DAYANANDA SAGAR COLLEGE OF ENGINEERING

(An Autonomous Institute affiliated to VTU, Belagavi – 590018, Approved by AICTE & ISO 9001:2008 Certified)
Accredited by National Assessment & Accreditation Council (NAAC) with 'A' grade & NBA

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

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CIE Report Mini Project -2 (22IDT28)

DESIGN OF SIMPLE WATER LEVEL INDICATOR

Submitted by

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DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

CERTIFICATE

Certified that the Mini project report entitled **"DESIGN OF SIMPLE WATER LEVEL INDICATOR" carried out by** ***ANANYA M (1DS22EE011), BHAVANA T (1DS22EE021), MANJULA S (1DS22EE054), ZOYATAJ S (1DS22EE110),*** a bonafide student of **DAYANANDA SAGAR COLLEGE OF ENGINEERING,** an autonomous institution affiliated to VTU, Belagavi in partial fulfillment for the award of Electrical and Electronics Engineering during the year 2022-2023. It is certified that all corrections/suggestions indicated for Internal Assessment have been incorporated in the report deposited in the departmental library. The Mini project report has been approved as it satisfies the academic requirements in respect of work prescribed for the Bachelor of Engineering Degree.

Signature of the Guide
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Signature of the HOD
Dr. P Usha
Professor & HOD
Department of EEE

Name of the Examiners	**Signature with date**
1.....	**.....**
2.....	**.....**

ACKNOWLEDGEMENT

The success and final outcome of this mini project required the guidance and assistance of many people. I would like to use this opportunity to express a few words of appreciation to everyone who have been a part of this project right from its inception.

Without their support, patience and guidance, this task would not have been completed. It is to them I owe my deepest gratitude.

I take this opportunity to express my deep regards to Dr. B G Prasad, Principal, Dayananda Sagar College of Engineering for providing an opportunity to do this mini project as a part of my curriculum in the partial fulfillment of the degree course.

I express my gratitude to Dr. P. USHA, HOD, Electrical and Electronics Engineering, Dayananda Sagar College of Engineering for providing valuable insights, making the resources available at right time and all the encouragement for the completion of our mini project.

I owe my profound gratitude to my project guide, Satish B A , Assistant Professor, Department of Electrical and Electronics Engineering, Dayananda Sagar College of Engineering, who took keen interest in my work and guided me all along, providing all the necessary information and references.

I would like to also express my sincere thanks to all the faculty members for their timely support and cooperation to me at all times, till the completion of this seminar. I also extend my heartfelt gratitude to all support staff at our institute, who directly or indirectly helped me in delivering this seminar within the specified duration.

TABLE OF CONTENT

CIE REPORT

1. INTRODUCTION:

A simple water level indicator is a basic electronic device used to measure and display the water Level in a container, such as a tank or reservoir. It typically consists of a series of sensors / LEDs placed at different water levels and connected to an LED display panel or other visual indicator through some coding techniques. As the water level changes , the corresponding sensor detects the presence of water and activates the respective LED , providing a visual representation of the water level. This cost-effective solution finds applications in various settings , from home water tanks to industrial systems , in a convenient location, allowing you to easily check the water level without the need to physically inspect the tank , ensuring efficient monitoring and management of water resources. The sensors connected providing users to easy to understand visual representation of the water level. The simplicity and reliability of this design make it popular choice for basic water level monitor needs. They detect the presence or absence of water at each level. This not only saves time and effort but also helps prevent situations where the tank runs dry unexpectedly. Overall, a water level indicator is a handy tool that promotes efficient water management and ensures that you never run out of water when you need it the most. Whether you have a water storage tank at home, a rainwater harvesting system, or even a fish tank, a water level indicator can provide you with valuable information about the water level at a glance.

