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Sathyamurthy Nagar, Avadi, Chennai – 600 062.

(Academically Autonomous Institution)

DEPARTMENT OF
ELECTRONICS (ROBOTICS)SANDWICH

PROJECT REPORT ON

GEOFENCING AND SOIL MOISTURE MEASURING DEVICE (GSMM) FOR AGRICULTURE

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Submitted in partial fulfillment of the requirement for the award of Diploma in Electronics (Robotics) Sandwich

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BONAFIDE CERTIFICATE

Certified that this project report entitled " GEOFENCING AND SOIL MOISTURE MEASURING DEVICE (GSMM) FOR AGRICULTURE " is the bonafide of the work done by Selvan K.Rubesh Register No. 1912459 Student of seventh Semester Electronics Robotics (Sandwich) Diploma Programme, during June 2020 – October 2022 in partial fulfillment of the requirement for the award of Diploma in Electronics Robotics Engineering (sandwich).

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Submitted for the end of the semester examination held on ……..

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Any work completed consist not only the experience and skill of an individual, but it includes an orgainised body of the people. As such many kind hearts lay behind the completion of our project.

First of all we wish our grateful gratitude to our parents who dedicated their life for us and for our studies.

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ORGANISATION OF THE THESIS

This Thesis is organized to contain the following chapters.

LIST OF FIGURES

CHAPTER 1

1.1 ABSTRACT

Now a days it is very difficult to supervise a large area of agricultural land. So to overcome this problem we introduces a new Idea called “Geofencing And Soil Moisture Measuring (GSMM) Device for agriculture. The main objective of this device is to maintain the crop in agricultural field without supervisor for long days. It is easy to supervise the large area of agricultural field without any difficulties. This can be done with the help of some sensors. This device continuously measures the moisture level of the soil in agricultural land. If the moisture of the soil decreases, then the sensor automatically gives signal to “ON” the motor pump which supply water to the crops till the moisture of the soil is required by the crops. Due to heavy rainfall the crops may be affected. If excess of water in agricultural land, it tends to drain the excess of water. This helps to protect the crops from heavy rainfall. Sometimes animals may affect the crops. So, if the animals enter into the agricultural field, it senses the animals and turn on the alarm, through this the people can understand that the animal is get into the field and they take further actions to move off the animals.

1.2 WORKING PRINCIPLE

This device continuously monitors the water content of the soil. This is done with the help of Soil Moisture Sensors. A number of Soil Moisture Sensors are placed in the agricultural field. When the moisture level of soil reduces, then the moisture sensor gives a signal to Arduino to turn ‘‘ON’’ the pump to irrigate the land, where the moisture level is not satisfied.

The Float Sensor is used here to detect the excess of water in agricultural land due to heavy rainfall. Overflow water will also affect the crops. So, to drain the water, we are using Servo Motor. Servo motor act as a door. When there is a overflow water, floats sensor will give a signal to Arduino to open the Ridge. When Servo Motor open the Ridge the overflow water will drain from the field in this way.

Crops may damage due to the entry of animal in agriculture land. So we are using IR Sensors to detect the animals, When it enters into the land. IR Sensor gives a signal to Arduino to turn ‘ON’ the buzzer. Through this, people can understand that the animals are entered into the field. Here we are interfacing LCD display and Arduino. LCD display is used to indicate in which direction the animals are entered into the land. Through this the people can easily identify where is the animal and do further steps, to make to move the animals away from the agricultural field.

