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## About Elecrow

Established in 2014, Elecrow is devoted to the open source hardware industry. We have helped thousands of innovators produce custom PCB and PCBA boards. We are dedicated to providing millions of electronic modules for industrial application and STEAM education.

Our mission is to build long-term relationship with our customers and provide exceptional customer services by pursuing business through innovation and advanced technology.

## Welcome message

Thanks for purchasing **Elecrow's Automatic Smart Plant Watering Kit!** You made your first step towards protecting your beautiful plants without the hassle of remembering to water your plants.

## Introduction

This document is divided in seven sections. The first section lists the **Automatic Smart Plant Watering Kit** features. The second describes what is in the box. It identifies the different components included in the kit, including a brief description of each component and what they are used for.

The third section provides an overview of how the system works. The next one describes how to install and configure the Arduino IDE. The fifth section explains how to upload the Arduino program in the Arduino Leonardo controller integrated in the Smart Pump Board. The sixth section describes how to assemble the components and powering the system for the first time.

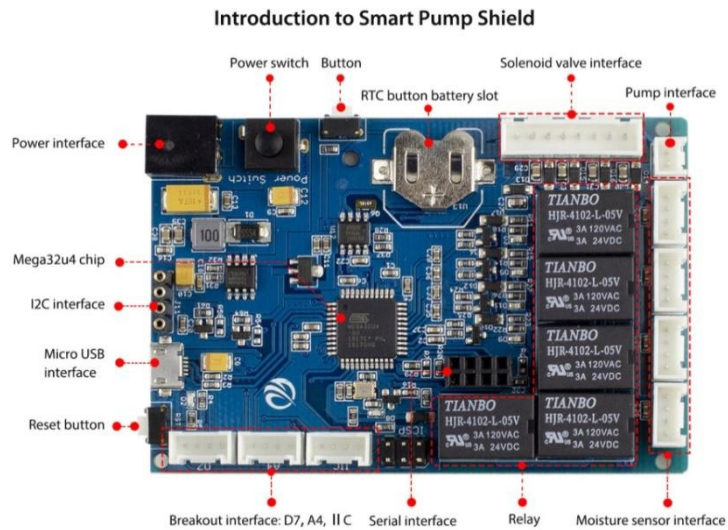
The final section contains troubleshooting guides and how to reach out to us in the rare case you experience problems not described in the section.

## Automatic Smart Plant Watering Kit Features

1. **Smart Pump Board with integrated control board** (Arduino Leonardo).  
No need for an external control board!
2. **Very low noise** Water Pump.  
Less than 65 dB when operating compared to 70dB when a desktop fan operates in high mode.
3. **Long life** Soil Humidity Sensors that can test the soil moisture.
4. **Plug and play components.**  
Say goodbye to messy jumpers and wire! Easy to assemble components, anyone can do it!
5. **Watering control for up to 4 plants** with one kit.
6. **One power supply** to power all the components.
7. **1.3" OLED screen** displays humidity percent for each plant.
8. **Real Time Clock and Battery backup**
  - The RTC can keep track of the current time and can be used in order to program actions at a certain time. It can also be used to set how frequent your plants are watered as well as show the watering time on the OLED display.
  - The RTC is powered by a CR1220 battery that keeps the time.

## What's Included in the Box?

### 1. Smart Pump Board (Qty. 1)



This is the brain of the kit. It reads information from the humidity sensors and decides which plant needs water and activates the right components to achieve this.

### 2. Power Supply 12 volts DC (Qty. 1)



It provides power to all the components in the kit.

### 3. Low Noise Water Pump (Qty. 1)

Takes water from a source and pumps it through the output valve.



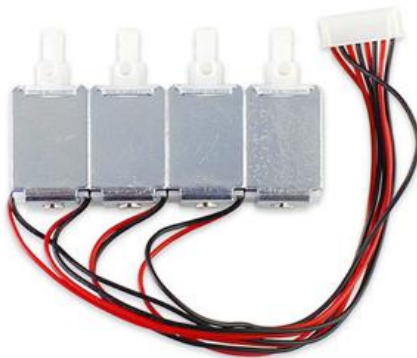
### 4. Five-way Water Pipe (Qty. 1)



Allows water coming from the water pump output valve to be distributed to four outputs.

This component, in combination with the Four-way valve allows watering individual plants.

### 5. Four-way Water Valve (Qty. 1)



Each valve has an input and output. The input takes water from a single water output from the five-way water pipe but only allows water to go through the output valve when the Smart Pump Board commands it. This permits that the a controlled water distribution, allowing the plants that need the water to receive it, while avoiding watering the plants that don't need it while at the same time saving water in the process.

## 6. Plastic Water Pipe (Qty. 1)



5 meters of 2/10 inches in diameter clear plastic water pipe.

## 7. Soil Humidity Sensors (Qty. 4)



These sensors measure the humidity in the soil and based on their readings, the Smart Pump Board decides if the plant needs water or not.

## 8. Cables (Qty. 4)



Each cable is 1 meter long.  
These cables are connected to the Soil Humidity Sensors on one end and to the Smart Pump Board on the other end.

## System Operation Overview

After uploading the complementary program into the controller (Arduino Leonardo) integrated in the Smart Pump Board and interconnect all the components you are ready to power the kit.

