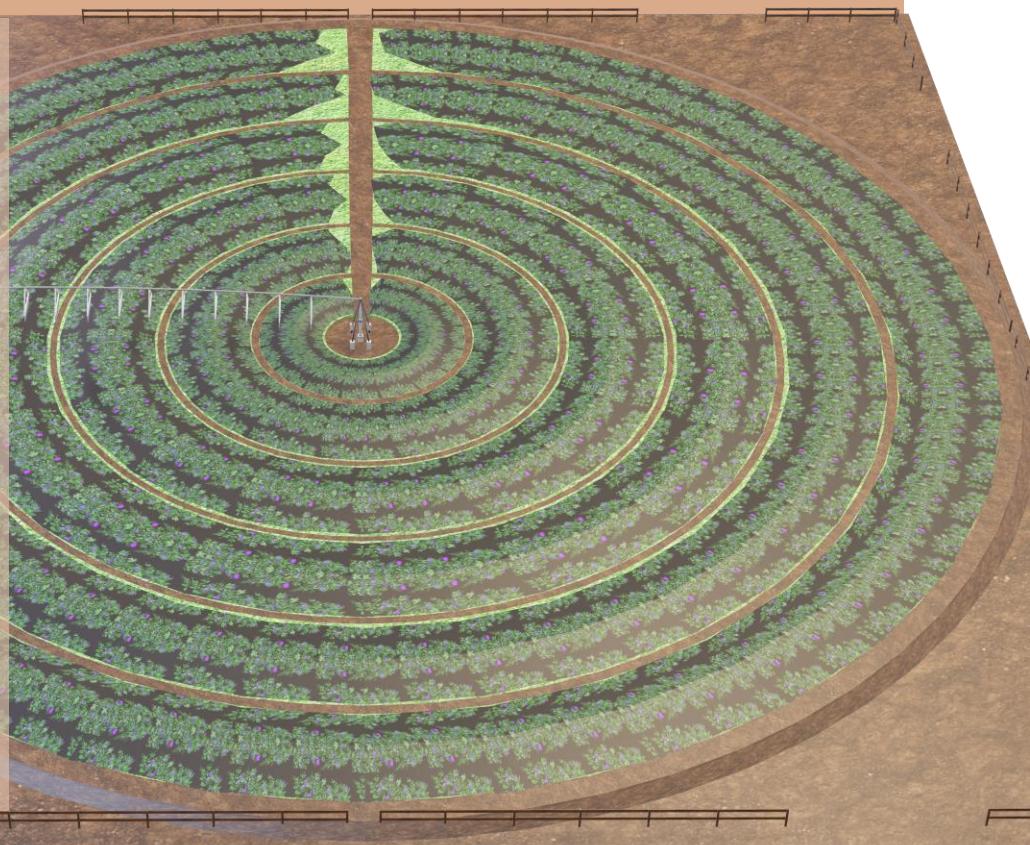




# Introduction

## Problematic

- John's way of watering his garden is not good.
- Sometimes he uses too much water, causing it to flow away and get wasted.
- Other times, he doesn't use enough water, and the plants don't get what they need.
- This irregular watering makes his garden unhealthy and wastes a lot of water, which is a big problem because there isn't much water to go around in his area.





# Introduction

## Introduction

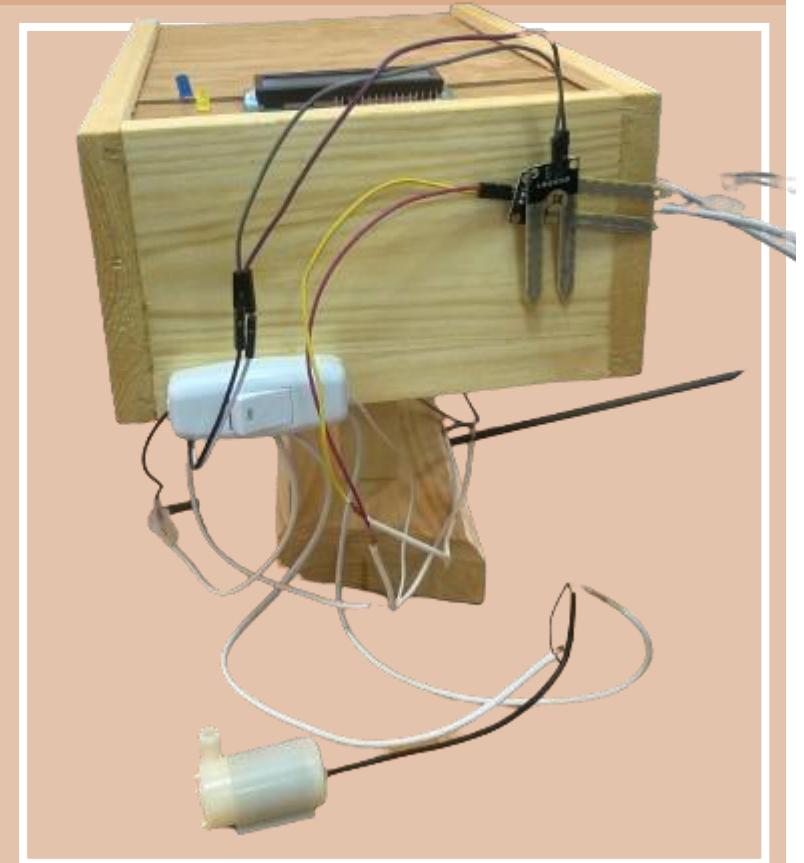
our innovative solution: a Smart Irrigation System designed to optimize water usage and ensure efficient irrigation. This system harnesses the power of modern technology

monitor soil moisture levels

air humidity and temperature

and plant needs

automatically adjusting the watering schedule to deliver the right amount of water at the right time





# Project context

## Automation of Watering

The main objective is to design an automated watering system that dynamically responds to water needs, using soil moisture sensors coupled with an Arduino UNO

### Easy To Install

Easy to install With Complete Accessories



#### Accessories



LetPot Drip Irrigation  
Controller×1



Water Pipe 10m



Water Pipe Bracket×10



Tee Connector×10



Adjustable Dripper×10



Filter×1



Power Adaptor×1



Pipe clip×2



Fixed clip×1



Anti-backflow valve×1



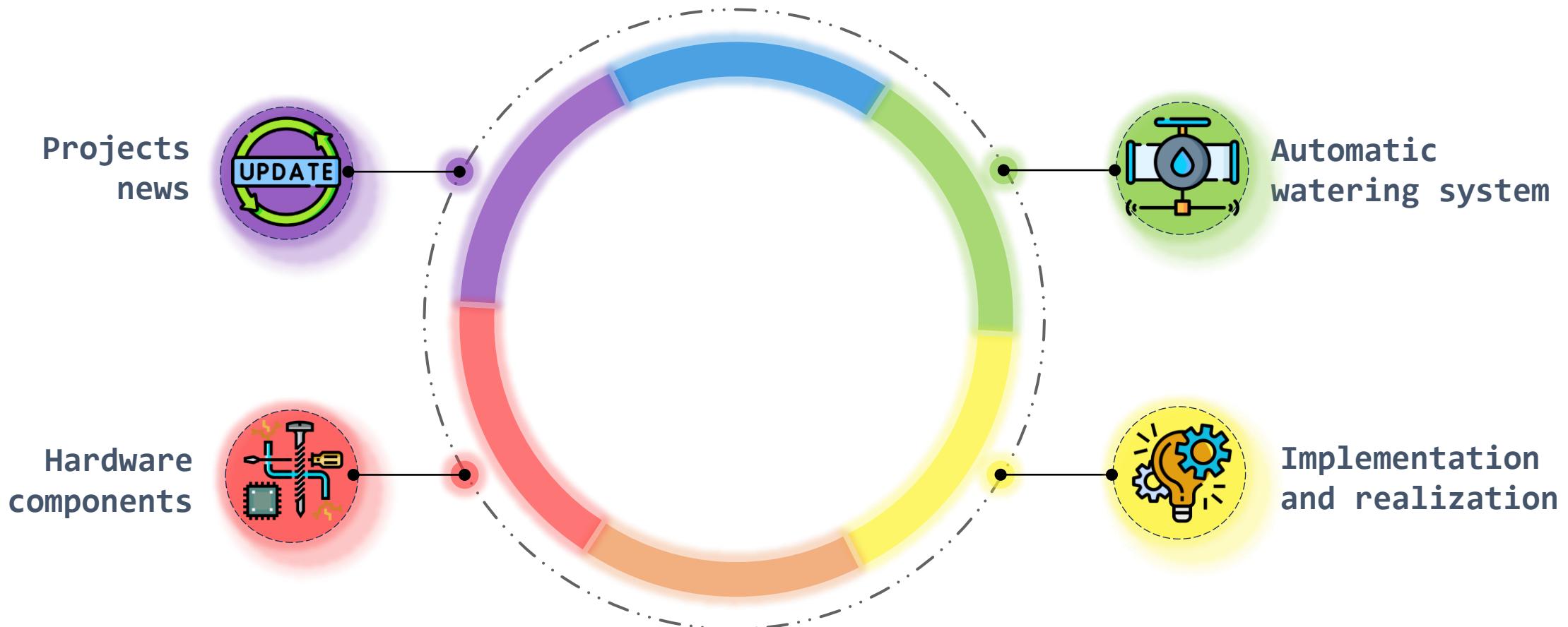
# Project context

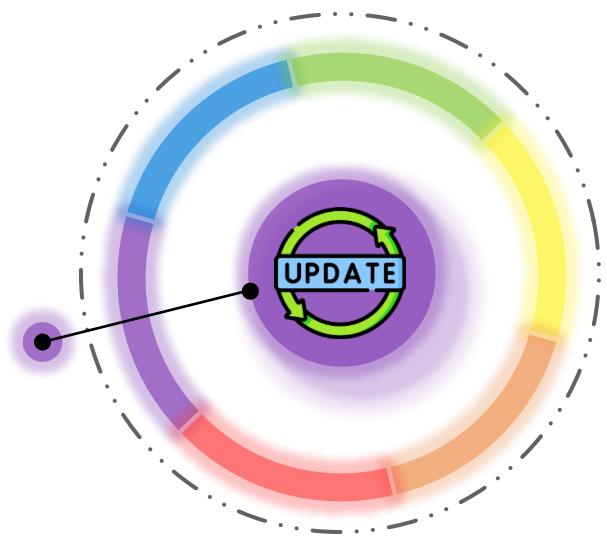
## Real Time Monitoring

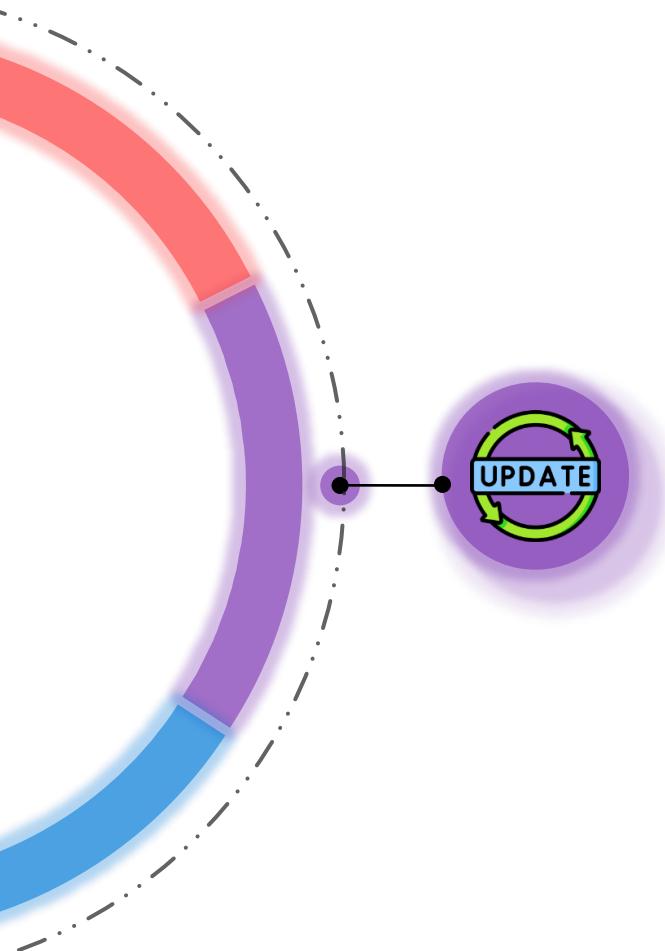


The project aims to implement a real-time monitoring system of environmental conditions, particularly temperature and humidity, using the **DHT11** sensor. And soil moisture percentage, using it **sensor**. This data is then transmitted to a web application and Blynk via the **ESP32**.

# Outline







# Projects news



# Projects news

## Internet of Things (IoT) technologies

In this context, Internet of Things (IoT) technologies have emerged as a promising solution to optimize agricultural practices and improve productivity.





## Typical IoT architecture

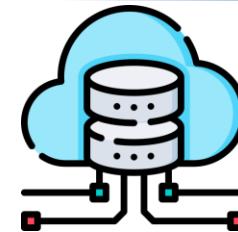
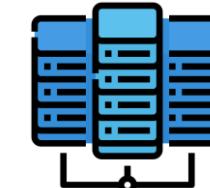
Perception Layer



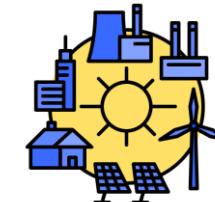
Transport Layer



Processing Layer



Application Layer

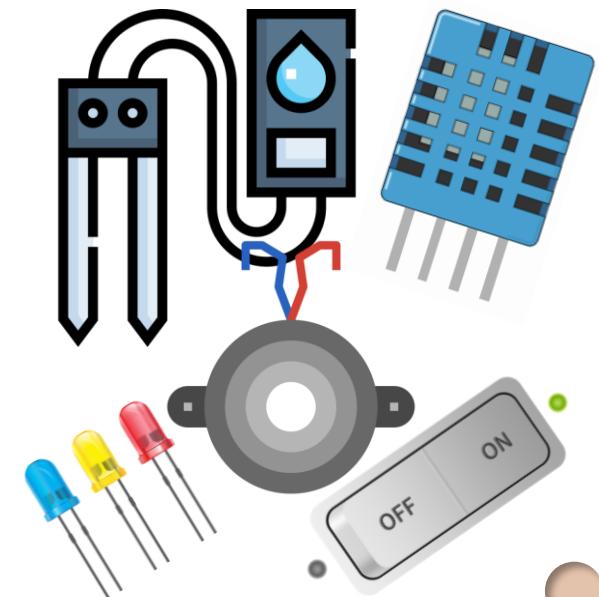




# Projects news

## Areas for improving the project

### Add more sensors



### Add Transmission Module



### Applications



Loading...