1.3 BLOCK DIAGRAM

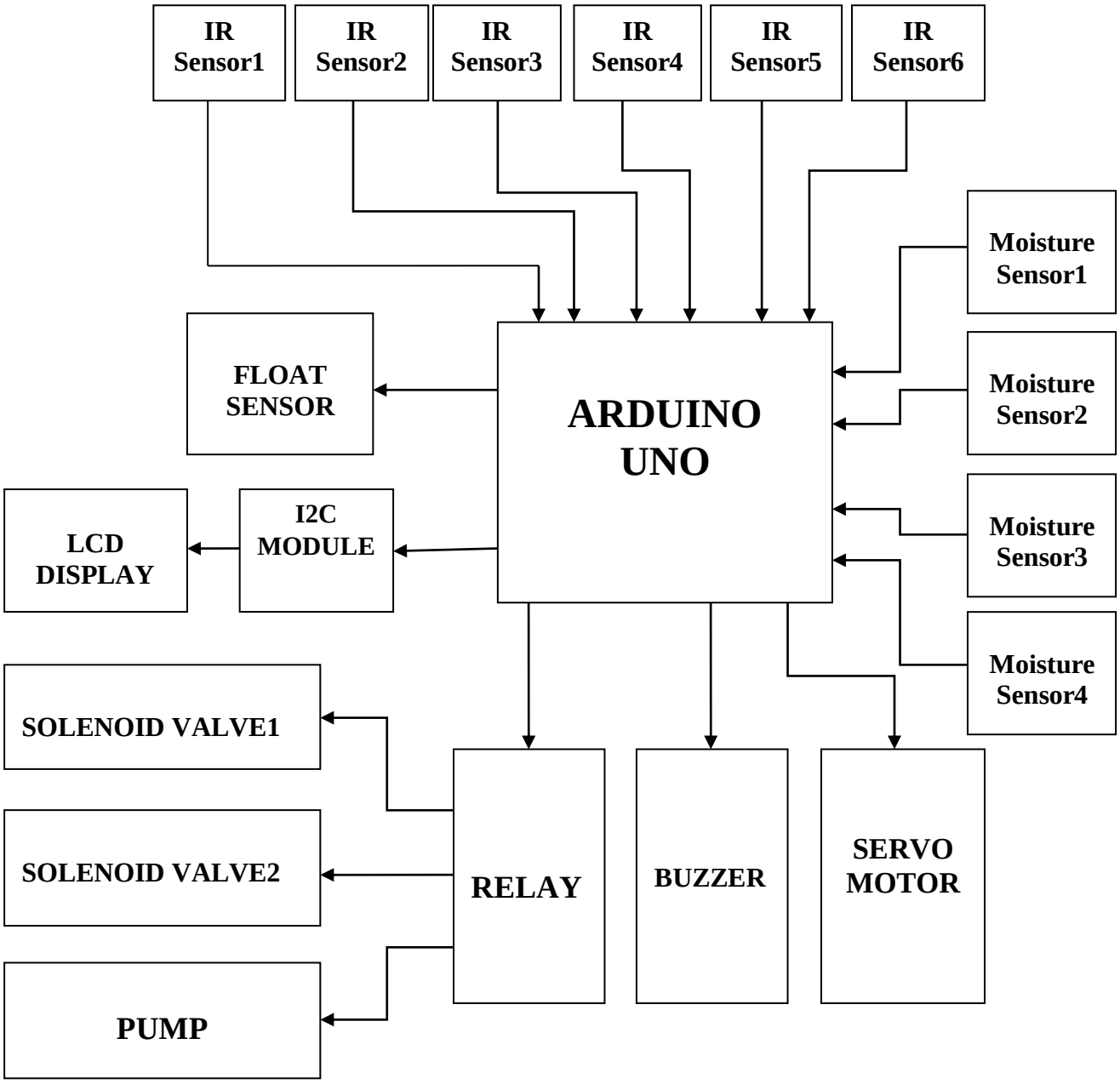

Fig No:1.1 Block Diagram

CHAPTER 2

2.1 COMPONENTS USED

HARDWARE REQUIREMENT

(i) Arduino uno

(ii) Servo Motor

(iii) Lcd display

(iv) Relay module

(v) Moisture sensor

(vi) Buzzer

(vii) Motor with pump

(viii) Solenoid Valve

(ix) I2C Module

(x) AC to DC Adapter

(xi) Float Sensor

(xii) IR Sensor

(i) ARDUINO UNO

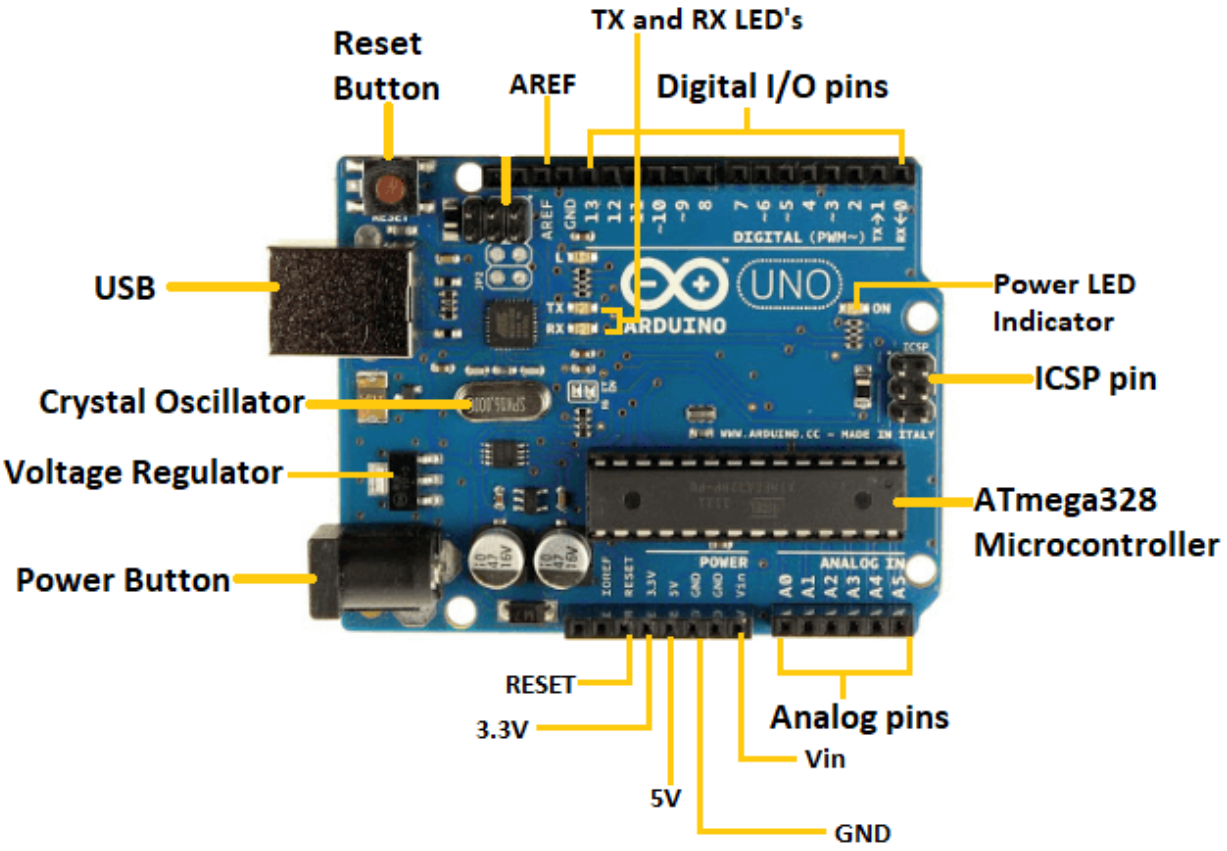

Fig. No:2.1 Arduino uno

ATmega328P is a high performance yet low power consumption 8-bit AVR microcontroller that's able to achieve the most single clock cycle execution of 131 powerful instructions thanks to its advanced RISC architecture. It can commonly be found as a processor in Arduino boards such as Arduino Fio and Arduino Uno.

Program Memory Type: Flash

Operating Voltage Range (V): 1.8 to 5.5v

CPU Speed (MIPS/DMIPS): 20

Features

- High performance, low power AVR® 8-bit microcontroller

Advanced RISC architecture

- 131 powerful instructions – most single clock cycle execution
- 32×8 general purpose working registers
- Fully static operation
- Up to 16MIPS throughput at 16MHz
- On-chip 2-cycle multiplier

High endurance non-volatile memory segments

- 32K bytes of in-system self-programmable flash program memory
- 1Kbytes EEPROM
- 2Kbytes internal SRAM
- Write/erase cycles: 10,000 flash/100,000 EEPROM
- Optional boot code section with independent lock bits
- In-system programming by on-chip boot program
- True read-while-write operation
- Programming lock for software security

Peripheral features

- Two 8-bit Timer/Counters with separate prescaler and compare mode
- One 16-bit Timer/Counter with separate prescaler, compare mode, and capture mode
- Real time counter with separate oscillator

- Six PWM channels
- 8-channel 10-bit ADC in TQFP and QFN/MLF package
- Temperature measurement
- Programmable serial USART
- Master/slave SPI serial interface
- Byte-oriented 2-wire serial interface (Phillips I2 C compatible)
- Programmable watchdog timer with separate on-chip oscillator
- On-chip analog comparator
- Interrupt and wake-up on pin change

Special microcontroller features

- Power-on reset and programmable brown-out detection
- Internal calibrated oscillator
- External and internal interrupt sources
- Six sleep modes: Idle, ADC noise reduction, power-save, power-down, standby, and extended standby

I/O and packages

- 23 programmable I/O lines
- 32-lead TQFP, and 32-pad QFN/MLF
- Operating voltage:
- 2.7V to 5.5V for ATmega328P

Temperature range

- Automotive temperature range: –40°C to +125°C

Speed grade

- 0 to 8MHz at 2.7 to 5.5V (automotive temperature range: –40°C to +125°C)
- 0 to 16MHz at 4.5 to 5.5V (automotive temperature range: –40°C to +125°C)

Low power consumption

- Active mode: 1.5mA at 3V - 4MHz
- Power-down mode: 1µA at 3V.

(ii) SERVO MOTOR SG90

Micro Servo Motor SG90 is a tiny and lightweight server motor with high output power. Servo can rotate approximately 180 degrees (90 in each direction), and works just like the standard kinds but smaller. You can use any servo code, hardware or library to control these servos. Good for beginners who want to make stuff move without building a motor controller with feedback & gear box, especially since it will fit in small places. It comes with a 3 horns (arms) and hardware.

Mechanism of Servo Motor

The type of motor is not critical to a servomotor and different types may be used. At the simplest, brushed permanent magnet dc motors are used, owing to their simplicity and low cost. Small industrial servomotors are typically electronically commutated brushless motors. For large industrial servomotors, ac induction motors are typically used, often with variable frequency drives to allow control of their speed. For ulti fields are used, mate performance in a compact package, brushless ac motors with permanent magnet effectively large versions of brushless dc electric motors. Drive modules for servomotors are a standard industrial component. Their design is a branch of power electronics, usually based on a three-phase mosfet or igbt h bridge. These standard modules accept a single direction and pulse count (rotation distance) as input.

They may also include over-temperature monitoring, over-torque and stall detection features. As the encoder type, gearhead ratio, and overall system dynamics are application specific, it is more difficult to produce the overall controller as an off-the-shelf module and so these are often implemented as part of the main controller.

Encoders

The first servomotors were developed with synchros as their encoders. Much work was done with these systems in the development of radar and anti-aircraft artillery during World War II.

Simple servomotors may use resistive potentiometers as their position encoder. These are only used at the very simplest and cheapest level, and are in close competition with stepper motors. They suffer from wear and electrical noise in the potentiometer track. Although it would be possible to electrically differentiate their position signal to obtain a speed signal, PID controllers that can make use of such a speed signal generally warrant a more precise encoder.

Modern servomotors use rotary encoders, either absolute or incremental. Absolute encoders can determine their position at power-on, but are more complicated and expensive. Incremental encoders are simpler, cheaper and work at faster speeds. Incremental systems, like stepper motors, often combine their inherent ability to measure intervals of rotation with a simple zero-position sensor to set their position at start-up.

Instead of servomotors, sometimes a motor with a separate, external linear encoder is used. These motor + linear encoder systems avoid inaccuracies in the drivetrain between the motor and linear carriage, but their design is made more complicated as they are no longer a pre-packaged factory-made system.

SG90 Micro Servo

Fig. No:2.2 Servo Motor

- SG90 is a servo motor which operates based on PWM control signals
- The servo maintains a certain angle (position) based on the width of the pulse fed in through a signal input
- Some technical specifications
- Weight: 9 g
- Dimension: 22.2 x 11.8 x 31 mm approx.
- Stall torque: 1.8 kgf·cm
- Operating speed: 0.1 s/60 degree
- Operating voltage: 4.8 V (~5V)
- PWM frequency = 50Hz
- Pin configuration: Yellow / Light Orange / White (Signal), Red / Dark Orange (+5V), Brown/Black (Ground)

Servo Library

- This library allows an Arduino board to control servo motors
- Standard servos allow the shaft to be positioned at various angles, usually between 0° and 180°
- Any digital pin on UNO can be used, not necessarily those supporting PWM. However, note that using Servo library disables analogWrite() functionality on pins 9 and 10
- attach(int) - attach a servo to an I/O pin, e.g., *servo*.attach(pin), *servo*.attach(pin, min, max)
- *servo:* a variable of type Servo, pin: pin number, default values: min = 544 us, max = 2400 us
- write(int) - write a value to the servo to control its shaft accordingly
- detach() - stop an attached Servo from pulsing its I/O pin

(iii) 16×2 LCD

GENERAL DESCRIPTION

LCD stands for liquid crystal display. They come in many sizes 8x, 8x2, 10x2, 16x1, 16x2, 16x4, 20x2, 20x4, 24x2, 30x2, 32x2, 40x2 etc . Many multinational companies like Philips Hitachi Panasonic make their own special kind of LCD'S to be used in their products. All the LCD'S performs the same functions (display characters numbers special characters ASCII characters etc). Their programming is also same, and they all have same 14 pins (0-13) or 16 pins (0 to 15). Alphanumeric displays are used in a wide range of applications, including palmtop computers, word processors, photocopiers, point of sale terminals, medical instruments, cellular phones, etc.

PRODUCT DESCRIPTION

This is an LCD Display designed for E-blocks. It is a 16 character, 2-line alphanumeric LCD display connected to a single 9-way D-type connector. This allows the device to be connected to most E-Block I/O ports. The LCD display requires data in a serial format, which is detailed in the user guide below. The display also requires a 5V power supply. Please take care not to exceed 5V, as this will cause damage to the device. The 5V is best generated from the E-blocks Multi programmer or a 5V fixed regulated power supply.

The 16 x 2 intelligent alphanumeric dot matrix displays is capable of displaying 224 different characters and symbols. A full list of the characters and symbols is printed on pages 7/8 (note these symbols can vary between brand of LCD used). This booklet provides all the technical specifications for connecting the unit, which requires a single power supply (+5V).

Fig No:2.3 LCD Display

FEATURES

- Input voltage: 5v
- E-blocks compatible
- Low cost
- Compatible with most I/O ports in the E-Block range
- Ease to develop programming code using Flow code icons

(iv) RELAY BOARD

PRINCIPLE

From the picture below, you can see that when the signal port is at low level, the signal light will light up and the optocoupler 817c (it transforms electrical signals by light and can isolate input and output electrical signals) will conduct, and then the transistor will conduct, the relay coil will be electrified, and the normally open contact of the relay will be closed. When the signal port is at high level, the normally closed contact of the relay will be closed. So you can connect and disconnect the load by controlling the level of the control signal port.

General Description

The 4 Channel Relay Module is a convenient board which can be used to control high voltage, high current load such as motor, solenoid valves, lamps and AC load. It is designed to interface with microcontroller such as Arduino, PIC and etc. The relays terminal (COM, NO and NC) is being brought out with screw terminal. It also comes with a LED to indicate the status of relay.

Product Description

This relay module is 5V active low. Low Active Means Relay will Get Trigger when Low Voltage/Signal Supplied to IN Pin. This Is A 5v 4-Channel Relay Interface Board, Be Able to Control Various Appliances, And Other Equipment with Large Current. It Can Be Controlled Directly By Microcontroller (Arduino, 8051, Avr, Pic, Dsp, Arm, Arm, Msp430, Ttl Logic).