Once power is connected, the controller will initialize the display, and it will read information from the Soil Humidity Sensors and determine the moisture content in the soil for each of the plants. If the moisture content in the soil of any of the plants is less than 20% (you can reset by yourself), the controller will initiate the process to water the corresponding plants.

The steps in the watering process are:

- a. The controller triggers the relay controlling the power to the water pump. This energizes the water pump by sending 12volts DC from the power supply to the water pump.
- b. The water pump will take water from the source into the input valve and sends it with a gentle pressure to the output valve.
- c. The output valve from the water valve goes into the input valve of the five-way water pipe and goes through the output valves that are connected to the four-way valve.
- d. The controller also opens the corresponding output in the four-way valve corresponding to the sensors reporting the low soil moisture content. In this way the plants that need watering will get the water.
- e. The controller will keep watering the plants until it detects that the moisture content in the soil gets to 20%.
- f. When the moisture content gets to the desired level, the controller will stop the watering process by sending a signal to the proper relays.
- g. The controller will resume the monitoring process.



## Arduino IDE installation and configuration

### 1. Download the Arduino IDE

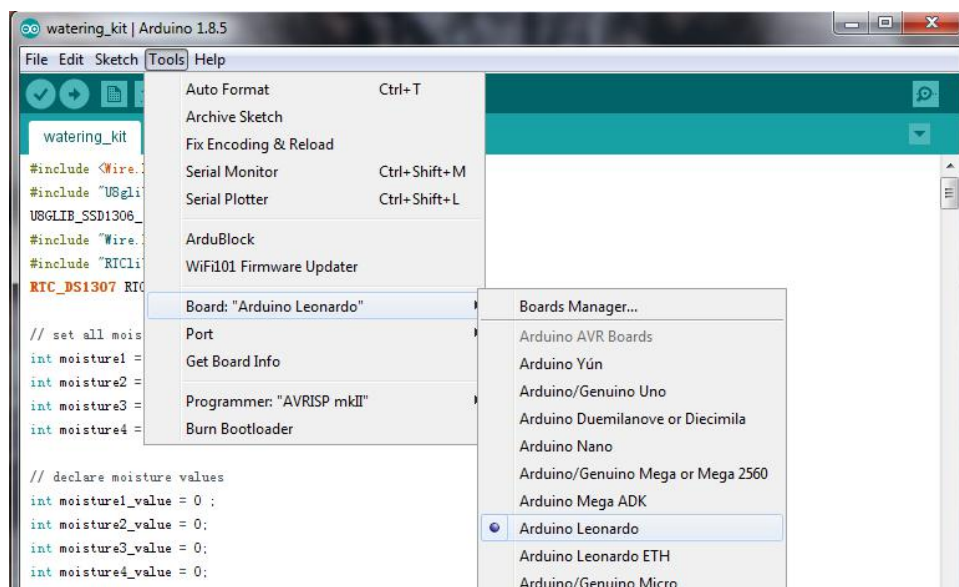
- Use the latest version of the Arduino IDE for your computer system.
- Here are the links to the latest version (at the time this document was created):
  - o Windows (XP and up)
    - [https://www.arduino.cc/download\\_handler.php?f=/arduino-1.8.9-windows.exe](https://www.arduino.cc/download_handler.php?f=/arduino-1.8.9-windows.exe)
  - o Mac OS X (10.8 Mountain Lion or newer) -
    - [https://www.arduino.cc/download\\_handler.php?f=/arduino-1.8.9-macosx.zip](https://www.arduino.cc/download_handler.php?f=/arduino-1.8.9-macosx.zip)
- To verify if there is a newer version.
  - o Visit the Arduino website at <https://www.arduino.cc/en/Main/Software>
  - o Locate the Download the Arduino IDE section and download the latest version for your computer system.

### 2. Install the Arduino IDE

- o Windows users, follow the installation instructions available [here](#).
- o Mac OS X users follow [these instructions](#) instead.

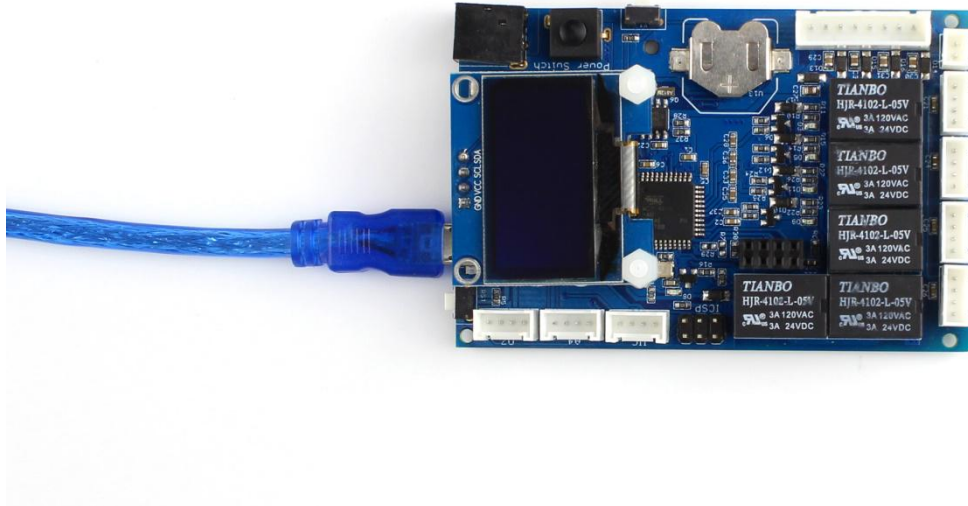
### 3. Configure which controller board will be used in the Arduino IDE

- On top of the Arduino IDE, click “**Tools>Board>**” and select “**Arduino Leonardo**” from the available options.

