Activity 11. Smart Water Pump

Project carried out and documented by: Cristișor Radu-Ștefan, 10th grade D, mathematics-computer science specialization, "Constantin Cantacuzino" National Pedagogical College Târgoviște.

1. Introduction

- The purpose of the experiment is to explain step by step the realization of a water pump using simple and easy-to-assemble components.
- Objectives of the experiment: To explain the realization of this type of pump, presenting the roles of each component and how to assemble it.

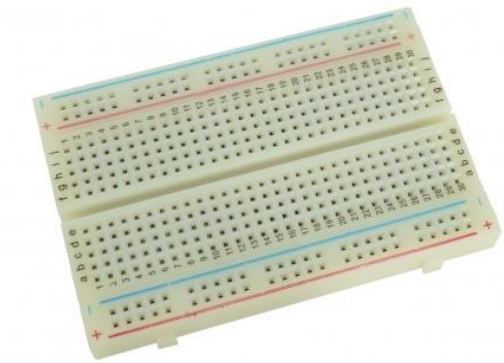
2. Required components

- **Arduino Uno R3**

It is an Arduino board that contains the ATmega328 microcontroller. It can be said that it is the most widespread board used by Arduino. The Arduino Uno has 14 digital input/output pins. 6 of them can be used as PWM output.

- **breadboard**

It is the instrument on which we test our circuits. It allows us to easily test the circuits we build without soldering them together. It allows us to test the circuits we have designed before transferring them to the printed circuit board or perforated boards.

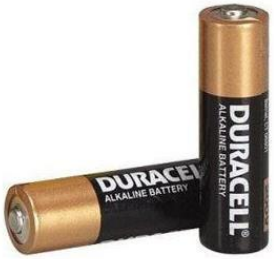


- **Water Pump**

It is a compact and efficient device, ideal for various applications that require the transport of liquids. This pump operates at a voltage of 5V, making it suitable for powering from low-power sources such as USB or other low-power power sources.

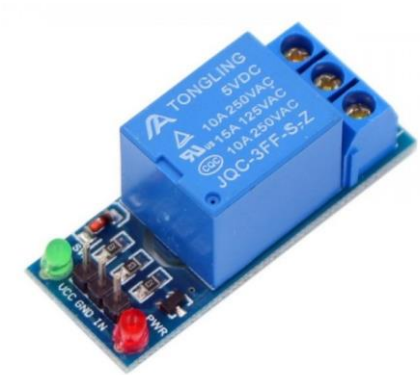
- **hose**

- **1.5 V batteries**



- **LCD screen**

It is a compact size liquid crystal display, very popular in electronics and microcontroller projects due to its versatility and ease of use. This screen model can display 16 characters on 2 lines.



-**Relay Mode**

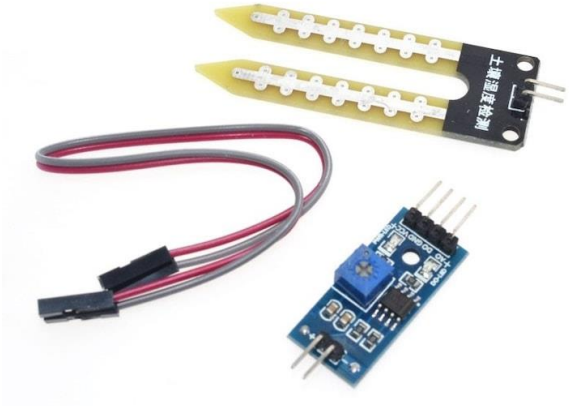
It is an electronic device used to control high-power circuits using low-power signals, usually coming from microcontrollers or other low-voltage control circuits.

-**Power Connector**

Connector suitable for customizing the power cord and for long length connections. It is used to power LED strips, UTP cable, surveillance cameras, etc.