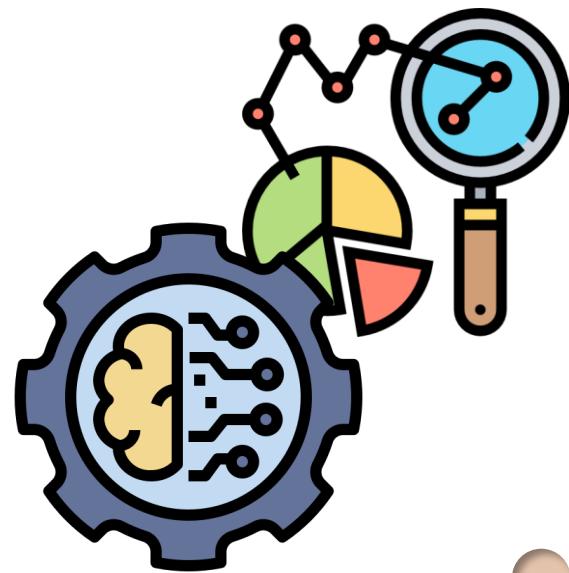
B



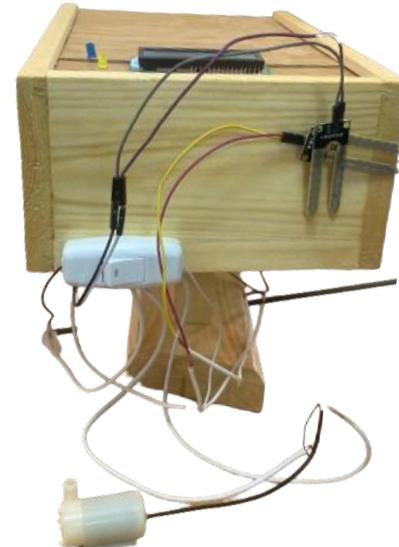
# Projects news

## Areas for improving the project

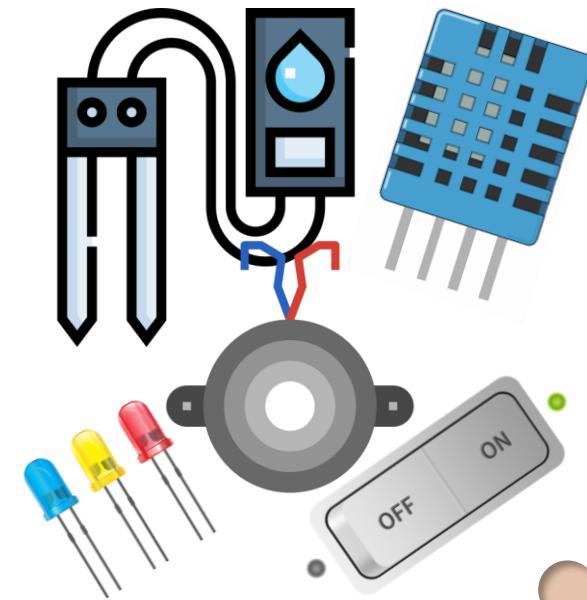
### Add ML Model

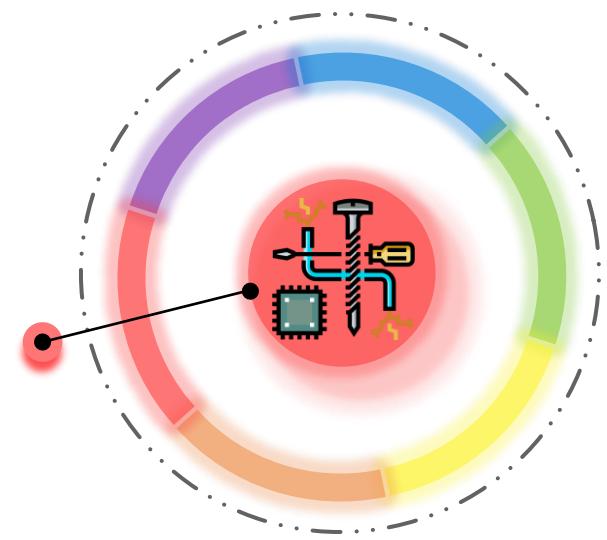


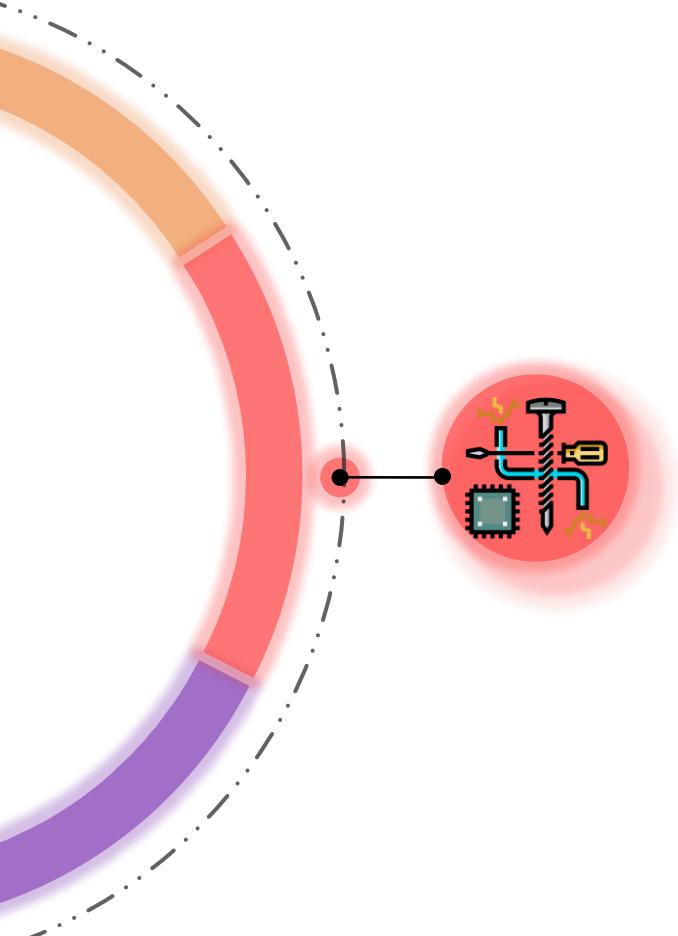
### Automatic watering system



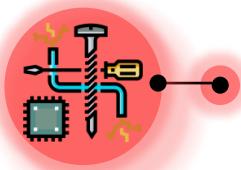
### Add more sensors



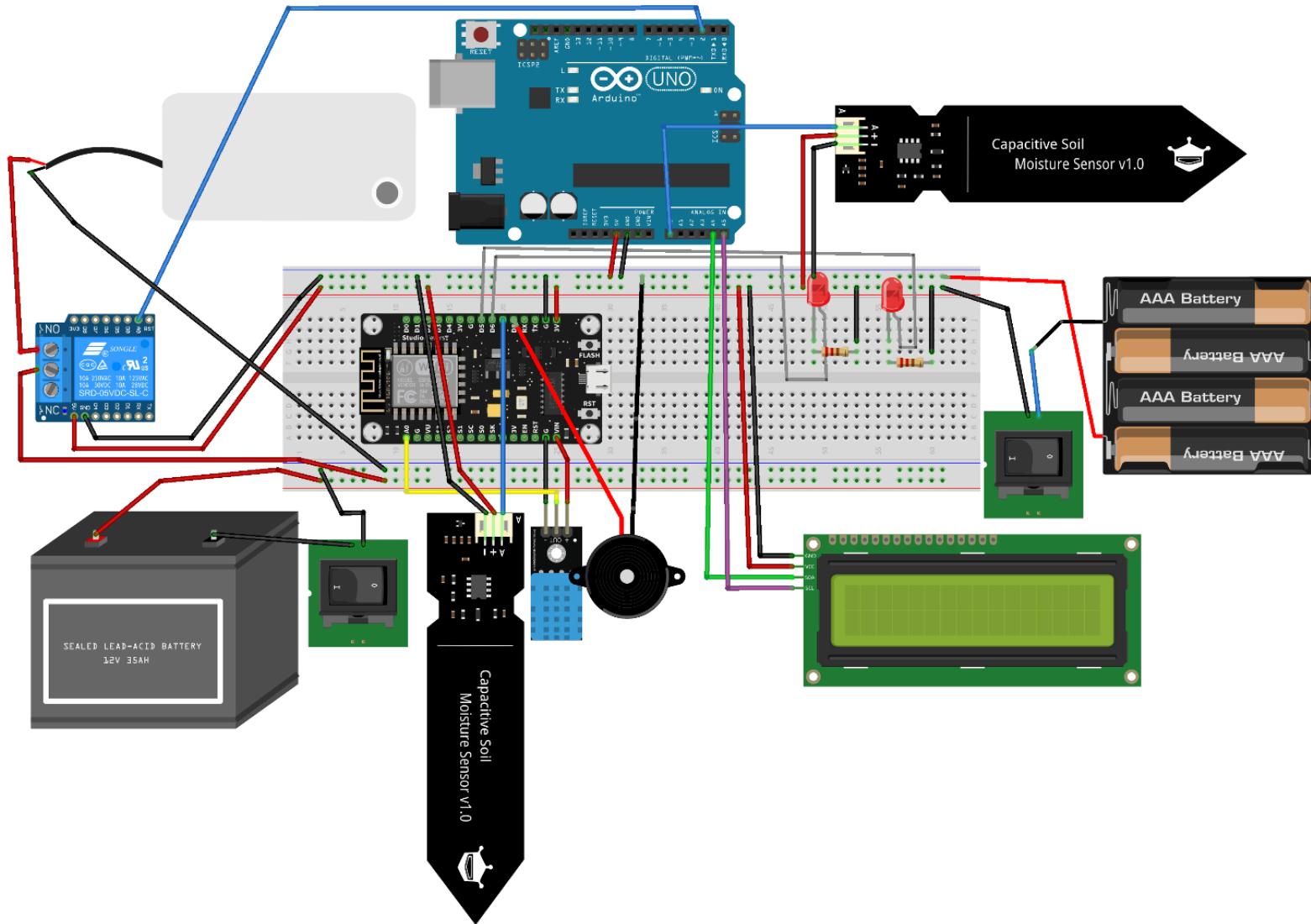


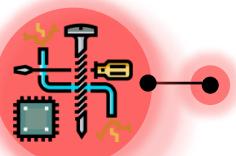


# Hardware components

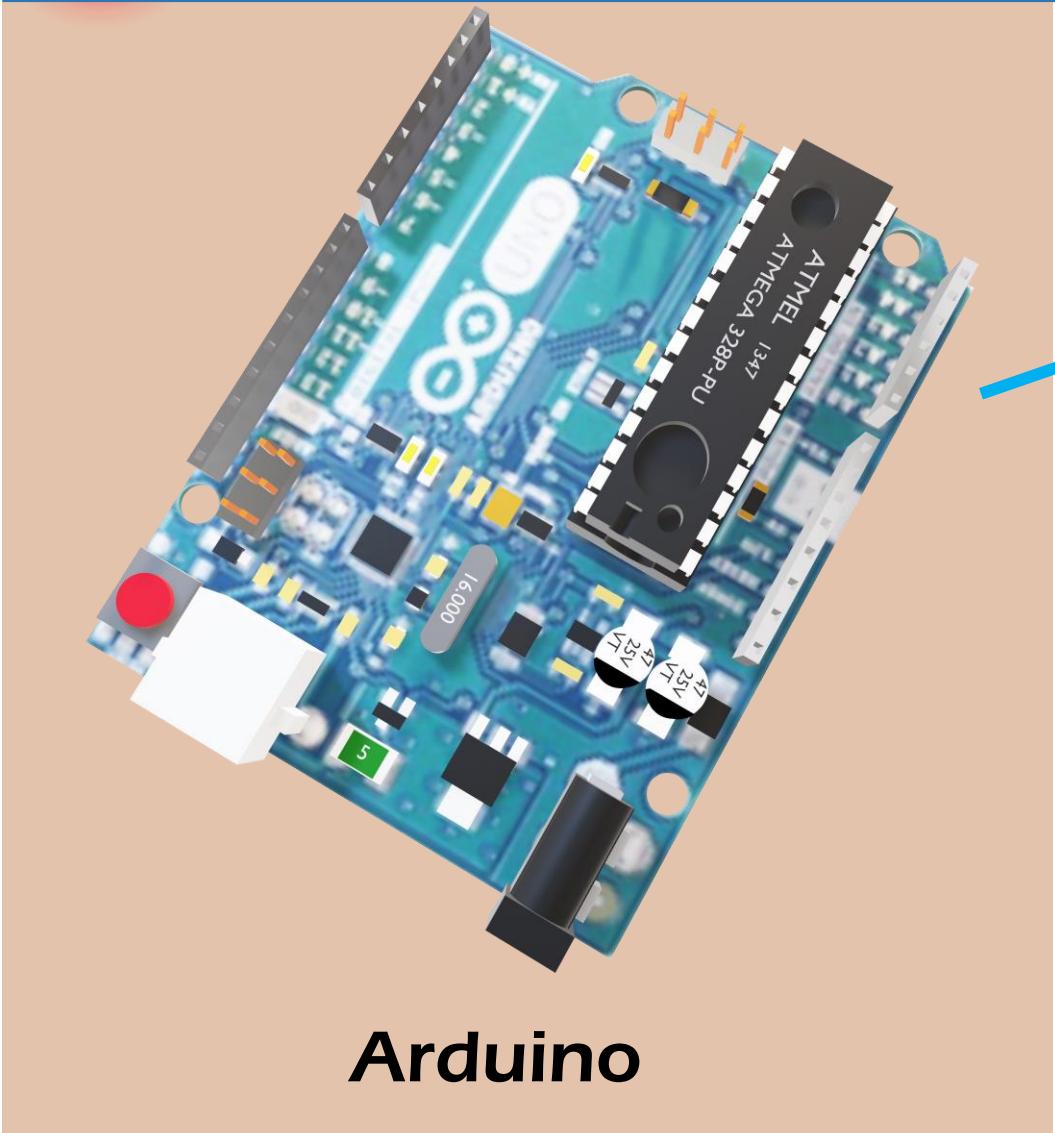