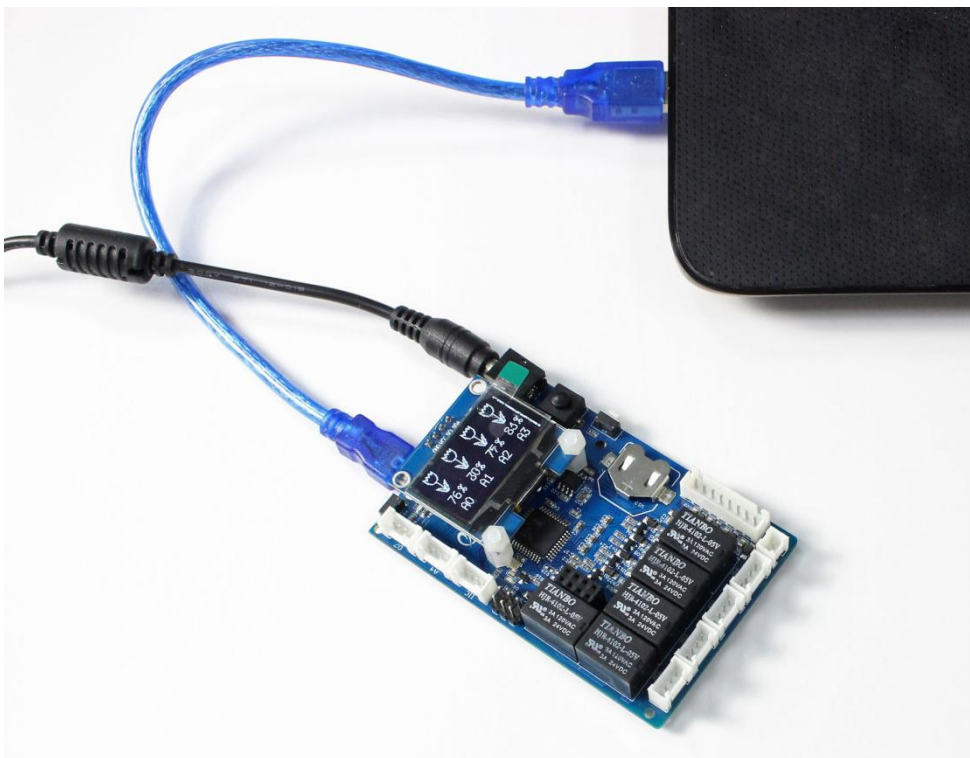


4. Connect the Smart Pump Board to your computer system

- Attach the micro usb side of the cable to the Smart Pump Board

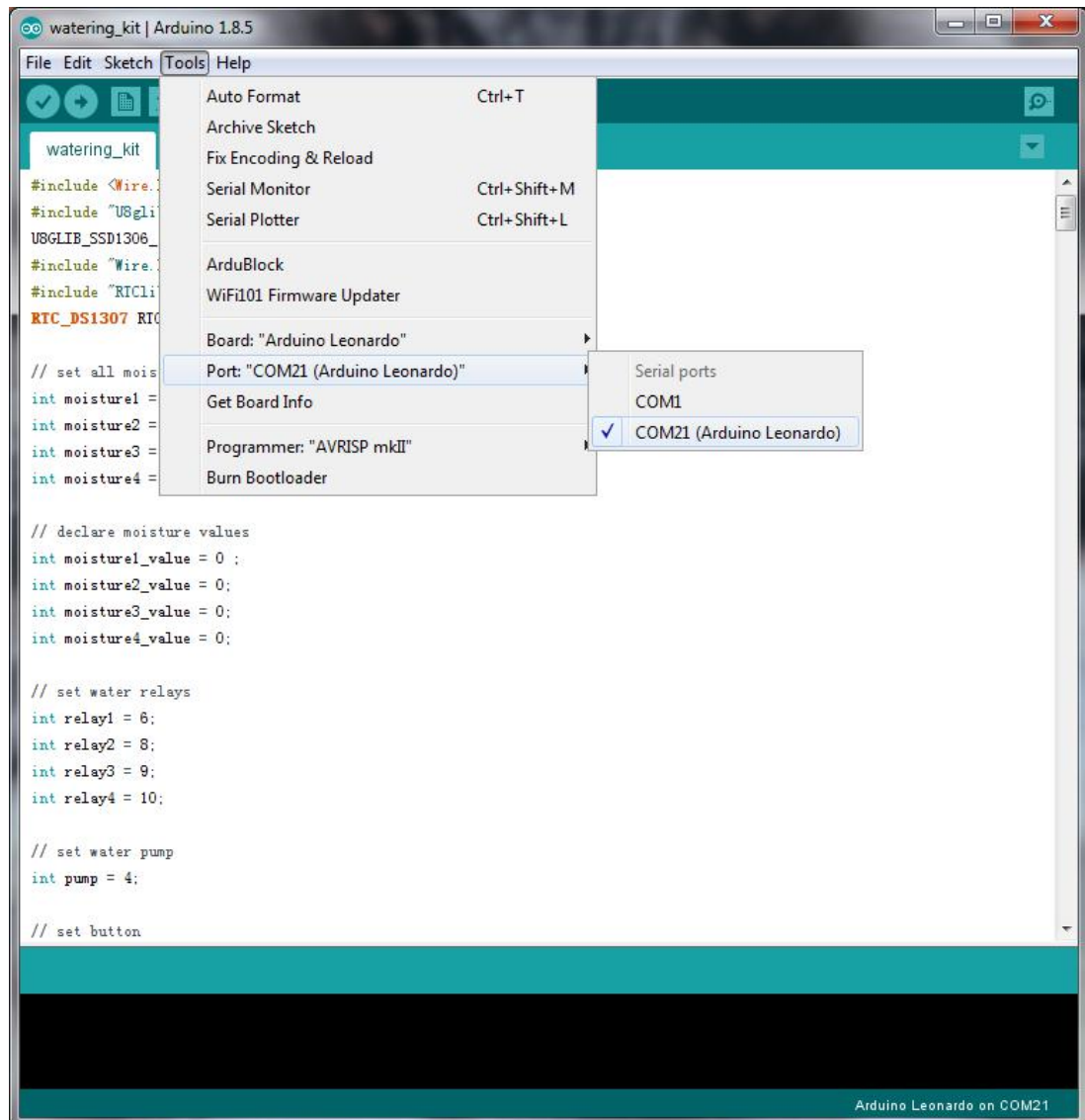


- Connect the other end of the usb cable to an usb port in your computer.
- (Notice: Please power the board by DC power when you upload the code)



## 5. Configure which communication port to use

- The Arduino IDE needs to know in which usb computer port the Arduino Leonardo controller is connected in order to communicate with it.
- To do so, select **"Tools>Port"** and select the COM port that indicates Arduino Leonardo. Please note that