5v 4-Channel Relay Interface Board, And Each One Needs 15-20ma Driver current Equipped With High-Current Relay, Ac250v 10a ; Dc30v 10a The 8550 Transistor Drive, Drive Ability Working Voltage 5 V

Has The Fixed Bolt Hole And Easy Installation Small Board Pcb Size: 7.2 Cm * 4.8 Cm Power Indicator (Green), Two Ways Of Relay Status Indicator Light (Red) Standard Interface That Can Be Controlled Directly By Microcontroller (Avr, Pic, Dsp, Arm, Arm, Msp430, Ttl Logic) Indication Led'S For Relay Output Status

Size : 54mm * 75mm

Input:

VCC: Positive supply voltage

GND: Ground

IN1--IN4: Relay control port

Output:

Connect a load, DC 30V/10A, AC 250V/10A

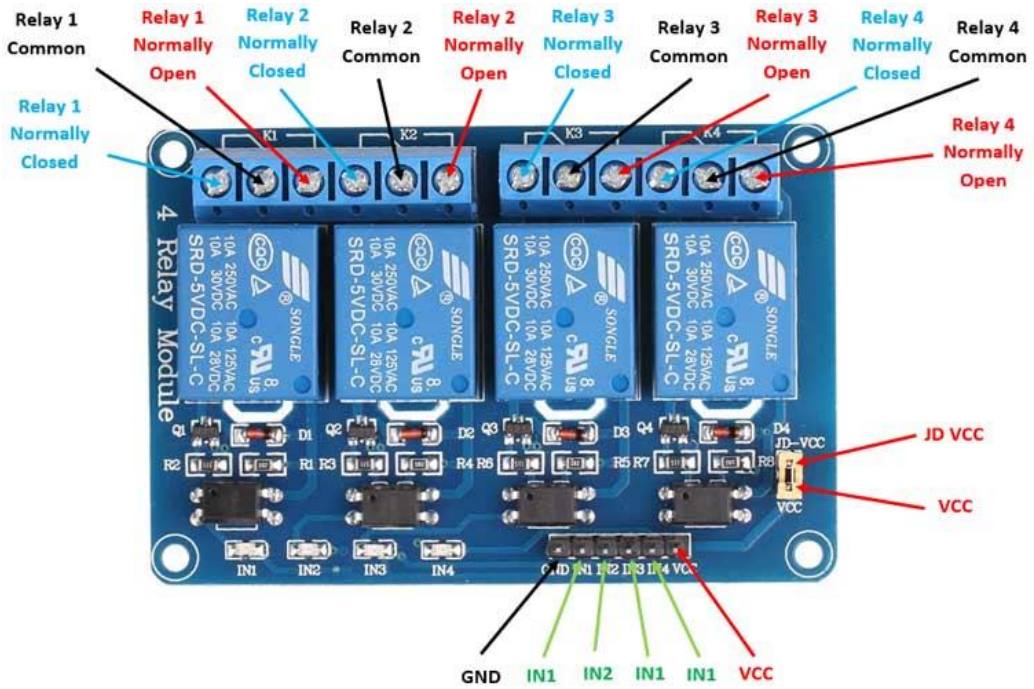

Fig No:2.4 Relay

Feartures

- Size: 75mm (Length) * 55mm (Width) * 19.3mm (Height)
- Weight: 61g
- PCB Color: Blue
- There are four fixed screw holes at each corner of the board, easy for install and fix. The diameter of the hole is 3.1mm

- High quality Songle relay is used with single pole double throw, a common terminal, a normally open terminal, and a normally closed terminal
- Optical coupling isolation, good anti-interference.
- Closed at low level with indicator on, released at high level with indicator off
- VCC is system power source, and JD_VCC is relay power source. Ship 5V relay by default. Plug jumper cap to use
- The maximum output of the relay: DC 30V/10A, AC 250V/10A

Roll of the system

- This is 5v 4-channel relay module.
- It is used to control high voltage, high current load such as motor, solenoid valves, lamps, buzzer.
- It is designed to interface with microcontroller such as Arduino, PIC and etc.

Specification:

- Digital output controllable
- Compatible with any 5V microcontroller such as Arduino.
- Rated through-current: 10A (NO) 5A (NC)
- Control signal: TTL level
- Max. switching voltage 250VAC/30VDC
- Max. switching current 10A
- Size: 76mm x 56mm x 17mm

APPLICATIONS

- Ac load Switching applications
- Dc load Switching applications
- Motor switching applications

(v) MOISTURE SENSOR

FC-28 Soil Hygrometer (Moisture) Sensor

Description

The FC28 Soil Moisture Sensor is a simple breakout for measuring the moisture in soil and similar materials. The soil moisture sensor is pretty straight forward to use. The two large exposed pads function as probes for the sensor, together acting as a variable resistor. The more water that is in the soil means the better the conductivity between the pads will be and will result in a lower resistance, and a higher SIG out. To get the FC28 Soil Moisture Sensor functioning all you will need is to connect the VCC and GND pins to your Microcontroller based device and you will receive a SIG out which will depend on the amount of water in the soil. One commonly known issue with soil moisture sensors is their short lifespan when exposed to a moist environment. This is a simple water sensor, can be used to detect soil moisture Module Output is high level when the soil moisture deficit, or output is low Can be used in module plant watering device, and the plants in your garden no need people to manage.

Soil moisture sensor

- Soil moisture sensors measure the volumetric water content in soil. Since the direct gravimetric measurement of free-soil moisture requires removing, drying, and weighing of a sample, soil moisture sensors measure the volumetric water content indirectly by using some other property of the soil, such as electrical resistance, dielectric constant, or interaction with neutrons as a proxy for the moisture content.
- The relation between the measured property and soil moisture must be calibrated and may vary depending on environmental factors such as soil type, temperature, or electric conductivity. Reflected microwave radiation is affected by the soil moisture and is used for remote sensing in hydrology and agriculture. Portable probe instruments can be used by farmers or gardeners.
- Soil moisture sensors typically refer to sensors that estimate volumetric water content. Another class of sensors measure another property of moisture in soils called water potential; these sensors are usually referred to as soil water potential sensors and include tensiometers and gypsum blocks.

Technology

Technologies commonly used to indirectly measure volumetric water content (soil moisture) include:

- Frequency Domain Reflectometry (FDR): The dielectric constant of a certain volume element around the sensor is obtained by measuring the operating frequency of an oscillating circuit.
- Time Domain Transmission (TDT) and Time Domain Reflectometry (TDR): The dielectric constant of a certain volume element around the sensor is obtained by measuring the speed of propagation along a buried transmission line; (see also: TDR moisture sensor)
- Neutron moisture gauges: The moderator properties of water for neutrons are utilized to estimate soil moisture content between a source and detector probe.
- Soil resistivity: Measuring how strongly the soil resists the flow of electricity between two electrodes can be used to determine the soil moisture content.
- Galvanic cell: The amount of water present can be determined based on the voltage the soil produces because water acts as an electrolyte and produces electricity. The technology behind this concept is the galvanic cell.

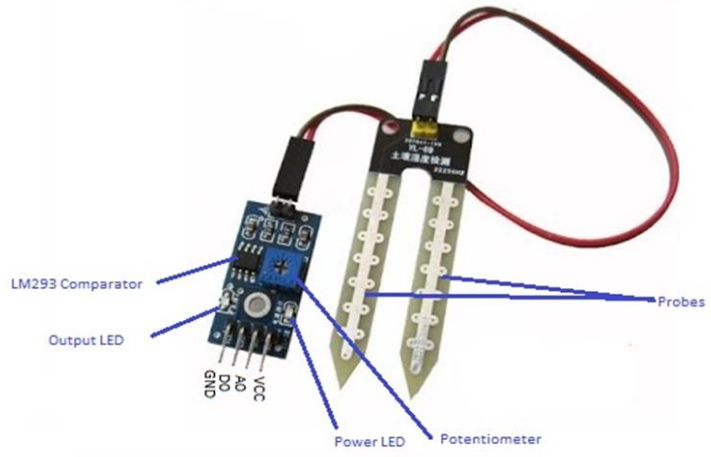

Fig No:2.5 Moisture sensor

Instructions for Use

Soil moisture module is most sensitive to the ambient humidity is generally used to detect the moisture content of the soil. Module to reach the threshold value is set in the soil moisture, DO port output high, when the soil humidity exceeds a set threshold value, the module D0 output low The digital output D0 can be connected directly with the microcontroller to detect high and low by the microcontroller to detect soil moisture. The digital outputs DO shop relay module can directly drive the buzzer module, which can form a soil moisture alarm equipment. Analog output AO and AD module connected through the AD converter, you can get more precise values of soil moisture

Interface Description (4-wire)

VCC: 3.3V-5V

GND: GND

DO: digital output interface (0 and 1)

AO: analog output interface

(vi) 5V BUZZER

General Description

This buzzer is an active buzzer, which basically means that it will buzz at a predefined frequency (2300 ±300 Hz) on its own even when you just apply steady DC power. If you are looking for a buzzer can produce varied tones from an oscillating input signal, then take a look at our passive buzzer.

Some people prefer to get active buzzers since they can use them with steady DC power but also be able to produce some variety of tones by applying an oscillating signal. Some consider them to be more versatile than their cousin, the passive buzzer, which is the type that requires an oscillating signal to create any tone.

It is possible, and often done, to still create different tones through an active buzzer when you apply an oscillating signal to the buzzer, but the spectrum of possible different tones is very limited and not as crisp or clean of sound as can be produced with a passive buzzer.

One advantage to an active buzzer is that you can still produce a sound from the buzzer connected to a microcontroller, such as an Arduino, by just driving a standard high output on the

connected pin. The benefits of this are that you don't need to use processing power, hardware timers, or additional code to produce sound.