2. Literature Survey:

• Hemant Lenka and his team based their research on the importance of water level controllers in irrigation in agriculture. According to the article, each crop needs a particular amount of water, which can be achieved by using an automated water level controller, which would also help to reduce water waste. They employ a technique to determine the rate of water flow in irrigation pipelines. It measures the rate of flow with a Hall Effect Sensor. The G1/2 Hall Effect water flow sensor is a sensing device that contains a turbine rotor whose speed varies depending on the rate of water flow.

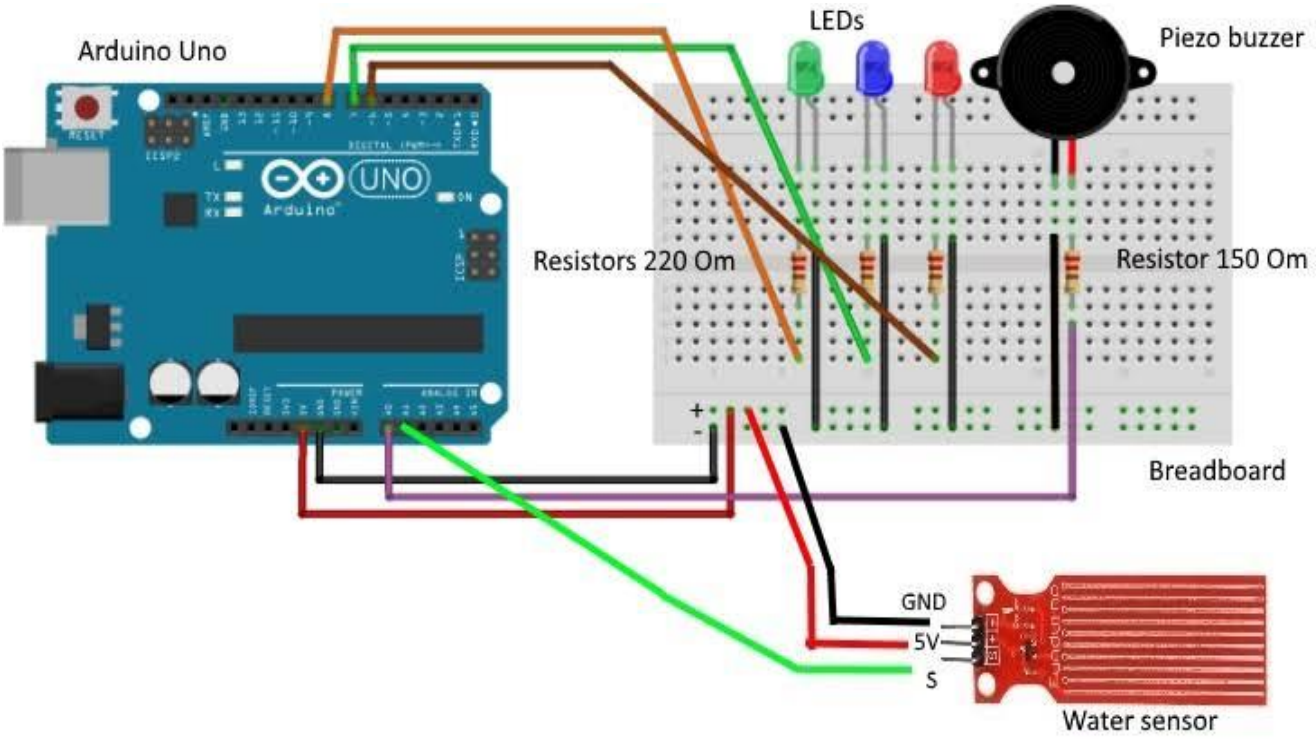
- The literature review focuses on different designs of automatic water level controllers.
- One design uses a mercury flow switch, which is affordable and durable but has the disadvantage of being slow and toxic.
- Another design uses resistive sensors that rely on water conductivity to detect water levels and control switches or pumps.
- Practical applications of automatic water level control include air conditioning tanks and power plant systems.
- The manual method of controlling water levels is prone to errors and inefficiencies.
- The objective of the study is to design a portable automatic water level control switch that turns the pump on when the water level is low and off to prevent dry-run.
- The device described in the research paper uses advanced sensing technology, an Arduino, and a relay to control the motor and display the water level on an LCD.
- Other researchers highlight the importance of water level controllers in irrigation and propose techniques for measuring water flow rates.
- An automated water level controller with SMS notification is presented as a solution for water maintenance during load shedding.

