

AUTOMATIC IRRIGATION AND MONITORING SYSTEM

**A Project submitted in partial fulfillment of the requirements
For the Award of Degree of
Bachelor of Science in Electrical and Electronic Engineering**

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December 2018**

Certification

This is to certify that this project and thesis entitled “AUTOMATIC IRRIGATION AND MONITRORING SYSTEM” is finished by the subsequent students below my direct direction and this work has been distributed by them within the laboratories of the Department of Electrical and Electronic Engineering below the college of Engineering of Narcissus pseudo narcissus International University in partial fulfillment of the necessities for the degree of Bachelor of Science in Electrical and Electronic Engineering. The presentation of the work was endured December 2018.

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Dedicated to

Our Parents

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List of Abbreviations

CD	Chromatic Dispersion
EMI	Immune to Electromagnetic Interference
FBG	Fiber Bragg Gratings
FWHM	Full Width at Half Maximum
GVD	Group Velocity Dispersion
LED	Light Emitting Diodes
MD	Material Dispersion
NLSE	Nonlinear Schrödinger Equation
PMD	Polarization Mode Dispersion
PUA	Piecewise Uniform Approach
RMS	Root Mean Square
SSMF	Standard Single Mode Fiber
TFBG	Tilted Fiber Bragg Gratings
UV	Ultraviolet
WD	Wave-guide Dispersion
WDM	Wavelength Division Multiplexed

List of Symbols

λ	Wavelength
λ_B	Bragg wavelength
n_{eff}	Effective index
z	Position along the grating
n	Mode index
f	Fundamental Frequency
ω	Angular frequency
M	Modulation Index
T	Fundamental Time Period

ACKNOWLEDGEMENT

First of all, we give thanks to Allah. Then we would like to take this opportunity to express our appreciation and gratitude to our project supervisor **Md. Mahmudur Rahman**, Assistant Professor of **Department of EEE**, Faculty of Engineering, Daffodil International University for being dedicated in supporting, motivating and guiding us through this project. This project can't be done without his useful advice and helps. Also thank you very much for giving us opportunity to choose this project.

We thank our departmental lab for their help during working period. Apart from that, we would like to thank our entire friends for sharing knowledge; information and helping us in making this project a success. Also thanks for lending us some tools and equipment.

To our beloved family, we want to give them our deepest love and gratitude for being very supportive and also for their inspiration and encouragement during our studies in this University.

Finally, we beg pardon for our unintentional errors and omission if any.

ABSTRACT

Watering the plant is that the most significant cultural follow and one among the labor intensive tasks in daily greenhouse operation. Watering systems ease the burden of obtaining water to plants once they want it. Knowing once and the way a lot of to water is 2 necessary aspects of watering method. to create the gardener works simply, the automated plant watering system is made. There have a varied kind victimization automatic watering system that are by victimization system, tube, nozzles and different. This technique uses watering system as a result of it will water the plants set within the pots. This project uses Arduino board that consists of ATmega328 Microcontroller. It's programmed in such the way that it'll sense the wet level of the plants and provide the water once needed. This kind of system is usually used for general plant care, as a part of caring for tiny and huge gardens. Normally, the plants ought to be moiré double daily, morning and evening. So, the microcontroller needs to be coded to water the plants within the garden or farms regarding twice per day. Individuals get pleasure from plants, their edges and also the feeling associated with nurturing them. But for many individuals it becomes difficult to stay them healthy and alive. To accommodate this challenge we've developed a model that makes a plant a lot of self-sustaining, watering itself from an oversized tank and providing itself with artificial daylight. The pro-To kind reports standing of its current conditions and conjointly reminds the user to refill the tank. The system automation is meant to be helpful to the user. we have a tendency to hope that through this model individuals can get pleasure from having plants while not the challenges associated with absent or forgetfulness.

CHAPTER 1

INTRODUCTION

1.1 Introduction

Bangladesh is a country of village and agriculture assumes a fundamental job for improvement of this country. In our country, farming relies upon the storms that have inadequate supply of water. Consequently the water system is utilized in agrarian field In Irrigation framework, depending upon the dirt sort, water is given to plant. In farming, 2 things square measure imperative, first to instigate information of in regards to the ripeness of soil and second to live moistness content in air. These days, for water system, very surprising strategies square measure out there that square measure won't to decrease the reliance of rain. What's more, to a great extent this strategy is driven by electric power and on/off programming. Amid this strategy, a temperature and moistness detecting components square measure put near the plant and near the module and passage unit handles the sensor data and transmit data to the management that in turns the control the stream of water through the siphon.

1.2 Problem Statement

Water system of plants is commonly an extremely long action; to be worn out an economical amount of your time, it needs an outsized amount of HR. Generally, every one of the means was dead by people. These days, a few frameworks use innovation to decrease the amount of workers or the time expected to water the plants. With such frameworks, the administration is to a great degree confined, and a lot of assets are as yet squandered. Water is one in every one of these assets that are utilized as well. Mass water system is one procedure acclimated water the plant. This procedure speaks to extensive misfortunes since the quantity of water given is in more than the plants' needs. The surplus water is depleted by the gaps of the pots in nurseries, or it permeates through the dirt.

The cutting edge impression of water is that of a free, normal asset that might be used in plenitude. Nonetheless, this is frequently not reality; in a few segments of North America, water utilization is exhausted.

It's therefore reasonable to expect that it'll in the blink of an eye turn into an extremely expensive asset all over. Notwithstanding the overabundance cost of water, work is winding up increasingly costly.

Therefore, if no exertion is put with in enhancing these assets, there'll be more money worried inside a similar technique. Innovation is possibly a response to curtail costs and hinder loss of assets.

1.3 Objective and Scope

The goal of this venture was to style a little scale programmed water system framework for inside that may utilize water amid an extra conservative method, in order to prevent water misfortune and limit the estimation of work.

The following aspects were considered in the choice of a design solution:

- Reliability
- Human intervention
- Expandability
- Maintenance
- Power consumption
- Water savings
- Installation costs

A vital idea is that the establishment costs, since costs more often than not affirm the practicability and suitability of a task. The establishment ought to be clear enough for a residential client. The water investment funds were also an indispensable aspect, since there's a prerequisite to weaken water misfortune and to expand the intensity of water utilized. Since the objective is to lessen the estimation of work, minimum regulating and institutionalization ought to be required. The framework ought to work with improved consistency. The office

utilization ought to try and be observed. For upkeep, the substitution parts ought to be immediately available and easy to.

1.4 Motivation

For constantly expanding interest and diminish in give of sustenance needs, it's essential to quick enhancement underway of nourishment innovation. Farming is only the supply to deliver this. This can be the crucial think about human social orders to developing and dynamic interest in nourishment generation. Farming assumes the imperative job inside the economy and advancement, similar to India. Because of absence of water and scarceness of land water result the diminishing volume of water on earth, the agriculturist use water system.

Water system might be characterized as the art of counterfeit use of water to the land or soil that implies relying upon the dirt kind; plants are to be given water.

- **Programming Computer:** Some system controllers enable the user to program the system with the systems own programmed. Alternative system needs laptop to program. Here we tend to are accessing Arduino IDE with the assistance of a laptop.
- **Controllers:** Relay management offer the intelligent management functions in automatic irrigation control.
- **Sensing Devices:** Sensing devices will report values, like temperature and wetness etc. or states.
- **I/O Interface Devices:** These devices offer the logical communication link between the controllers and also the controlled device systems.