Circuit Diagram

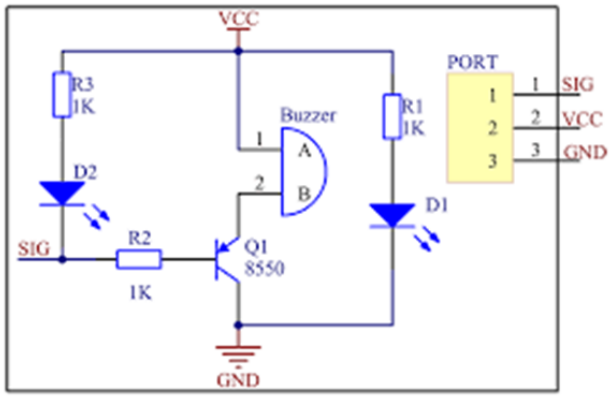

Fig NO:2.6 Buzzer Block Diagram

Product Description

This Mini Piezo Transducer Features: Mini 5V Piezo Transducer PCB & Breadboard Mountable Low Power Consumption Sealed Base Potted Base to Maximize Protection against Flux Contamination Masking label is included over the sound emission hole to permit board cleaning Low Profile Housing 7.6mm Pitch Dimensions 12mm dia x 7.5(H)mm Technical Specification Rated voltage: 5V DC Operating voltage min/max.: 3 – 8V DC Sound output: 85dB Frequency: 2300 ±300Hz Response time: 50ms Housing material: PST Operating temperature: -20°C to +85°C Storage temperature: -20°C to +88°C Weight: 2g

Fig No:2.7 Buzzer

(vii) MOTOR WITH PUMP

Description of DC Motor

An electric motor is a machine which converts electrical energy to mechanical energy. Its action is based on the principle that when a current-carrying conductor is placed in a magnetic field, it experiences a magnetic force whose direction is given by Fleming's left-hand rule.

When a motor is in operation, it develops torque. This torque can produce mechanical rotation. DC motors are also like generators classified into shunt wound or series wound, or compound wound motors.

Principle of Operation of DC Motor

A uniform magnetic field in which a straight conductor carrying no current is placed. The conductor is perpendicular to the direction of the magnetic field.

In figure II the conductor is shown as carrying a current away from the viewer, but the field due to the N and S poles has been removed. There is no movement of the conductor during the above two conditions. In figure III the current carrying conductor is placed in the magnetic field. The field due to the current in the conductor supports the main field above the conductor, but opposes the main field below the conductor. 12 Volt water pump is a dc electric water pump motor that powered by a 12V direct current power supply. It use centrifugal force that generated by high speed rotated impeller to booster, transfer, lift or circulate liquids like water, oil, coolant for sprayers, car, fountain, shower, garden etc.

FLEMING'S LEFT HAND RULE

Keep the force finger, middle finger and thumb of the left hand mutually perpendicular to one another. If the fore finger indicates the direction of magnetic field and middle finger indicates direction of current in the conductor, then the thumb indicates the direction of the motion of conductor.

Pump

A pump is a device that moves fluids (liquids or gases), or sometimes slurries, by mechanical action, typically converted from electrical energy into hydraulic energy. Pumps can be classified into three major groups according to the method they use to move the fluid: direct lift, displacement, and gravity pumps.

Pumps operate by some mechanism (typically reciprocating or rotary), and consume energy to perform mechanical work moving the fluid. Pumps operate via many energy sources, including manual operation, electricity, engines, or wind power, and come in many sizes, from microscopic for use in medical applications, to large industrial pumps.

Mechanical pumps serve in a wide range of applications such as pumping water from wells, aquarium filtering, pond filtering and aeration, in the car industry for water-cooling and fuel injection, in the energy industry for pumping oil and natural gas or for operating cooling towers and other components of heating, ventilation and air conditioning systems. In the medical industry, pumps are used for biochemical processes in developing and manufacturing medicine, and as artificial replacements for body parts, in particular the artificial heart and penile prosthesis.

When a casing contains only one revolving impeller, it is called a single-stage pump. When a casing contains two or more revolving impellers, it is called a double- or multi-stage pump.

In biology, many different types of chemical and biomechanical pumps have evolved; biomimicry is sometimes used in developing new types of mechanical pumps.

Pumping power

The power imparted into a fluid increases the energy of the fluid per unit volume. Thus, the power relationship is between the conversion of the mechanical energy of the pump mechanism and the fluid elements within the pump. In general, this is governed by a series of simultaneous differential equations, known as the Navier–Stokes equations. However, a simpler equation relating only the different energies in the fluid, known as Bernoulli's equation can be used. Hence the power, P, required by the pump:

where Δp is the change in total pressure between the inlet and outlet (in Pa), and Q, the volume flow-rate of the fluid is given in m^3/s. The total pressure may have gravitational, static pressure and kinetic energy components; i.e. energy is distributed between change in the fluid's gravitational potential energy (going up or down hill), change in velocity, or change in static pressure. η is the pump efficiency, and may be given by the manufacturer's information, such as in the form of a pump curve, and is typically derived from either fluid dynamics simulation (i.e. solutions to the Navier–Stokes for the particular pump geometry), or by testing. The efficiency of the pump depends upon the pump's configuration and operating conditions (such as rotational speed, fluid density and viscosity etc.)

For a typical "pumping" configuration, the work is imparted on the fluid, and is thus positive. For the fluid imparting the work on the pump (i.e. a turbine), the work is negative. Power required to drive the pump is determined by dividing the output power by the pump efficiency. Furthermore, this definition encompasses pumps with no moving parts, such as a siphon.

Efficiency

Pump efficiency is defined as the ratio of the power imparted on the fluid by the pump in relation to the power supplied to drive the pump. Its value is not fixed for a given pump, efficiency is a function of the discharge and therefore also operating head. For centrifugal pumps, the efficiency tends to increase with flow rate up to a point midway through the operating range (peak efficiency or Best Efficiency Point (BEP) and then declines as flow rates rise further. Pump performance data such as this is usually supplied by the manufacturer before pump selection. Pump efficiencies tend to decline over time due to wear (e.g. increasing clearances as impellers reduce in size).

When a system includes a centrifugal pump, an important design issue is matching the head loss-flow characteristic with the pump so that it operates at or close to the point of its maximum efficiency.

Pump efficiency is an important aspect and pumps should be regularly tested. Thermodynamic pump testing is one method.

Minimum flow protection

Most large pumps have a minimum flow requirement below which the pump may be damaged by overheating, impeller wear, vibration, seal failure, drive shaft damage or poor performance. A minimum flow protection system ensures that the pump is not operated below the minimum flow rate. The system protects the pump even if it is shut-in or dead-headed, that is, if the discharge line is completely closed.

The simplest minimum flow system is a pipe running from the pump discharge line back to the suction line. This line is fitted with an orifice plate sized to allow the pump minimum flow to pass. The arrangement ensures that the minimum flow is maintained, although it is wasteful as it recycles fluid even when the flow through the pump exceeds the minimum flow.

A more sophisticated, but more costly, system (see diagram) comprises a flow measuring device (FE) in the pump discharge which provides a signal into a flow controller (FIC) which actuates a flow control valve (FCV) in the recycle line. If the measured flow exceeds the minimum flow then the FCV is closed. If the measured flow falls below the minimum flow the FCV opens to maintain the minimum flowrate.

As the fluids are recycled the kinetic energy of the pump increases the temperature of the fluid. For many pumps this added heat energy is dissipated through the pipework. However, for large industrial pumps, such as oil pipeline pumps, a recycle cooler is provided in the recycle line to cool the fluids to the normal suction temperature. Alternatively the recycled fluids may be returned to upstream of the export cooler in an oil refinery, oil terminal, or offshore installation.

Roll of the System

- It is used to pump the water from the ground.
- This Motor operating with 12v dc power supply.

Fig No:2.8 Motor with Pump

Specification

Rated Voltage: DC 12V

- Load: Water
- water absorption: 1L-1.2L/min
- Current(With load): Less than 320mA
- Flow : 2.0LPM
- Total Size : D27 x 75mm
- Water Hole Diameter： 6.5mm
- Maximum pressure : More than 360mmHg
- Noise: Less than <60Db

(viii) SOLENOID VALVE

A solenoid valve is an electromechanically operated valve .

Solenoid valves differ in the characteristics of the electric current they use, the strength of the magnetic field they generate, the mechanism they use to regulate the fluid, and the type and characteristics of fluid they control. The mechanism varies from linear action, plunger-type actuators to pivoted-armature actuators and rocker actuators. The valve can use a two-port design to regulate a flow or use a three or more port design to switch flows between ports. Multiple solenoid valves can be placed together on a manifold.

Solenoid valves are the most frequently used control elements in fluidics. Their tasks are to shut off, release, dose, distribute or mix fluids. They are found in many application areas. Solenoids offer fast and safe switching, high-reliability, long service life, good medium compatibility of the materials used, low control power and compact design.

Operations

There are many valve design variations. Ordinary valves can have many ports and fluid paths. A 2-way valve, for example, has 2 ports; if the valve is open, then the two ports are connected and fluid may flow between the ports; if the valve is closed, then ports are isolated. If the valve is open when the solenoid is not energized, then the valve is termed normally open (N.O.). Similarly, if the valve is closed when the solenoid is not energized, then the valve is termed normally closed (N.C.). There are also 3-way and more complicated designs. A 3-way valve has 3 ports; it connects one port to either of the two other ports (typically a supply port and an exhaust port).

Solenoid valves are also characterized by how they operate. A small solenoid can generate a limited force. An approximate relationship between the required solenoid force F_s, the fluid pressure P, and the orifice area A for a direct acting solenoid valve is:

Where d is the orifice diameter. A typical solenoid force might be 15 N (3.4 lb_f). An application might be a low pressure (e.g., 10 psi (69 kPa)) gas with a small orifice diameter.