the actual numbers after the "COM" word will vary from computer to computer, so they could be different from the ones shown in the figure.



6. Once completed, proceed to the next section to upload the program into the Arduino IDE and program the Arduino Leonardo controller in the Smart Pump Board.

## Uploading the Program into the Smart Pump Board

1. Download the Library: [www.elecrow.com/download/Watering\\_kit\\_library.zip](http://www.elecrow.com/download/Watering_kit_library.zip) and extract it.

Copy it to the file-libraries in the arduino IDE file,

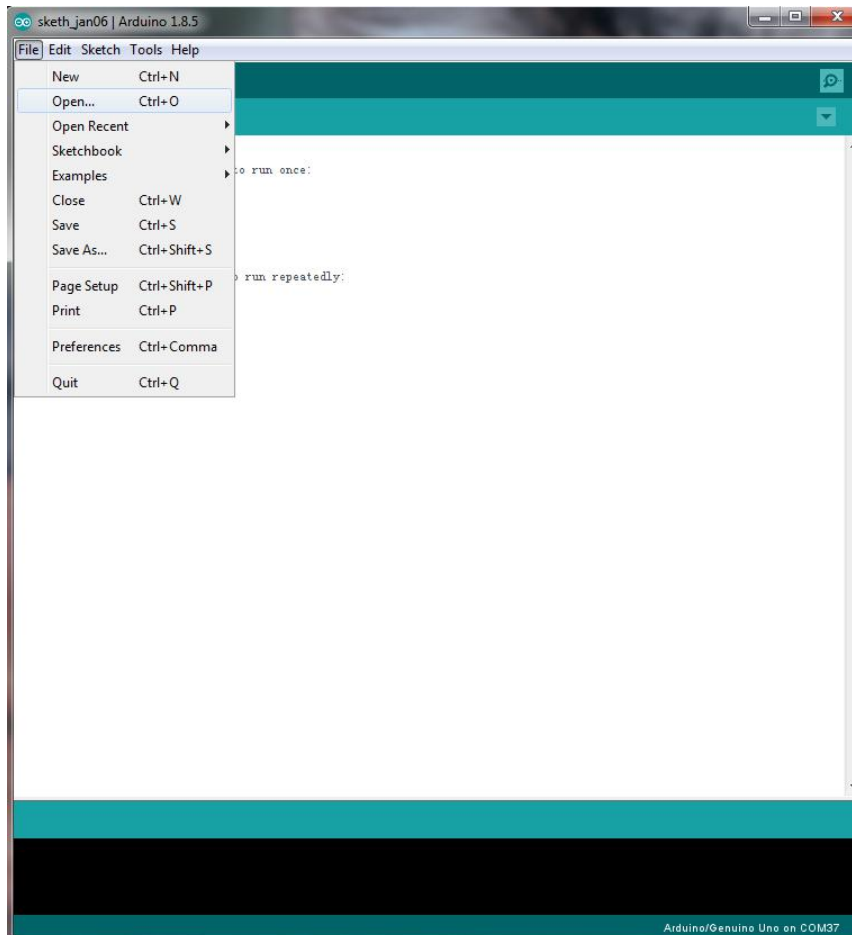
i.e. D:\Program Files (x86)\Arduino\libraries.

