A

Technical Report

on

AUTOMATIC WATER SPRINKLER

Submitted to CMR Institute of Technology in the partial fulfillment of the requirement of

Social Innovation Lab

Of

II B.Tech I- Semester

in

ECE DEPARTMENT

Submitted by

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(UGC-AUTONOMOUS)

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Department of ECE

Certificate

This is to certify that the technical report entitled "***AUTOMATIC WATER SPRINKLER***" is the bonafide work done and submitted by

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towards the partial fulfillment of the requirement of Social Innovation (SIL) Laboratory of **II B. Tech I-Semester** in **ECE** is a record of bonafide work carried out by them during the period **Aug 2021 to Jan 2022.**

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1. INTRODUCTION

In the present scenario, plants are playing a main role to protect our environment. Due to this reason, many homes are established with indoor plants. These plants keep our homes beautiful and at the same time these plants produces pure air in our homes. We also grow different plants in our balconies. So these plants has to taken care. They should have proper sunlight to grow. They must be provided with adequate amount of water at regular intervals of time.

Due to our busy schedules and hectic work life especially in metropolitan and mega cities in our country and as well as in abroad, we could find some time to take care off these plants. Hence resulting in less amount o water provided to plants and leads to drying up of plants and finally dehydration

To eradicate this problem, we created a device called AUTOMATIC WATER SPRINKLER.

It is a device which water our plants automatically without wasting water. It provides accurate and adequate amount of water at regular intervals of time without involvement of human being. In addition with homes, this device is applicable to villas, gardens with minimal number of plants. It will save our time, consumption of water.

It can provide sufficient amount of water to plants according to the moisture content in the soil. and we can save water as well as our time because of automatic water sprinkler. The is also minimal.

The main thing is, it is water resistive in the rainy season and it will be in active mode until power supply is provided. It is mostly applicable in summer season due to high temperatures.

2. Empathize

Empathize is the capacity to understand or feel what another person is experiencing from within their frame of reference, that is, the capacity to place oneself in another's position. Emphasis is the strategy that aims to draw the viewer's attention to a specific design element. Depending on time constraints, a substantial amount of information is gathered at this stage to use during the next stage and to develop the best possible understanding of the users, their needs, and the problems that underlie the development of that particular product.

Having empathy can include having the understanding that there are many factors that go into decision making and thought processes.

● The empathize process of automatic water sprinkler includes following questionnaire :

→ What if there is power cut or short circuited? Would there be any consequences?

→ Do this device useful for plants which require dry soil?

→ Wastage of power if the motor runs if there's lack of water.

→ Is this product waterproof?

→Does it provide shock to our pets, if it gets contact with a living body?

→ Does it provide accurate amount of water to plants? .

→ What would be the consequence , if there could be a direct sunlight falling on the sensor used?

These Empathized questionnaire has been analysed and taken into consideration for further step.

3. Define

The Define stage will help the designers in your team gather great ideas to establish features, functions, and any other elements that will allow them to solve the problems or, at the very least, allow users to resolve issues themselves with the minimum of difficulty.

During the Define stage, you put together the information you have created and gathered during the Empathise stage. This is where you will analyse your observations and synthesise them in order to define the core problems that you and your team have identified up to this point. You should seek to define the problem as a problem statement in a human-centred manner.

By knowing the suggestions of others we created some changes in our product like:

→ If there's a frequent power cut, then the power supply could be replaced with solar panels. It is all about owners liability. Even plants can able to withstand for 2 hours without water, if there could be a power cut

→ In addition to this, we can solve second problem also means atleast a week we come to see our plants. at that time if we see the situation of plants and water in containers results in estimation of water that plants require

→ The motor will run with water in accordance with the level of water with the container.

→ And from another problem i.e., because of wet soil through out the day the roots of the plants would become strengthenless , Hence device is indicated such a way that a minimum amount of water is supplied to the soil to keep hydrated.