3. The Project Methodology:

A. Working:

The circuit is designed to indicate three levels of water stored in the tank: low but not empty, half and full but not overflowing. When there is no water in the tank, all the LEDs are off as an indication that the tank is completely empty. When water level increases and touches the sensor, the Red LED will glow indicating that there is water within the tank. As the water level continues to rise and reaches half the tank, Yellow LED will glow and Green LED indicates full water level. Then the water in the tank rises to full an alarm is made by the buzzer as an indication that the tank is completely full.

B. Circuit diagram:



C .Components are used:

a)Arduino Uno:

The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller (MCU) and developed by Arduino.cc and initially released in 2010. The microcontroller board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits.The board has 14 digital I/O pins (six capable of PWM output), 6 analog I/O pins, a 16 MHz ceramic resonator, a USB connection and is programmable with the Arduino IDE (Integrated Development Environment), via a type B USB cable.

b)Water level sensor module:

Hydrostatic pressure level sensors are submersible sensors used for measuring the level of liquids (including corrosive liquids) in deep tanks or water in reservoirs. Pressure water level loggers provide accuracy and reliability across a wide range of applications.

c)Light-emitting diode (LED):

In the simplest terms, a light-emitting diode (LED) is a semiconductor device that emits light when an electric current is passed through it. Light is produced when the particles that carry the current (known as electrons and holes) combine together within the semiconductor material.

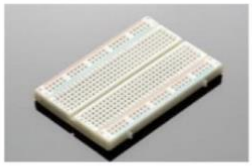
d)Buzzer:

When water level increases and touches the sensor , an alarm is made by the buzzer as an indication that the tank is full.

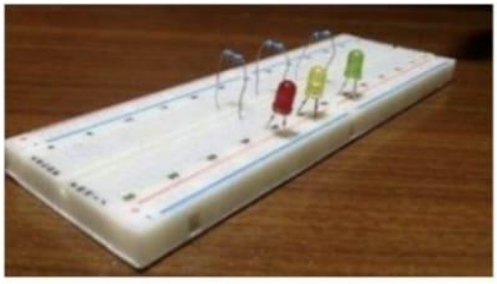
e)Resistor (220 ohm):

f)Connecting wires:

g)Breadboard:



Step 1: Assemble LED on Breadboard



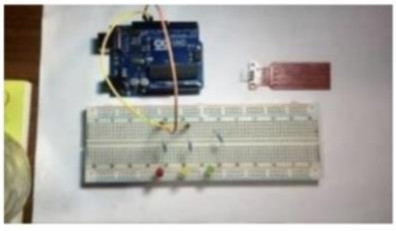
Red: (indicating extremely low level)

Yellow: (indicating half water level)

Blue: (indicating full water level)

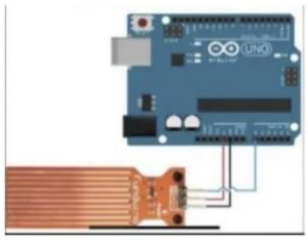
- Connect the cathode of each led to power rail(blue rail) on breadboard which would be the ground supply.
- Connect the anode of LED to different nodes.
- Connect 220 ohms resistor in series with each LED.

Step 2: Make Connections with Arduino and LED . Make connections for LED with digital pins On Arduino as follows.