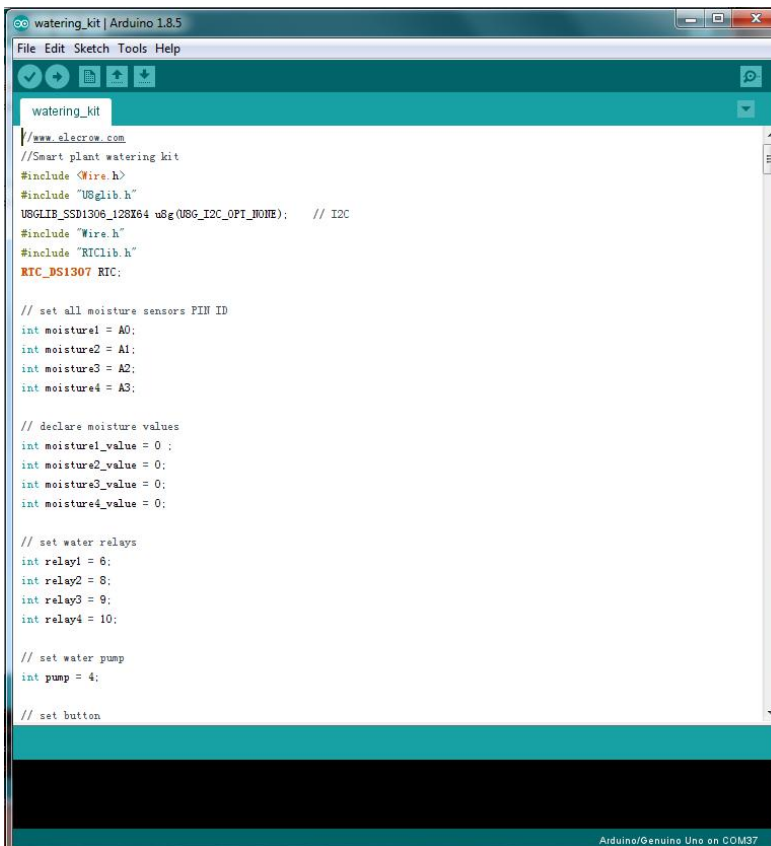
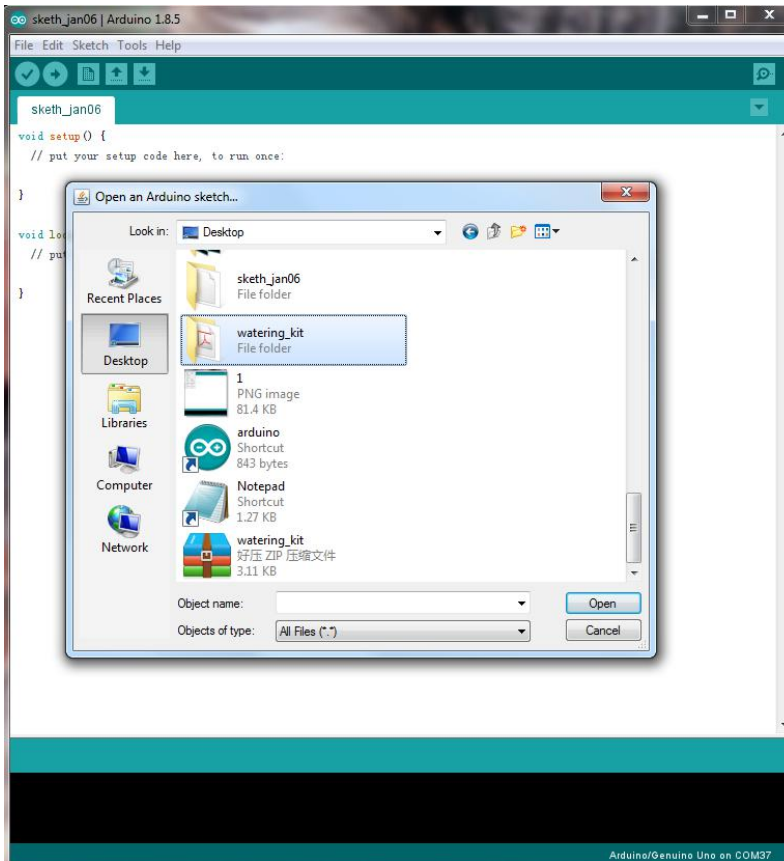
2. Download the Program

Download the program at [https://www.elecrow.com/download/watering\\_kit.zip](https://www.elecrow.com/download/watering_kit.zip)

3. Extract the file from the zip file. The filename is watering\_kit.ino

4. Load the program in the Arduino IDE





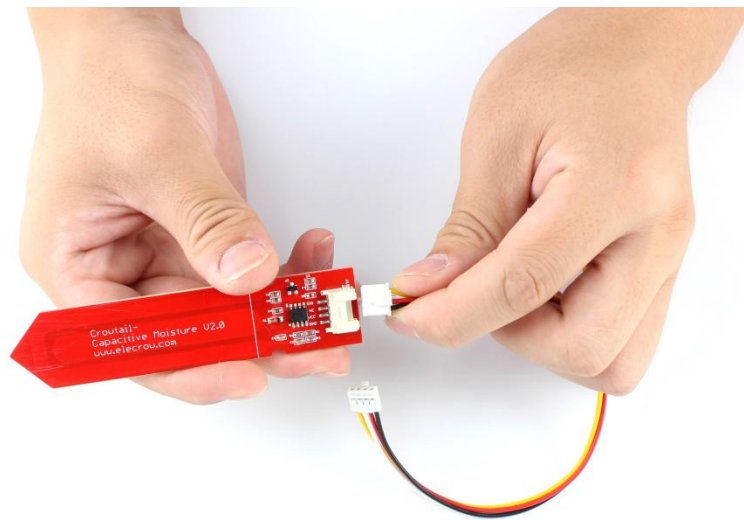
## 5. Upload the Code to the Arduino Board