4. Ideate

During the third stage of the Design Thinking process, we are ready to start generating ideas. We are grown to understand our users and their needs in the Empathise stage, and you've analysed and synthesised our observations in the Define stage, and ended up with a human- centred problem statement. With this solid background, our team members will start to "think outside the box" to identify new solutions to the problem statement you've created, and you can start to look for alternative ways of viewing the problem.

●From those solutions we ideated some things:

→ we inserted some connections to the mini water pipe to give water several plants

→ Lcd display is connected to the device to tell us that power is coming or not.

→Lcd is also used to indicate whether motor is in on or off position.

→ We constructed device very minimal to carry anywhere.

→It weighs very less. It requires very minimal amount of power to work.

→ AC supply is converted to DC supply and provided to entire device which prevents from shocks and some current resistive parts are fixed to it. Additionally it is added with regards to children and pets in our home.

Components Required:

S.no	Name of the Components	Quantity
1.	Arduino UNO	1
2.	Soil Moisture Sensor	1
3.	5V Relay Module	1
4.	16*2 LCD	1
5.	LED	2
6.	Breadboard	1
7.	Male to Male Jumping Wires	10
8.	Female to Female Jumping Wires	10
9.	Male to Female Jumping Wires	10
10.	Connecting Wires	As required
11.	10k Potentiometer	2
12.	18V2Amp Transformer	1
13.	Voltage Regulator 7805	1
14.	5V Mini Water pump(Electric DC motor)	1
15.	DC power jack	1
16.	1k Resistor	1

Arduino UNO:

Arduino is an open source physical computing platform based on simple input or output board and development environment that implements the processing language(www.processing.org). Arduino can be used to develop standalone interactive objects or can be connected to software on your computer. The boards can be assembled by hand or purchased. assembled; the open source integrated development environment (IDE) can be downloaded for free from www.arduino.cc.

Introduction to Arduino Boards:

Arduino is a architecture that combines Atmel microcontroller family with standard hardware into a board with inbuilt bootloader for plug and play embedded programming. Arduino software comes with an IDE that helps writing, debugging and burning program into Arduino. The IDE also comes with a serial communication window which can easily get the serial data from the board.

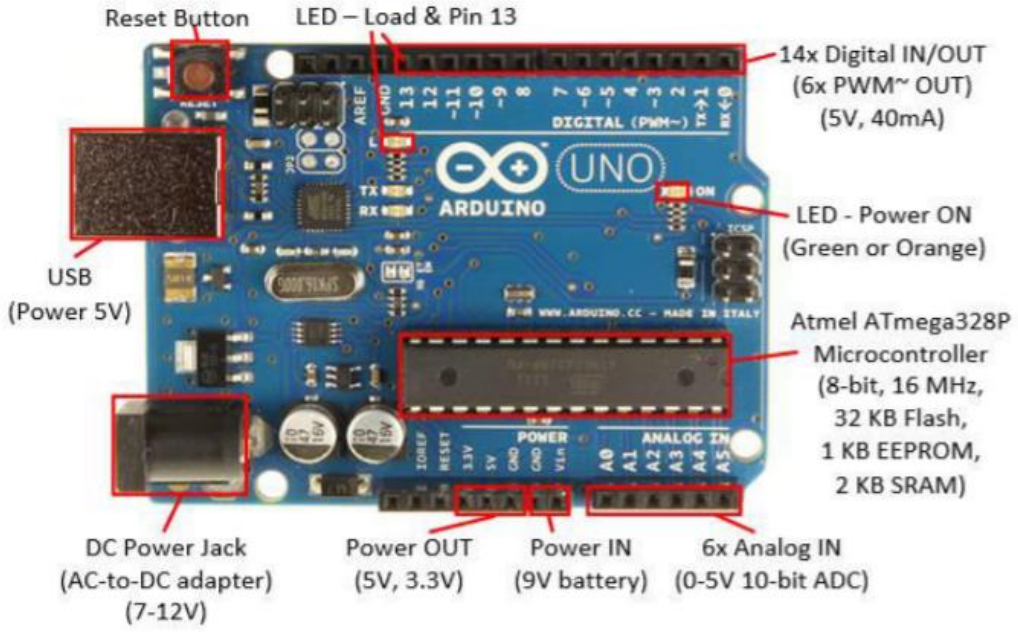


Fig: Arduino UNO architecture.