- Red LED wired to Digital to pin 07
- Yellow LED wired to Digital to pin 11
- Blue LED Wired to Digital to pin 08

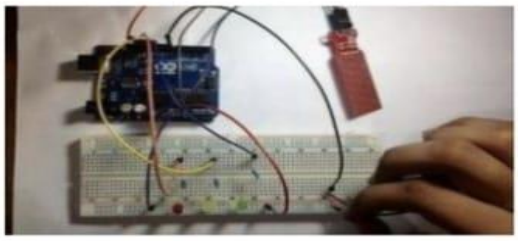
Step 3: Connect the Water Sensor with Arduino



Connect the water level sensor to Arduino as follows:

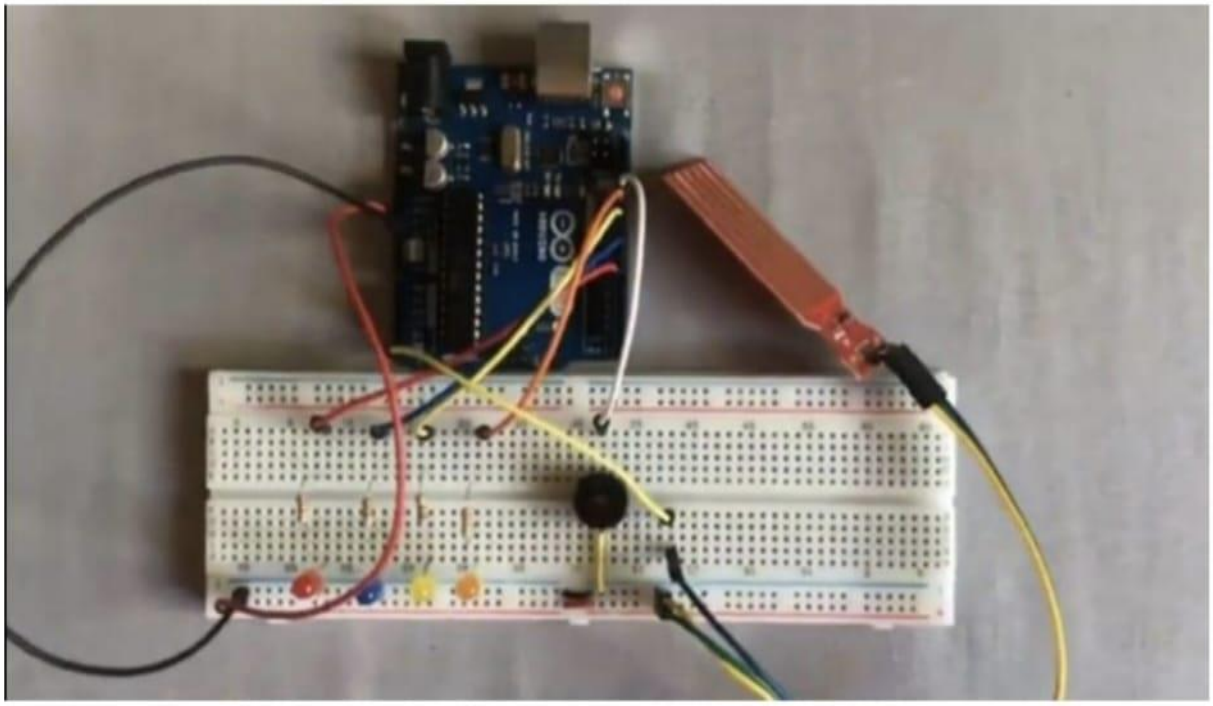
- With the Water Sensor pins you need to connect to the Arduino pins.
- The Negative (-) pin will need connect to the GND on the Arduino with a wire.
- The Positive (+) pin is needed to connect to the VCC on the Arduino And The (S) pin needs to be connected to A0 on the Arduino with the wires provided.

