Water Level Indicator

UNIVERSITY OF ENGINEERING
&
MANAGEMENT, JAIPUR

Water Level Indicator

Submitted in the partial fulfilment of the degree of

BACHELOR OF COMPUTER APPLICATION

BY

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UNDER THE GUIDANCE OF

PROF. Subrat Gautam

COMPUTER SCIENCE & ENGINEERING

Approval Certificate

This is to certify that the project report entitled **"Water Level Indicator"** submitted by **Naveen Choudhary** (Roll: **12019004009040**) in partial fulfilment of the requirements of the degree of **Bachelor of Computer Application** from **University of Engineering and Management, Jaipur** was carried out in a systematic and procedural manner to the best of our knowledge. It is a bona fide work of the candidate and was carried out under our supervision and guidance during the academic session of 2019-2022.

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Prof. Subrat Gautam

Project Guide, Assistant Professor (CSE)

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ABSTRACT

The drinking water crisis in India is reaching alarming proportions. It might very soon attain the nature of global crisis. Hence, it is of extreme importance to preserve water. In home-based water tank, the one problem is very common to us that the control of water level of overhead tank, as a result the wastage of water is increasing day by day. But we all know water is very precious to us. This problem can be controlled by a simple electronic circuit consists with some cheap electronic components, that circuit is called 'Water Level Indicator'. The operation of water level controller works upon the fact that water conducts electricity. So, water can be used to open or close a circuit. As the water level rises or falls, different circuits in the controller send different signals. These signals are used to switch ON or switch OFF the motor pump as per our requirements. Water Level Indicator is a simple low-cost circuit. First, we introduced this circuit from the web. There the circuit is made with various components like transistors (BC547.BC548) Resistors, Leds and etc. After we discussed that how to make the circuit without transistors and after we calculate that we got the result, beside we got help from our teacher about this circuit. At last, we got a simple circuit without transistor and it shows result. We removed the transistors to make the circuit cheap and easy installation to all.The other liquid control circuits, which we have seen those are very critical than this circuit..

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CHAPTER - 1

1. INTRODUCTION

A Water Level Indicator may be defined as a system by which we can get the information of any water reservoir. Water level indicator system is quite useful to reduce the wastage of water from any reservoir, while filling such reservoir. Water is most essential thing on earth .Safe drinking water is essential to human and other life forms even though it provides no calories or organic nutriants. The total amount of water available on Earth has been estimated at 1.4 billion cubic kilometers, enough to cover the planet with a layer of about 3 km. About 95% of the Earth's water is in the oceans, which is unfit for human consumption. About 4% is locked in the polar ice caps, and the rest 1% constitutes all fresh water found in rivers, streams and lakes which is suitable for our consumption. A study estimated that a person in India consumes an average of 135 litres per day. This consumption would rise by 40% by the year 2025. This signifies the need to preserve our fresh water resources . However, some observers have estimated that by 2025 more than half of the world population will be faced water based vulnearbility. The presence of water level indicator in reservoir can help control wastage and water indeaquacy in such reservoir. Water level indicator is used to show level of water in an over head tank, this keeps the user informed about the water level at all time avoids the situation of water running out when it is most needed. Indicators circuits have also alarm features. It not indicate amount of water present in overhead tank but also gives an alarm when tank is full. Advantages of the proposed water level controller are, very less maintenance, very low cost, very simple construction and the circuit involved is also relatively simpler. It can be easily made at home . After assembling the system, what remains is to observe its operation and efficiency. This can be done by breaking down the activity of the controller from the detection of water to the working of the pump. We go over the responses obtained when water reaches the sensors and the logic employed behind it. We also try to justify how a system as simple as ours can compete with those available commercially.

2 OBJECTIVE

The following objectives are likely to be focused and achieved at the end of the project.