- Click the  to upload the code

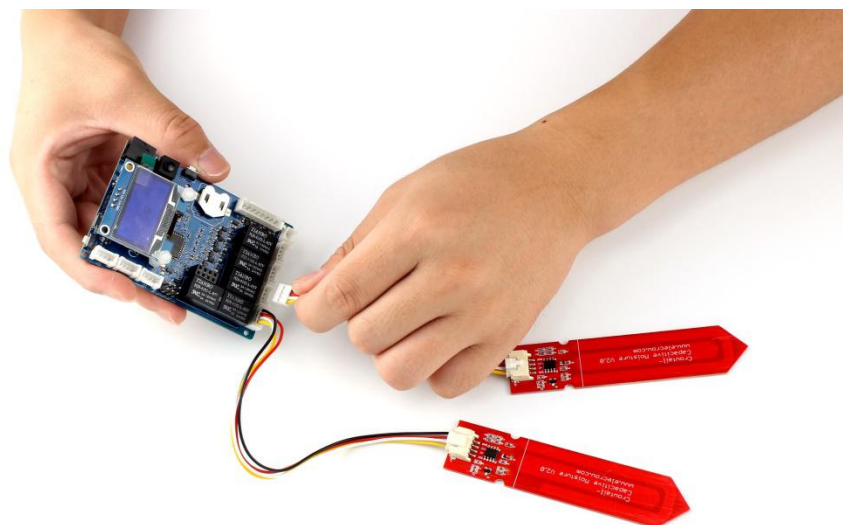
## Assembling the components

Note: For an overview of the process please watch this [YouTube video](#)