Step 4:

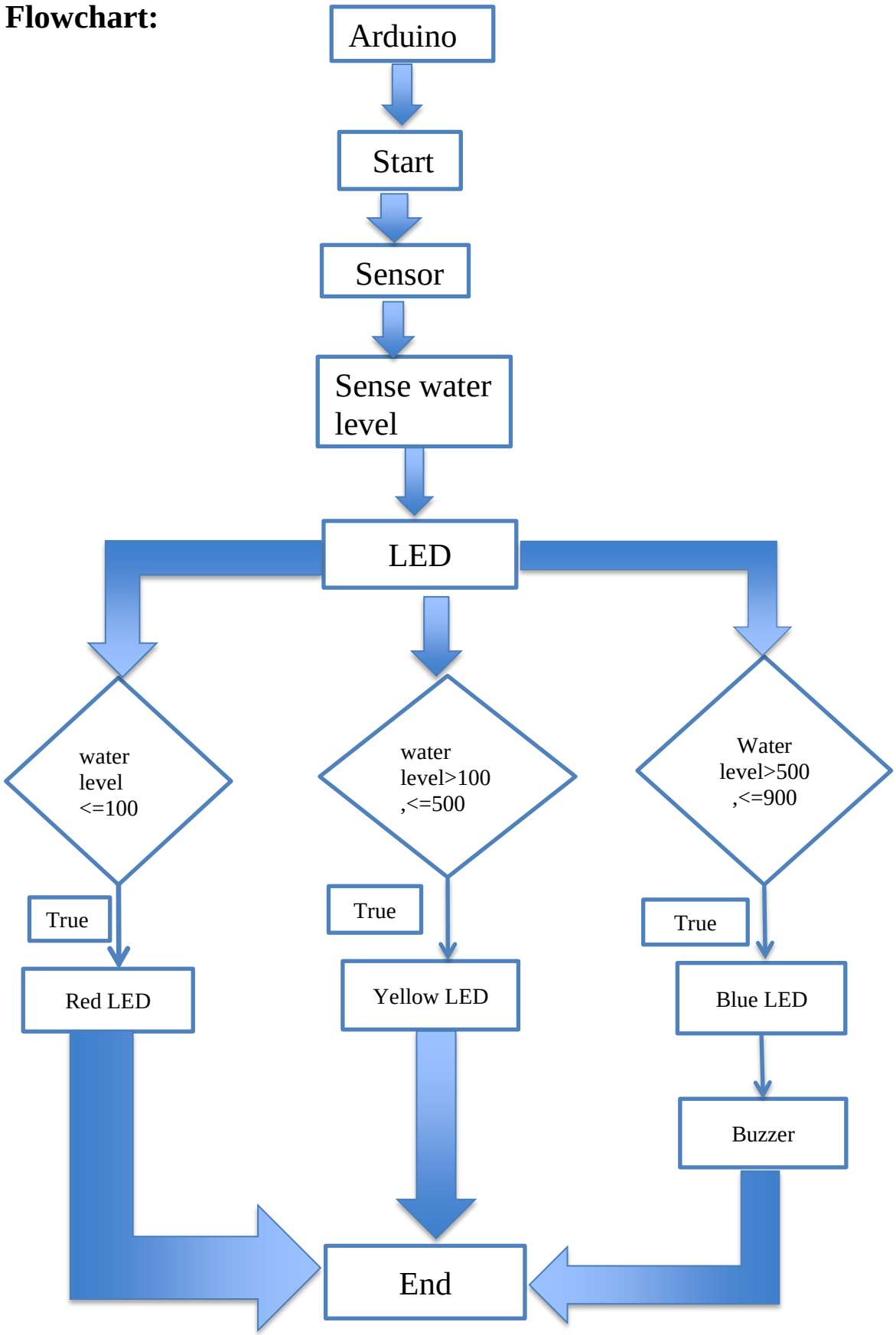


Connect the buzzer the positive to Digital pin 13 of Arduino and the negative to ground on the board on the negative. After putting all components on the breadboard connected to the Arduino and making sure all components are connected , now place the water sensor in the tank empty and then pour the water slowly into tank.