1.5 Objective and Method

The goal of the trial was to see the water input expected to deal with a steady given soil wet. It completely was directed to measure the ideal water stream to gauge the size of the funnels and of the repository. It totally was performed by exploitation single regular plant, the African violet.

This plant was picked because of it needs normal soil wet. The little scale machine-controlled water system framework is of measurements satisfactory for a house. The zone devoted to the plant is of with respect to one zone unit. the whole framework has been tried amid a house. because of the analysis was done all through the winter season, the house required to be

warmed to deal with a persistent temperature of 20°C to 22°C; this furthermore implies the proportion inside the house needed to remain very steady. The framework was arranged going to a window since there was each day all through amid a six-week time span; the dirt wet was estimated utilizing a wet meter. Since the African violet needs a relative wet dimension of 4/10, a preliminary was made to deal with this dimension by infusing estimated volumes of H₂O with a syringe.

1.6 Summary

In our nation, agribusiness relies upon the storms that have inadequate supply of water. That the water system is utilized in rural field In Irrigation framework, depending upon the dirt kind Irrigation of plants is now and again an extremely long movement; to be exhausted a moderate amount of your time, it needs a larger than average amount of HR. Generally, every one of the means was dead by people. These days, a few frameworks use innovation to downsize the measure of representatives or the time expected to water the plants.

CHAPTER 2

PROJECT OVERVIEW

2.1 Introduction

Horticulture is a business that utilizes heaps of water. More often than not, this asset isn't utilized with proficiency and considerable measures of water are squandered. Inside the near future, these squanders can speak to an outsized include of money. The individuals WHO deal with this asset with productivity will be winning time and money. Amid this undertaking report, a programmed water system framework is typically prescribed to diminish the water information and human intercession, while fulfilling the plants' needs. To start with, the primary concerns of the issue are condensed. The objective and furthermore the extent of the task are portraying. Some broad ways to deal with the look are explored. The outcome and finishes of a test to work out the ideal measures of water are referenced. At that point, the directed style is clarified well with the point, necessities and requirements, recreation and check result for everything about parts. A fast investigation is performed to evaluate the feasibility of such a task available. At long last, the look is faultfinder

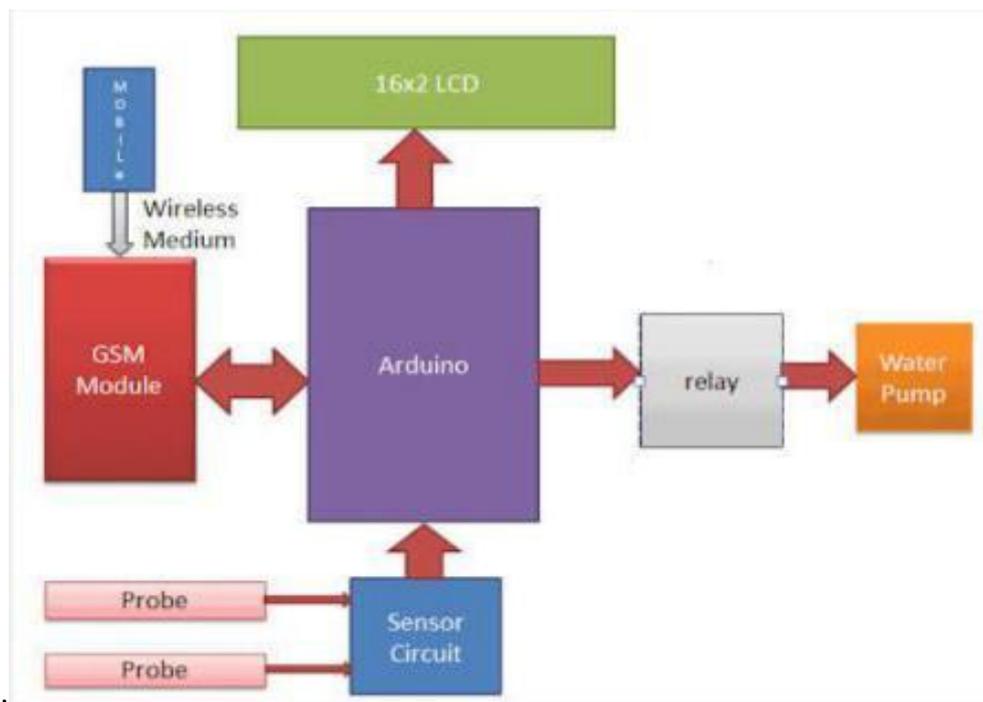


Fig. 2.1: Flow chart of automatic irrigation system

2.2 Arduino

Is relate ASCII content document equipment and programming bundle organization, venture and client network that styles and fabricates microcontroller-based units for building advanced gadgets and intelligent articles that may detect and the executives the physical world? The venture depends on a group of microcontroller board styles plant made fundamentally by sensible comes in Italian Republic, and conjointly by a wide range of merchants, exploitation fluctuated 8-bit at mega AVR microcontrollers or 32-bit Atmel ARM processors. These frameworks offer arrangements of computerized and simple I/O sticks that might be interfaced to various broadening sheets ("shields") and diverse circuits. The sheets highlight sequential correspondences interfaces, together with USB on a few models, for stacking programs from PCs. For programming the microcontrollers, the Arduino stage gives relate incorporated advancement environment (IDE) upheld the procedure venture, which has bolster for C, C++ and Java programming dialects. the essential was presented in 2005, getting the opportunity to offer a moderate and straightforward} technique for tenderfoots and experts to shape gadgets that move with their air exploitation sensors and actuators Common examples of such gadgets implied for amateur specialists encapsulate basic and movement locators. Arduino sheets region unit available economically in preassembled type, or as hand crafted packs. The equipment style particulars region unit audaciously available, allowing the Arduino sheets to be processing plant made by anybody. Promotion organic product Industries measurable in mid-2011 that more than three hundred,000 authorities Arduino had been financially made, and in 2013 that 700,000 authority sheets were in clients' grasp.

2.2.1 Arduino Advantages

Arduino have direct and open client skill, Arduino has been utilized in a large number of different comes and applications. The Arduino programming framework is anything but difficult to-use for novices, in any case sufficiently adaptable for cutting edge clients. It keeps running on Macintosh, Windows, and Linux. Instructors and understudies use it to make low cost logical instruments, to demonstrate science and material science standards, or to incite began with programming and AI. Architects and originators assemble intelligent models, performers and specialists use it for establishments and to try different things with new melodic instruments. Producers, obviously, use it to make a few of the comets displayed at the Maker Faire, for example. Arduino could be a key apparatus to discover new things. Anybody youngsters, specialists, craftsmen, software engineers will start tinkering basically following the well ordered headings of a unit, or imparting thoughts on-line to elective

2.4 Requirements and Constraints

The geotextile has to fulfill the following requirements:

- It needs to contain at least the size of the tank in water of avoid overflow. If the mains are used as the water source, It must be able to hold at least the amount of water supplied in a full period of wetting.
- It must be resistant to roots, algae, weeds, and diseases that occur in a home environment. This is to prevent contamination between plants.

Used is generally chlorinated contamination is not likely to originate from outside the house.

- It has to be strong enough for human to walk on it.
- It needs to be durable. A life cycle of 5 years is a minimum.

Additionally, the following constraints are imposed:

- Its cost must not be prohibitive.
- It must be large enough approximately 2 m².
- The geotextile must be compatible with most pots commercially available.



Fig. 2.3: complete circuit of automatic irrigation system

If we want to control this system with remote control system, than we need to use smart mobile phone to control this system though the Bluetooth device.