1. To make the most commercial and reliable water level controller using as less resources as possible.
2. To study the controller model and observe its characteristics.
3. To compare the controller with the conventional controllers available in market.
4. To propose any ideas or improvements that can lead to future development of the controller.
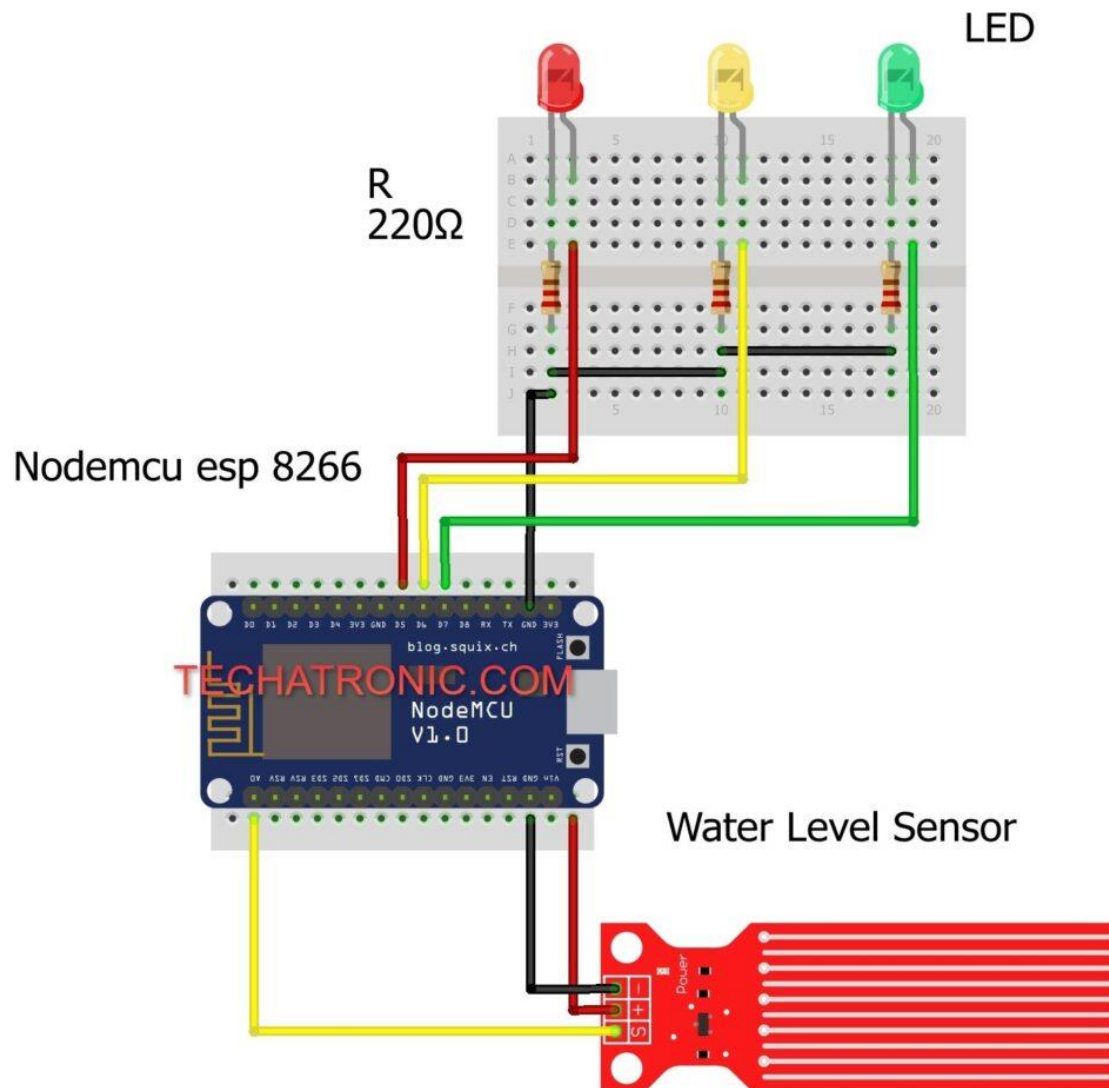
3 BLOCK DIAGRAM

Fig 1.3.1: BLOCK DIAGRAM

4 HARDWARE REQUIREMENTS

1. Resistors: 33ohms

2. Speaker

3. Different colour LEDs

4. IC: ULN2003

5. NodeMCU

5 SOFTWARE REQUIREMENTS

1. Arduino IDE

2. Programming Language: C

3. Arduino IoT Cloud

4. Arduino IoT Remote

CHAPTER – 2

1. Resistors: 33ohms:

A resistor is   a passive two-terminal electrical   component that implements electrical resistance as a circuit element. In electronic circuits, resistors are used to reduce current flow, adjust signal levels, to divide voltages, bias active elements, and terminate transmission lines, among other uses. High-power resistors that can dissipate many watts of electrical power as heat may be used as part of motor controls, in power distribution systems, or as test loads for generators.