Circuit connection :



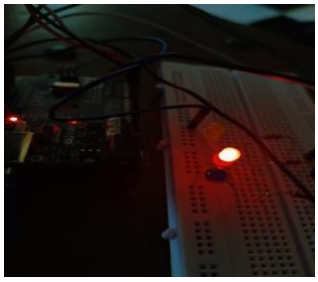
Flowchart:


Arduino
Start
Sensor
Sense water level
LED
water level <=100
water level>100 ,<=500
Water level>500 ,<=900
True
True
True
Red LED
Yellow LED
Blue LED
Buzzer
End

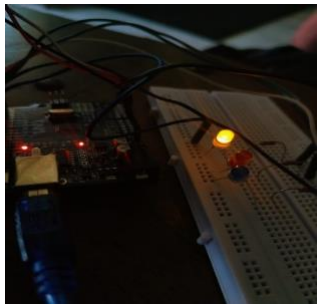
4.Results / Outputs:

The circuit is designed to indicate three levels of water stored in the tank: low but not empty, half and full but not overflowing. When there is no water in the tank, all the LEDs are off as an indication that the tank is completely empty. When water level increases and touches the sensor,

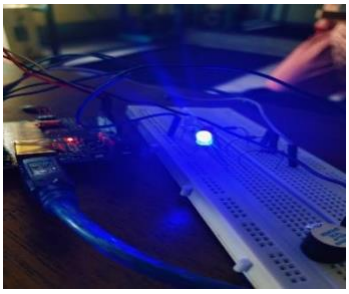
the Red LED will glow indicating that there is water within the tank.



As the water level continues to rise and reaches half the tank, Yellow LED will glow.



When the water in the tank rises to full and blue LED will glow and an alarm is made by the buzzer as an indication that the tank is full.



5.Conclusion :

A water level indicator is a valuable tool that helps us monitor an manage water levels effectively. Whether it is in a household water tank, a swimming pool, or a reservoir, having a reliable indicator allows us to ensure that we have an adequate supply of water and prevent any potential issues such as overflow or shortage. By providing real-time information about the water levels, a water, level indicator empowers us to take proactive measures and make informed decisions about water usage and conservation. This not only helps us save water and reduce wastage but also promotes sustainability and environmental consciousness. Investing in a water level indicator is a small step that can make a big difference in our water management efforts, ensuring that we have a sufficient and sustainable water supply for our needs.

6.Reference:

1.Official Arduino BT website: https://www.arduino.cc/en/software

2. https://youtu.be/AURxODjCcoo

3.INTERNATIONAL JOURNAL OF ENGINEERING RESEARCH & TECHNOLOG (IJERT) 4.Sourove,A.M.,Pratik,R.,Golam,K.,Sahid,H.and Samiul,I.(2016) "Construction of Digital Water Level and Automatic Pump Controlled System" Volume 03, Issue 12.www.researchgate.net

5. https://learn.sparkfun.com/tutorials/analog-to-digital-conversion/all

DATA SHEET:

Water level sensor:

The product introduction:2013 latest Water Sensor is a Easy to use, compact and lightweight , high cost of water , droplets identification and detection sensors. This sensor is working The principle is to measure the size of the trace amount of water droplets through the line with a series of parallel wires exposed . And domestic and foreign Products compared not only small , powerful, and cleverly designed with the following features : First, the amount of water to simulate Conversion ; Second, plasticity, based on the sensor output analog values ; Third, low power consumption , high sensitivity ; Fourth, can Directly connected to a microprocessor or other logic circuitry , and the controller board for a variety of , for example : ArduinoController , STC microcontroller , AVR microcontroller and so on.