# Hardware components

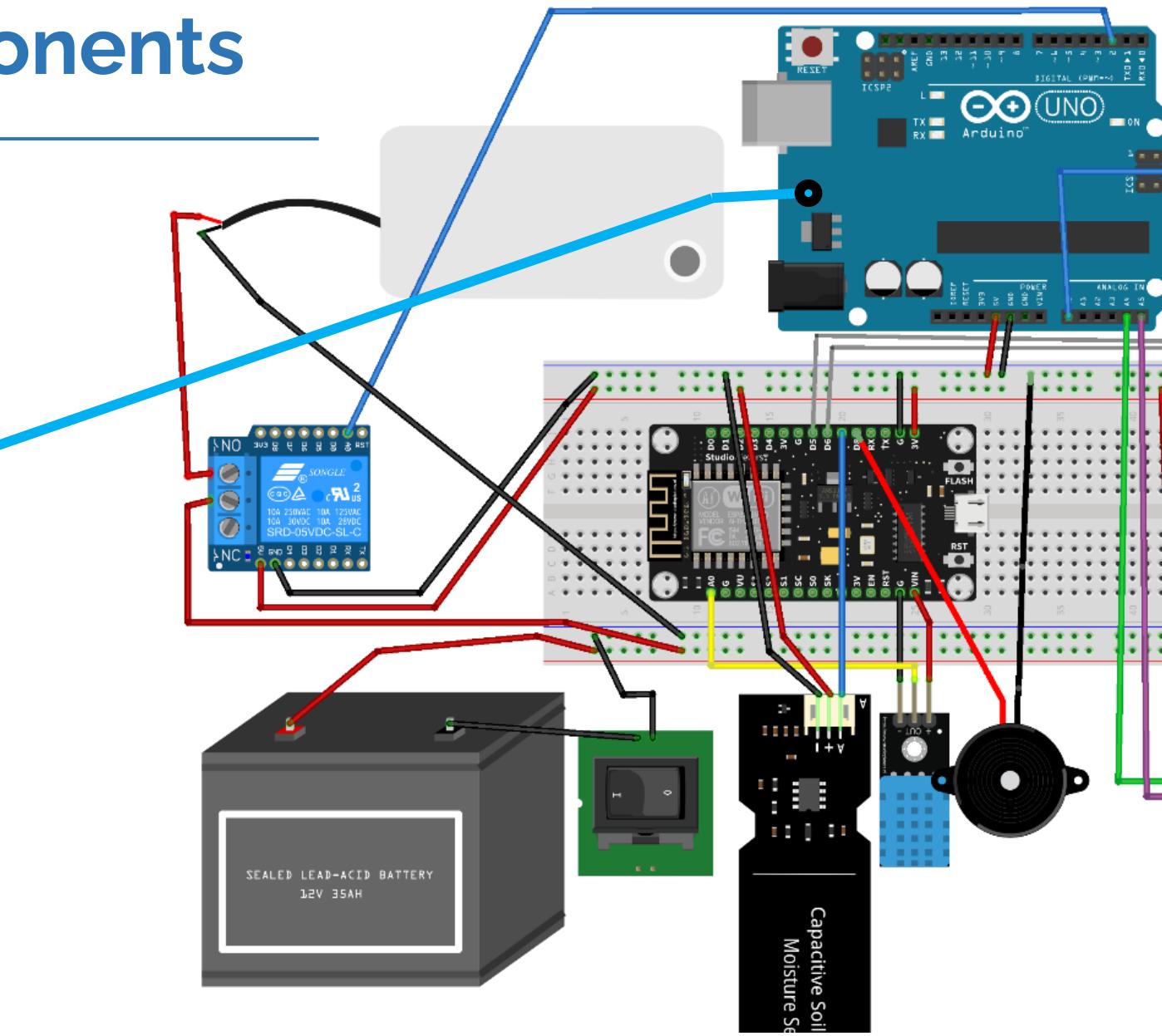


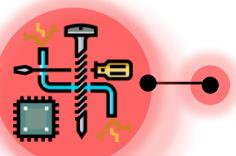


# Hardware components

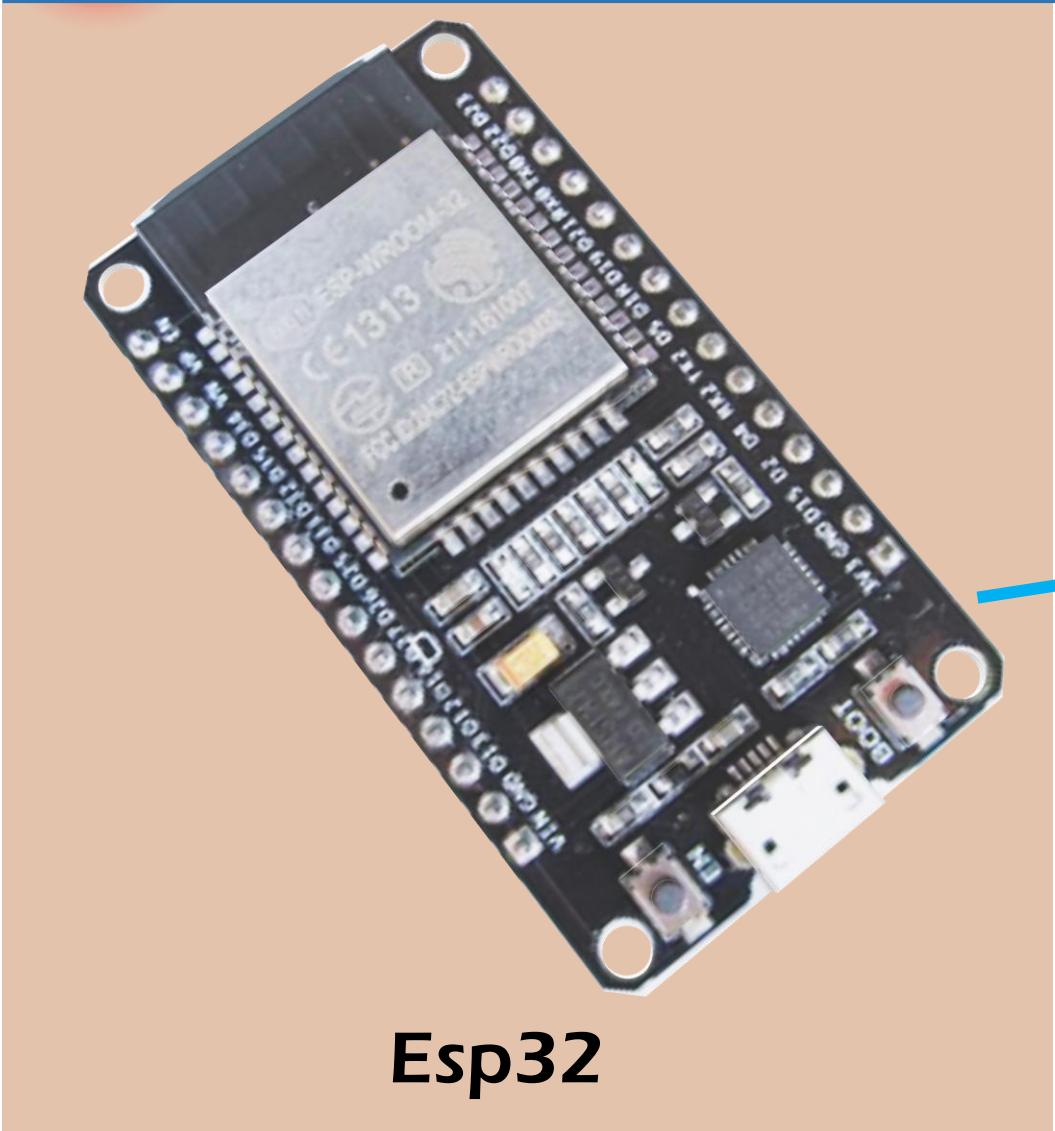


Arduino

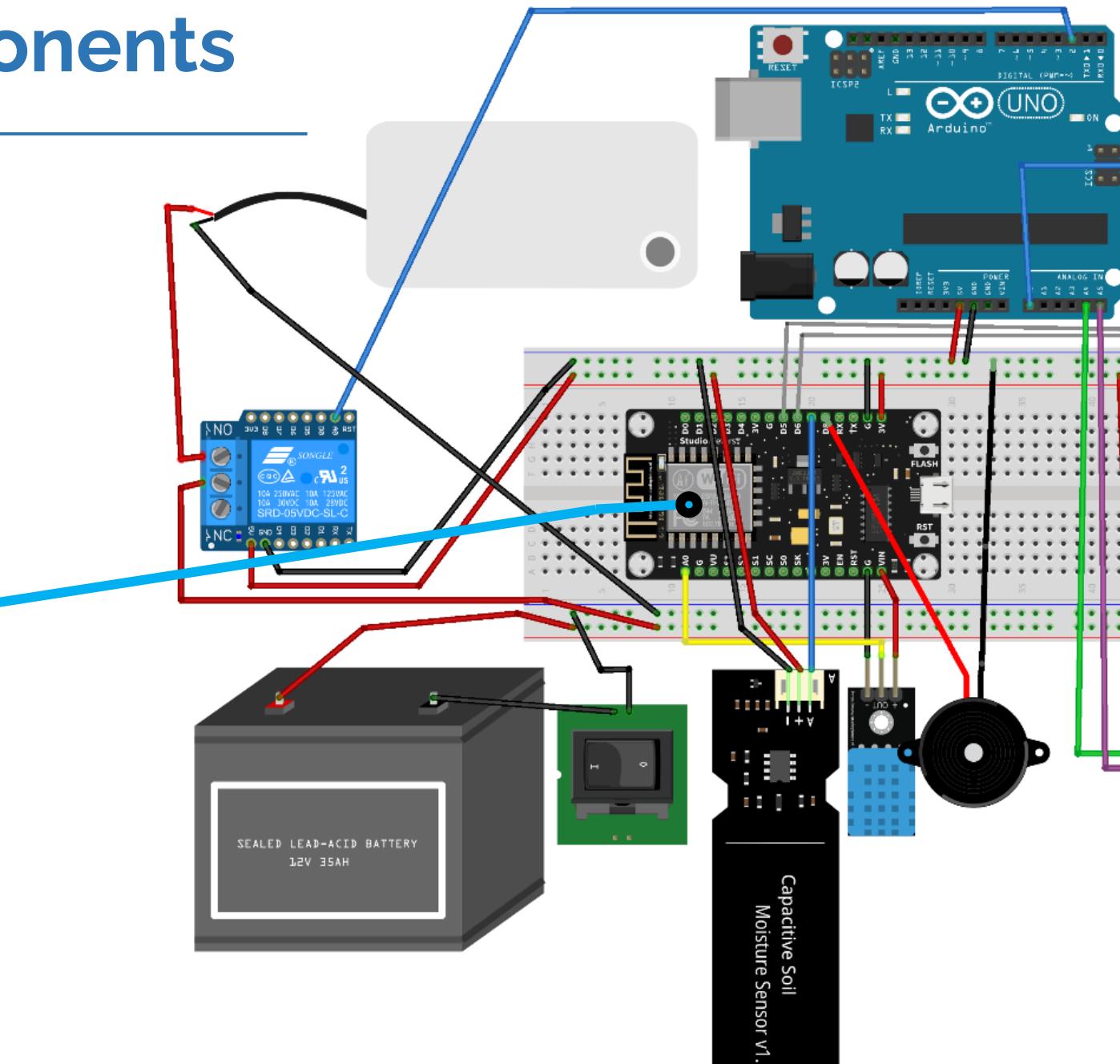


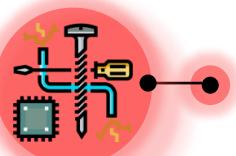


# Hardware components

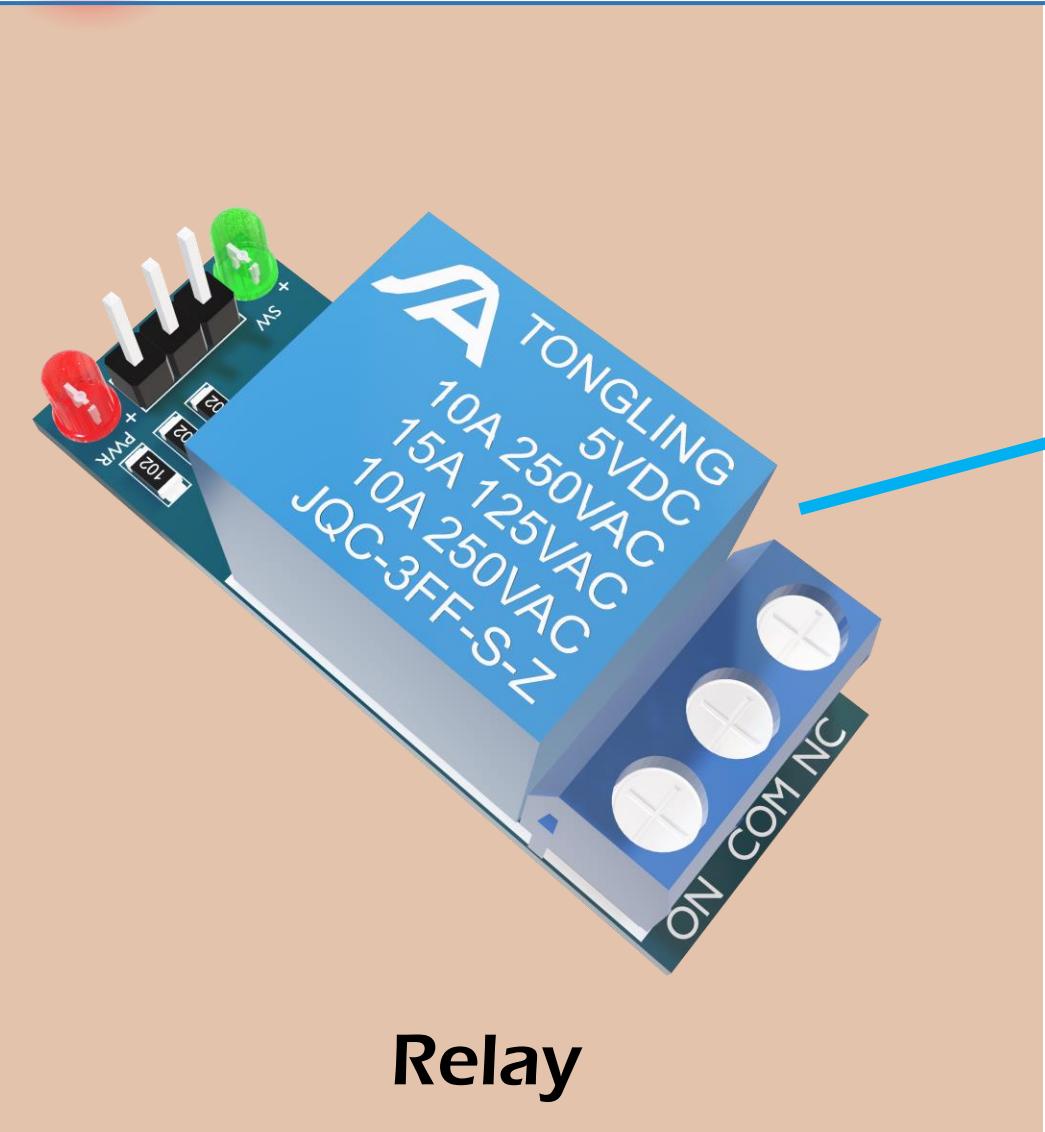


Esp32

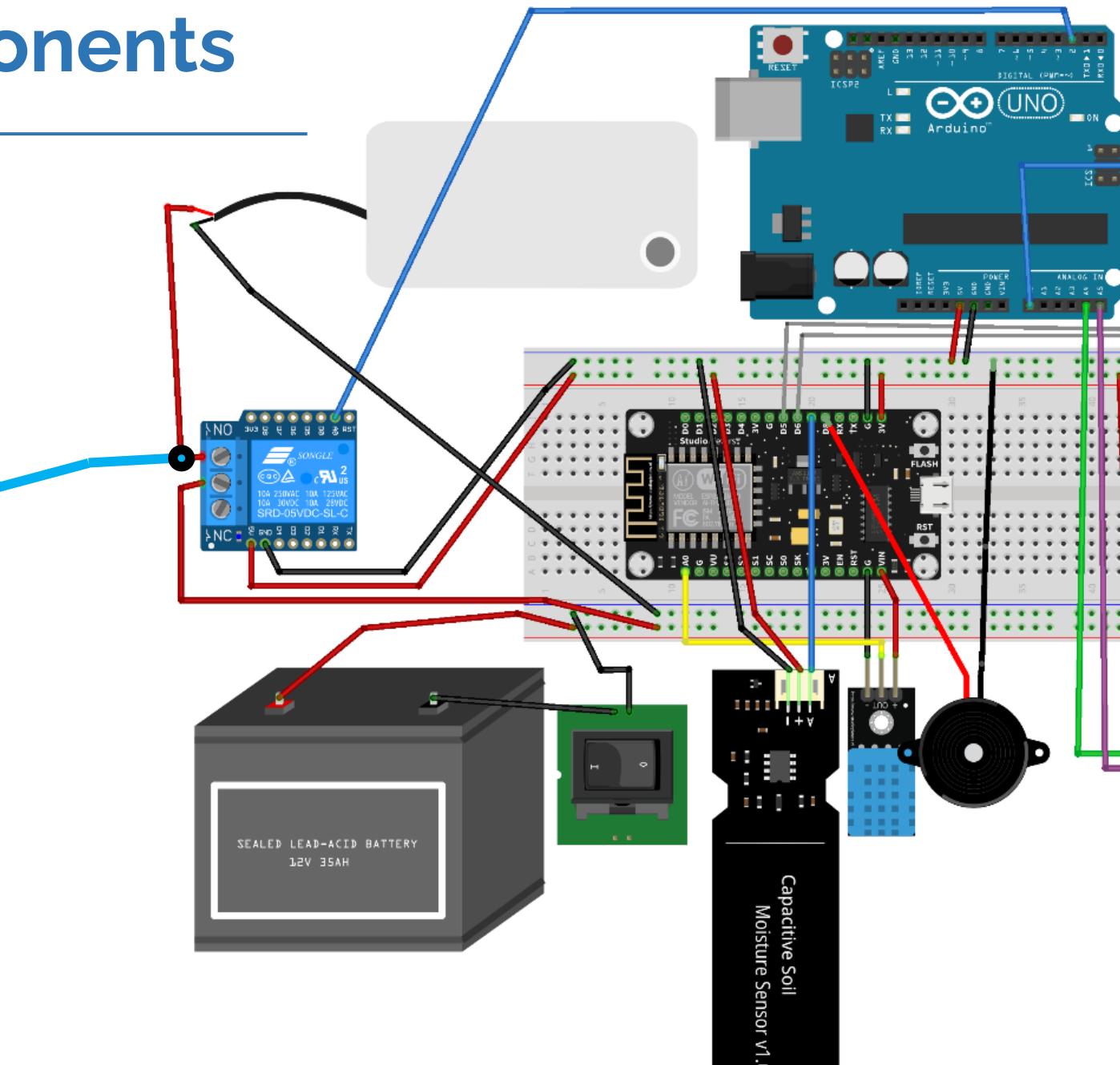


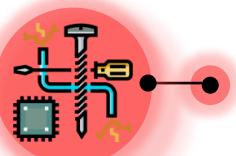


# Hardware components

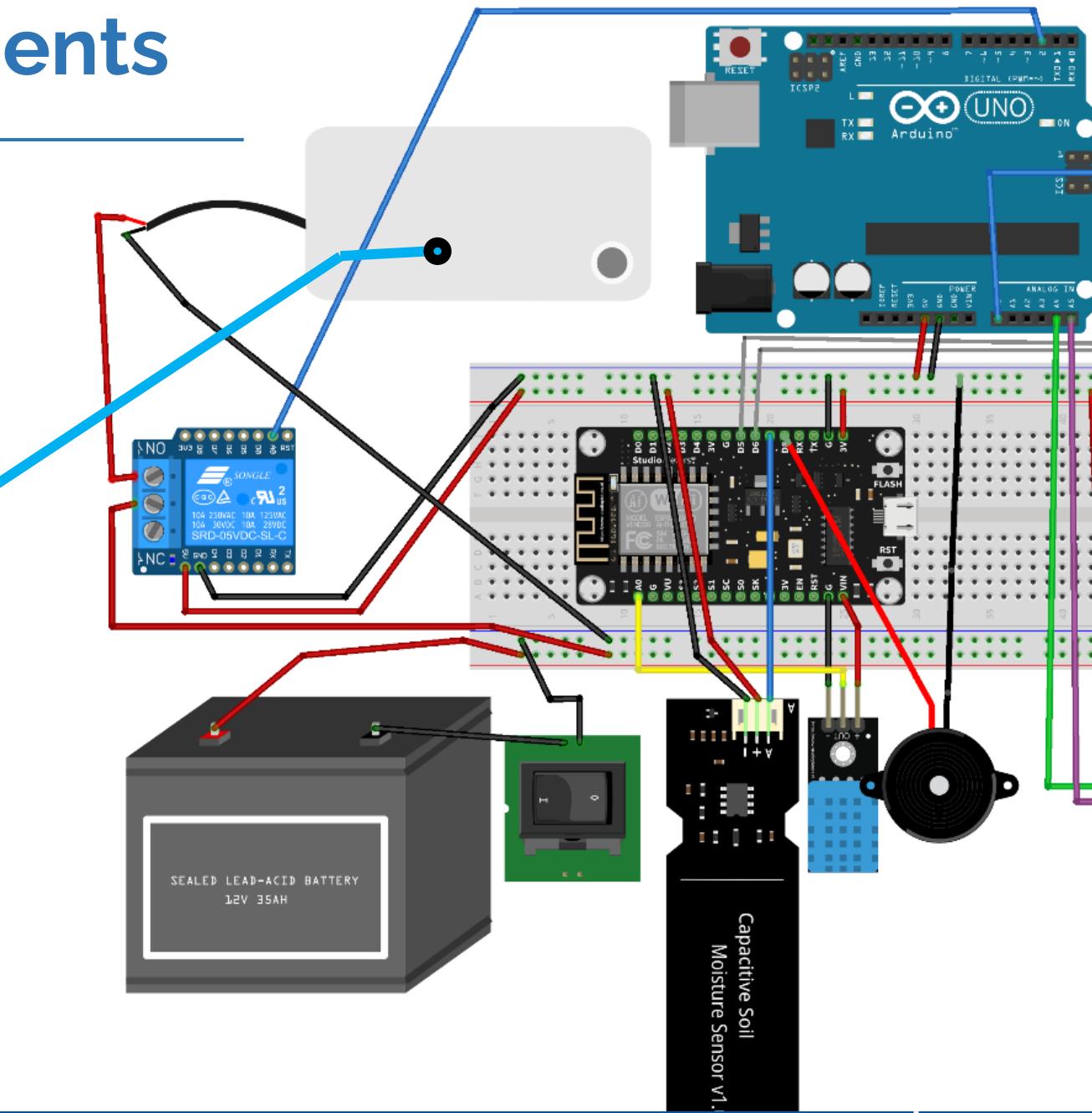
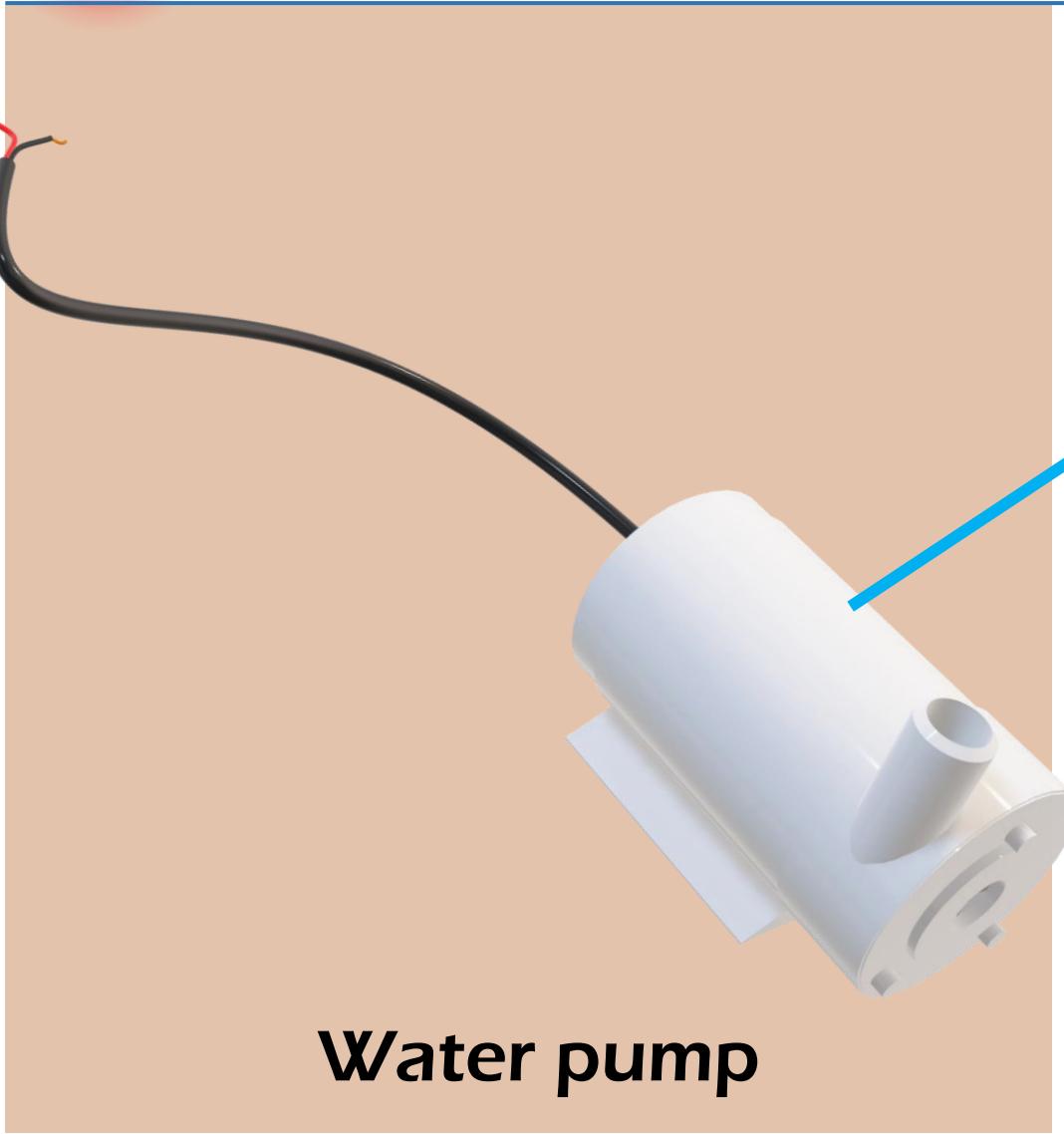