Fixed resistors have resistances that only change slightly with temperature, time or operating voltage. Variable resistors can be used to adjust circuit elements (such as a volume control or a lamp dimmer), or as sensing devices for heat, light, humidity, force, or chemical activity. A resistor is an electrical component that limits or regulates the flow of electrical current in an electronic circuit. Resistors can also be   used to provide a specific voltage for an active device such as a transistor.
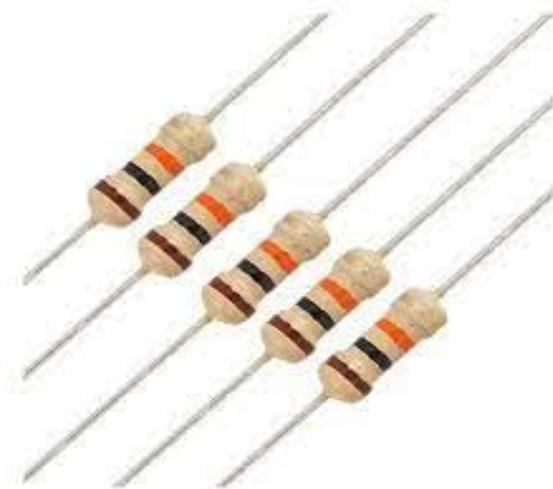
Fig 2.1.1 RESISTORS

2. Buzzers

A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric (piezo for short). Typical uses of buzzers and beepers include alarm devices, timers, train and confirmation of user input such as a mouse click or keystroke. Buzzers are also known as sounders, piezo buzzers, audible alarms, audio indicators and piezo transducers. They are piezo or electro-mechanical devices that produce a sound when an AC or DC voltage is applied.

This sound is usually a single buzz tone, although dual tone and fast/slow pulse sounders are available. An audio signaling device like a beeper or buzzer may be electromechanical or piezoelectric or mechanical type. The main function of this is to convert the signal from audio to sound. Generally, it is powered through DC voltage and used in timers, alarm devices, printers, alarms, computers, etc. Based on the various designs, it can generate different sounds like alarm, music, bell & siren.

Fig 2.2.1 BUZZER

3. LEDs

LED, in full **light-emitting diode**, in electronics, a semiconductor device that emits infrared or visible light when charged with an electric current. Visible LEDs are used in many electronic devices as indicator lamps, in automobiles as rear-window and brake lights, and on billboards and signs as alphanumeric displays or even full-colour posters. Infrared LEDs are employed in autofocus cameras and television remote controls and also as light sources in fibre-optic telecommunication systems.

The familiar lightbulb gives off light through incandescence, a phenomenon in which the heating of a wire filament by an electric current causes the wire to emit photons, the basic energy packets of light. LEDs operate by electroluminescence, a phenomenon in which the emission of photons is caused by electronic excitation of a material. The material used most often in LEDs is gallium arsenide, though there are many variations on this basic compound, such as aluminum gallium arsenide or aluminum gallium indium phosphide. These compounds are members of the so-called III-V group of semiconductors—that is, compounds made of elements listed in columns III and V of the periodic table. By varying the precise composition of the semiconductor, the wavelength (and therefore the colour) of the emitted light can be changed.

Fig 2.3.1 LEDs

4. ULN2003

ULN2003 comes with multiple functions. It has seven Darlington transistors installed which could help to control 7-Loads at the same time. It comes with 16 pins and multiple packings like SOP, PDIP, TSSOP or SOIC. This could help the user to install the IC with any circuit without taking too much space as a transistors circuit. The output power source could apply separately to all the outputs but the input will be the same as all microcontrollers and microprocessors.

The voltage range for any load is 50V but the current range is 500mA which could be increased by combining the multiple output pins. ULN2003 comes with internal safety protection from back emf. It has an internal flyback protection system which gives protection to the device.

Fig 2.4.1 ULN2003

5. Node MCU

The NodeMCU (Node MicroController Unit) is an open-source software and hardware development environment built around an inexpensive System-on-a-Chip (SoC) called the ESP8266. The ESP8266, designed and manufactured by Espressif Systems, contains the crucial elements of a computer: CPU, RAM, networking (WiFi), and even a modern operating system and SDK. That makes it an excellent choice for Internet of Things (IoT) projects of all kinds.

However, as a chip, the ESP8266 is also hard to access and use. You must solder wires, with the appropriate analog voltage, to its pins for the simplest tasks such as powering it on or sending a keystroke to the "computer" on the chip. You also have to program it in low-level machine instructions that can be interpreted by the chip hardware. This level of integration is not a problem using the ESP8266 as an embedded controller chip in mass-produced electronics. It is a huge burden for hobbyists, hackers, or students who want to experiment with it in their own IoT projects.