The specification parameters

1 Product Name: water level sensor

2 Item :. K-0135

3 Operating voltage :. DC5V

4 Working current : less than 20mA

5 Sensor Type : Analog

6 detection area :. 40mm x16mm

7 Production process :. FR4 double-sided HASL

8 mounting hole size : 3.0mm

9 user-friendly design : half-moon -slip handle depression

10 Working temperature :. 10 ℃ -30 ℃

11 Operating Humidity : 10% ~ 90 % non -condensing

12 Weight :. 3g

13 Product Dimensions : 65mm x 20mm x 8mm

The test Water Sensor Module:

We use the Arduino controller to be tested , need to use hardware devices as follows :

1. Arduino controller × 1
2. Arduino sensor expansion board × 1
3. Water Sensor Module × 1
4. 3P sensor cable × 2
5. IR & LED Modue (red) × 1
6.USB data communication cable × 1

Water Sensor DuPont line will be connected to the Arduino sensor expansion board interface A1.

The use of sensors:

The red line will be connected to the Arduino piranha light sensor expansion board D8. After completing the hardware connection , the code is compiledAfter downloading the Arduino inside.

Arduino UNO:

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digit input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

Summary

Microcontroller : ATmega328

Operating Voltage : 5V

Input Voltage (recommended) : 7-12V

Input Voltage (limits) : 6-20V

Digital I/O Pins : 14 (of which 6 provide PWM output)

Analog Input Pins : 6

DC Current per I/O Pin : 40 mA

DC Current for 3.3V Pin : 50 mA

Flash Memory : 32 KB (ATmega328) of which 0.5 KB used by bootloader

SRAM : 2 KB (ATmega328)

EEPROM : 1 KB (ATmega328)

Clock Speed : 16 MHz

Power:

The Arduino Uno can be powered via the USB connection or with an external power supply. The power source is selected automatically.External (non-USB) power can come either from an AC-to-DC adapter (wall-wart) or battery. The adapter can be connected by plugging a 2.1mm center-positive plug into the board's power jack. Leads from a battery can be inserted in the Gnd and Vin pin headers of the POWER connector.

The board can operate on an external supply of 6 to 20 volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and the board may be unstable. If using more than 12V, the voltage regulator may overheat and damage the board. The recommended range is 7 to 12 volts.

The power pins are as follows:

 VIN. The input voltage to the Arduino board when it's using an external power source (as opposed to 5 volts from the USB connection or other regulated power source). You can supply voltage through this pin, or, if supplying voltage via the power jack, access it through this pin.

 5V.This pin outputs a regulated 5V from the regulator on the board. The board can be supplied with power either from the DC power jack (7 - 12V), the USB connector (5V), or the VIN pin of the board (7-12V). Supplying voltage via the 5V or 3.3V pins bypasses the regulator, and can damage your board. We don't advise it.

 3V3. A 3.3 volt supply generated by the on-board regulator. Maximum current draw is 50 mA.

 GND. Ground pins.

Buzzer:

Features

• Black in colour

• With internal drive circuit

• Sealed structure

• Wave solderable and washable

• Housing material: Noryl

Specifications:

Rated Voltage : 6V DC

Operating Voltage : 4 to 8V DC

Rated Current* : ≤30mA

Sound Output at 10cm* : ≥85dB

Resonant Frequency : 2300 ±300Hz

Tone : Continuous

Operating Temperature : -25°C to +80°C

Storage Temperature : -30°C to +85°C

Weight : 2g

*Value applying at rated voltage (DC)

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Course Outcomes: After completion of the course, the graduates will be able to

CO1	Identify and assemble various electrical and electronics components
CO2	Design basic electrical and electronic circuit/models
CO3	Building of electrical and electronics circuits.
CO4	Connect as an individual or in a team in developing technical mini projects
CO5	Conclude and write project related activities and findings.

Mapping of Course outcomes to Program outcomes and PSOs:

	PO 1	**PO 2**	**PO 3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO 9**	**PO1 0**	**PO1 1**	**PO1 2**	**PSO 1**	**PSO 2**	**PSO 3**
CO1															
CO2															
CO3															
CO4															
CO5															

Name and Signature of the Students

(1)

(2)

(3)

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Signature of Internal Guide with date