Relay



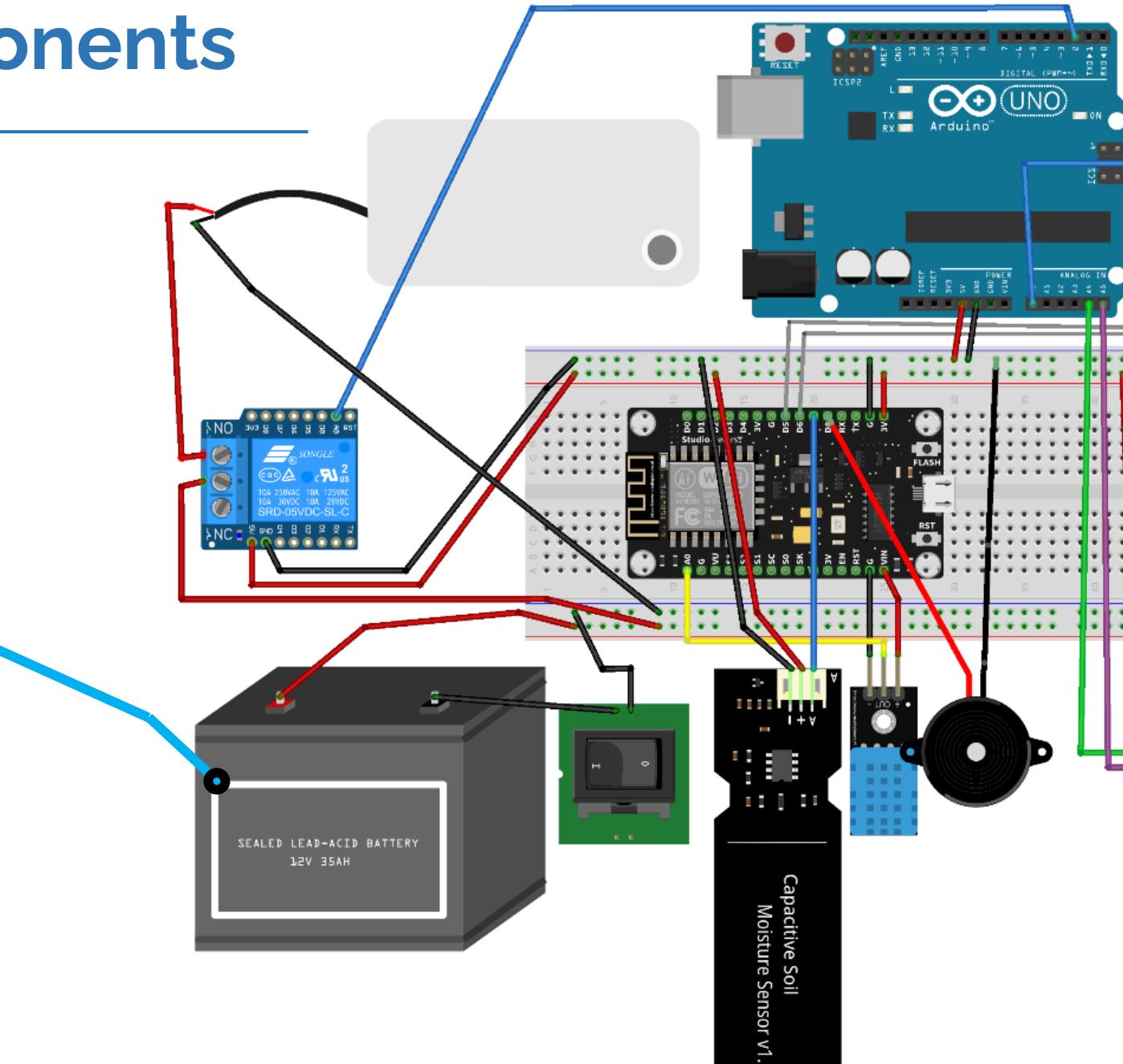


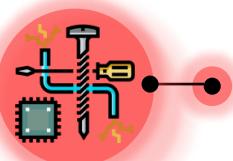
# Hardware components



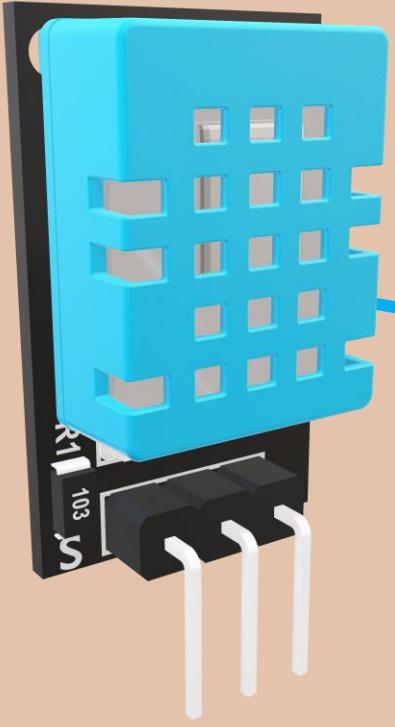


# Hardware components

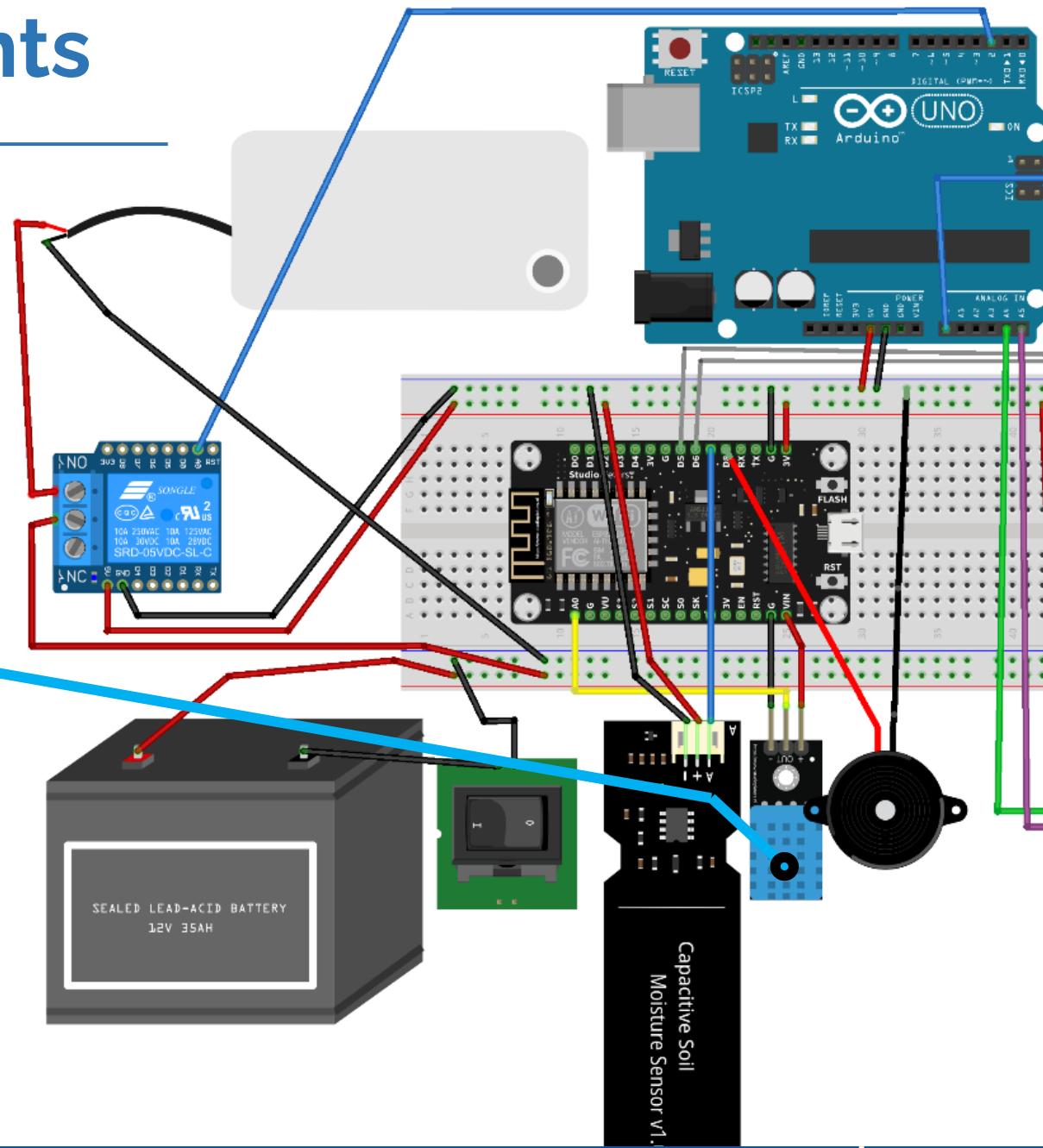


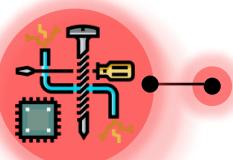


# Hardware components



# Dht11

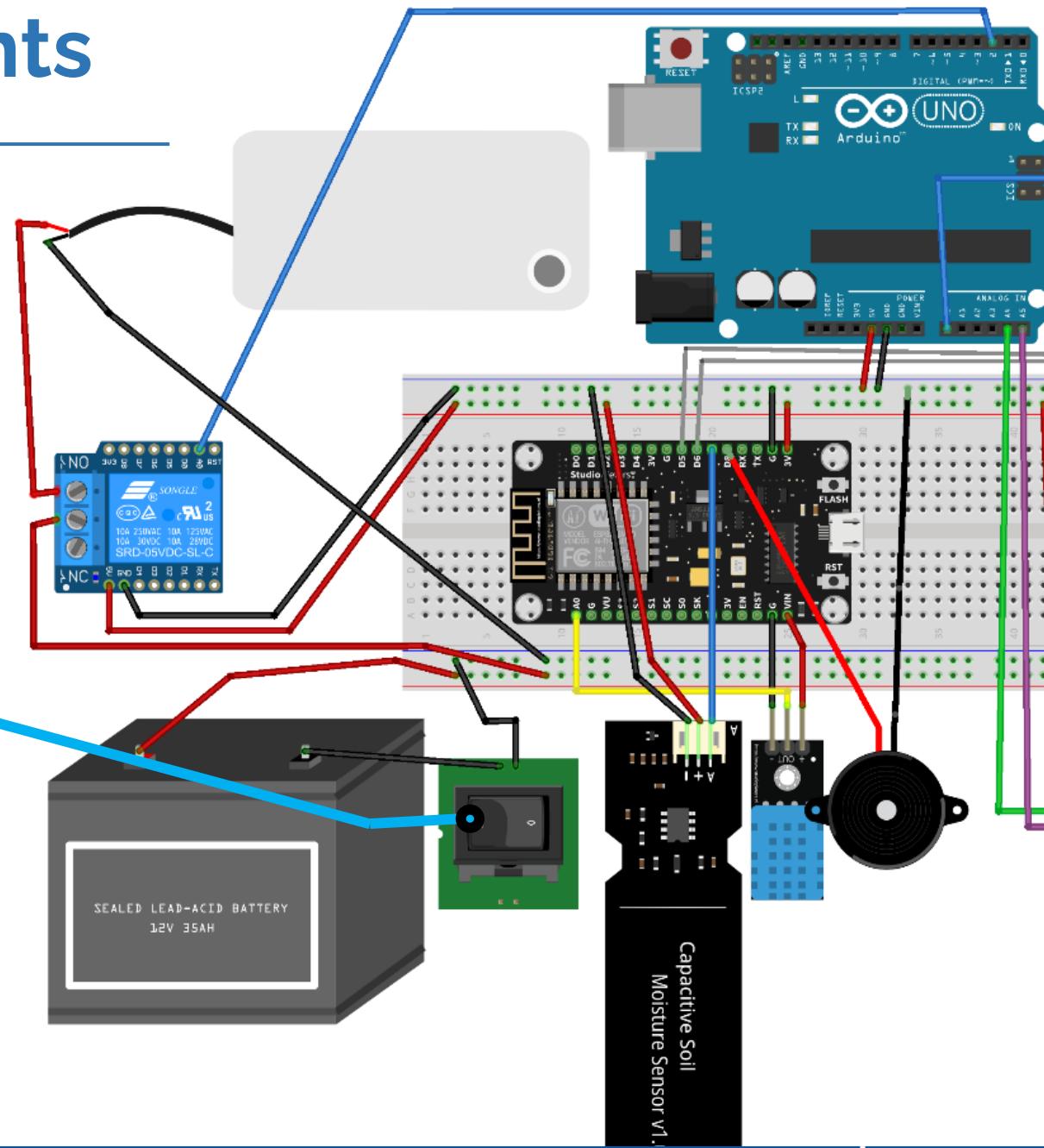