2.5 Summary

The small-scale machine-controlled irrigation system is of dimensions acceptable for a house. The expense dedicated to the plant is of regarding one center. The complete system has been tested in an exceedingly house. as a result of the experiment was done throughout the winter season, Designers and designers build interactive prototypes, musicians and artists use it for installations and to experiment with new musical instruments. Makers, of course, use it to create several of the comets exhibited at the Maker Faire, as an example.

CHAPTER 3

THEORETICAL MODEL

3.1 Introduction

In this venture report, a programmed water system framework is prescribed to weaken the water information and human mediation, while fulfilling the plants' needs. In the first place, the primary concerns of the issue square measure abridged. The objective and furthermore the extent of the undertaking square measure spoke to. Some broad ways to deal with the arranging square measure investigated. The outcomes Associate in nursing finishes of a test to see the predefined measures of water square measure referenced.

3.2 Component list

Table3.1: Component list of proposed system

SL NO	NAME OF COMPONENTS	QUANTITY
1	Arduino UNO	1
2	Real Time Clock	1
3	DHT11 Temperature and Humidity Sensor	1
4	Electric DC Motor	1
5	Relay Module	1
6	1 k Resistor	1
7	Power Supply cord for Arduino	1
8	MOSFET	1
9	Female Headers	10
10	Male Headers	10
11	Diode	1
12	Jumper wire	20

3.3 Arduino

Arduino is relating open supply physical figuring stage bolstered simple info/yield board and an improvement setting that executes the procedure dialect (www.processing.org). Arduino might be wont to create independent intelligent articles or might be associated with programming framework on your PC. The sheets might be amassed by hand or obtained preassembled; the open supply IDE (Integrated Development Environment) might be downloaded for nothing out of pocket from web.

3.3.1 Introduction to Arduino Boards

Arduino is relating degree structure that blends Atmel microcontroller family with typical equipment into a board with intrinsic boot loader for fitting and play inserted programming. Arduino code accompanies relate degree IDE that helps composing, investigating and consuming system into Arduino. The IDE also accompanies a Serial Communication window through which may essentially get the sequential learning from the board.

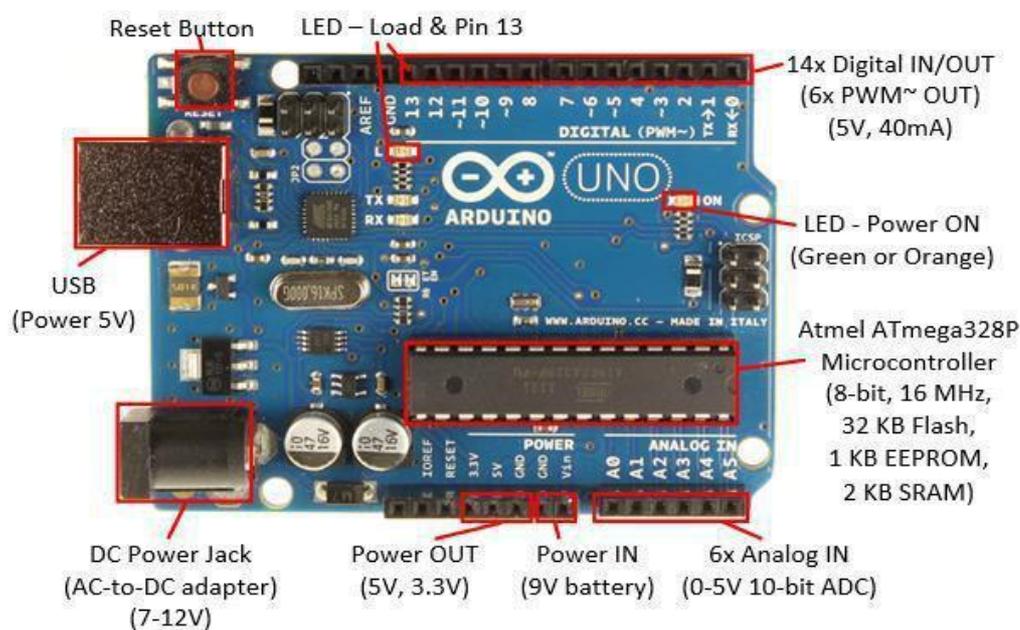


Fig.3.1: Arduino Uno Architecture

3.3.2 Pin Description of Arduino Uno

The Uno might be a microcontroller board bolstered the ATmega328P. it's fourteen advanced information/yield pins (of that about six will be utilized as PWM yields), about six simple sources of info, a sixteen megacycle quartz, a USB affiliation, an impact jack, AN ICSP header and a push catch. Everything about fourteen computerized pins will be utilized as AN information or yield, exploitation stick Mode (), advanced Write (), and computerized filter ()

capacities. They work at five volts. Each stick will give or get twenty am as proposed agent condition and has an encased draw up opposition (detached as a matter of course) of 20-50k ohm. A greater part of 40mA is that the value that must not be surpassed on any I/O stick to keep away from lasting damage to the microcontroller.

In addition, some pins have specialized functions:

- Serial: 0(RX) and 1(TX). Accustomed receive (RX) and Transmit (TX) TTL serial knowledge.
- External Interrupts: two and three. These pins are organized to trigger associate degree interrupt on an occasional worth, a rising or falling edge, or a amendment in worth.
- PWM: 3, 5, 6, 9, 10, and 11. Offer 8-bit PWM output with the analog Write () perform.
- SPI: 10(SS), 11(MOSI), 12(MISO), 13(SCK). These pins support SPI communication victimization the SPI library.
- LED: 13. There's a constitutional light-emitting diode driven by digital pin thirteen.
- TWI: A4 or SDA pin and A5 or SCL pin. Support TWI communication victimization the wire library.

The Uno has half dozen analog inputs, labeled A0 through A5, every of that provides ten bits of resolution. By default they live from ground to five volts, through is it potential to vary the higher finish of their vary victimization the AREF pin and also the analog Reference () perform.

There are a couple of other pins on the board

- AREF Reference voltage for the analog inputs. Used with analog Reference.
- Reset. Bring this line LOW to reset the microcontroller. Generally wont to add a push button to shields that block the one on the board.

3.4 DHT11 Temperature and humidity sensor

DHT11 advanced temperature and stickiness gadget might be a composite gadget contains a label computerized flag yield of the temperature and moistness. Use of a furious

computerized modules collection innovation and furthermore the temperature and moistness detecting innovation, to affirm that the stock has high duty and great long-run security. The gadget incorporates a resistive feeling of wet components and NTC temperature estimating gadgets, and associated with an unrivaled 8-bit microcontroller.

They comprise of a moistness detecting segment, a NTC temperature sensor (or indoor regulator) and an IC on the rear of the sensor. For estimating dampness they utilize the mugginess detecting part which has two anodes with dampness holding substrate between them. In this way, as the mugginess changes, the conductivity of the substrate changes or the opposition between these anodes changes. This adjustment in obstruction is estimated and prepared by the IC which makes it prepared to be perused by a microcontroller.



Fig. 3.2: Temperature & Humidity sensor

On the contrary hand, for estimation temperature these gadgets utilize a NTC temperature sensor or a semiconductor unit. A semiconductor unit is extremely a resistor that revisions its opposition with change of the temperature.

These sensors zone unit made by sintering of semi semiconducting materials like earthenware production or polymers in order to supply bigger changes inside the obstruction with just little changes in temperature. The expression "NTC" proposes that "Negative Temperature Coefficient", this recommends the opposition diminishes with increment of the temperature.