Pin Description off Arduino UNO:

The UNO is a microcontroller board based on the. Atmega328P. It has 14 digital input or output pins, 6 analog inputs, a 16MHz quartz crystal, a USB connection, a power Jack, and ICSP header and the reset button. Each of the 14 digital pins can be used as an input or output, using pinMode(), and digitalRead() functions. They operate at 5 volts. Each pin can provide or receive 20mA as recommended operating condition and has an internal pull up resistor(disconnected by default) of 20 to 50K ohm. A maximum of 40mA is the value that must not be exceeded on any input pin to avoid permanent damage to the microcontroller.

In addition, some pins have specialized functions:

- Serial: 0(RX) and 1(TX). Used to receive (RX) and Transmit (TX) TTL serial data.
- External Interrupts: 2 and 3. These pins can be configured to trigger an interrupt on a low value, a rising or falling edge, or a change in value.
- PWM: 3, 5, 6, 9, 10, and 11. Provide 8-bit PWM output with the analogWrite() function.
- SPI: 10(SS), 11(MOSI), 12(MISO), 13(SCK). These pins support SPI communication using the SPI library.
- LED: 13. There is a built-in LED driven by digital pin 13.
- TWI: A4 or SDA pin and A5 or SCL pin. Support TWI communication using the wire library

The Uno has 6 analog inputs, labelled A0 through A5, each of which provide 10 bits of resolution. By default they measure from ground to 5 volts, through

it is possible to change the upper end of their range using the AERF pin and the analog Reference() function.

There are a couple of other pins on the board.

- AERF reference voltage for the analog inputs. Used with analog Reference.
- Reset. Bring this line low to the reset microcontroller. Typically used to add a reset button to Shields which blocked the one on the board.

Soil Moisture Sensor:

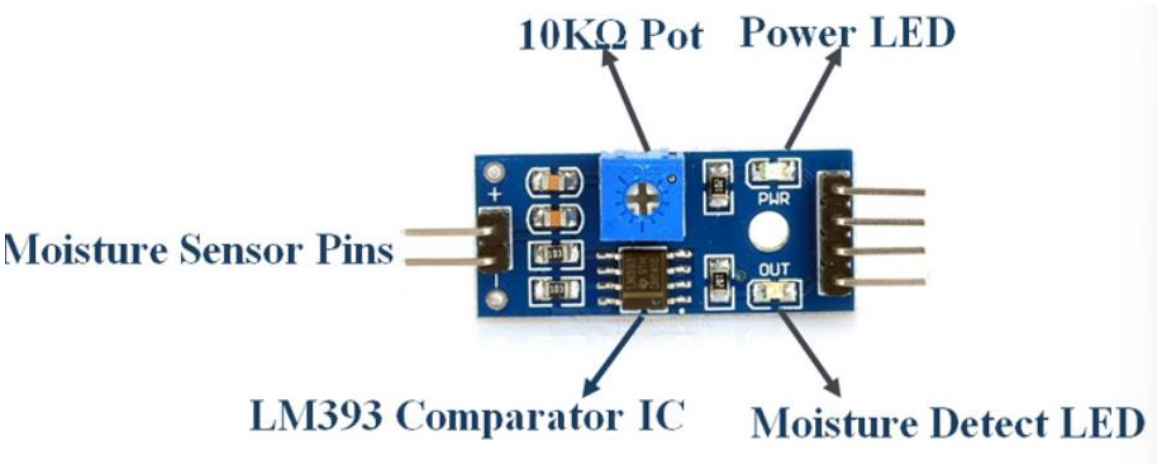
This soil moisture sensor model is used to detect the moisture of the soil. It measures the volumetric content of water inside the soil and gives us the moisture level as output. The module had more digital and analog outputs and a potentiometer to adjust the threshold level.