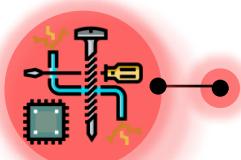


# Hardware components

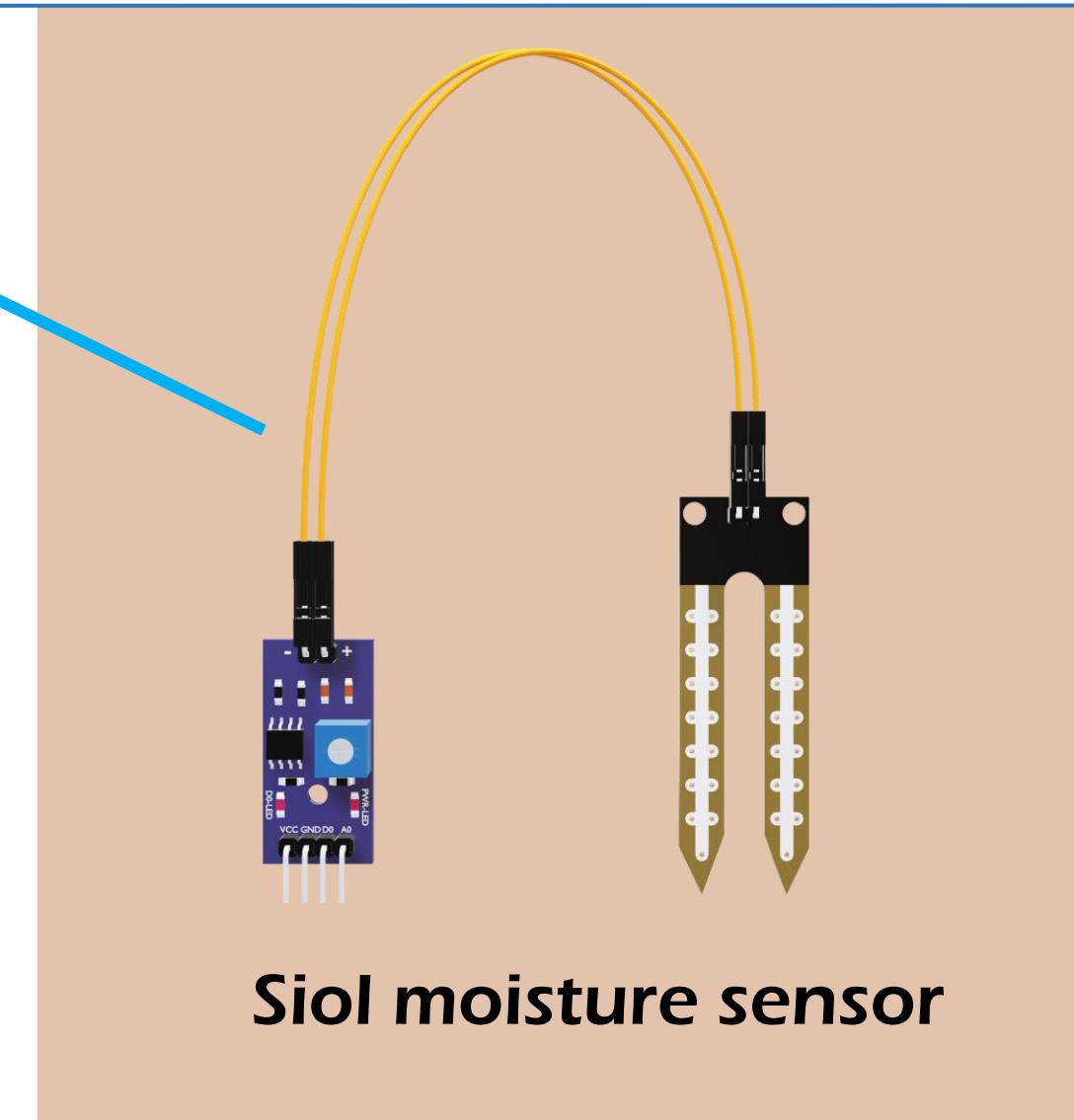
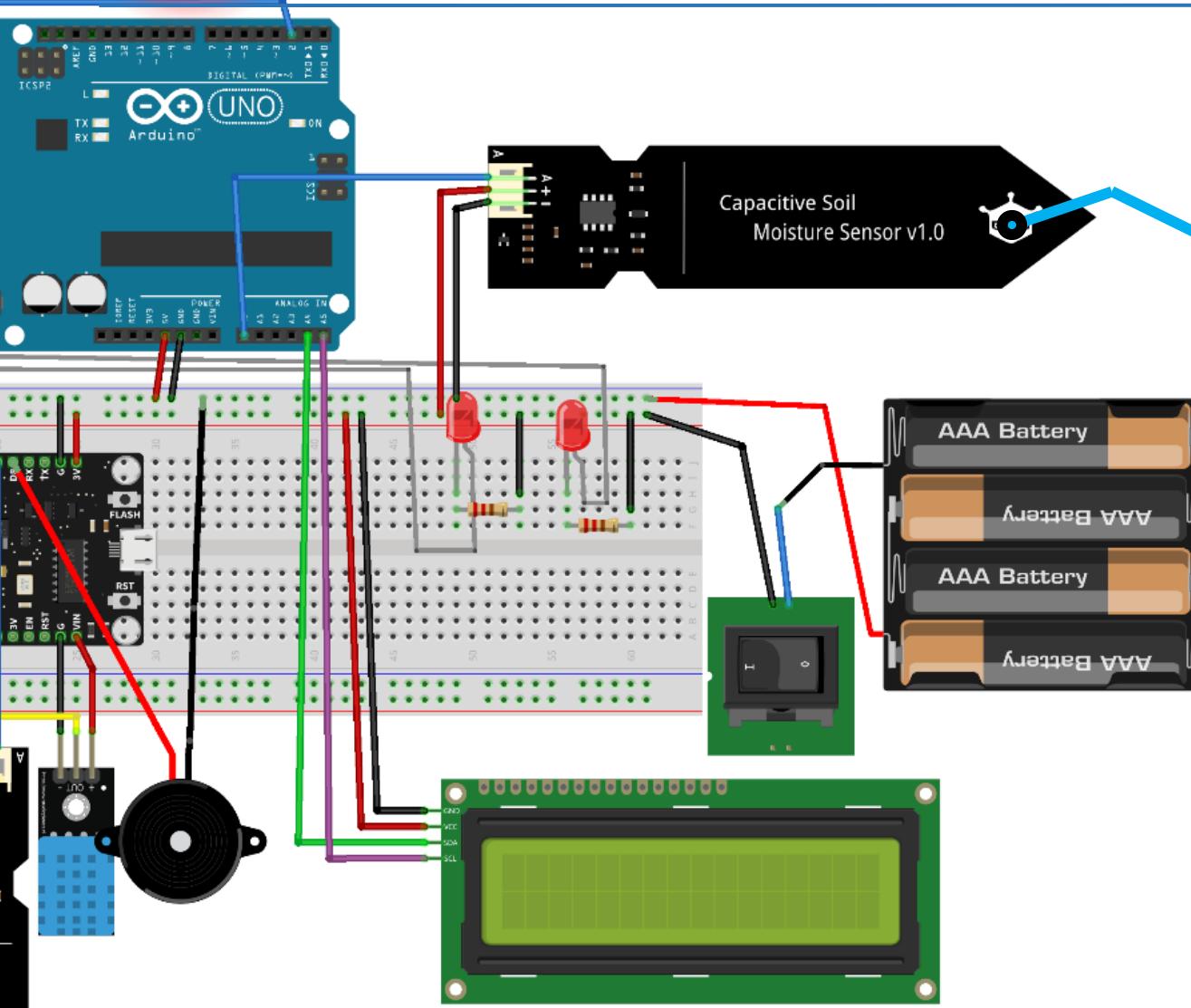


# Switch Button

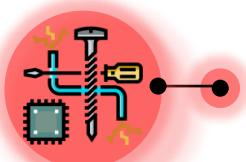




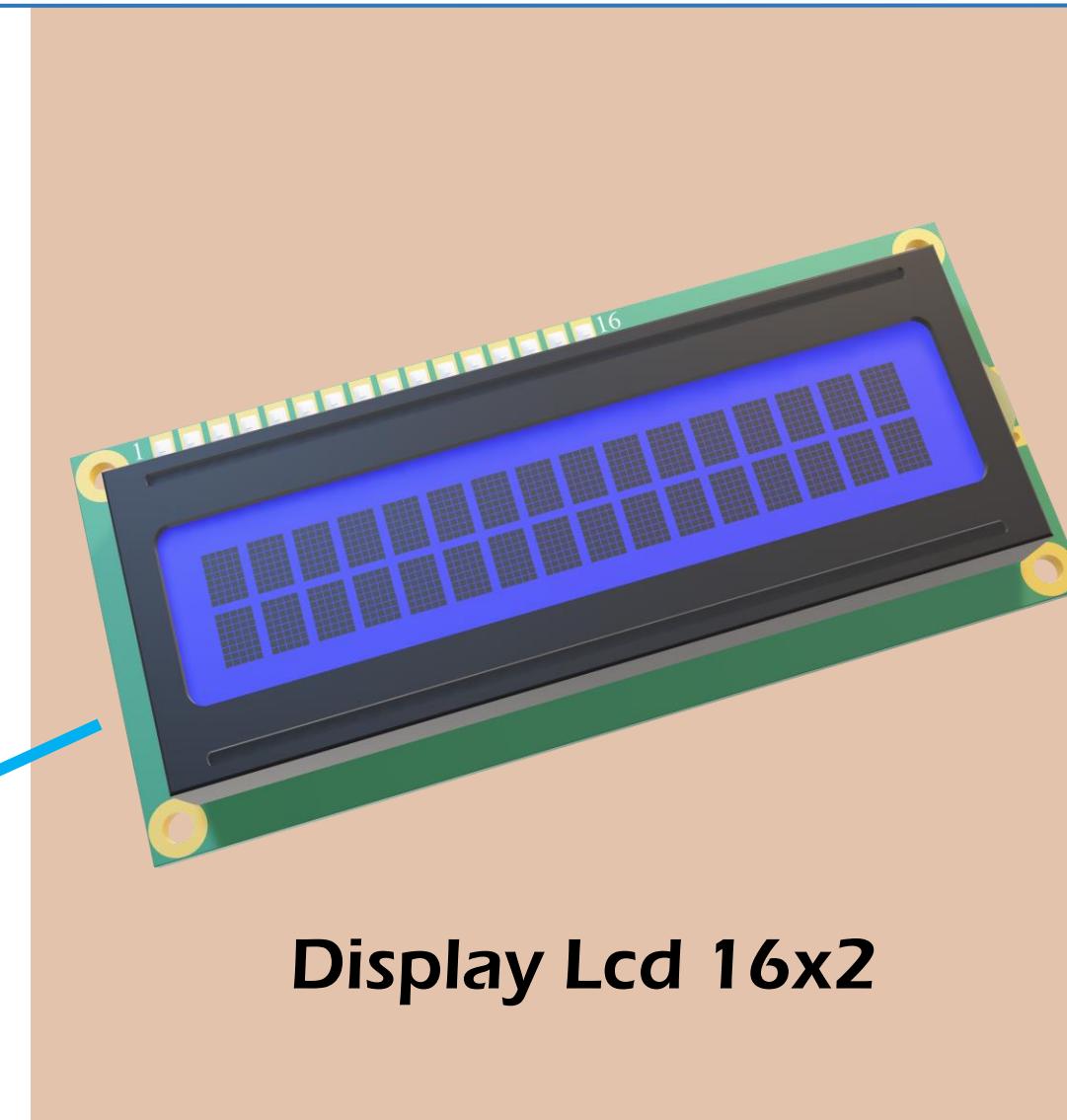
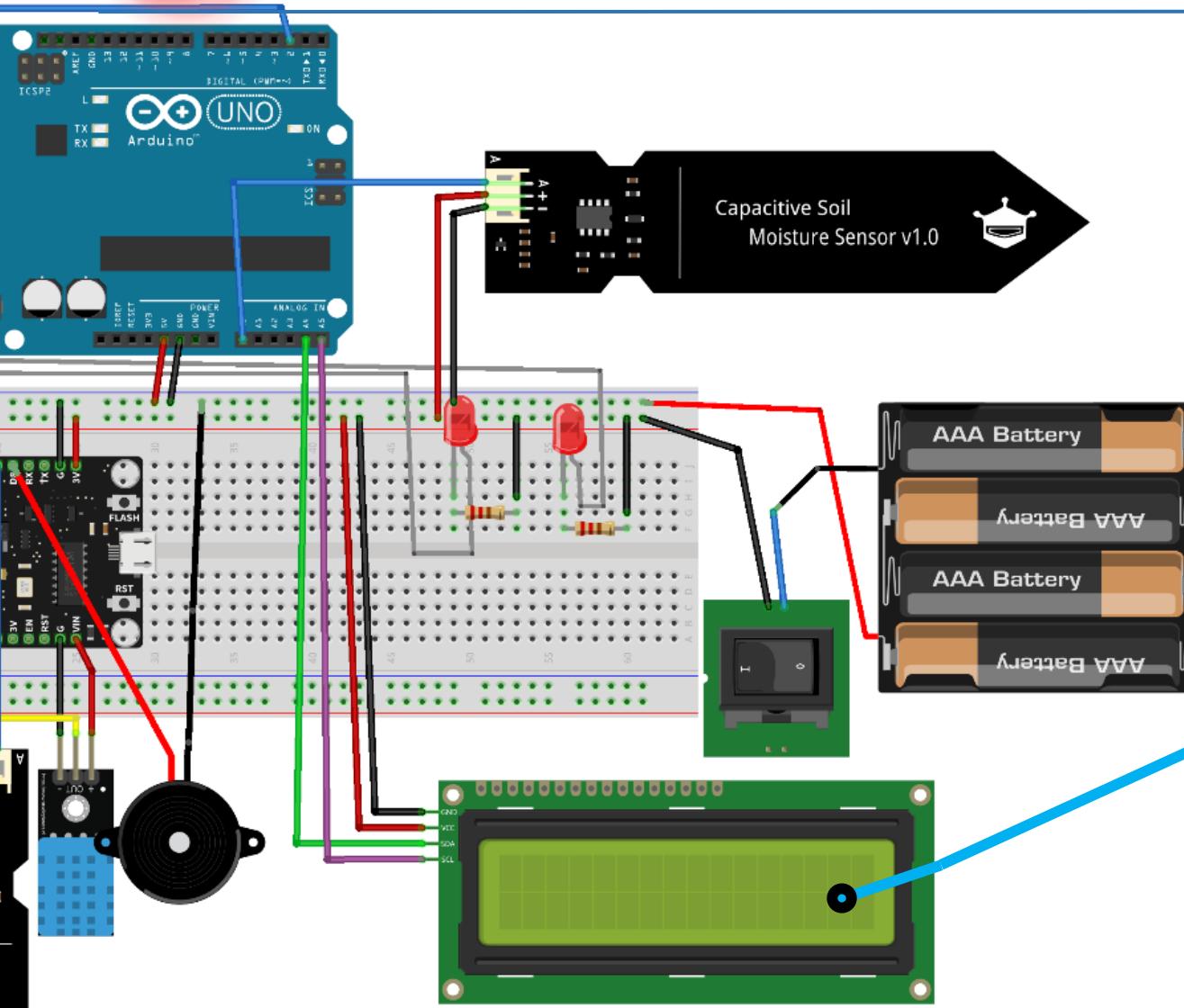
# Hardware components