1. Attach the cable to the Soil Humidity Sensors as shown in the figure. Repeat for each sensor.

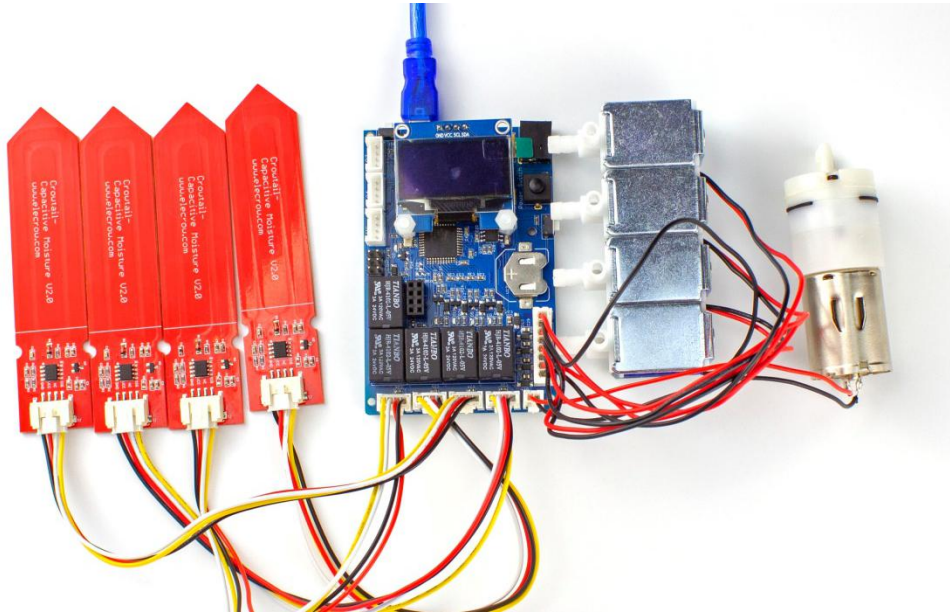


2. Connect the Soil Humidity Sensors to the Smart Pump Board





### 3. Connect the Water Pump and the Four-way Valve to the Smart Pump Board



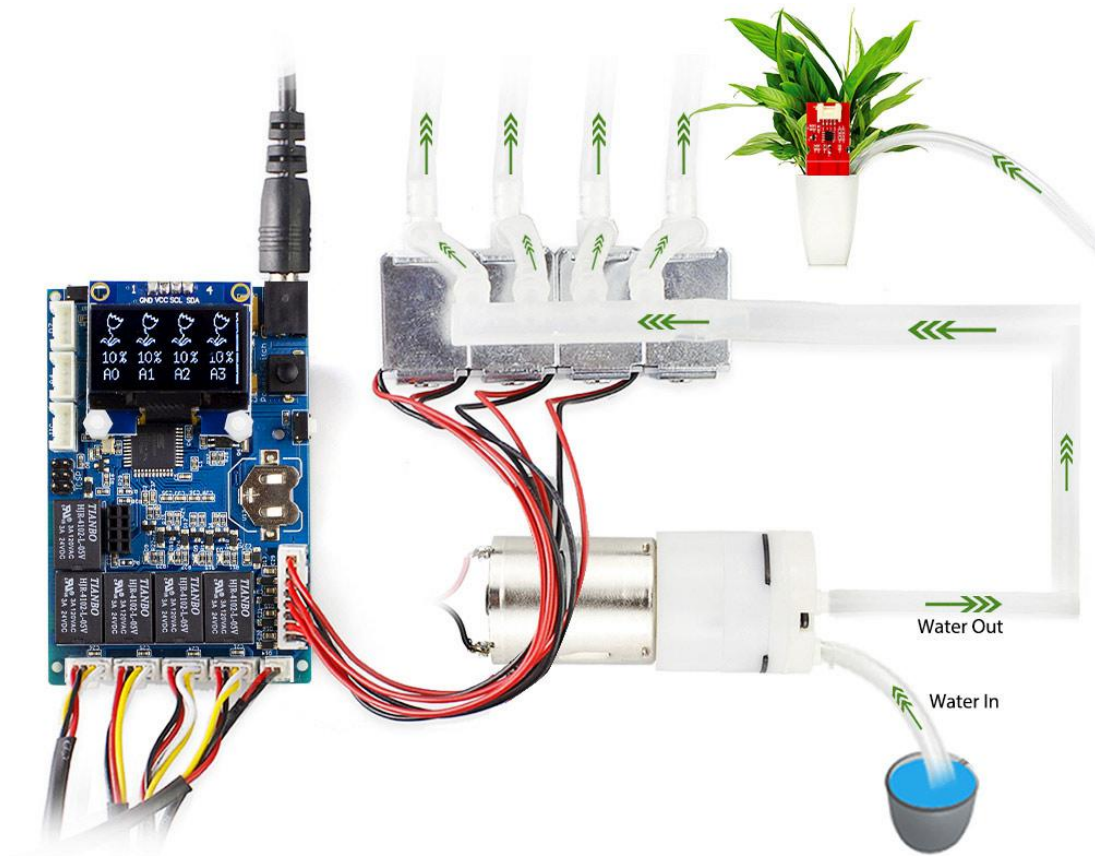
### 4. Cut the plastic water pipe

First cut: for water source to water pump input (depends on water source height)

Second cut: water pump output to five-way valve input. (depends on how you locate the plants)

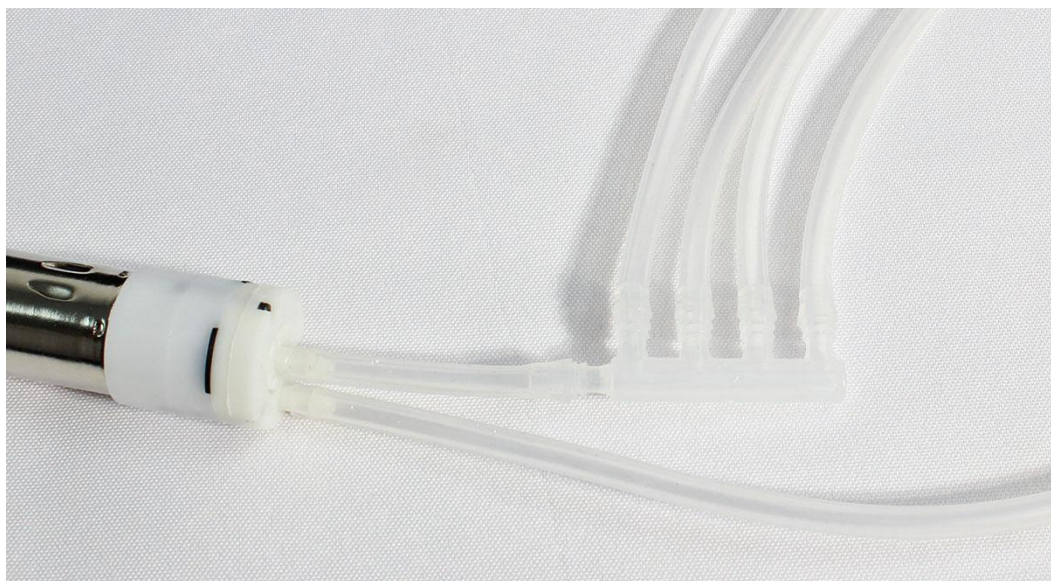
Third cut: 4 pieces for the output valves in the five-way valve to the input of the four-way water valves. (depends on how you locate the plants)

Fourth cut: 4 pieces for the output valves of the four-way water valves to the soil where each plant is planted. (depends on how you locate the plants)