- It measures each air temperature and wetness.
- Relative humidness expressed as a proportion.
- HS1100 is employed for sensing humidness.
- The outputs in terms of frequency vary 5 kHz to ten kilocycles.

3.5 Real time clock (RTC)

Constant timekeepers (RTC), on the grounds that the name prescribes zone unit clock modules. The DS1307 genuine clock (RTC) IC is Associate in Nursing eight stick gadget exploitation Associate in Nursing I2C interface. The DS1307 might be a low-control clock/date-book with fifty six bytes of battery reinforcement SRAM. The clock/date-book gives seconds, minutes, hours, day, date, month and year qualified data. The tip date of consistently is mechanically balanced, especially for a considerable length of time with yet thirty one days.

They are available as integrated circuits (ICs) and supervise timing like a clock and also operate date like a calendar. The main advantage of RTC is that they have an arrangement of battery backup which keeps the clock/calendar running even if there is power failure. An exceptionally little current is required for keeping the RTC animated. We can find these RTCs in many applications like embedded systems and computer mother boards, etc.



Fig 3.3: Real Time Clock (RTC)

3.5.1 Working of DS1307

In the simple circuit the 2 inputs X1 and X2 are associated with a thirty two.768 rate oscillator on the grounds that the supply for the chip. VBAT is associated with positive culture of a 3V battery chip. Vic capacity to the I2C interface is 5V and may tend abuse microcontrollers. On the off chance that the office give Vic isn't allowed examine and composes are limited.

3.6 Light emitting diode (LED)

An intersection rectifier (LED) could be a two-lead semiconductor light. It's a contact diode that discharges lightweight once initiated. When a proper voltage is connected to the leads,

negatrons territory unit ready to recombine with electron openings among the gadget, cathartic vitality inside the style of photons.

This effect is named electroluminescence, and furthermore the shade of daylight (comparing to the vitality of the photon) is chosen by the vitality band hole of the semiconductor. LEDs square measure close to nothing (short of what one mm²) and incorporated optical parts is likewise wont to frame the diagram.

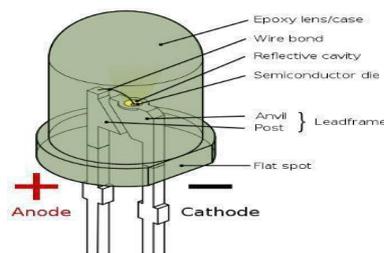


Fig 3.4: LED

3.7 Resistor

A resistance may be a passive two-terminal electrical element that implements ohmic resistance as a circuit part. In electronic circuits, resistors area unit accustomed cut back current flow, regulate signal levels, to divide voltages, bias active parts, and terminate transmission lines, among different uses. High-powered resistors that may dissipate several watts of wattage as heat is also used as a part of motor controls, in power distribution systems, or as take a look at masses for generators. Mounted resistors have resistances that solely amendment slightly with temperature, time or in operation voltage. Variable resistors is accustomed regulate circuit parts (such as a volume management or a lamp dimmer), or as sensing devices for warmth, light, humidity, force, or chemical activity.



Fig 3.5: Resistor

3.8 Relay Module

Hand-off is relating degree attraction gadget that is utilized to confine 2 circuits electrically and interface them attractively. They horribly supportive gadgets and allow one circuit to alter another though they're absolutely independent. They're ordinarily wont to interface relate degree electronic circuit (working at an intermittent voltage) to relate degree electrical gadget that works at frightfully high voltage. for instance, a transfer will assemble a 5V DC battery circuit to alter a 230V AC mains circuit. Hence silky low detecting component circuit will drive, say, a follower or an electrical globule.

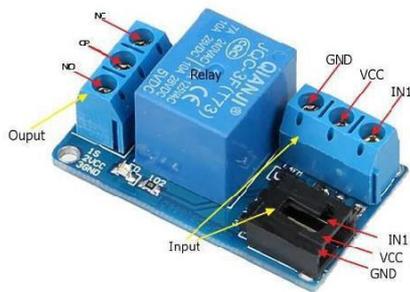


Fig. 3.6: Relay Module

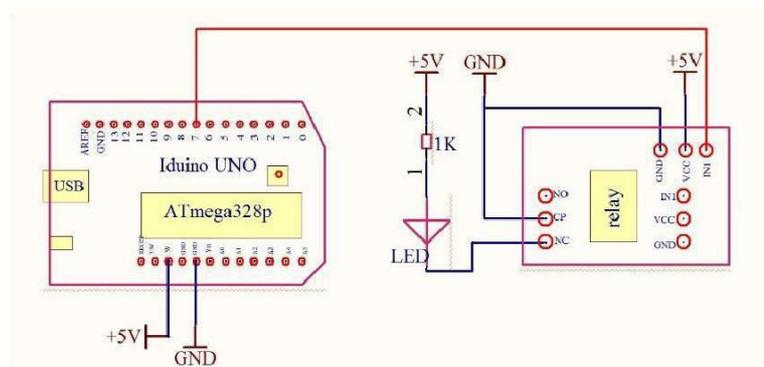


Fig 3.7: Connection Diagram of Relay With Arduino

A transfer switch is partitioned into 2 sections: info and yield. The yield area envelops a loop that creates attractive transition once smooth low voltage from AN electronic circuit is connected thereto. This voltage is named the agent voltage. Unremarkably utilized transfers are offered in a few setups of agent voltages like 6V, 9V, 12V, 24V and so forth the yield area comprises of contactors that interface or disengage consequently. Amid an essential hand-off there are 3 contactors: typically open (NO), generally shut (NC) and standard (COM). At no reason express, the COM is associated with NC. When the agent voltage is connected the hand-off loop gets invigorated and furthermore the COM changes contact to NO.

3.9 Diode (IN4148)

In physics, a diode could be a two-terminal electronic element that conducts primarily in one direction (asymmetric conductance), its low (ideally zero) resistance to the flow of current in one direction, and high (ideally infinite) resistance within the alternative. A semiconductor device could be a crystalline piece of semiconductor material with a contact connected to 2 electrical terminals.



Fig. 3.8: Diode

3.10 MOSFET

The 2N7000 MOSFET is associate degree N-channel, enhancement-mode MOSFETs used for low-power change applications, with totally different lead arrangements and current ratings.

The 2N7000 may be a wide accessible and fashionable half, usually counseled as helpful and customary parts to own around for amateur use.

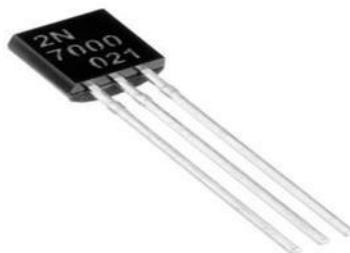


Fig. 3.9: MOSFET

The 2N7000 is sixty V devices and it will switch two hundred mA. The 2N7002 is another completely different completely different} give up different resistance, current rating and package. The 2N7002 is additionally referred to as "small define transistor" SOT-23 surface-mount, that is that the most typically used three-lead surface-mount package.

3.11 DC Motor

A DC motor is any of a category of rotary electrical machines that converts electrical energy power into energy. The foremost common varieties consider the forces made by magnetic fields. Nearly all kinds of DC motors have some internal mechanism, either mechanical device or electronic; to sporadically amend the direction of current flow partly of the motor.

DC motors were the primary kind wide used, since they might be steam-powered from existing direct-current lighting power distribution systems. A DC motor's speed may be controlled over a good vary, mistreatment either a variable offer voltage or by dynamical the strength of current in its field windings. Tiny DC motors area unit utilized in tools, toys, and appliances..