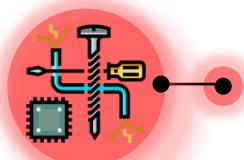
Soil moisture sensor



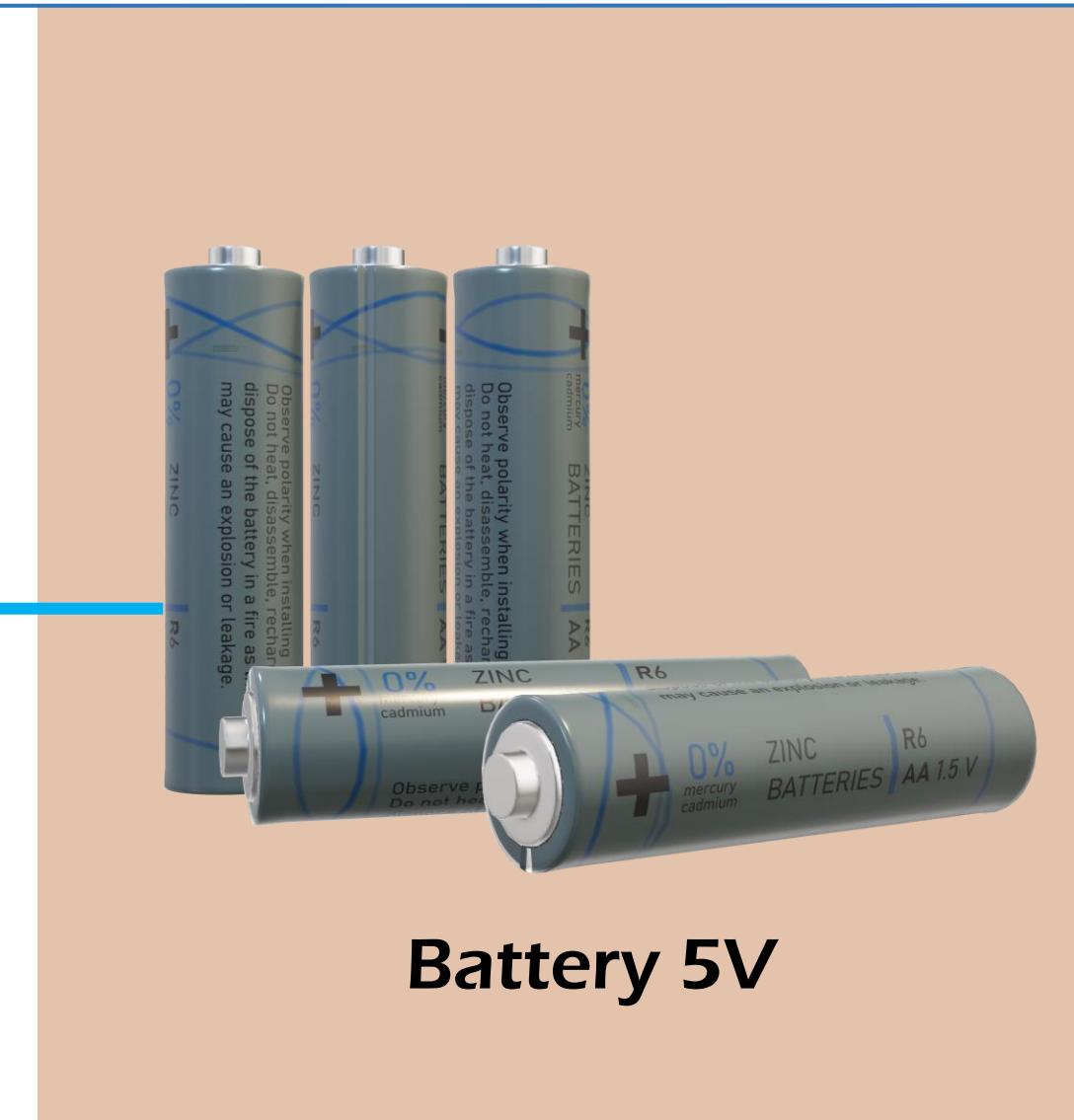
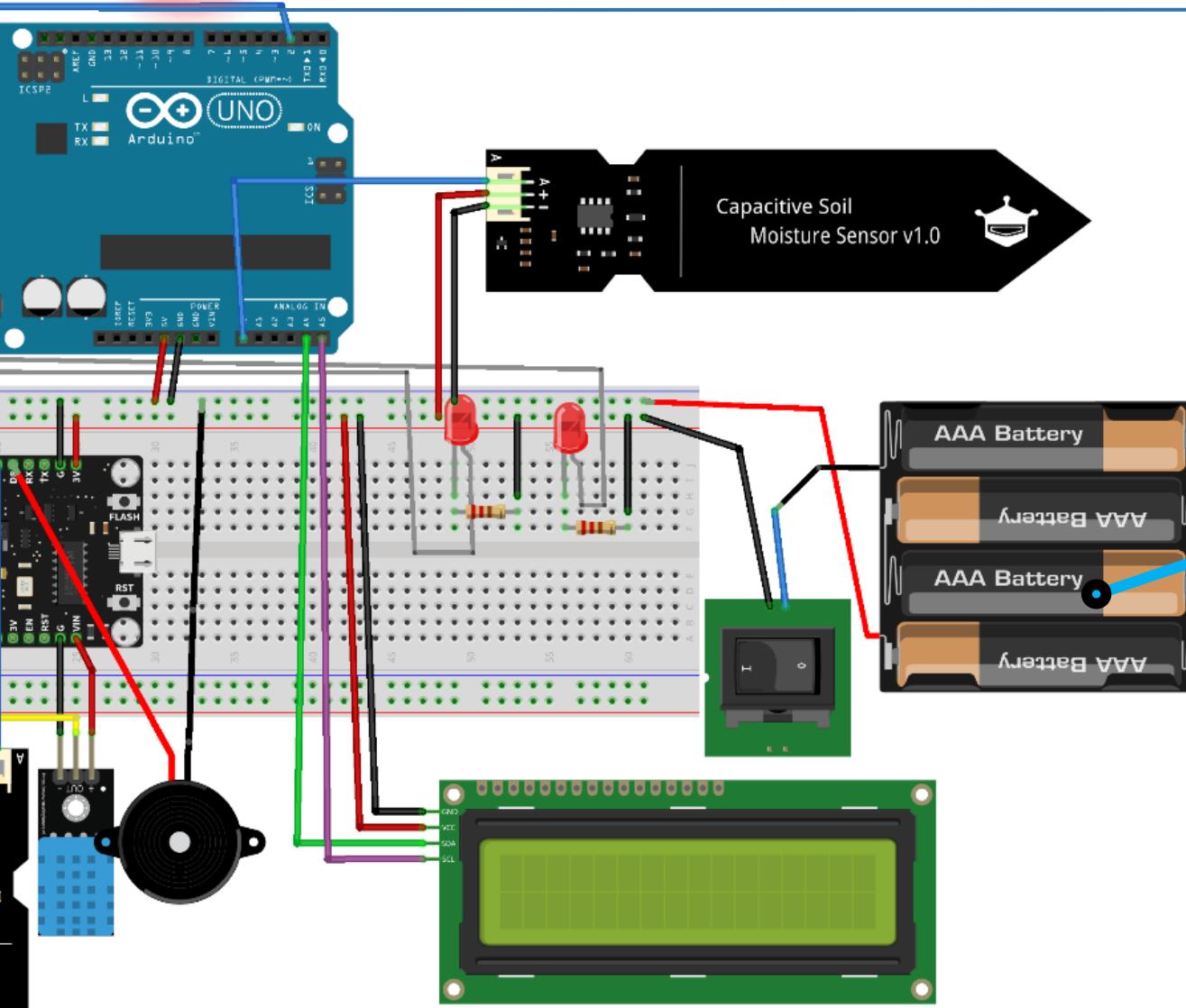
# Hardware components



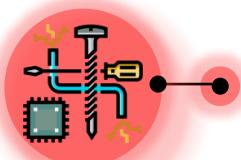
Display Lcd 16x2



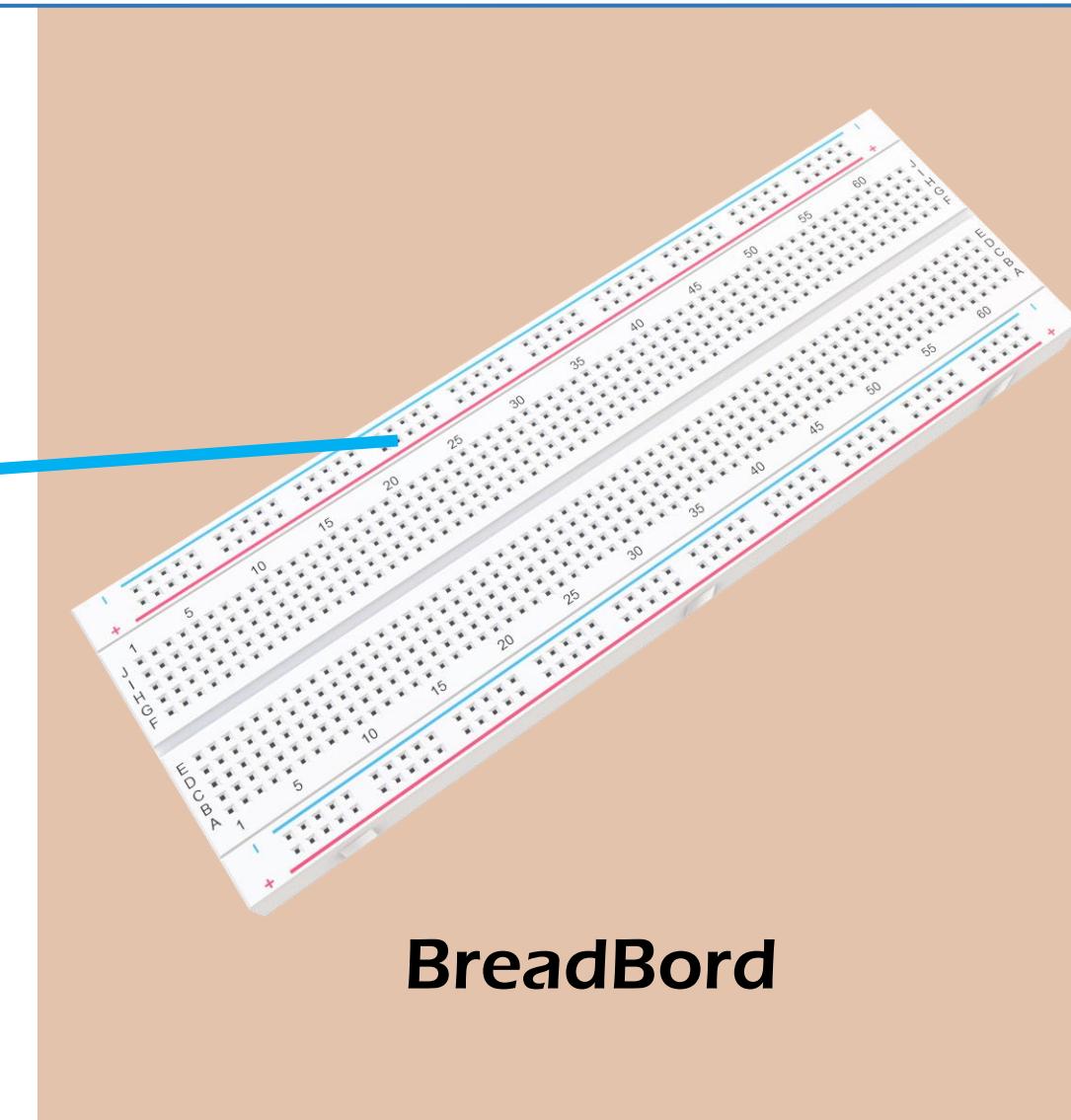
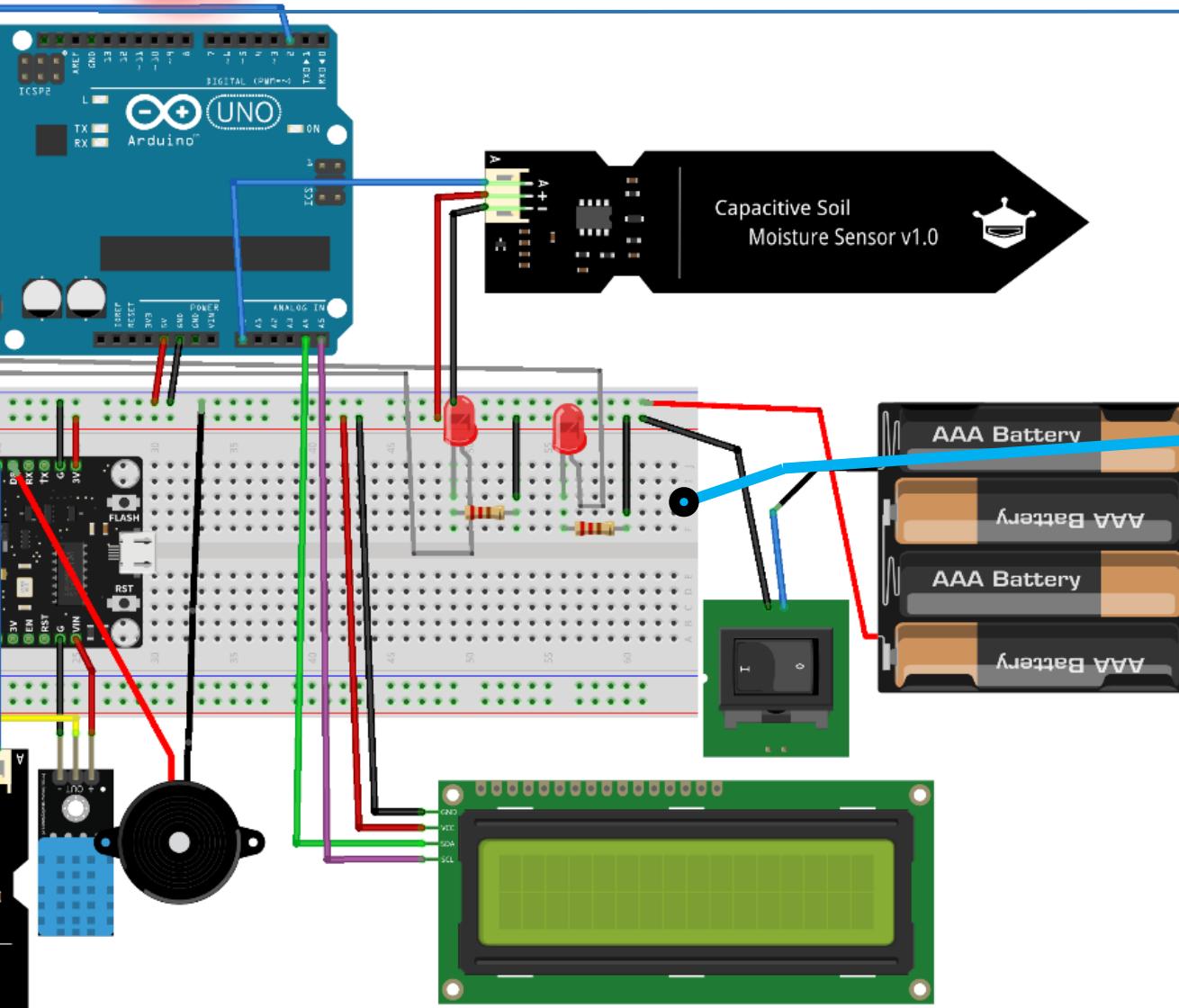
# Hardware components



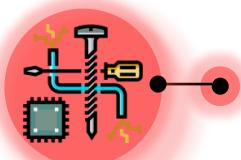
**Battery 5V**



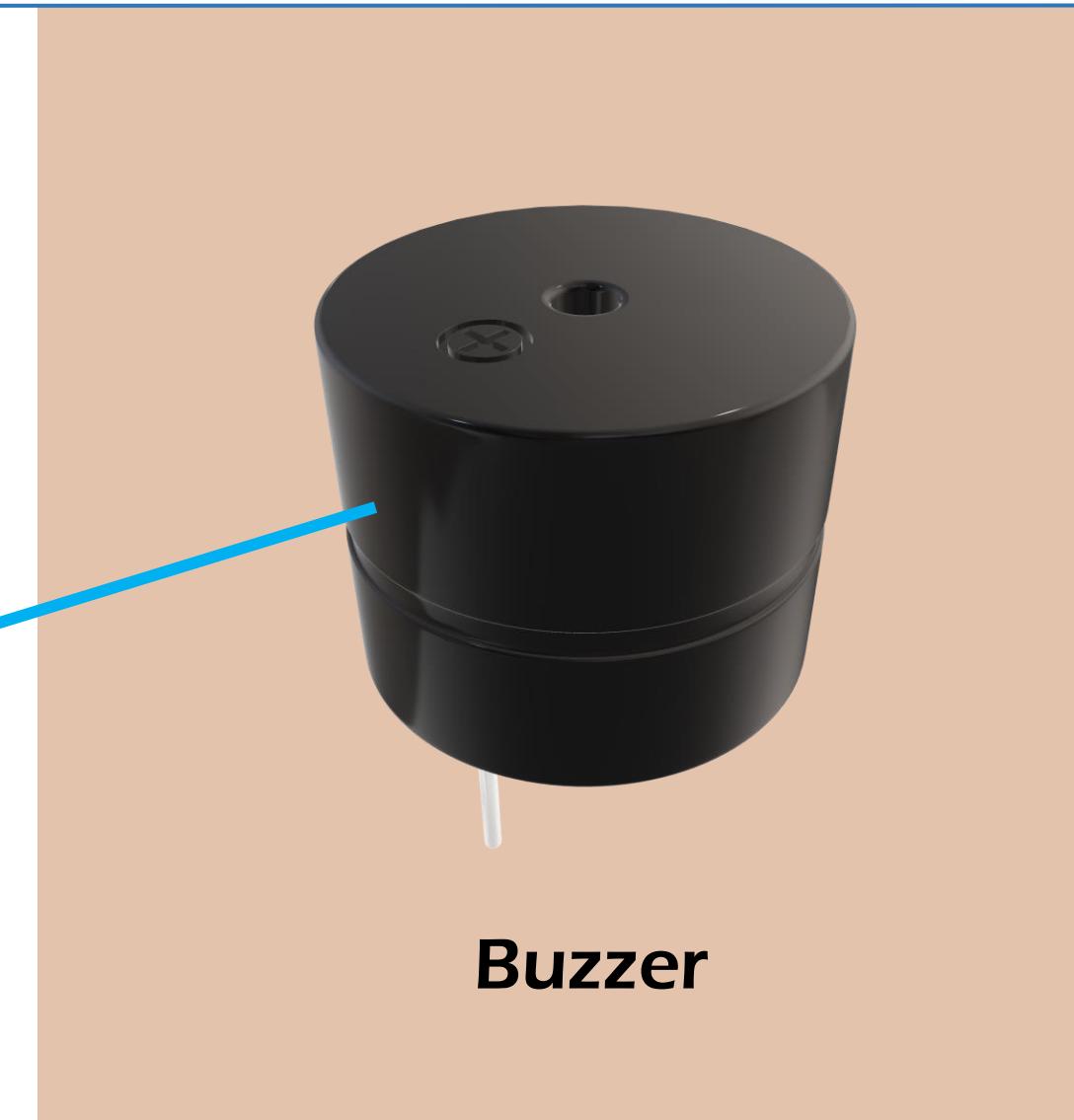
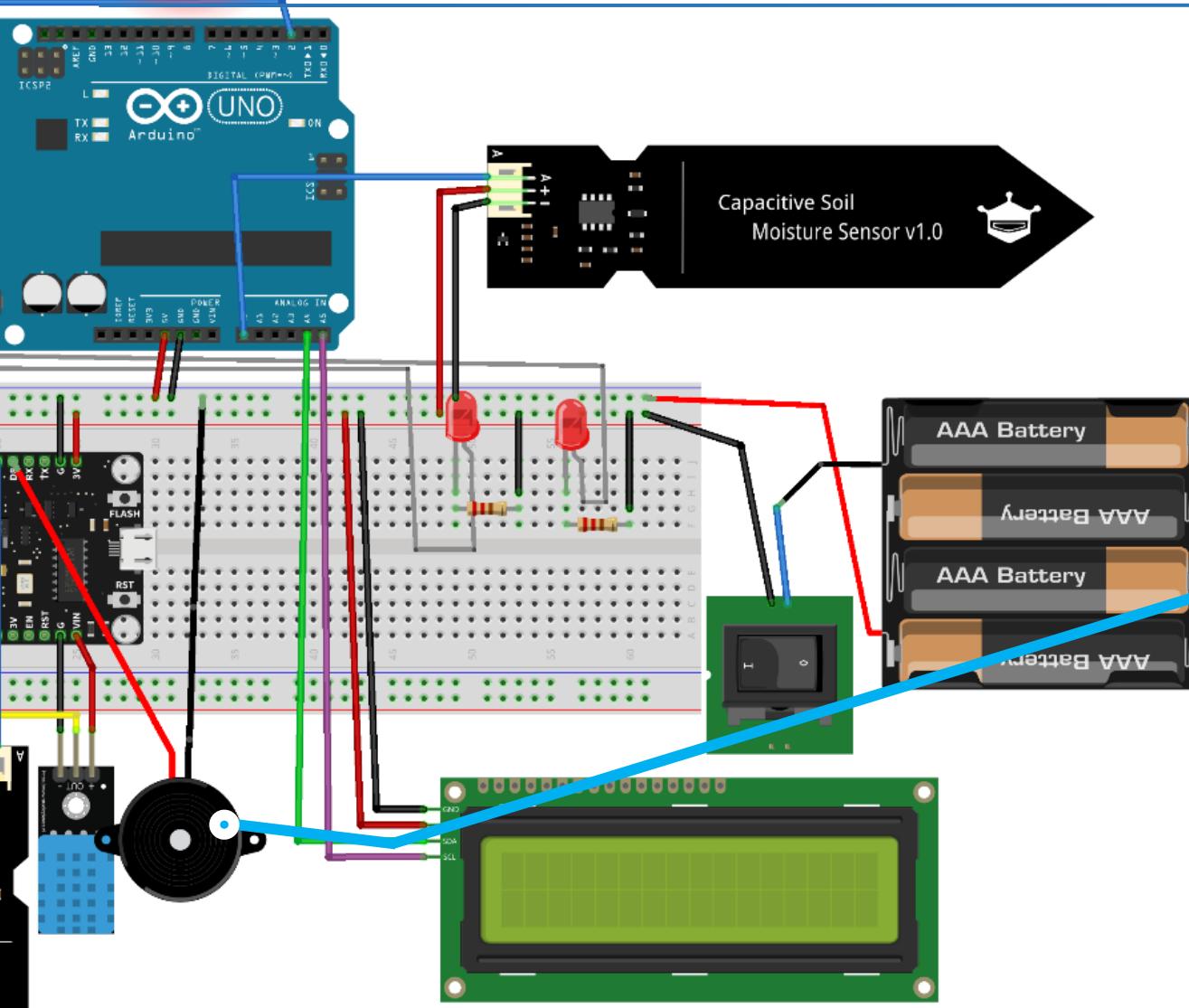
# Hardware components