If the force required is low enough, the solenoid is able to directly actuate the main valve. These are simply called Direct-Acting solenoid valves. When electricity is supplied, electrical energy is

converted to mechanical energy, physically moving a barrier to either obstruct flow (if it is N.O.) or allow flow (if it is N.C.). A spring is often used to return the valve to its resting position once power is shut off. Direct-acting valves are useful for their simplicity, although they do require a large amount of power relative to other types of solenoid valves.

If fluid pressures are high and orifice diameter is large, a solenoid may not generate enough force on its own to actuate the valve. To solve this, a Pilot-Operated solenoid valve design can be used. Such a design uses the pressurized fluid itself to apply the forces required to actuate the valve, with the solenoid as a "pilot" directing the fluid (see subsection below). These valves are used in dishwashers, irrigation systems, and other applications where large pressures and/or volumes are desired. Pilot-operated solenoids tend to consume less energy than direct-action, although they will not work at all without sufficient fluid pressure and are more susceptible to getting clogged if the fluid has solid impurities.

A direct-acting solenoid valve typically operates in 5 to 10 milliseconds. Pilot-operated valves are slightly slower; depending on their size, typical values range from 15 to 150 milliseconds.

Power consumption and supply requirements of the solenoid vary with application, being primarily determined by fluid pressure and orifice diameter. For example, a popular ¾-inch 150 psi sprinkler valve, intended for 24 VAC (50–60 Hz) residential systems, has a momentary inrush of 7.2 VA, and a holding power requirement of 4.6 VA. Comparatively, an industrial ½-inch 10,000 psi valve, intended for 12, 24, or 120 VAC systems in high-pressure fluid and cryogenic applications, has an inrush of 300 VA and a holding power of 22 VA. Neither valve lists a minimum pressure required to remain closed in the unpowered state.

Roll of the System

- Solenoid valve is used to restrict the water flow in the agriculture land.
- The operating volt of this solenoid valve is 12 volt.
- Solenoid valves are the most frequently used control elements in fluidics.
- Outlet of the motor is directly coupled to this valve.

Fig No:2.9 Solenoid Valve

Specifications

12V DC 1/2″ Electric Solenoid Water Air Valve Switch (Normally Closed)

- Rated Operating Voltage: 12V DC.
- Rated Current: 0.6A.
- Operation Mode: NC (Normally Closed)
- Pressure: 0.02 – 0.8MPa.
- Max fluid temperature: 100°C.

(ix) I2C MODULE

I2C (Inter-Integrated Circuit, eye-squared-C), alternatively known as I2C or IIC, is a synchronous, multi-controller/multi-target (controller/target), packet switched, single-ended, serial communication bus invented in 1982 by Philips Semiconductors. It is widely used for attaching lower-speed peripheral ICs to processors and microcontrollers in short-distance, intra-board communication

Several competitors, such as Siemens, NEC , Texas Instruments, STMicroelectronics, Motorola, Nordic Semiconductor and Intersil , have introduced compatible I2C products to the market since the mid-1990s.System Management Bus (SMBus), defined by Intel in 1995, is a subset of I2C, defining a stricter usage

One purpose of SMBus is to promote robustness and interoperability. Accordingly, modern I^2C systems incorporate some policies and rules from SMBus, sometimes supporting both I^2C and SMBus, requiring only minimal reconfiguration either by commanding or output pin use.

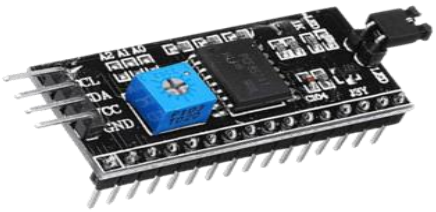

Fig No:2.10 I2C Module

DESIGN

I^2C uses only two bidirectional open-collector or open-drain lines: serial data line (SDA) and serial clock line (SCL), pulled up with resistors. Typical voltages used are +5 V or +3.3 V, although systems with other voltages are permitted.

The I^2C reference design has a 7-bit address space, with a rarely used 10-bit extension.[12] Common I^2C bus speeds are the 100 kbit/s *standard mode* and the 400 kbit/s fast mode. There is also a 10 kbit/s low-speed mode, but arbitrarily low clock frequencies are also allowed. Later revisions of I^2C can host more nodes and run at faster speeds (400 kbit/s fast mode, 1 Mbit/s fast mode plus, 3.4 Mbit/s *high*-speed mode, and 5 Mbit/s ultra-fast mode). These speeds are more widely used on embedded systems than on PCs.

Note that the bit rates are quoted for the transfers between controller and target without clock stretching or other hardware overhead. Protocol overheads include a target address and perhaps a register address within the target device, as well as per-byte ACK/NACK bits. Thus the actual transfer rate of user data is lower than those peak bit rates alone would imply. For example, if each interaction with a target inefficiently allows only 1 byte of data to be transferred, the data rate will be less than half the peak bit rate.

The number of nodes which can exist on a given I^2C bus is limited by the address space and also by the total bus capacitance of 400 pF, which restricts practical communication distances to a few meters. The relatively high impedance and low noise immunity requires a common ground potential, which again restricts practical use to communication within the same PC board or small system of boards.

Reference design

The aforementioned reference design is a bus with a clock (SCL) and data (SDA) lines with 7-bit addressing. The bus has two roles for nodes, either controller or target:

- Controller node: Node that generates the clock and initiates communication with targets.
- Target node: Node that receives the clock and responds when addressed by the controller.

The bus is a multi-controller bus, which means that any number of controller nodes can be present. Additionally, controller and target roles may be changed between messages (after a STOP is sent).

There may be four potential modes of operation for a given bus device, although most devices only use a single role and its two modes:

- Controller transmit: Controller node is sending data to a target.

- Controller receive: Controller node is receiving data from a target.
- Target transmit: Target node is sending data to the controller.
- Target receive: Target node is receiving data from the controller.

In addition to 0 and 1 data bits, the I^2C bus allows special START and STOP signals which act as message delimiters and are distinct from the data bits. (This is in contrast to the start bits and stop bits used in asynchronous serial communication, which are distinguished from data bits only by their timing.)

The controller is initially in controller transmit mode by sending a START followed by the 7-bit address of the target it wishes to communicate with, which is finally followed by a single bit representing whether it wishes to write (0) to or read (1) from the target.

If the target exists on the bus then it will respond with an ACK bit (active low for acknowledged) for that address. The controller then continues in either transmit or receive mode (according to the read/write bit it sent), and the target continues in the complementary mode (receive or transmit, respectively).

The address and the data bytes are sent most significant bit first. The start condition is indicated by a high-to-low transition of SDA with SCL high; the stop condition is indicated by a low-to-high transition of SDA with SCL high. All other transitions of SDA take place with SCL low.

If the controller wishes to write to the target, then it repeatedly sends a byte with the target sending an ACK bit. (In this situation, the controller is in controller transmit mode, and the target is in target receive mode.)

If the controller wishes to read from the target, then it repeatedly receives a byte from the target, the controller sending an ACK bit after every byte except the last one. (In this situation, the controller is in controller receive mode, and the target is in target transmit mode.)

An I^2C transaction may consist of multiple messages. The controller terminates a message with a STOP condition if this is the end of the transaction or it may send another START condition to retain control of the bus for another message (a "combined format" transaction).

Message protocols

I^2C defines basic types of transactions, each of which begins with a START and ends with a STOP:

- Single message where a controller writes data to a target.
- Single message where a controller reads data from a target.
- Combined format, where a controller issues at least two reads or writes to one or more targets.

In a combined transaction, each read or write begins with a START and the target address. The START conditions after the first are also called repeated START bits. Repeated STARTs are not preceded by STOP conditions, which is how targets know that the next message is part of the same transaction.

Any given target will only respond to certain messages, as specified in its product documentation.

Pure I^2C systems support arbitrary message structures. SMBus is restricted to nine of those structures, such as read word *N* and write word *N*, involving a single target. PMBus extends SMBus with a Group protocol, allowing multiple such SMBus transactions to be sent in one combined message. The terminating STOP indicates when those grouped actions should take effect. For example, one PMBus operation might reconfigure three power supplies (using three different I^2C target addresses), and their new configurations would take effect at the same time: when they receive that STOP.

With only a few exceptions, neither I^2C nor SMBus define message semantics, such as the meaning of data bytes in messages. Message semantics are otherwise product-specific. Those exceptions include messages addressed to the I^2C general call address (0x00) or to the SMBus Alert Response Address; and messages involved in the SMBus Address Resolution Protocol (ARP) for dynamic address allocation and management.

In practice, most targets adopt request-response control models, where one or more bytes following a write command are treated as a command or address. Those bytes determine how

subsequent written bytes are treated or how the target responds on subsequent reads. Most SMBus operations involve single-byte commands.

I2C Interfacing LCD

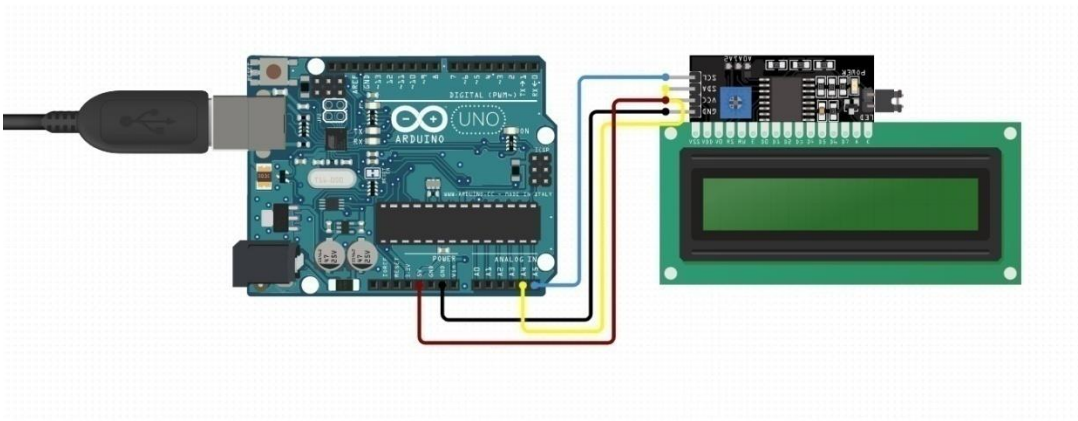

Fig No:2.11 I2C Interfacing LCD

Roll of the System

- I2C uses only two bidirectional open collector or open drain lines, Serial Data Line (SDA) and Serial Clock Line (SCL), pulled up with resistors.
- It is used to minimize the no of pin while interfacing Arduino uno and LCD display.