Fig 3.10: DC Motor

3.12 Moisture Sensor

Soil wetness sensors live the water content in soil. A soil wetness probe is created from multiple soil wetness sensors.

Technologies unremarkably employed in soil wetness sensors include:

Frequency domain sensing element like a capacitance sensing element

Neutron wetness gauges, utilize the moderator properties of water for neutrons.

Electrical resistance of the soil

In this explicit project, we are going to use the wetness sensors which may be inserted within the soil, so as to live the wetness content of the soil.

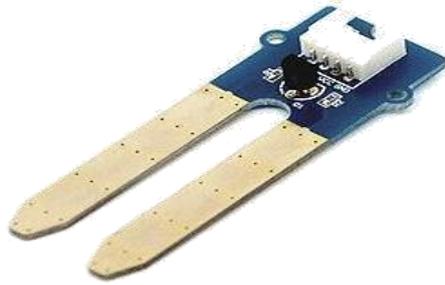


Fig 3.11: Sensor

Soil electrical conduction is exclusively estimated exploitation 2 metal conduits dispersed separated inside the dirt with the exception of that broke down salts extraordinarily modify the water conduction and might puzzle the estimations. a shoddy fix is to enter conductors amid a permeable mineral square that discharges nuclear number 20 and salt particles to overwhelm the dirt commotion dimension of particles. The water consumed by the square is connected with soil water potential over the differ - 60 to - 600 kepi giving a tertiary marker to be utilized in medium to genuine soils. Non-dissolving granular lattice sensors square measure right now out there with an extra demanding detail for the change zero to - 200 kappa and utilize inward institutionalization approaches to balance varieties due to solutes and temperature.

Techniques for abusing soil nonconductor properties extremely live intermediary factors that extra or less epitomizes a section as a result of the dirt electrical conduction and square measure in this way characteristically delicate to varieties in soil saltiness and temperature besides as water. Estimations likewise are experiencing soil mass thickness and furthermore the extent of beyond any doubt and free water dictated by the dirt sort. Regardless, sensible exactness and accuracy will be accomplished underneath explicit conditions and a couple of detecting component assortments turned out to be wide embraced for logical work.

3.12.1 Sensor Instantiation

A single device is often wont to management the irrigation for several zones (where AN irrigation zone is outlined by a magnet valve) or multiple sensors are often wont to irrigate individual zones. Within the case of 1 device for many zones, the zone that's ordinarily the driest, or most in would like of irrigation, is chosen for placement of the device so as to confirm adequate irrigation all told zones.

Some general rules for the burial of the soil wetness device square measure

- Sensors ought to be buried within the root zone of the plants to be irrigated; as a result of this is often wherever plants can extract water. Burial within the root zone can facilitate guarantee adequate turf or landscape quality. For turf grass, the detector ought to usually be buried at concerning 3 inches deep.
- Sensors got to be in smart contact with the soil when burial; there ought to be no air gaps encompassing the detector. Soil ought to be packed firmly however not overly round the detector.
- If one detector is employed to regulate the whole irrigation system, it ought to be buried within the zone that needs water 1st, to make sure that every one zones get adequate irrigation. Typically, this may be vicinity with full sun or the realm with the foremost sun exposure.
- Sensors ought to be placed a minimum of five feet from the house, delimitation, or associate degree moth-resistant surface.

3.13 Water Pump

A small pump and a driver. A driver is to produce enough current for the pump, my application wants a twig distance concerning one meter, and therefore this pump is enough. however if you wish to create a system that wants an oversized spray vary, you will would like larger pumps, or maybe a pressurized device to create the projectile even farther, like the watering system in an exceedingly garden



Fig 3.12: Water pump

The pumping of water may be a basic and sensible technique, way more sensible than scooping it up with one's hands or lifting it in a very hand-held bucket. This can be true whether or not the water is drawn from a recent supply, emotional to a required location, purified, or used for irrigation, washing, or waste treatment, or for evacuating water from AN undesirable location. No matter the end result, the energy needed to pump water is a particularly exacting part of water consumption.

3.14 AT mega 328P Microcontroller

The microcontroller may be a low-power CMOS (Complementary Metal chemical compound Semiconductor) 8-bit microcontroller supported the AVR increased RISC architecture (Reduced Instruction Set Computer) architecture. The powerful execution of directions in an exceedingly single clock cycle results in the accomplishment of one unit of measurement per megahertz throughputs permitting the designer to optimize power consumption versus process speed. Peripherals and handle interrupts. The AVR uses the Harvard design.



Fig. 3.13: ATmega328 Microcontroller Architecture

The internal design of the microcontroller is shown in figure three.3. The central process unit (CPU) is that the brain of the microcontroller that controls the execution of the program. The MCU (Microcontroller unit) consists of 4K/8K bytes of in-system programmable flash with read-while-write capabilities, 256/412/1K bytes EEPROM at the side of the 512/1K/2K bytes of SRAM. At the side of this, the MCU consists of the many different options.

- 23 general purpose I/O lines and thirty two general purpose operating registers.
- Flexible timer/counters with compare modes, internal and external interrupts and a serial programmable USART.
- A byte-oriented 2-wire serial interface, Associate in Nursing SPI serial port, a 6-Channel 10-bit ADC (8 channels in TQFP and QFN/MLF packages), a Programmable watch-dog timer with an indoor generator and five software-selectable power saving modes.

The five, PC code selectable, control sparing modes zone unit inert mode, Power-down mode, Power-spare mode, ADC Noise Reduction mode and furthermore the Standby mode. As

referenced in segment a couple of.1.2, the PC equipment is that the cerebrum of the microcontroller that controls the execution of the program.

In this way the equipment is prepared to get to the memories, perform figuring's, the board with independent memories and transports for program and data to augment the execution further on the grounds that the likeness. The standard of execution of bearings inside the program memory is that the single-level pipelining. The possibility of pre-bringing succeeding guidance though capital punishment one guidance enables the bearings to be dead in each clock cycle and furthermore the program memory is inside the System Reprogrammable nonvolatile capacity. Republished from Datasheet of ATmega328.

The graph of AVR equipment Core configuration is appeared in figure three. The quick access Register File contains thirty two x eight piece generally useful working registers with one cycle interim which closes in an exceptionally single-cycle ALU activity. The number juggling and consistent tasks between the registers or between the steady and an enlist square measure bolstered by the ALU. The standing register is refreshed to reflect information concerning the aftereffects of the task when relate degree scientific process. The boot program segment and furthermore the application segment square measure the 2 principle areas of the program nonvolatile capacity. Stack stores the name and address of the program counter all through the hinders and programming framework calls that is designated inside the general data SRAM. The size of the stack is prohibited by the general size and use of the SRAM. The data SRAM is available through 5 very surprising tending to modes bolstered inside the AVR plan though the stack pointer

3.15 Microcontroller Module

Controller is that the main a part of the system wherever all the method flows are controlled by this hardware consequently to the embedded programming in it. Microcontroller is chosen for the system because the controller. In alternative word it's the guts of this device system. The functions of the microcontroller are restricted by makers or the kinds of sure model. Here we tend to use Arduino Uno R3 for ATmega328P microcontroller.