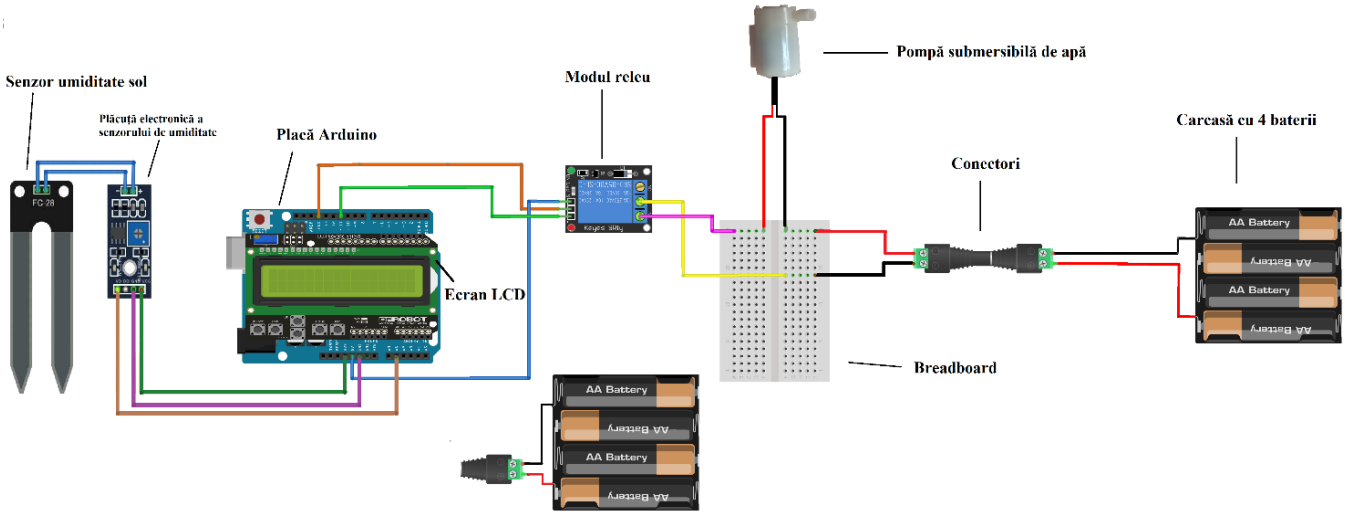
- **Connectors**

- **Sensor and humidity mode**

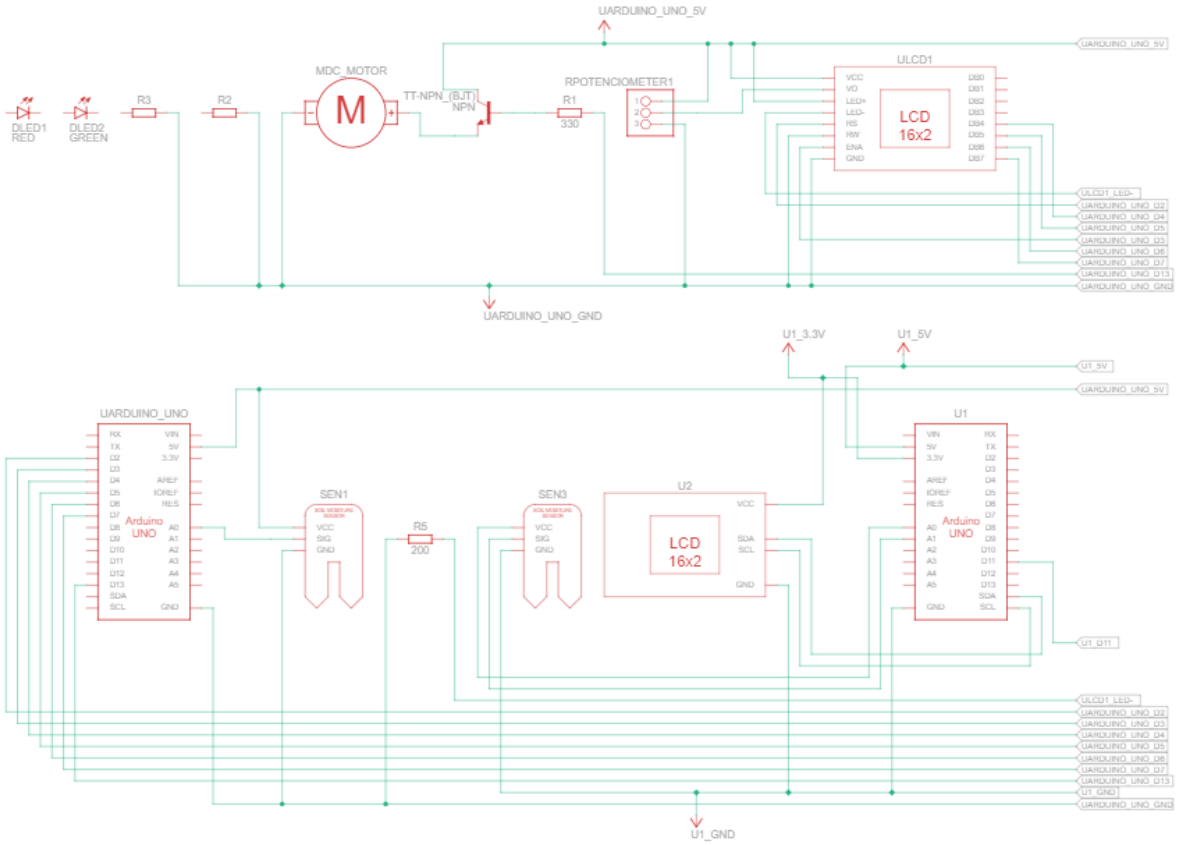


- **Water level sensor**

3. Circuit diagram



4. Wiring diagram



5. Working mode

a) Connecting the Arduino Uno Board and LCD
b) Using 3 connectors, connect the humidity sensor module to the Arduino board
c) The humidity sensor is connected to the module via 2 connectors
d) The relay module is connected to the board through a connector
e) Using 2 other connectors, one for the + terminal and the - terminal, respectively, the relay module is connected to a breadboard, the pins being placed at a distance from each other
f) The relay module is connected with 2 other battery connectors, respectively by the power connector that will connect with the water pump
g) The water pump is connected
h) Another connector is used to connect the power connector to the same battery housing to which the relay module is attached
i) The water level sensor is connected to the circuit as follows: the source cable is connected directly to the Arduino board, and the other 2 connectors, corresponding to the 2 sources, are connected to the breadborard, each in a row with the cable with the same function of the relay module
j) A connector for the + terminal and the terminal - are connected to the breadboard to the Arduino board
k) A second power connector is connected to a second battery case via 2 connectors. It will power the Arduino board using the electrical current from the batteries
l) With the help of a USB cable, the operating code is transmitted from a PC to the Arduino board
m) Fill 2 glasses with water
n) Attach one of the ends of the pump
o) The water pump and level sensor are put in one glass, and the humidity sensor in the other glass

Video tutorial: https://youtu.be/WPN8jnKEnfc