SPECIFICATION AND FUTURES

1.Compatible with Arduino/Genuino UNO, Mega, Micro, Nano, Mini

2. I2C Address: 0x20-0x27(0x20 default)

3. Back lit (Blue with white char color)

4. Supply voltage: 5V

5. Interface: I2C/TWI x1,Gadgeteer interface x2

6. Adjustable contrast

7. Size: 82 x 35 x 18 mm (3.2×1.4×0.7 in)

8. White text on the Blue background

9. Interface Address: 0x27

10. Character Color: White

(x) AC TO DC ADAPTER

AC to DC Converters are one of the most important elements in power electronics. This is because there are a lot of real-life applications that are based on these conversions. The electrical circuits that transform alternating current (AC) input into direct current (DC) output are known as AC-DC converters. They are used in power electronic applications where the power input a 50 Hz or 60 Hz sine-wave AC voltage that requires power conversion for a DC output.

The process of conversion of AC current to dc current is known as rectification. The rectifier converts the AC supply into the DC supply at the load end connection. Similarly, transformers are normally used to adjust the AC source to reduce the voltage level to have a better operation range for DC supply.

Concept of Alternating current (AC) & Direct current (DC)

Alternating Current

In alternating current, the current changes direction and flows forward and backward. The current whose direction changes periodically is called an alternating current (AC). It has non-zero frequency. It is produced by AC generator, dynamo.

Direct Current

In direct current, the current doesn't change its magnitude and polarity. If the current always flows in the same direction in a conductor then it is called direct current. It has zero frequency. It is produced by cells, battery, DC generator etc.

Simple Steps to change AC into DC

Now us discuss about AC to DC converter. Let us consider frequently used converter in the power supply circuit, 230V AC to 5V DC converter.

1. Stepping down the Voltage Levels

Sometimes voltages need to be increased while sending power to long distances. Similarly, voltages need to be decreased for equipment that uses the lower power. The step-up transformers are being used for stepping up the voltage levels and step-down transformers are being used for stepping down the voltage levels.

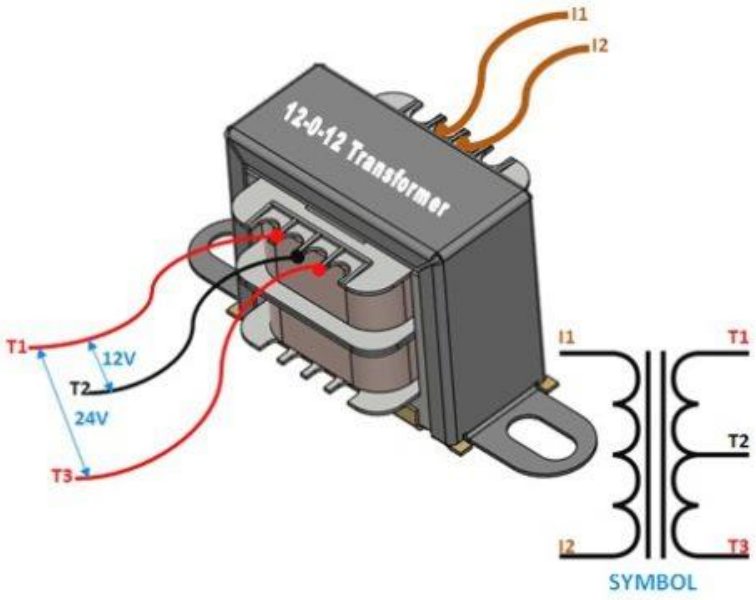

Fig No:2.12 Step Down Transformer

Consider a transformer with 12V Output. The 230V AC power supply is converted into 12V AC by using step down transformer. RMS value and its peak value can be given by the product of the square root of two and RMS value and is approximately equal to 17V which is the output of the step-down transformer.

2. AC to DC Power Converter Circuit

The rectifier converts the AC supply into the DC supply at the load end connection. There are different types of rectifiers, such as half-wave, full-wave, and bridge rectifiers.

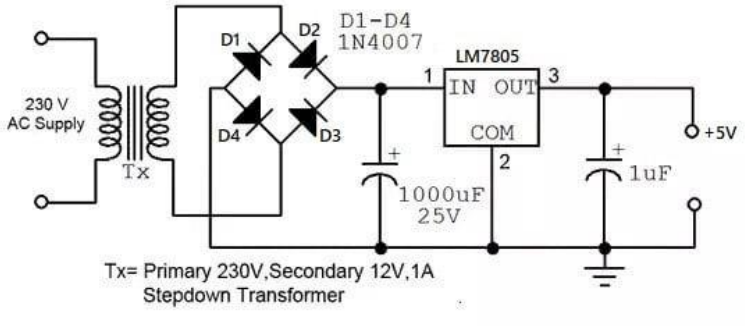

Fig No:2.13 Bridge Rectifier

Full Bridge rectifier which consists of four diodes are connected in the form of a bridge. The diode conducts only in one direction, i.e during forward bias. It remains in an off state in another direction, i.e. during reverse bias.

In the above circuit, during the positive half cycle, the diodes D2 & D4 conducts. And during the negative half cycle of the power supply, diodes D1 & D3 conducts. Thus, in this way input AC power is rectified into output DC power. But the problem is DC output power consists of pulses and is not pure DC.

3. Obtaining Pure DC Waveform

We need to convert the pulsating DC to pure DC. To do that, most of the circuit uses a Capacitors. The capacitor is used to store energy while the input voltage is increasing from zero to its peak value. The energy from the capacitor can be discharged while the input voltage is decreasing from its peak value to zero.

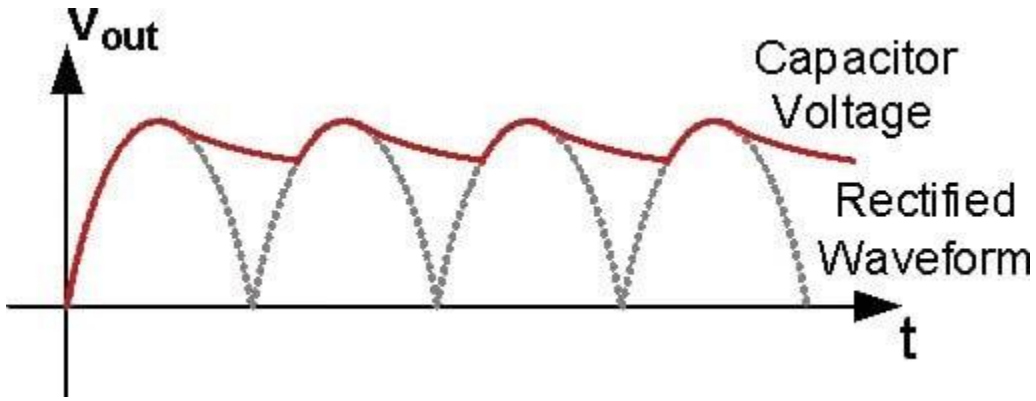

Fig No:2.14 OUTPUT Waveform

Thus, In this way, we can convert the pulsating DC into pure DC using this charging & discharging process of the capacitor.

4. Regulating Fixed DC Voltage

In order to fix the output voltage to the fixed desired value, we finally use the voltage regulator IC. The DC voltage regulators IC comes with the name 78XX. The last two digits XX-represents

the output voltage value. For example, to limit the output voltage to 5V, we use the 7805 Voltage Regulator IC. And to limit the voltage to 9V, we use a 7809 Voltage regulator.

Ac to Dc Adapter

Fig No:2.15 AC to DC Adapter

Applications

The AC to DC Converters are used in almost all electronics and electrical devices. They are used as power supply circuits for Household applications like vacuum cleaners, washing machines, refrigerators, electric rice cookers. For daily life, usable products like computers, televisions, cell phone chargers, etc AC-to-DC Converters play a very important role.

Most of the electronics sensors and modules only operate on DC supply and hence they use AC to DC Converters. They are also used in medical equipment, factory automation, building automation, process control systems, signage displays & telecommunication.

The other applications of AC to DC Converters are in renewable energy management, test & measuring equipment, defense, aerospace, and transportation system.

(xi) FLOAT SENSOR

Side Mount Level Sensor

Side mount level switches operate based on non-contact magnetic float and reed switch technology and are actuated by a rise or fall in fluid levels. Non-contact sensors offer broad fluid compatibility and are ideal for operations involving chemicals or high-temperature fluids. Designed for single point tank monitoring, side mount level sensors can be mounted from inside the tank and outside the tank using a compression grommet or tapped hole. This design accommodates large or small tanks and vessels, allowing use in a broad range of level measurement applications.

Side Mount Level Switches Designed for Demanding Operating Environments

elobau's side mount level switches feature a rugged design for harsh operating environments and come in an option of polypropylene or polypropylene material for compatibility with virtually any type of liquid. The option of threaded grommets or compression grommets also provides versatility for different mounting needs. The float can be either hinged or connected by a Teflon® flap based on your requirements. Teflon® flaps are ideal for liquid with particulate matter that may impede the movement of the hinged float.

Our level measurement solutions are in applications ranging from car washes to hydraulic power operations and have a reputation for quality. We always stay on the cutting edge of technology to provide reliable solutions for even the most challenging applications.

Features of elobau's Side Mount Level Sensors

These side mount level switches come with cable or M12 connections. Internal or external mounting threads are also available. A standard hinge is provided on the broken fingerstyle or Teflon if materials can accumulate on the hinge. Our switches can also be mounted in either direction to indicate open or closed when the level changes. The broad temperature range means you can use our sensors outdoors without issues.