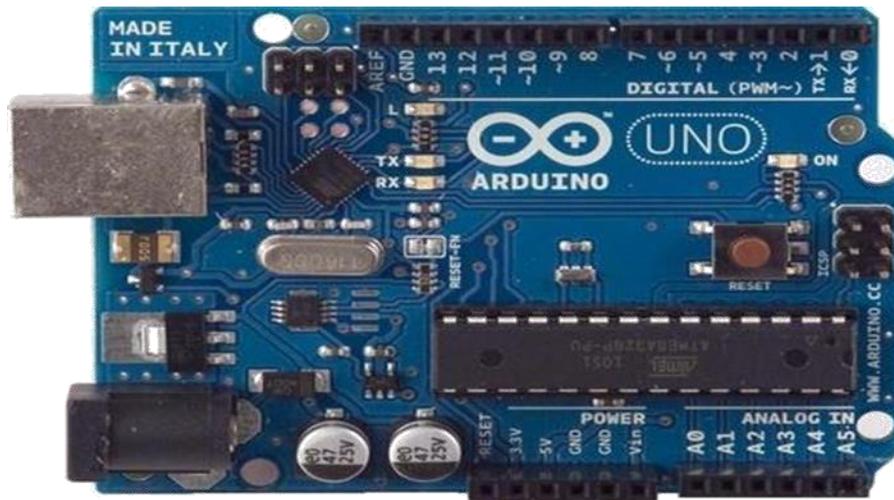


Figure 3.14: Our Arduino Uno R3

3.16 ATmega328p

Is chosen because the controller for the project since it offers numerous functions and applicable for the system additionally it's largely offered within the market. It's a twenty eight pin IC.

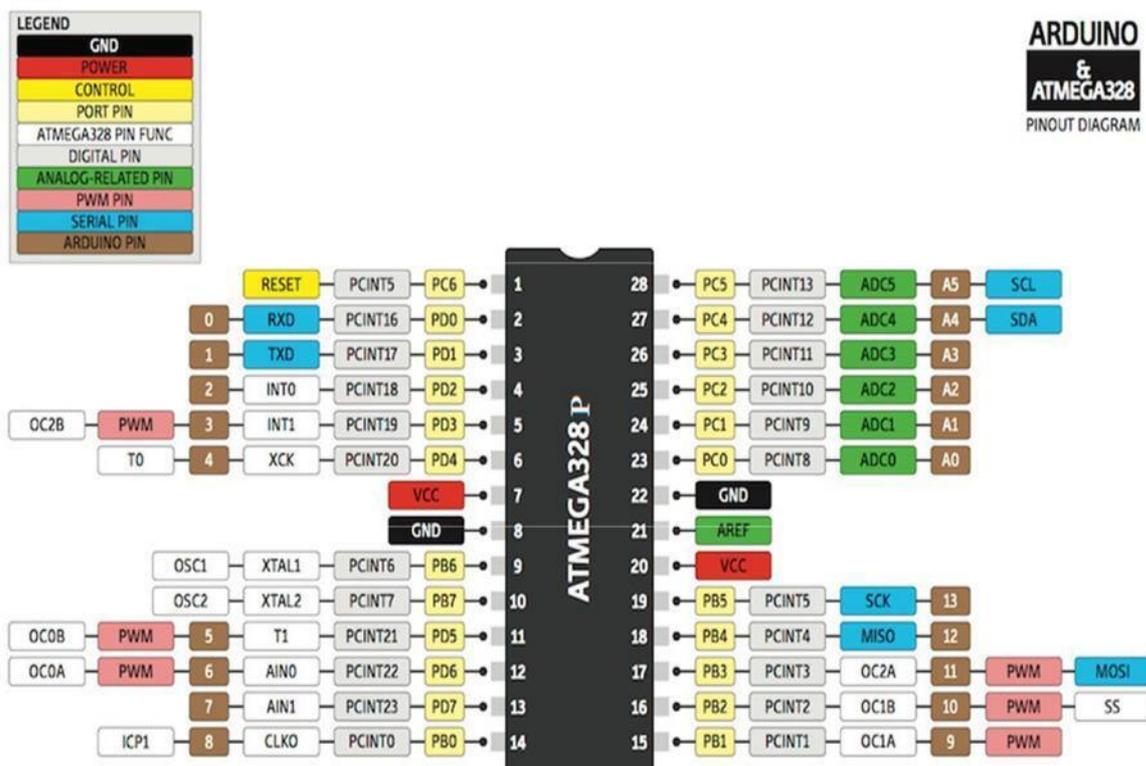


Figure 3.15: Pin Diagram of ATmega328P interfacing with Arduino.

3.17 Oscillator

As microcontroller want a clock thus for 2 capacitors and a crystal is employed which is able to turn out sixteen megahertz the 2 capacitors square measure connected to PIN number nine and ten of microcontroller.



Figure 3.16: Crystal Oscillator

3.18 Power Supply

The Arduino board will treat Associate in nursing external offer of vi to twenty volts. If furnished but 7V, however, the 5V pin may provide but 5 volts and also the board could also be unstable. If victimization quite 12V, the Potentiometer might overheat and injury the board. The suggested vary is seven to twelve volts. In our project we tend to use twelve V AC/DC adapters for power offer



Figure3.17: 12V Ac-Dc Power Supply

3.19 Testing the System

As a matter of first importance, all the equipment units of the framework were tried and it completely was guaranteed that they were amid a sensible working condition. At that point, each and every unit was interfaced and upheld one by one with the microcontroller board and drove with the PC code with regards to the necessity of the machine. The testing of the apparatus wasn't done rapidly once it totally was finished. Or maybe every unit of the apparatus was tried one by one. The second unit wasn't tried till the essential unit gave the normal outcome and till it completely was not working with regards to the necessity of the apparatus. Toward the finish of the units were working appropriately, the units were whole along then the full framework was created and tried. The boot program area and furthermore the application segment square measure the principle areas of the program nonvolatile capacity. Stack stores the name and address of the program counter all through the hinders and programming framework calls that is assigned inside the general data SRAM. Enthusiastic to a required area, purged, or utilized for water system, washing, or waste treatment, or for clearing water from an unwanted area. Regardless of the final product.

3.20 Overall theory of the Project

The project over all consists of the subsequent components:

- ❖ Microcontroller AT mega 328P
- ❖ DC motor 12v
- ❖ Sensor
- ❖ Arduino Device
- ❖ Crystal generator eleven.0592 MHz
- ❖ Switch
- ❖ Diode
- ❖ Arduino coder
- ❖ 12 V AC/DC adapters
- ❖ Wiring and miscellaneous
- ❖ Resister
- ❖ Water pump
- ❖ Real clock (RTC)

3.21 Summary

In this Chapter, we tend to portray the equipment improvement half. the subject of the way we tend to create and style and conjointly concerning the creator of our framework. We tend to conjointly work with code amid this equipment improvement half. The task over all comprises of the components portrayal. The circuit graph might be a dc control framework. Programming code of this line devotee is comprehended as ARDUINO-IDE .This is open supply programming stage.

CHAPTER 4

DISCUSSION AND IMPLEMENTATION

4.1 Introduction

One eye catching more advance that might be gaga this digital physical framework is to have numerous clients inside a similar space utilize this enhancement program. A variety with time might be seen of the estimation of water as each harvest has very surprising necessities all through their phases of development. It'd be eye catching to get a handle on if having a decent scope of clients would cover the utilization up the day or on the other increment crest utilizations.