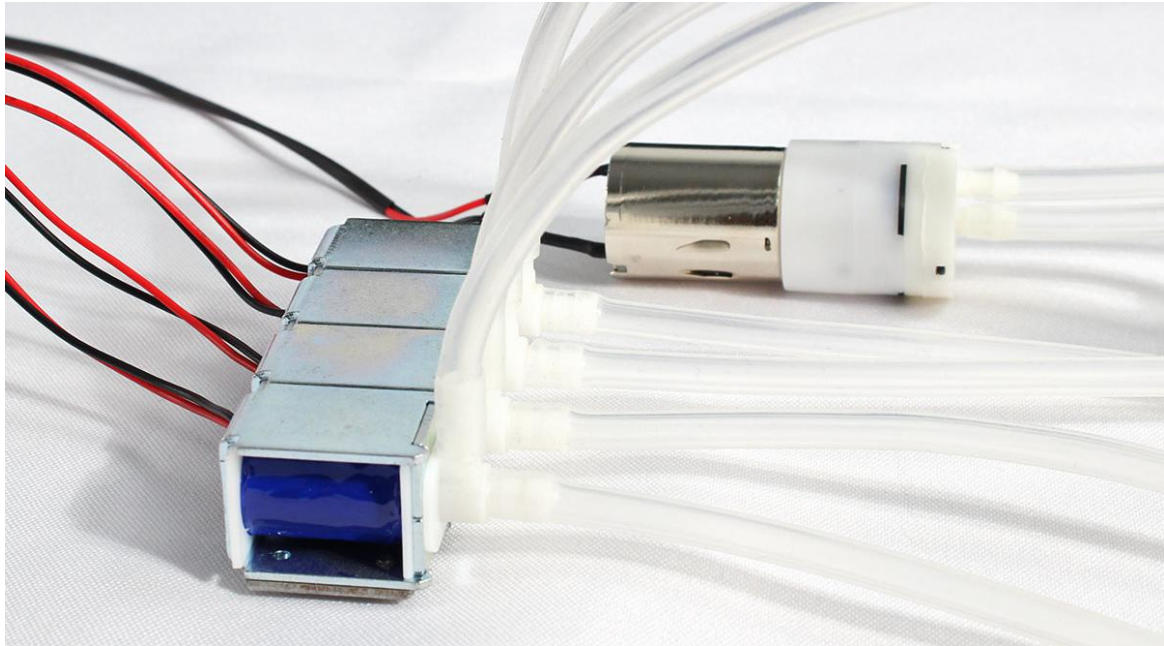
### 5. Connect the Water Pipes

Cut the water pipe and divide them to 6 parts. Make sure the pipe that goes inside the water source will be long enough to reach the water. We'll connect 2 of the pipes to the pump, one sucks the water from the water sources while the other connects to the five-way water pipe.



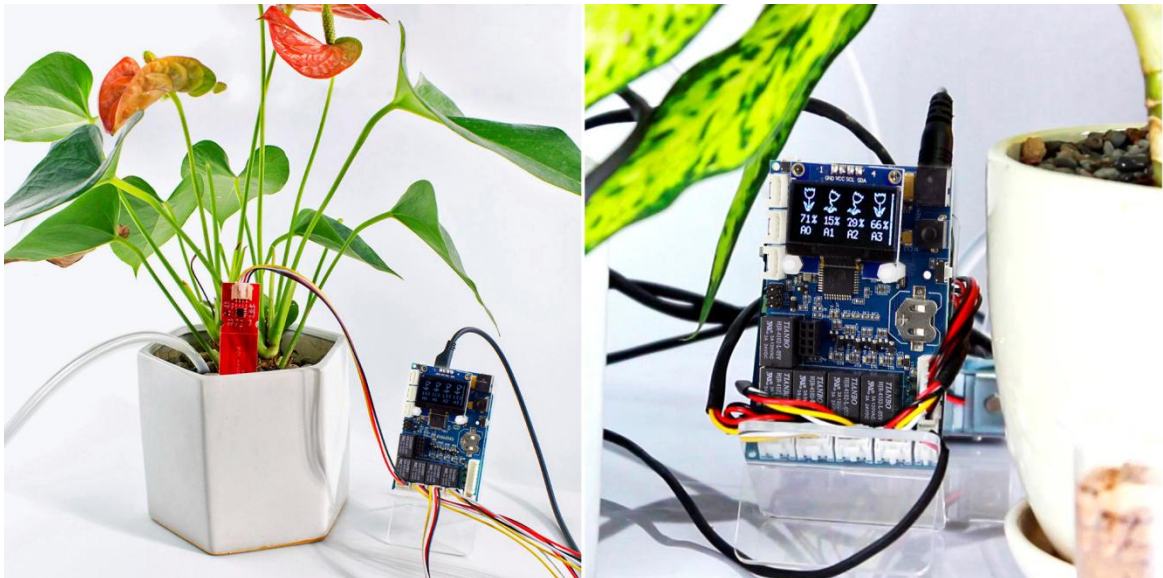


Connect five pipes to the valves.



## 6. Power it Up!

Just power the board with single 12V power supply directly! The shield will split the power between the Leonardo and the other devices. That way, the Leonardo will get 5V while the pump and the switch will get 12V.



## Troubleshooting

Your Elecrow Arduino Plant Watering Kit is guaranteed to operate properly for a period of 365 days.

Symptom	Recommendations

## Warranty Information

Your Elecrow Arduino Plant Watering Kit is guaranteed to operate properly for a period of 365 days. This warranty provides for repair or replacement, at manufacturer's option, of any defective components. This warranty is limited to the actual cost of repairs and will not cover shipping costs or any consequential damages resulting from failure of the unit or its components to perform as stated. All warranty work must be done by the manufacturer. The manufacturer will not cover the costs of repairs done elsewhere.

Warranty will be voided if unit has been tampered with, altered or repaired by unauthorized persons or companies.

Should there be any questions about the kit, please feel free to reach us at [info@elecrow.com](mailto:info@elecrow.com).