Fig No:2.16 Float Sensor

1 side mount

2 Threaded or compression grommet

3 Hinge float (standard)

4 Reed based float

5 Form A, B or C contacts

6 Teflon® flap (fluids particulate matter)

7 Polyamide or polypropylene material

8 IP67

9 -25° to +105°C broken finger or +100°C on float style

10 Various cable lengths available

11 M12 connectors available

(xii) IR SENSOR

Introduction

Infrared radiation is an electromagnetic wave with wavelength of 700nm to 1 mm. It is emitted by objects with temperature above 0 kelvin. Furthermore intensity and wavelength of infrared radiation depends on the temperature of the object.

The infrared sensors are the sensors that detect/measure infrared radiation or change in the radiation from outer source source or inbuilt source.Also sensors that uses the property of infrared radiations to detect the changes in surrounding are termed as infrared sensors.

IR sensor

IR sensor is an electronic device, that emits the light in order to sense some object of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. Usually, in the infrared spectrum, all the objects radiate some form of thermal radiation. These types of radiations are invisible to our eyes, but infrared sensor can detect these radiations.

The emitter is simply an IR LED (Light Emitting Diode) and the detector is simply an IR photodiode . Photodiode is sensitive to IR light of the same wavelength which is emitted by the IR LED. When IR light falls on the photodiode, the resistances and the output voltages will change in proportion to the magnitude of the IR light received.

There are five basic elements used in a typical infrared detection system: an infrared source, a transmission medium, optical component, infrared detectors or receivers and signal processing. Infrared lasers and Infrared LED's of specific wavelength used as infrared sources.

The three main types of media used for infrared transmission are vacuum, atmosphere and optical fibers. Optical components are used to focus the infrared radiation or to limit the spectral response.

IR Sensor Working Principle

There are different types of infrared transmitters depending on their wavelengths, output power and response time. An IR sensor consists of an IR LED and an IR Photodiode, together they are called as PhotoCoupler or OptoCoupler.

IR Transmitter or IR LED

Infrared Transmitter is a light emitting diode (LED) which emits infrared radiations called as IR LED's. Even though an IR LED looks like a normal LED, the radiation emitted by it is invisible to the human eye.

Fig No:2.17 Infrared LED

IR Receiver or Photodiode

Infrared receivers or infrared sensors detect the radiation from an IR transmitter. IR receivers come in the form of photodiodes and phototransistors. Infrared Photodiodes are different from normal photo diodes as they detect only infrared radiation. Below image shows the picture of an IR receiver or a photodiode,

Fig NO:2.18 Photodiode

Different types of IR receivers exist based on the wavelength, voltage, package, etc. When used in an infrared transmitter – receiver combination, the wavelength of the receiver should match with that of the transmitter.

The emitter is an IR LED and the detector is an IR photodiode. The IR photodiode is sensitive to the IR light emitted by an IR LED. The photo-diode's resistance and output voltage change in proportion to the IR light received. This is the underlying working principle of the IR sensor.

When the IR transmitter emits radiation, it reaches the object and some of the radiation reflects back to the IR receiver. Based on the intensity of the reception by the IR receiver, the output of the sensor defines.

Application

1.Security

2.Lighting appliances

3.Household or other appliances

CHAPTER 3

3.1 SOFTWARE DESCRIPTION

SOFTWARE REQUIREMENT

- Arduino-IDE
- Embedded C

ARDUINO IDE

The Arduino integrated development environment (IDE) is a cross-platform application (for Windows, macOS, Linux) that is written in the programming language Java. It is used to write and upload programs to Arduino board.

The source code for the IDE is released under the GNU General Public License, version 2. The Arduino IDE supports the languages C and C++ using special rules of code structuring. The Arduino IDE supplies a software library from the Wiring project, which provides many common input and output procedures. User-written code only requires two basic functions, for starting the sketch and the main program loop, that are compiled and linked with a program stub main() into an executable cyclic executive program with the GNU toolchain, also included with the IDE distribution. The Arduino IDE employs the program argued to convert the executable code into a text file in hexadecimal encoding that is loaded into the Arduino board by a loader program in the board's firmware.

Arduino is an open-source hardware and software company, project and user community that designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical and digital world. Its products are licensed under the GNU Lesser General Public License (LGPL) or the GNU General Public License (GPL), permitting the manufacture of Arduino boards and software distribution by anyone. Arduino boards are available commercially in preassembled form or as do-it-yourself (DIY) kits.

Arduino board designs use a variety of microprocessors and controllers. The boards are equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various

expansion boards or breadboards (shields) and other circuits. The boards feature serial communications interfaces, including Universal Serial Bus (USB) on some models, which are also used for loading programs from personal computers. The microcontrollers are typically programmed using a dialect of features from the programming languages C and C++. In addition to using traditional compiler toolchains, the Arduino project provides an integrated development environment (IDE) based on the Processing language project.

The Arduino project started in 2003 as a program for students at the Interaction Design Institute Ivrea in Ivrea, Italy, aiming to provide a low-cost and easy way for novices and professionals to create devices that interact with their environment using sensors and actuators. Common examples of such devices intended for beginner hobbyists include simple robots, thermostats and motion detectors.

The name Arduino comes from a bar in Ivrea, Italy, where some of the founders of the project used to meet. The bar was named after Arduin of Ivrea, who was the margrave of the March of Ivrea and King of Italy from 1002 to 1014.

EMBEDDED C

Embedded C is a set of language extensions for the C programming language by the C Standards Committee to address commonality issues that exist between C extensions for different embedded systems.

Historically, embedded C programming requires nonstandard extensions to the C language in order to support exotic features such as fixed-point arithmetic, multiple distinct memory banks, and basic I/O operations. In 2008, the C Standards Committee extended the C language to address these issues by providing a common standard for all implementations to adhere to. It includes a number of features not available in normal C, such as fixed-point arithmetic, named address spaces and basic I/O hardware addressing. Embedded C uses most of the syntax and semantics of standard C, e.g., main() function, variable definition, data type declaration, conditional statements (if, switch case), loops (while, for), functions, arrays and strings, structures and union, bit operations, macros, etc.

3.2 Code Used

```
#include<Wire.h>

#include <LiquidCrystal_I2C.h>

#include<Servo.h>

LiquidCrystal_I2C lcd(0x27,16,2);

int led = 1;

int IRSensor1 = 2;

int IRSensor2 = 3;

int IRSensor3 = 4;

int IRSensor4 = 5;

int IRSensor5 = 6;

int IRSensor6 = 7;

int floatsensor = 8;

int buzzer = 10;

int northsolenoid = 11;

int southsolenoid = 12;

int pump = 13;

int sensorPin = A0;

int sensorValue;

int sensorPin1 = A1;

int sensorValue1;
```

```
int sensorPin2 = A2;
int sensorValue2;
int sensorPin3 = A3;
int sensorValue3;
int limit = 500;
Servo motor;
void setup()
{
lcd.init();
lcd.backlight();
Serial.begin(9600);
motor.attach(9);
pinMode (1, OUTPUT);
pinMode (2, INPUT_PULLUP);
pinMode (3, INPUT_PULLUP);
pinMode (4, INPUT_PULLUP);
pinMode (5, INPUT_PULLUP);
pinMode (6, INPUT_PULLUP);
pinMode (7, INPUT_PULLUP);
pinMode (8, INPUT_PULLUP);
pinMode (10, OUTPUT);
```

```
pinMode (11, OUTPUT);
pinMode (12, OUTPUT);
pinMode (13, OUTPUT);
}
void loop()
{
lcd.setCursor(2,0);
lcd.print("GSMM  DEVICE");
lcd.setCursor(3,1);
lcd.print("NO PROBLEM");
sensorValue = analogRead(sensorPin);
Serial.println("Analog Value : ");
Serial.println(sensorValue);
sensorValue1 = analogRead(sensorPin1);
Serial.println("Analog Value1 : ");
Serial.println(sensorValue1);
sensorValue2 = analogRead(sensorPin2);
Serial.println("Analog Value2 : ");
Serial.println(sensorValue2);
sensorValue3 = analogRead(sensorPin3);
Serial.println("Analog Value3 : ");
```

```
Serial.println(sensorValue3);
if (sensorValue>limit)
{
digitalWrite(11,LOW);
digitalWrite(13,LOW);
delay(10000);
digitalWrite(13,HIGH);
digitalWrite(11,HIGH);
}
if (sensorValue1>limit)
{
digitalWrite(11,LOW);
digitalWrite(13,LOW);
delay(10000);
digitalWrite(13,HIGH);
digitalWrite(11,HIGH);
}
if (sensorValue2>limit)
{
digitalWrite(12,LOW);
digitalWrite(13,LOW);
```

```
delay(10000);
digitalWrite(13,HIGH);
digitalWrite(12,HIGH);
}
if (sensorValue3>limit)
{
digitalWrite(12,LOW);
digitalWrite(13,LOW);
delay(10000);
digitalWrite(13,HIGH);
digitalWrite(12,HIGH);
}
delay(1000);
if (digitalRead(2) == LOW)
{
lcd.clear();
delay(100);
digitalWrite(10, HIGH);
digitalWrite(1, HIGH);
lcd.setCursor(3,0);
lcd.print("ANIMAL  ON");
```

```
lcd.setCursor(2,1);
lcd.print("EAST  REGION");
delay(60000);
lcd.clear();
digitalWrite(10, LOW);
digitalWrite(1, LOW);
}
if (digitalRead(3) == LOW)
{
lcd.clear();
delay(100);
digitalWrite(10, HIGH);
digitalWrite(1, HIGH);
lcd.setCursor(3,0);
lcd.print("ANIMAL  ON");
lcd.setCursor(2,1);
lcd.print("EAST  REGION");
delay(60000);
lcd.clear();
digitalWrite(10, LOW);
digitalWrite(1, LOW);
```

```
}
if (digitalRead(4) == LOW)
{
lcd.clear();
delay(100);
digitalWrite(10, HIGH);
digitalWrite(1, HIGH);
lcd.setCursor(3,0);
lcd.print("ANIMAL  ON");
lcd.setCursor(2,1);
lcd.print("SOUTH REGION");
delay(60000);
lcd.clear();
digitalWrite(10, LOW);
digitalWrite(1, LOW);
}
if (digitalRead(5) == LOW)
{
lcd.clear();
delay(100);
digitalWrite(10, HIGH);
```

```
digitalWrite(1, HIGH);
lcd.setCursor(3,0);
lcd.print("ANIMAL  ON");
lcd.setCursor(2,1);
lcd.print("WEST  REGION");
delay(60000);
lcd.clear();
digitalWrite(10, LOW);
digitalWrite(1, LOW);
}
if (digitalRead(6) == LOW)
{
lcd.clear();
delay(100);
digitalWrite(10, HIGH);
digitalWrite(1, HIGH);
lcd.setCursor(3,0);
lcd.print("ANIMAL  ON");
lcd.setCursor(2,1);
lcd.print("WEST  REGION");
delay(60000);
```

```
lcd.clear();
digitalWrite(10, LOW);
digitalWrite(1, LOW);
}
if (digitalRead(7) == LOW)
{
lcd.clear();
delay(100);
digitalWrite(10, HIGH);
digitalWrite(1, HIGH);
lcd.setCursor(3,0);
lcd.print("ANIMAL  ON");
lcd.setCursor(2,1);
lcd.print("NORTH REGION");
delay(60000);
lcd.clear();
digitalWrite(10, LOW);
digitalWrite(1, LOW);
}
delay(500);
if(digitalRead(8)==LOW)
```

```
{
motor.write(90);
}
if(digitalRead(8)>LOW)
{
motor.write(0);
}
}
```