Fig 2.5.1 Node MCU

CHAPTER – 3

1. Arduino IDE

The Arduino IDE is an open-source software, which is used to write and upload code to the Arduino boards. The IDE application is suitable for different operating systems such as **Windows, Mac OS X, and Linux**. It supports the programming languages C and C++. Here, IDE stands for **Integrated Development Environment**.

The program or code written in the Arduino IDE is often called as sketching. We need to connect the Genuino and Arduino board with the IDE to upload the sketch written in the Arduino IDE software. The sketch is saved with the extension '.ino.'
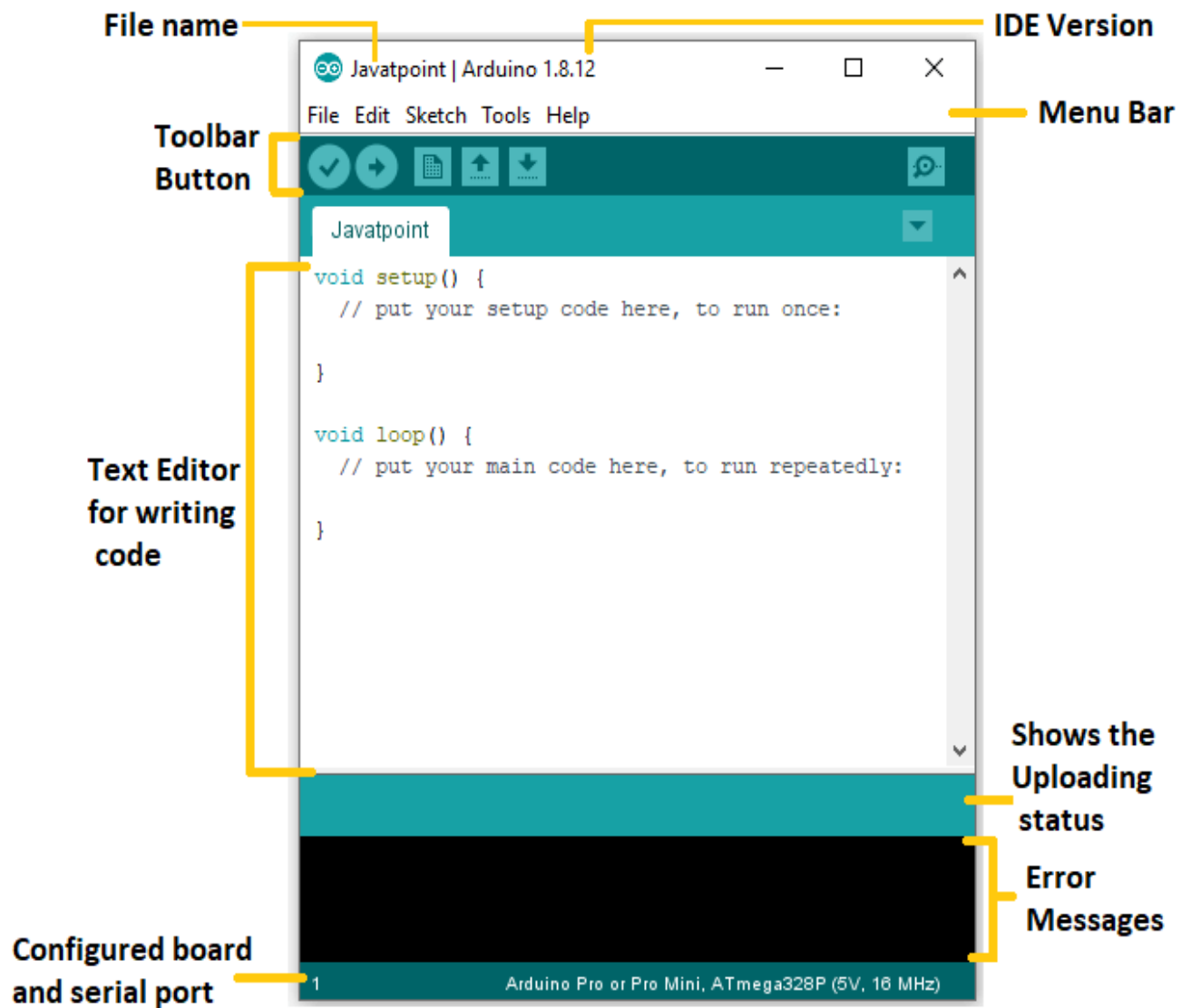
Fig 3.1.1 Arduino IDE

2. Programming Language: C

C is an imperative, procedural language in the ALGOL tradition. It has a static type system. In C, all executable code is contained within subroutines (also called "functions", though not in the sense of functional programming). Function parameters are passed by value, although arrays are passed as pointers, i.e. the address of the first item in the array. Pass-by-reference is simulated in C by explicitly passing pointers to the thing being referenced.