6. Programming

Software used: Arduino IDE

Code

```
#include <LiquidCrystal.h>
#include "DHT.h"
#define DHTPIN 2
#define DHTTYPE DHT11

DHT dht(DHTPIN, DHTTYPE);

const int rs = 8, en = 9, d4 = 4, d5 = 5, d6 = 6, d7 = 7;
LiquidCrystal LCD(RS, EN, D4, D5, D6, D7);
```

```
int humidity = 0;
int displayHumidity = 0;
int levelWater = 0;

void setup()
{
  Serial.begin(9600);
  LCD.begin(16, 2);
  LCD.clear();
  LCD.setSlider(0, 0);
  LCD.print("NEXTLAB. TECH");
  pinMode(11, OUTPUT);
}
void loop()
{
  digitalWrite(11, HIGH);
  humidity = analogRead(A1);
  WaterLevel = analogRead(A3);
  displayHumidity = 800 - humidity;
  LCD.clear();
  LCD.setSlider(0, 0);
  LCD.print("Humidity:");
  LCD.setCursor(0, 1);
  LCD.print(displayHumidity);
  delay(1500);
  Serial.println(waterLevel);
  LCD.clear();
  LCD.setSlider(0, 0);
  LCD.print("Water level:");
  LCD.setCursor(0, 1);
  LCD.print(waterlevel);

  delay(1500);

  float humi = dht.readHumidity();
  float tempC = dht.readTemperature();
  float tempF = dht.readTemperature(true);

  LCD.clear();
  LCD.setSlider(0, 0);
  LCD.print("WithWet:");
  LCD.print(humi);
  LCD.setCursor(0, 1);
  LCD.print("C:");
  LCD.print(tempC);
  LCD.setCursor(7, 1);
  LCD.print(" F:");
  LCD.print(tempF);
  delay(1500);
```

```
  if (displayHumidity < 280 & levelWater > 400)
{
    digitalWrite(11, LOW);
    delay(1500);
    digitalWrite(11, HIGH);
}
  delay(10);
}
```

7. Conclusions

The role of this experiment was to use simple materials, easy to use and assemble, so that we could achieve something complex, such as this water pump, sophisticated enough so that it would be able to automatically water the plant when it did not have enough water and efficiently detect humidity in the atmosphere

8. Bibliographic references

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