Soil moisture sensor module pinout configuration:

Pin Name	Description
VCC	The VCC pin powers the module, typically with + 5V
GND	Power supply ground.
D0	Digital out pin for digital output.
A0	Analog out pin for analog output.

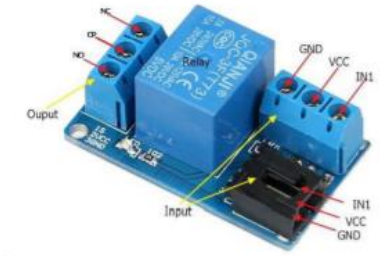
Soil moisture sensor module features and specifications:

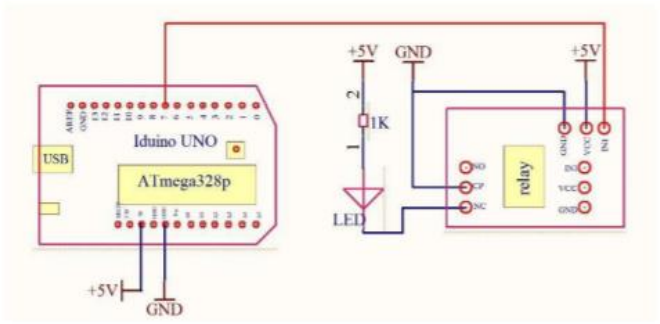
- Operating Voltage: 3.3V to 5V DC
- Operating Current: 15mA
- Output Digital - 0V to 5V, Adjustable trigger level from preset
- Output Analog - 0V to 5V based on infrared radiation from fire flame falling on the sensor
- LEDs indicating output and power
- PCB Size: 3.2cm x 1.4cm
- LM393 based design
- Easy to use with Microcontrollers or even with normal Digital/Analog IC
- Small, cheap and easily available



RELAY MODULE:

Relay is an electromagnetic device which is used to isolate two circuits electrically and connect them magnetically. They are very useful devices and allow one circuit to switch another one while they are completely separate. They are often used to interface an electronic circuit (working at a low voltage) to an electrical circuit which works at very high voltage. For example, a relay can make a 5V DC battery circuit to switch a 230V AC mains circuit. Thus a small sensor circuit can drive, say, a fan or an electric bulb.





A relay switch can be divided into two parts: input and output. The output section has a coil which generates magnetic field when a small voltage from an electronic circuit is applied to it. This voltage is called the operating voltage. Commonly used relays are available in different configuration of operating voltages like 6V, 9V, 12V, 24V etc. the output section consists of contactors which connect or disconnect mechanically. In a basic relay there are three contactors: normally open (NO), normally closed (NC) and common (COM). At no point state, the COM is connected to NC. When the operating voltage is applied the relay coil gets energized and the COM changes contact to NO.

Mini Water Pump:

Micro DC 3-12V Micro Submersible Pump Mini water pump For Fountain Garden Mini water circulation System DIY project. This is a low cost, small size Submersible Pump Motor which can be operated from a 3 ~ 6V power supply. It can take up to 120 liters per hour with very low current consumption of 220mA. Just connect tube pipe to the motor outlet, submerge it in water and power it. Make sure that the water level is always higher than the motor. Dry run may damage the motor due to heating and it will also produce noise.

Specifications:

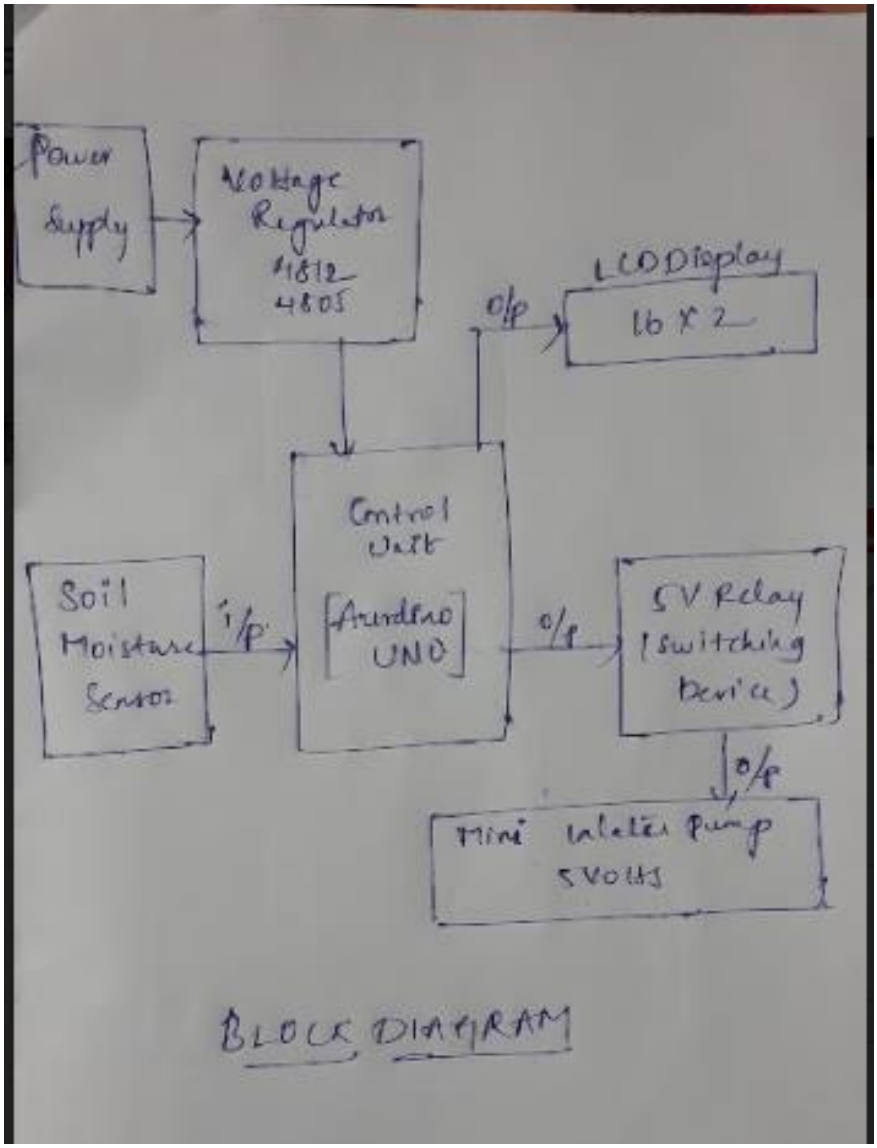
- Operating Voltage : 3 ~ 6V
- Operating Current : 130 ~ 220mA
- Flow Rate : 80 ~ 120 L/H
- Maximum Lift : 40 ~ 110 mm
- Continuous Working Life : 500 hours
- Driving Mode : DC, Magnetic Driving
- Material : Engineering Plastic
- Outlet Outside Diameter : 7.5 mm
- Outlet Inside Diameter : 5 mm

Proposed Algorithm:

```
#include<LiquidCrystal.h>
LiquidCrystal lcd(12, 11, 5, 4, 3, 2);
int water;//random variable
void setup() {
  // Switch on the LCD screen
  lcd.begin(16, 2);
  // Print these words to my LCD screen
  lcd.print("Automatic");
  lcd.setCursor(0,1);
  lcd.print("Water Sprinkler");
  pinMode(3,OUTPUT);
   pinMode(6,INPUT);
     pinMode(13,OUTPUT);
}
void loop() {
  // put your main code here, to run repeatedly:
water= digitalRead(6);
if(water==HIGH)
{
  digitalWrite(3,LOW);
  digitalWrite(13,HIGH);
  delay(1000);
  }
else{
  digitalWrite(3,HIGH);
  digitalWrite(13,LOW);
  delay(1000);
  }
  delay(400); }
```