C program source text is free-format, using the semicolon as a statement separator and curly braces for grouping blocks of statements.

The C language also exhibits the following characteristics:

- The language has a small, fixed number of keywords, including a full set of control flow primitives: if/else, for, do/while, while, and switch. User-defined names are not distinguished from keywords by any kind of sigil.
- It has a large number of arithmetic, bitwise, and logic operators: +,+=,++,&,||, etc.
- More than one assignment may be performed in a single statement.
- Functions:
  - Function return values can be ignored, when not needed.
  - Function and data pointers permit ad hoc run-time polymorphism.
  - Functions may not be defined within the lexical scope of other functions.
  - Variables may be defined within a function, with scope.
  - A function may call itself, so recursion is supported.

3. Arduino IoT Cloud

Arduino IoT Cloud is an application that helps makers build connected objects in a quick, easy and secure way. You can connect multiple devices to each other and allow them to exchange real-time data. You can also monitor them from anywhere using a simple user interface.

Arduino IoT Cloud is fully integrated in the Arduino Create ecosystem, you will be able to generate a template code in Arduino IoT Cloud and then edit and upload it to your board using the Arduino Web Editor.
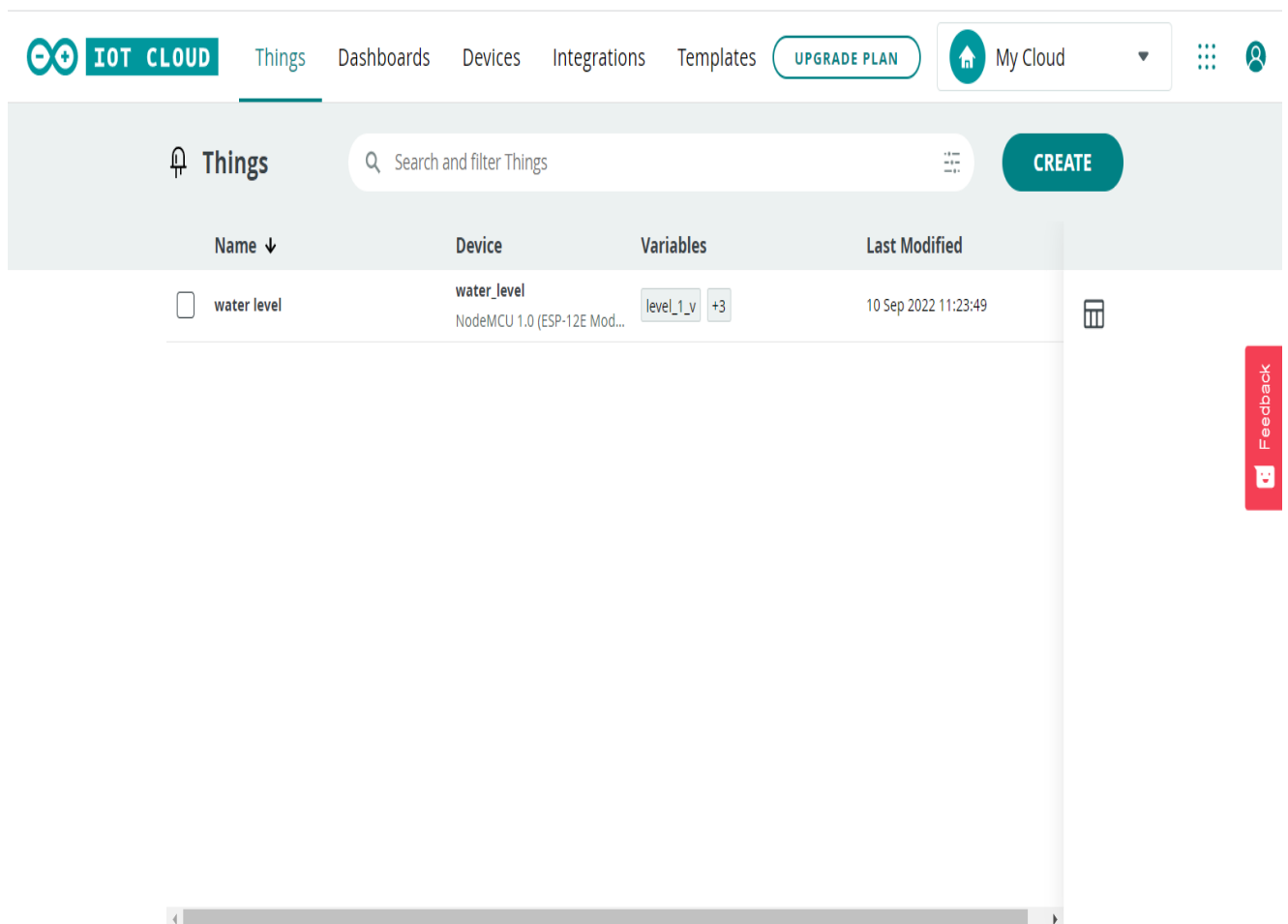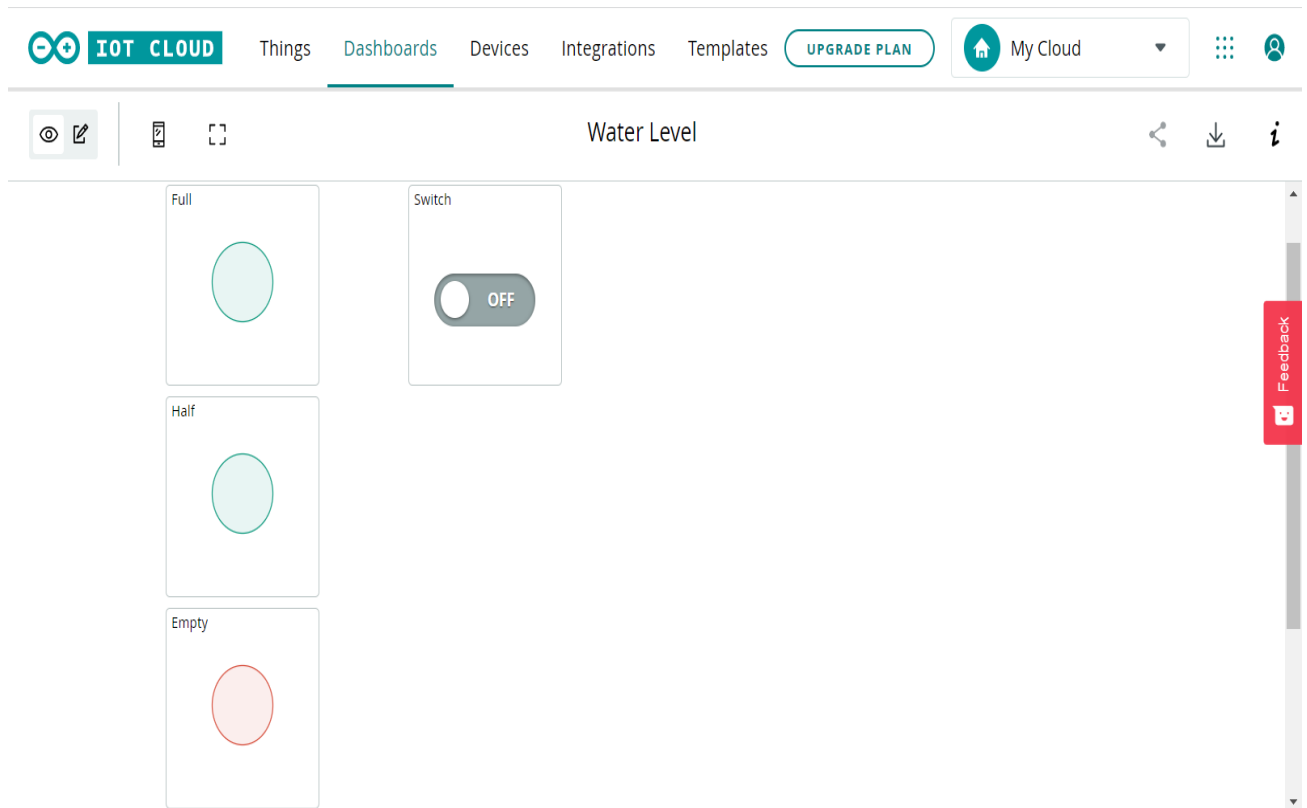