CHAPTER 4

4.1 FINAL OUTPUT HARDWARE

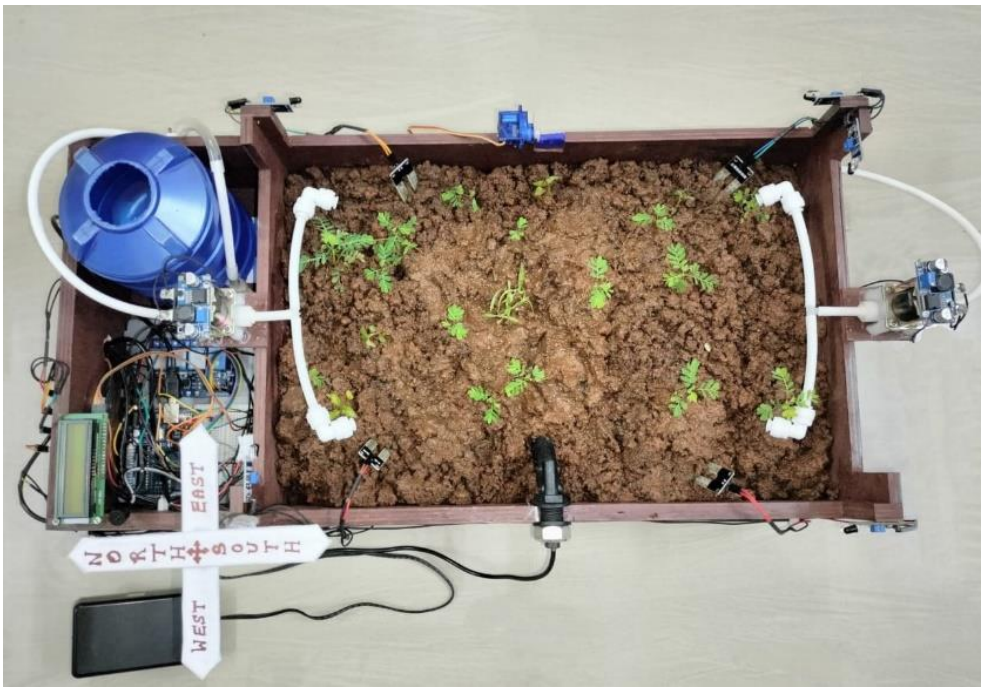

Fig no:2.19 Top View of Project

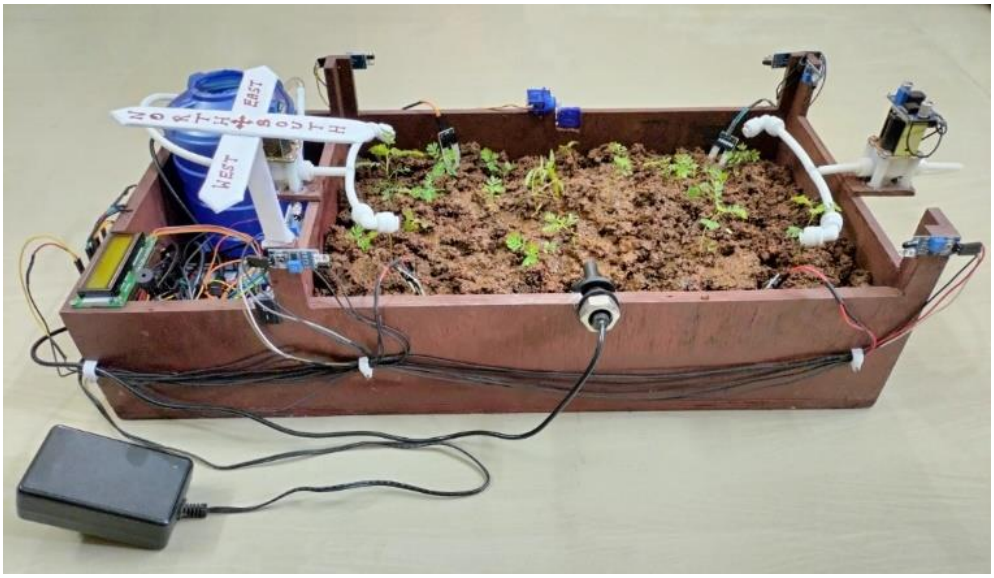

Fig no:2.20 Side View of Project

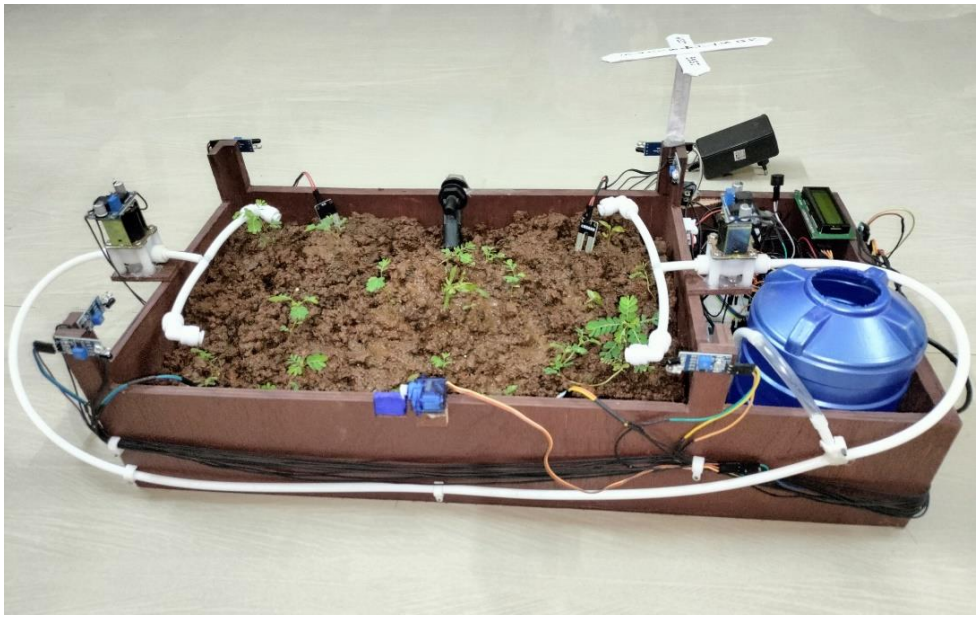

Fig. no:2.21 Project Picture

CHAPTER 5

5.1 ADVANTAGE

- No damage of crops due to enter of animals.
- Automatic drain system, when over flow of water due to heavy rain fall.
- Easy to maintain the agricultural field.
- No need of manual irrigation.

5.2 FUTURE SCOPE

- By interfacing Bluetooth or Wi-Fi module with the system, we can monitor the current situation of the agricultural field through Mobile Phone at anywhere in the world.
- Through this we can get message in our Mobile phone in which direction the animal is entered.

5.3 PROBLEM FACED

- The main problem we are faced is, the device is not working according to the program.
- Sensors are not interfacing with the Arduino uno.

CHAPTER 6

6.1 COST ESTIMATION

Sl. No.	Parts	Qty.	Material cost in Rs.
1	Arduino uno	1no	700/-
2	Servo Motor	1no	150/-
3	Lcd Display	1no	150/-
4	4channel Relay Module	1no	190/-
5	Moisture Sensor	2nos	150/-
6	9v Battery	1no	30/-
7	Buzzer	1no	20/-
8	Motor With Pump	1no	80/-
10	Solenoid Valve	2nos	560/-
11	I2c Module	1no	100/-
12	Ac To Dc Adapter	1no	300/-
13	Float Sensor	1no	200/-

14	IR Sensor	7nos	300/-
15	Hose	5 meters	100/-
16	frame	1no	500/-
17	wires	10 meters	200/-
18	12v to 5v Converter	2nos	200/-
Total in Rs.			3930/-

CHAPTER 7

7.1 CONCLUSION

- This device is very helpful and easier to maintain the agricultural field with less man power
- Through this the damage of crops due to animals are avoided
- Without supervise the agricultural land can be maintained for long day

7.2 TEAM MEMBERS DETAILS

NAME OF THE MEMBERS	DETAILS
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