4.2 Discussion

As presented inside the presentation, numerous decisions exist to execute changes on the water utilization of products. As we tend to decide on the great water system decision to fulfill a digital physical framework, some plant necessities were dismissed in order to alter the framework and fabricate it achievable to explicit it in an exceptionally numerical way. The restriction of this can be that our framework depends vigorously on human information to arrange the requirements expected to fulfill plant development conditions. Preferably, information sent from sensors should be sufficient to work out the quantity of water to create to the plant, with none must be constrained to determine conditions. Notwithstanding, programming such a situation includes a profound comprehension of the communication of the plant with its setting all through its development technique. This can be a whole specific field in its very own and isn't the primary focal point of this investigation. Preferably, a ton of complete data library on plant necessities would be important to possess a framework that amazingly enhances efficiency. However, having A coordinated versatile framework stays important to adjust to the local particularities.

4.3 Implementation Part

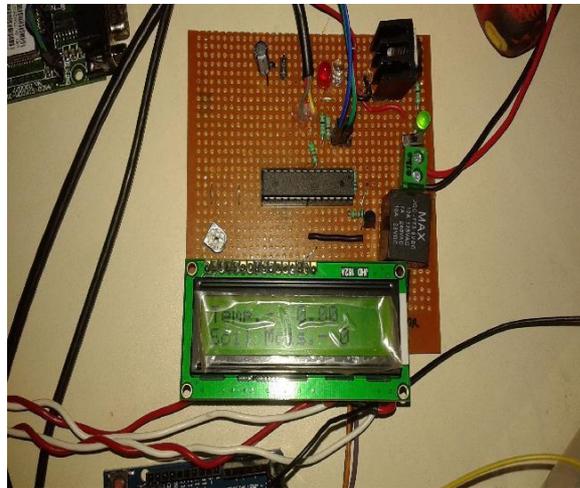


Figure: 4.1 LCD Display initial Values

In this Image with the assistance of liquid crystal display LCD digital show alphanumeric display we tend to display the knowledge concerning the temperature of the soil victimization the sensors utilized in our project. LCDs permit displays to be abundant diluting than beam tube (CRT) technology. LCDs consume abundant less power. At the start the temperature is zero as shown in figure. The half needs 12V power and therefore the microcontroller needed solely 5V therefore the power will be step down with the assistance of register. There are 2 diode light-weights red light-weight is blink once temperature is high and inexperienced light is blink once temperature is low. And if there's no such condition is happens the no light-weight is glow. The knowledge associated with the temperature is send to the users mobile through GSM module.



Figure: 4.2 Water Pump

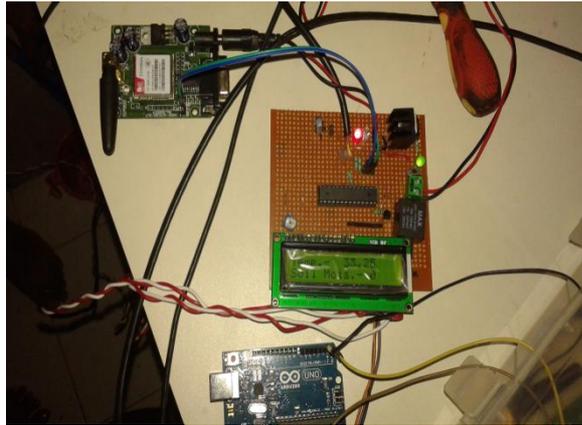


Figure: 4.3 LCD Display Values after Sensing Data from Soil

When we activate the motor the water can mechanically visit the plants root. It'll take around one minute. We have a tendency to can also cut back this point with the assistance of program. And therefore the temperature is going to be showed on the alphanumeric display. Once soil wetness sensing element is swaybacked into the soil then the wetness of soil is additionally displayed. Whereas swaybacked within the soil beware that the soil wetness sensing element isn't totally swaybacked.



Figure: 4.4 GSM Modem

AGSM electronic hardware could be a specific sort of electronic gear that acknowledges a SIM card, and works over a membership to a portable administrator, somewhat like a versatile. From the portable administrator point of view, GSM electronic hardware appearances somewhat like a versatile. In our System GSM electronic hardware is use for the causing data with respect to the temperature to the client's portable. In our framework we will in general use SIM900 for the correspondence. This GSM electronic hardware

could be a greatly flexible attachment and play quad band SIM900A GSM electronic gear for immediate and straightforward joining to RS232 applications. Backings choices like Voice, SMS, Data/Fax, GPRS and coordinated TCP/IP stack.

4.4 Summary

This is a full particular field in its very own and isn't the primary focal point of this examination. In a perfect world, an extra extensive information library on plant needs would be important to possess a framework that amazingly enhances efficiency. We tend to can likewise downsize this point with the help of program. And furthermore the temperature is appeared on the computerized showcase. When soil wetness gadget is ruler tic into the dirt then the wetness of soil is furthermore shown. Though ruler tic inside the dirt be careful that the dirt wetness gadget isn't absolutely master tic.

CHAPTER 5

ADVANTAGE AND RESULT

5.1 Introduction

An imperative idea is that the establishment costs, since costs for the most part affirm the practicability and feasibility of an undertaking. The establishment ought to be sufficiently direct for a local client. The water reserve funds were conjointly a vital side, since there's a prerequisite to lessen water misfortune and to augment the power of water utilized. Since the objective is to decrease the cost of work, negligible bearing and movement ought to be required. The framework ought to work with advanced consistency.

5.2 Basic points of interest

Saves Water: Studies demonstrate that this sort of machine-controlled water system framework expends 40-half less water when contrasted with the typical framework.

Enhances Growth: Ideal development condition is been given once contact of water is been connected over extraordinary measure of your time.

This sensible irrigation system extends watering time for plants, and provides ideal growth condition.

- **Save Time:** during this sprinklers moving and setting isn't needed therefore it saves time and timer delay as per the condition will be intercalary for automatic watering.
- **Adaptable:** This sensible irrigation system will be adjusted and changed per the dynamical atmosphere.
- **Simpler Method:** it's straightforward to work it starts by planning the map of your garden and marking the situation of planting. Then the desired distance is been measured for length of plastic conduit in order that the required space will be reached.

5.3 Software testing's

After and moral idea Safety and good idea are one in everything about essential parts of the venture. Since, designers should remember this that mishaps will happen wherever and with anybody. In this way, there's constantly a risk though doing this kind of venture which has genuine apparatus. Along these lines, it's important for each specialist to remain this wellbeing and good idea as a top priority while working inside the workshop or encased by genuine apparatus which may cause extreme damage. This section can go in the little print concerning these wellbeing concerns. Though doing such extends wellbeing is one in everything about essential issue as far as development of the venture. For instance, when boring, security glasses ought to be set on and wellbeing gatekeeper ought to be utilized. This is this is regularly this will be because of driller can transform out a soil molecule which may get into the eyes thus wellbeing glasses is indispensable for boring. when boring persistently start from the little bores because of exploitation bigger penetrates straightaway will hurt the issue that must be bore and may furthermore cause scores of commotion, the most pessimistic scenario situation is that bore will stick into the board and start turning it close by itself which may make extreme damage the person who is boring. The simple last thing that must be dealt with is to frame positive that the vacuum is for the most part on all through boring if feasible which may retain the earth molecule and anticipates them to encourage stuck inside the eyes. Another most noteworthy security thought is outrageous alert ought to be taken while attaching because of hand apparatus gets hot and may just consume ones' hand.