Fig 3.3.1 Arduino IoT Cloud
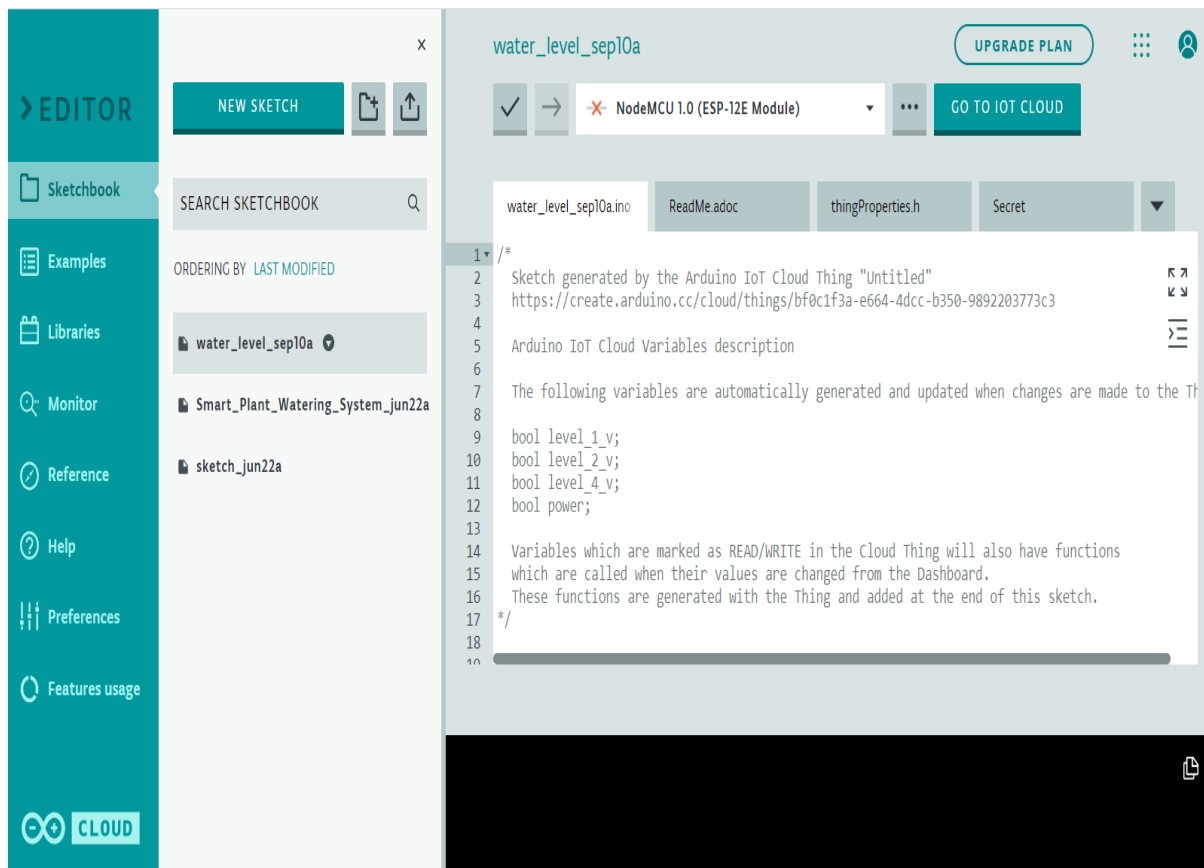
Fig 3.3.2 Arduino IoT Dashboard

Fig 3.3.3 Arduino IoT
Code Ide

4. Arduino IoT Remote

The Arduino IoT Cloud Remote is free a companion app to their Arduino IoT Cloud, an online version of the Arduino IDE application. Projects in the Arduino IoT Cloud are called "things" and they represent the hardware and software used to build a project. By creating a dashboard for the "thing", the project can be controlled via the Arduino IoT Cloud Remote app, for example a robot controlled from your smartphone. Or the thing can send data, from your sensors directly to your smartphone.