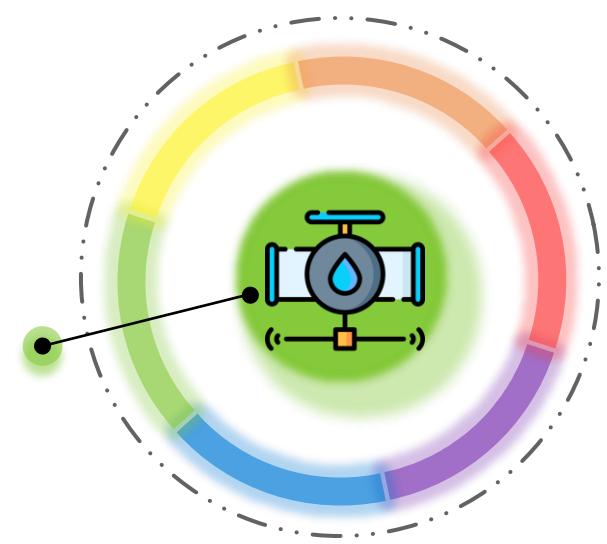


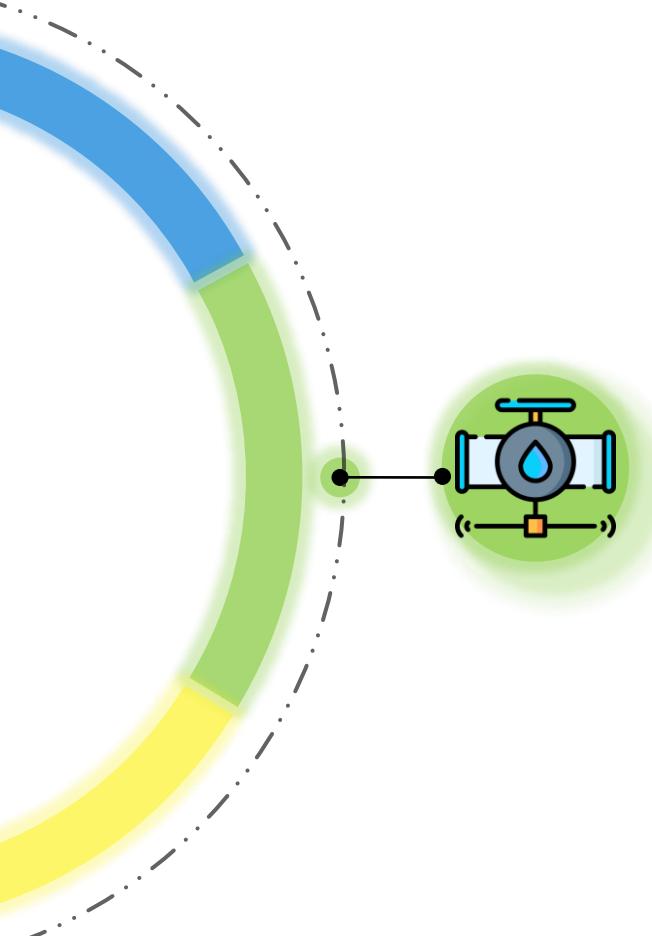
**BreadBord**



# Hardware components



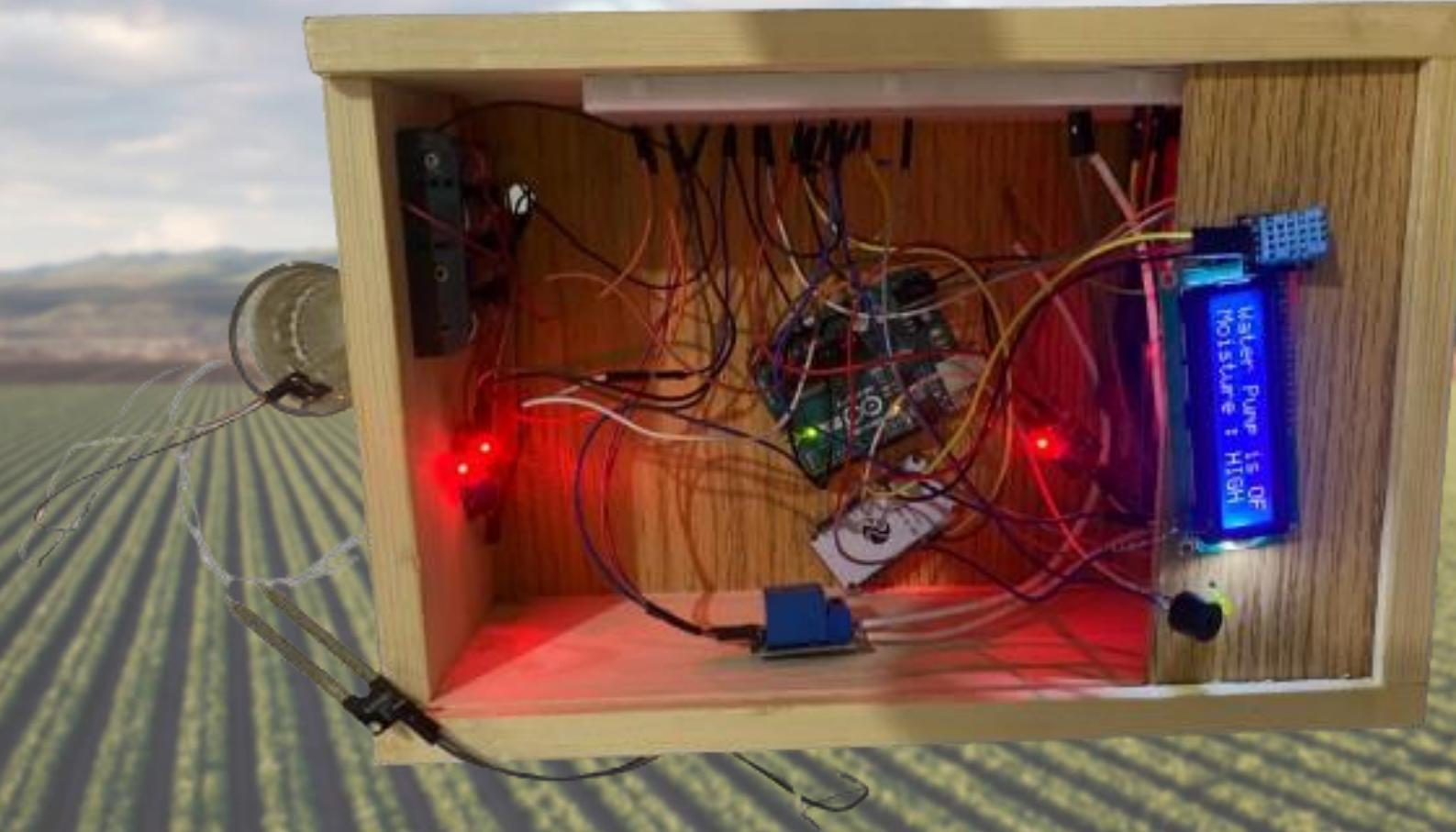


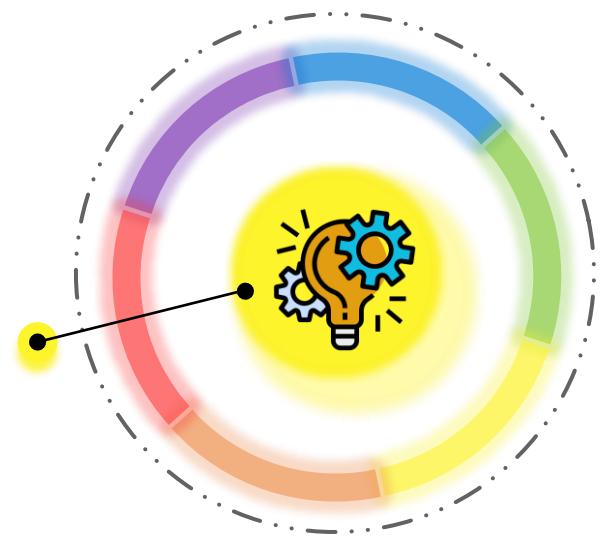


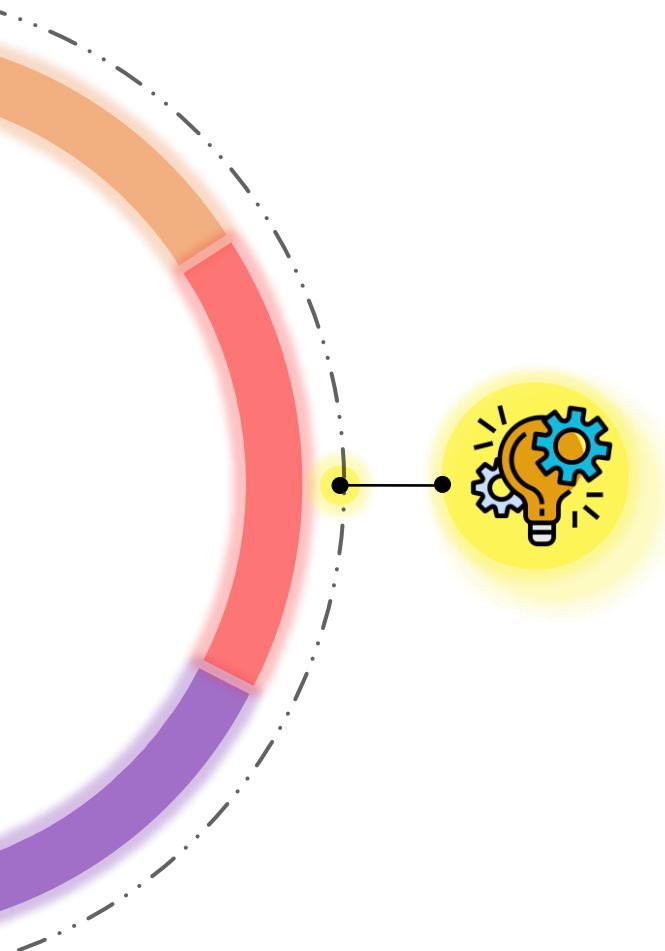
# Automatic watering system



# Automatic watering system







# Implementation and realization



# Implementation and realization

## Features of the Esp32



2.4 GHz dual-mode Wi-Fi  
and Bluetooth

32-bit Microprocessor

Capacitive touch, ADCs, DACs, I<sup>2</sup>C, UART,  
CAN 2.0, SPI, I<sup>2</sup>S, RMII, PWM, and more

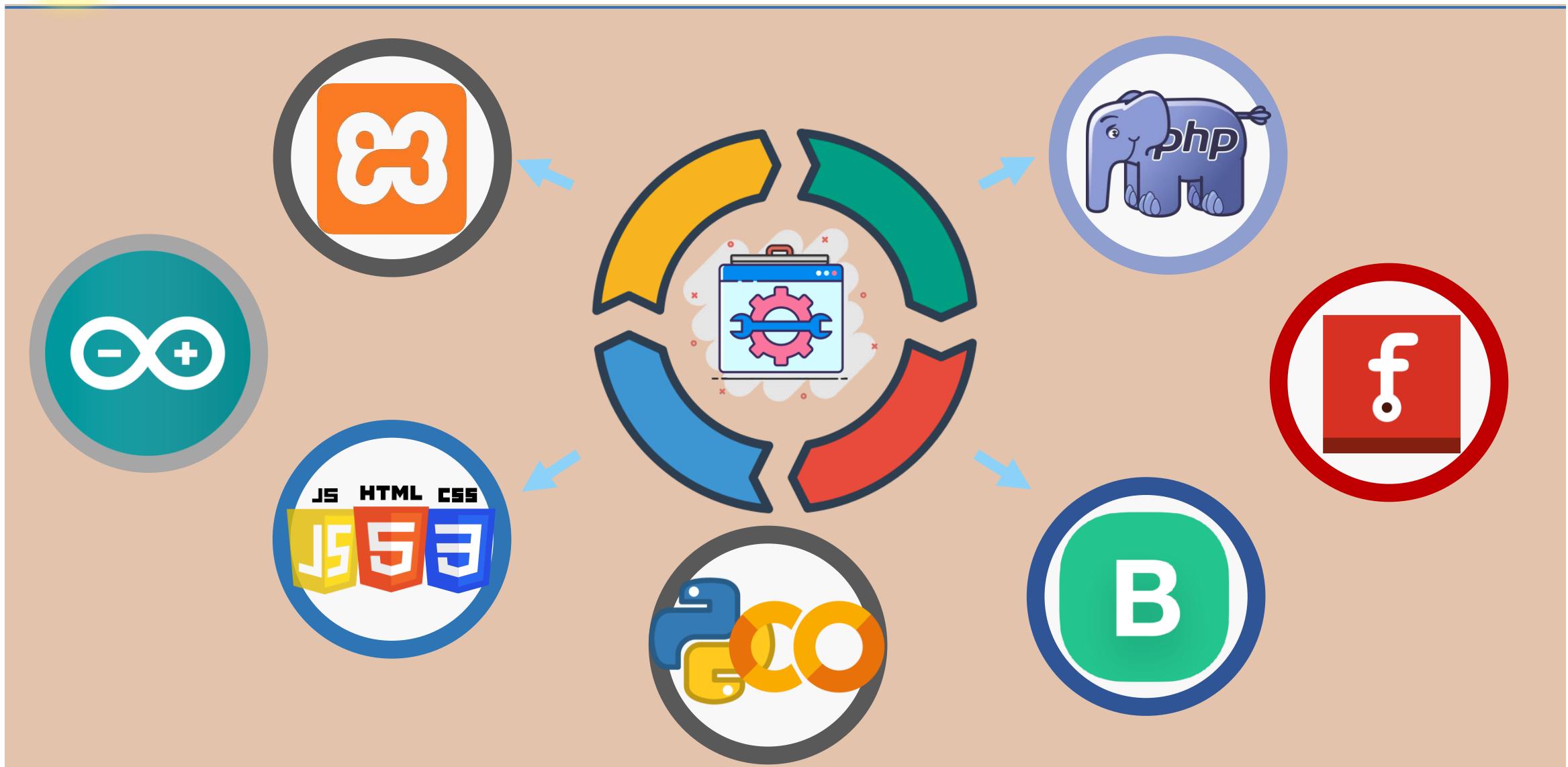


# Automatic watering system





# Implementation and realization





# Implementation and realization

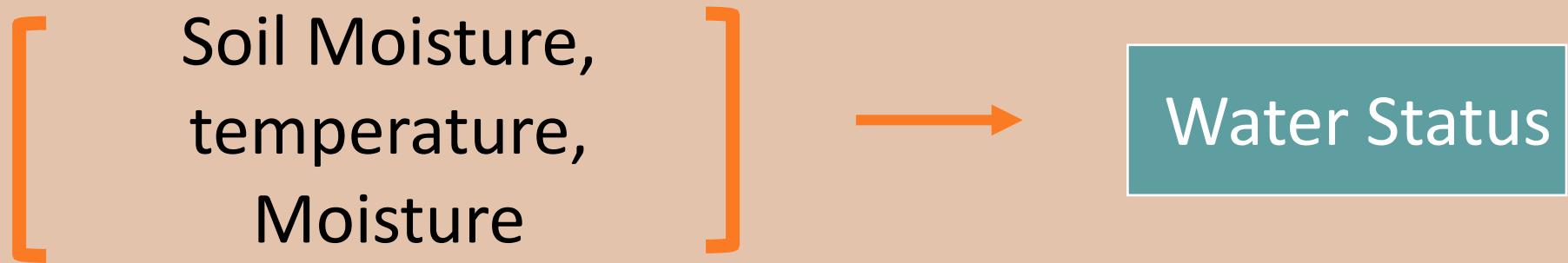
## DataSet (temperature, humidity, soil moisture)