When attaching makes positive the vacuum is on that ingests all the unsafe gasses from securing. In the event that feasible, wellbeing gloves ought to be ceaselessly on once attaching. Make certain weld iron ought to be control from the most astounding that keeps hands from consuming and gives sublime quality affixing on the board. While cutting a Vero board it ought to try and be whole as a main priority that everyone the sides of the Vero board are washing to the touch. In the event that feasible documented the sides of the Vero board and makes it washes. On the off chance that someone is making the PCB gloves ought to be worn that ceaselessly protect from hurtful fluids like corrosive that is inside the Etching technique. While bowing the metal sheet inside the workshop it's important to convey the metal sheet from the middle and not from the sides since it might make rub the skin. Wellbeing shoes ought to be ceaselessly on once working inside the workshop because of theirs consistently a chance of falling a pointy bit of metal or a mallet on to the shoes.

Loose textileing vesture wear covering consumer goods should be avoided whereas operating within the workshop as a result of within the workshop one is enclosed by completely different significant forms of machineries which might grab a loose cloth and cause severe harm to the employee. Once wire removal makes certain it should be done gently and to not damage others by throwing the remains. Once testing the digital display and PCB boards, ensure the world is clean from stripy wires that would cause short circuits.

After writing the SRS document package style captive in to static testing section which has reviewing of the document. This is often wherever verification of the necessities happens.

There is a unit four numerous forms of verification strategies outlined below:

- Inspection (I): management or visual verification.
- Analysis (A): verification supported analytical evidences.
- Demonstration (D): verification of operational characteristics, while not quantitative menstruation.
- Test (T): verification of quantitative characteristics with quantitative menstruation.

For each demand of the SRS document, a verification methodology is outlined with abbreviation of I, A, D and T.

5.4 Verification

Prerequisite ID request Title procedure REQ-010 Verify that the sensors of the framework get readings I REQ-020 Verify that the data is shown on the screen D REQ-030 it's checked that the microcontroller of the framework is overseeing or working legitimately in light of the fact that it offers 100% outcome for each demand. D REQ-040 Verify that lock circuit was doing what's envisioned to do. That take sin three info and releases eight sticks A REQ-050 Verify that the SMS has been sent and gotten by GSM D once the confirmation part programming framework testing hostage in to the dynamic testing part wherever unit testing and reconciliation tests occurs. Of these testing have just been worn out testing technique segment.

5.5 Results

As all the testing completed acceptable outcome. Since there's no in essence unequivocal outcome that must be recorded. since the framework works with wetness and DHT11 (temperature and wetness) gadget that takes perusing in accordance with this temperature

and stickiness. Readings from the wetness gadget inside the circuit furthermore depend on what this wetness level is for the plant. Something else, by and large outcome setting out from the circuit in wording.

5.6 Cost of Project

Costing is frequently an essential issue to frame any extend. Worth of physical science isn't steady for a creating nation like Asian nation, because of Asian nation ne'er delivers physical science segments anyway import from option created nation and through import worth relies on the supply of remote cash. Normal worth of parts utilized in this task is given howl.

Table5.1: Price list of the Hardware used

SL.NO	NAME	Quantity	Price per Quantity	Price(BDT)
1	Arduino Uno R3 (ARD-0001)	1	550	550
2	Water Pump	1	180	180
3	DC Motor 12v	1	150	150
4	Ac-Dc Adapter 12V 2A	1	150	150
5	PCB Board	1	740	740
6	Switch	1	10	10
7	White Board	1	320	320
8	Sensor	1	100	100
9	Diode	1	5	5
10	Male-Male Jumper Wires	1	120	120
11	Male-Female Jumper Wires	1	120	120
12	Female-Female Jumper Wires	1	120	120
13	Others		550	550
			Total cost =	3235

5.7 Summary

This is because of driller will fabricate an earth molecule which may come in the eyes thus security glasses is critical for penetrating. when penetrating perpetually start from the little bores because of exploitation bigger bores straightaway will hurt the issue that must be bore and may also cause voluminous clamor, That take sin three info and releases eight sticks A REQ-050 Verify that the SMS has been sent and gotten by GSM D when the confirmation part programming bundle testing contacted in to the dynamic testing part wherever unit testing and combination tests occurs.

CHAPTER 6

CONCLUSION AND RECOMMENDATION

6.1 Introduction

The outcomes relate degreed finishes of a trial to work out the ideal measures of water region unit referenced. At that point, the directed styles are clarified altogether with the point, needs and requirements, reproduction and investigate results for everything about segments. This part can go in the little print concerning these security concerns. While doing such extend security is one among the essential issue regarding development of the undertaking. For instance, when penetrating.

6.2 Conclusion

The programmed water system the board exploitation Arduino Uno has been by experimentation confirm to figure acceptably and that we may with progress set the clock and figured out how to deal with the engine after some time. This technique not exclusively records estimations of temperature and wetness it conjointly controls the engine thus. Breaking down the air marvel engine can mechanically keep up water framework making it feasible to deal with verdure while not human intercession.

6.3 Variation of the work

Different ways and devices are produced to see once trims require water and the manner in which plentiful water system water must be connected. These epitomize the varying soil and plant recognition ways yet on the grounds that the parcel of normal soil water parity and arranging recreation models. The work of the different arranging instruments depends on the information needs connected with sort of information: climate, soil and harvest, yet to the recurrence of learning collection. Assessments of evapotranspiration and product water needs assume a critical job in a few of the models and numerous water stress criteria. Identification

of impediments and should be utilized by agriculturists and chiefs is imperative inside the decision of the reasonable arranging ways.

6.4 Future work

Utilizing this strategy as structure, the framework will be swollen typify to incorporate} various diverse decisions that may incorporate versatile application the executives of engine and Wi-Fi controlled perception. These can extend the working capacity and power of this model. It will be authorized not in horticulture anyway in greenhouses in any spots abuse the mechanical gadget origination. It's a monster scope once it's blended with IOT .Automation can get a shiny new measurement through this.

6.5 Summary

A computerized water system framework alludes to the activity of the framework with no or essentially at least manual intercession next to the police examination. Essentially every framework (trickle, sprinkler, surface) will be machine-controlled with encourage of clocks, sensors or PCs or Mechanical apparatuses. It makes the water system technique a ton of conservative and staff. Will consider distinctive essential cultivating undertakings. On the contrary hand, such a framework. Can be profitable and amazingly convoluted in its style and should needs experts to mastermind and Implement it.

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Appendix A

```
// include the library
#include <LiquidCrystal.h>

// init the lcd display according to the
circuit LiquidCrystal lcd(A1, A0, 13, 12,
11, 10); int Pump = 4;

int Moisture_input_D = 3;
int Moisture_input_A = A5;
// it's a 16x2 LCD so...
int screenWidth = 16;
int screenHeight = 2;

// the two lines
// line1 = scrolling
String line1 = "Automatic Irrigation System";
// line2 = static
//String line2 = "humidityReal";

// just some reference flags int
stringStart, stringStop = 0; int
scrollCursor = screenWidth;

char state;

// most of the part is pretty basic void
setup() {
lcd.begin(screenWidth,screenHeight);
pinMode(Pump,OUTPUT);
pinMode(Pump,LOW);
```

```

pinMode(Moisture_input_D,INPUT);
pinMode(Moisture_input_D,LOW);
pinMode(Moisture_input_A,INPUT);
pinMode(Moisture_input_A,LOW);
Serial.begin(9600);
}

void loop() {

int humidityRaw= analogRead(A5);
int humidityReal=map(humidityRaw,1023, 0, 0, (100));

if(digitalRead(Moisture_input_D) ==
HIGH){ digitalWrite(Pump,HIGH);
Serial.print("Moisture= 30%");
lcd.setCursor(scrollCursor, 0);
lcd.print(line1.substring(stringStart,stringStop));
lcd.setCursor(2, 1);
lcd.print("Moisture=");
lcd.setCursor(11

```