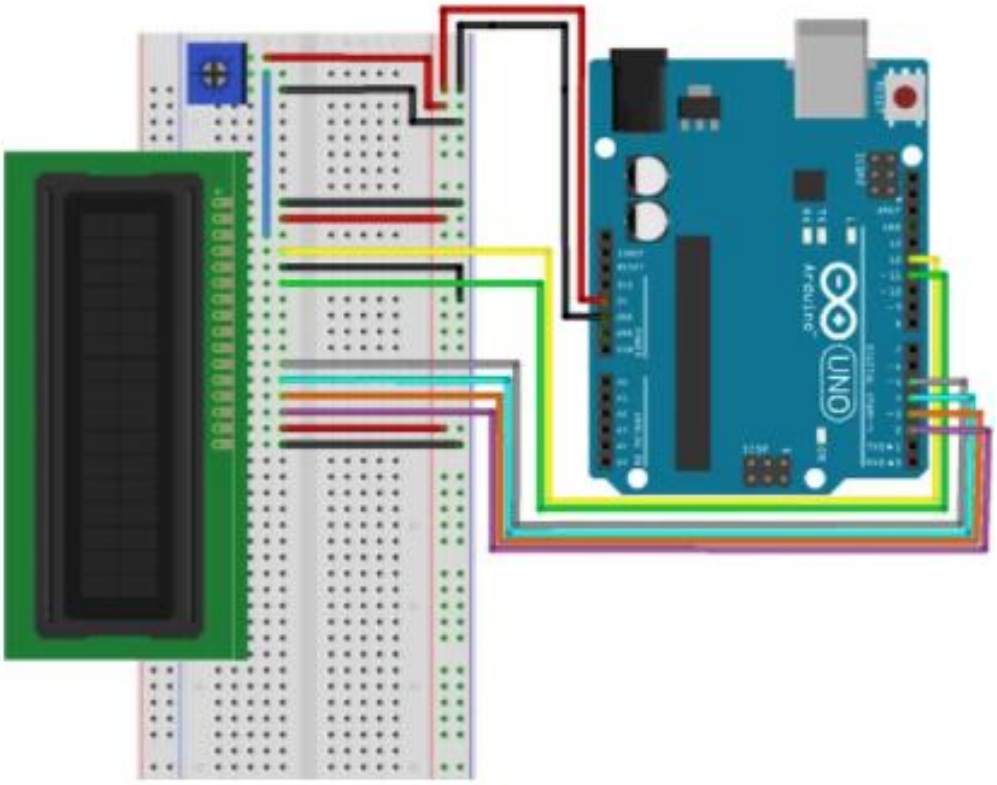
5.Prototype

Block Diagram:



Block Diagram

Pin Diagram Of LCD Display:



Arduino PIN Connections:

S.no	Pin1	Pin2
1.	Digital Pin 6(Arduino)	V0(Moisture Sensor)
2.	Digital Pin 3(Arduino)	IN(Relay)
3.	Digital Pin 13(Arduino)	+ve (LED)
4.	Digital Pin Gnd(Arduino)	-ve(LED)
5.	5v(Arduino)(Power Section)	VCC(Relay)
6.	Gnd1(Arduino)(Power Section)	Gnd(Moisture Sensor)
7.	Gnd2(Arduino)(Power Section)	Gnd(Relay)
8.	Vin(Arduino)(Power Section)	VCC(Moisture Sensor)

As we know that automatic water sprinkler is used to water the plants. In this device mainly the moisture sensor is used to detect the moisture level in soil and it provides the information to control unit of the device. The device constitutes mainly by relay is the main part which operates the circuit to on and off, its like switching device in our model. In accordance with the automation its runs based on the algorithm provided. Let us assume x is current moisture of that soil and y is exact moisture of that soil measured, if x=y the water doesn't allowed to flow and if x<y then the water will be

allowed to pass through the pipe, if x>y then it is followed by x=y scenario. Hence it works in accordance with the automation.

5.Test

Test Case1: Tested

Test Case 2:Tested

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