	Soil Moisture	Temperature	Air Humidity
0	683.802906	29.184908	71.789699
1	408.571567	33.707205	77.977391
2	659.092074	24.760311	60.776282
3	842.929764	32.738515	59.323543
4	414.199320	25.692744	66.624914



# Implementation and realization

## Idea For Model

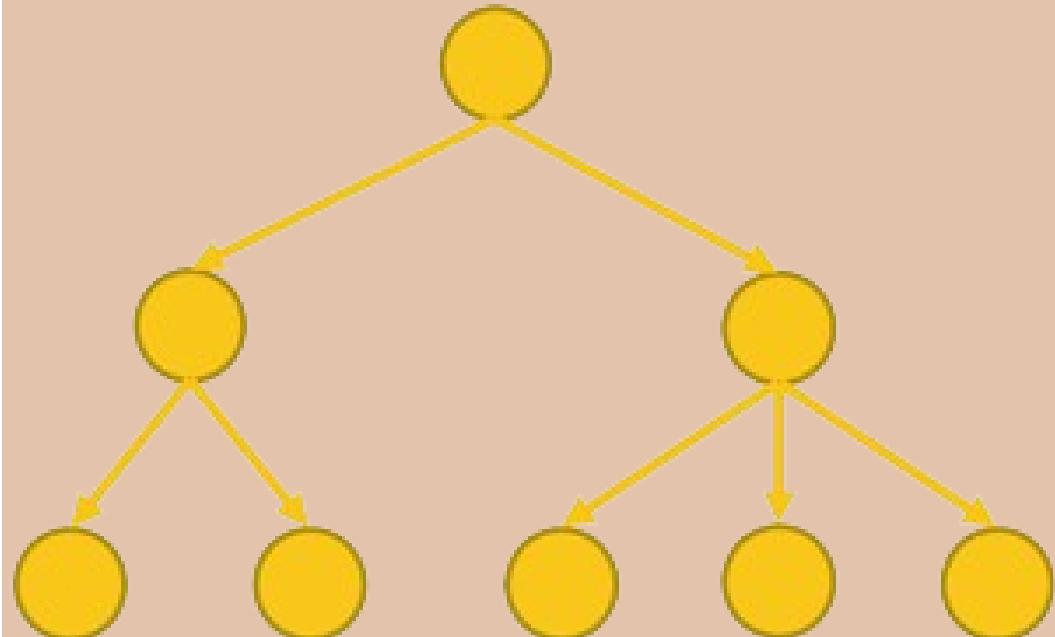




# Implementation and realization

## Models ML

### Decision Tree



Accuracy: **0.998**

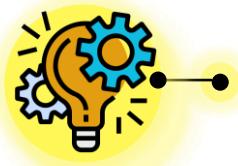
Precision: **0.998**

Recall: **0.998**

F1 Score: **0.998**

Confusion Matrix:

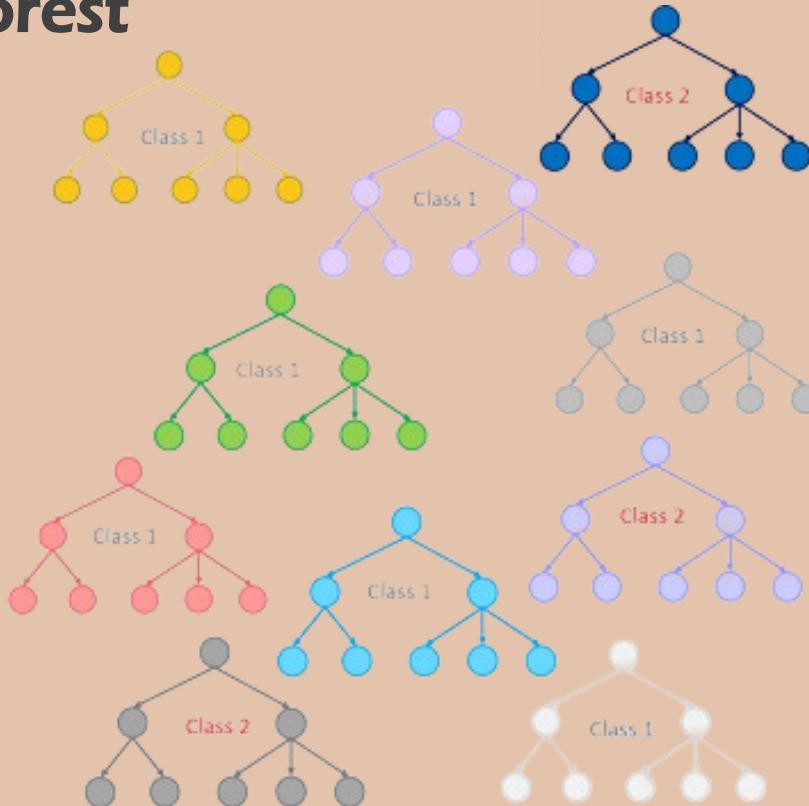
<b>84</b>	0	0
0	<b>568</b>	1
0	0	<b>247</b>



# Implementation and realization

# Models ML

# Random Forest



Accuracy: 0.996

Precision: 0.998

Recall: 0.998

F1 Score: 0.998

## Confusion Matrix:

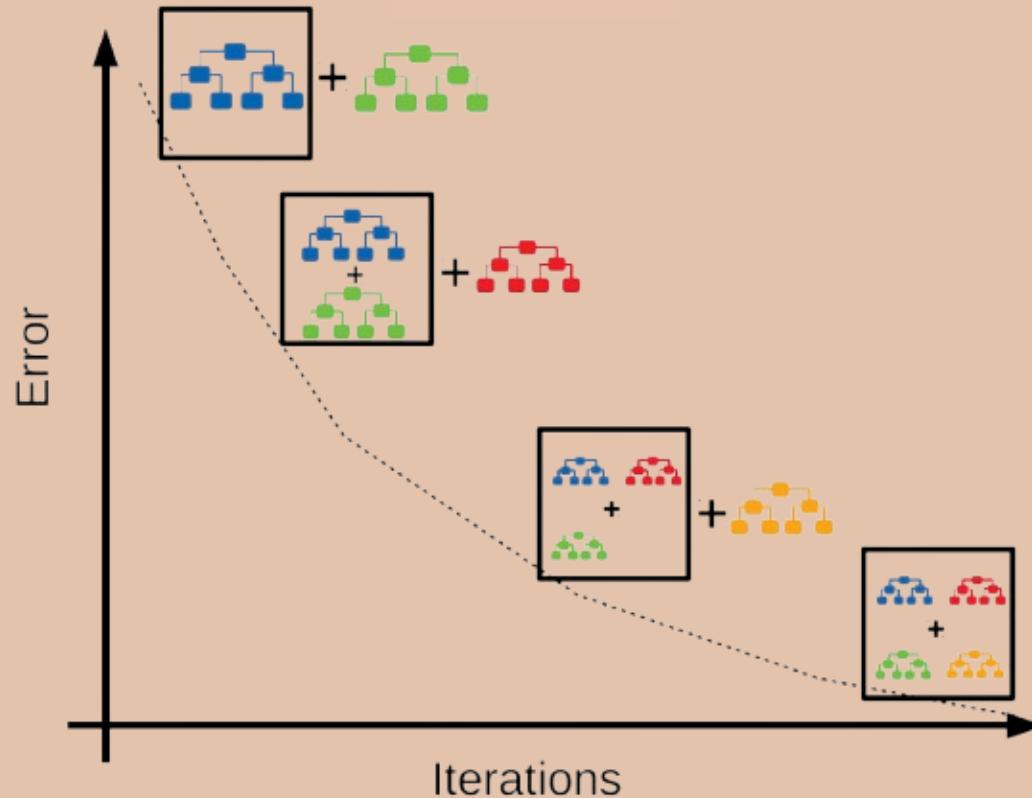
84	0	0
1	568	0
0	0	247



# Implementation and realization

## Models ML

### Gradient Boosting



Accuracy: 0.997

Precision: 0.998

Recall: 0.998

F1 Score: 0.998

Confusion Matrix:

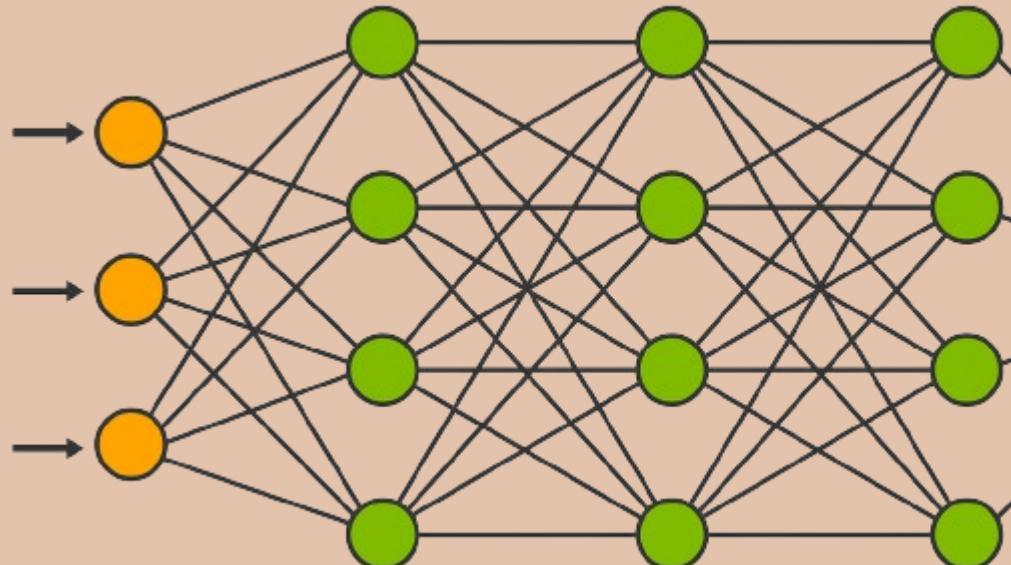
84	0	0
0	568	1
0	0	247



# Implementation and realization

## Models ML

### Neural Network



Accuracy: 0.83

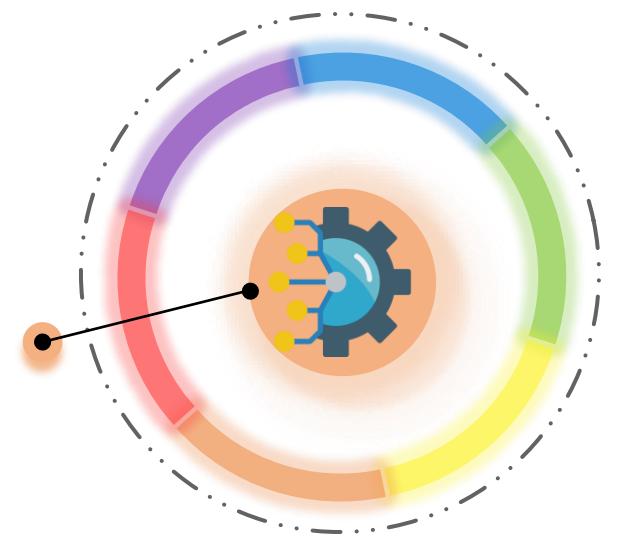
Precision: 0.912

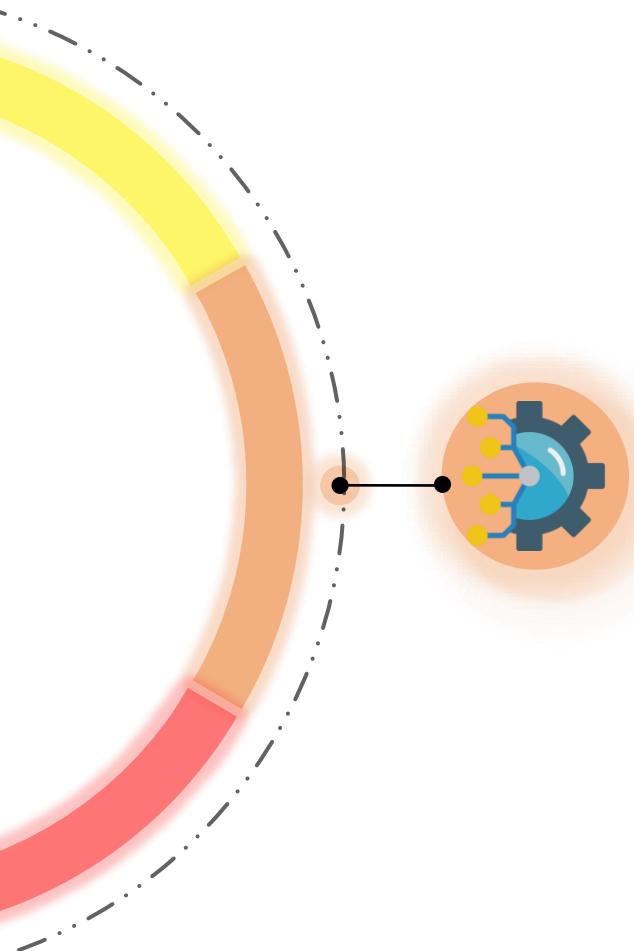
Recall: 0.91

F1 Score: 0.906

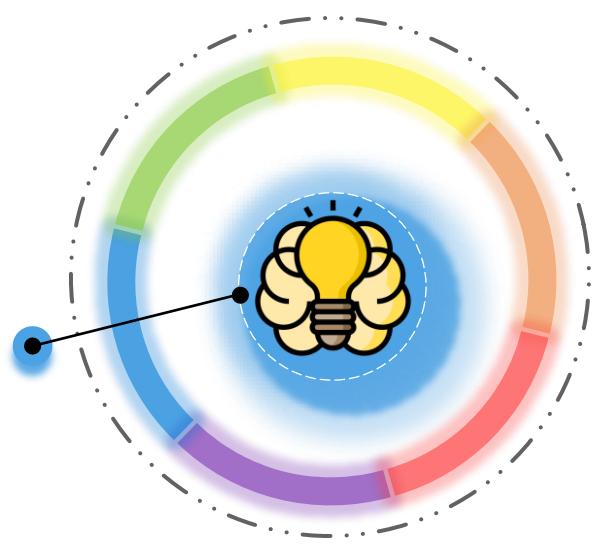
Confusion Matrix:

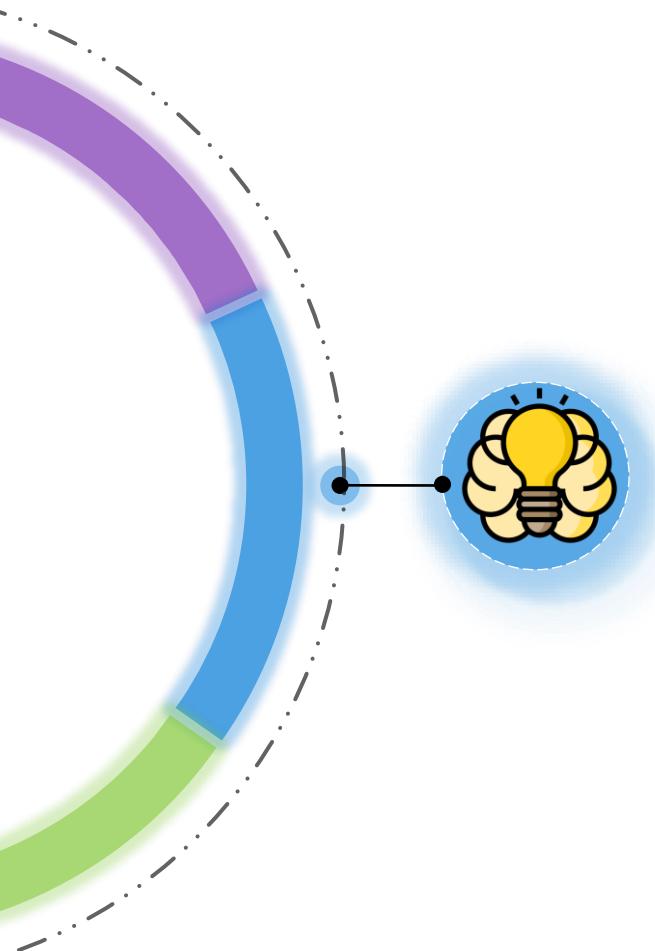
72	5	7
1	565	3
18	47	182





# Demonstration

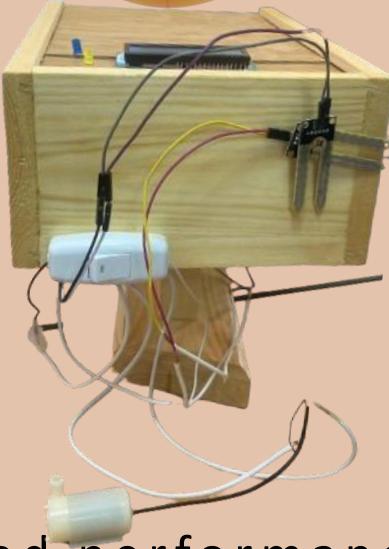




# Conclusion



# Conclusion



Good performance



If wifi is not present

The image features a large, bold, white sans-serif font that reads "THANK YOU!" in all caps. The letters are semi-transparent, allowing a dark brown background with a subtle grid pattern to show through. In the top left corner, there is a small, semi-transparent rectangular box containing the number "54.7861". In the bottom left corner, another small, semi-transparent rectangular box contains the number "41.85725". The overall composition is clean and modern.