When it comes to maker projects, there are fans for both the Arduino and Raspberry Pi.(opens in new tab) The Arduino IoT Cloud sees a streamlined, cloud based workflow that offers a refreshing alternative for fans from both camps.
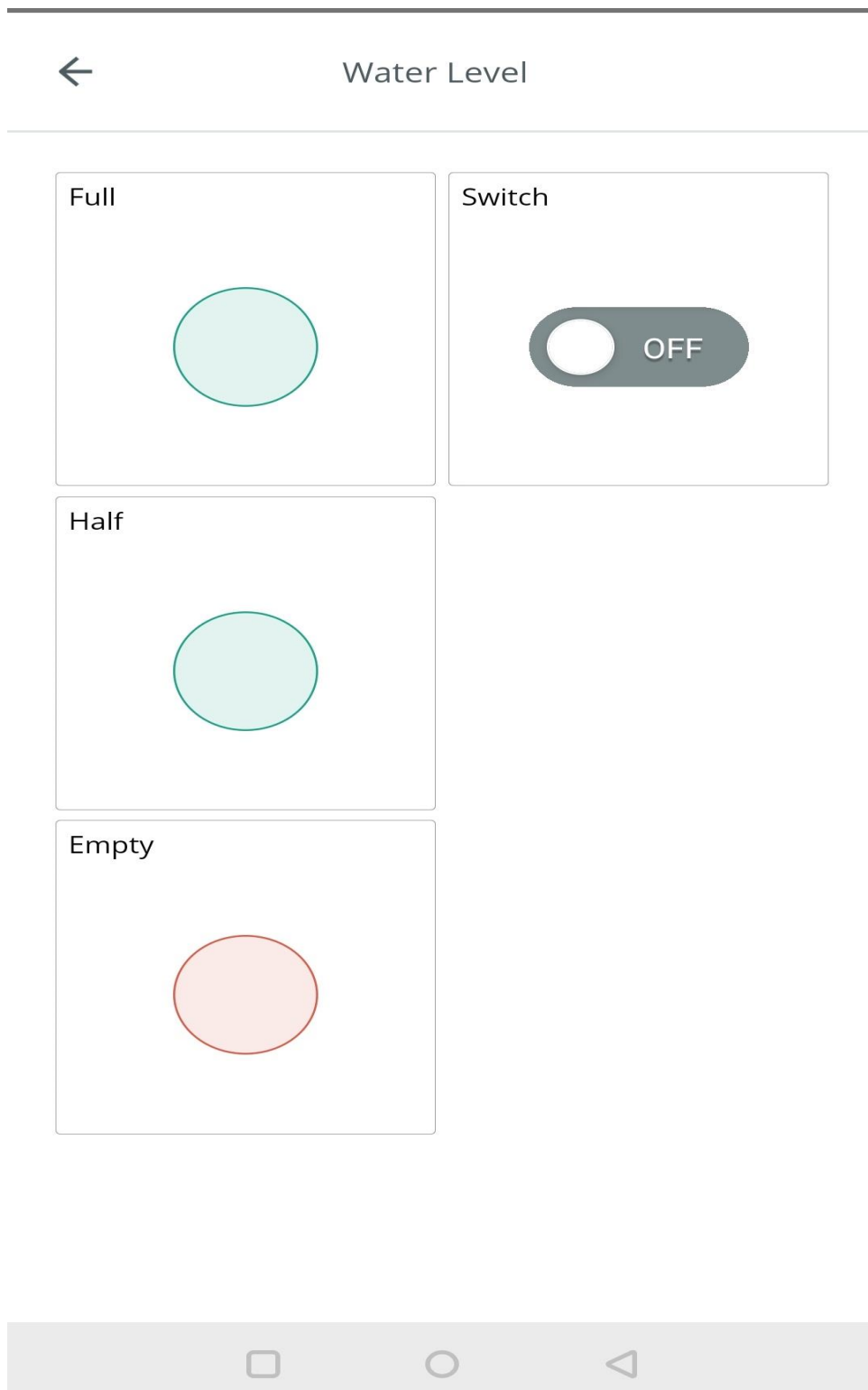
← Water Level

Full

Switch

OFF

Half

Empty

Fig 3.4.1 Arduino IoT Remote

CHAPTER – 4

1. Market Potential

Market Potential of this water level indicator is very high for following reason.

1. Simple circuit: This water level indicator consists with a simple circuit. It is so simple to install and its so much easy to use.

2. Low cost The equipments required for this circuit are readily available in the market and of very low value.

3. Low voltage consumption The circuit does not need any AC auxilliary supply, it operates on DC voltage source (9 V DC). Thus it is a very low consumption circuit.

4. Pollution control Process Involved in the manufacturing of this item does not have any effect on environment

2. Process of manufacture

A simple water level indicator can be made using resistors, LEDs, etc. For this it may be designed a water sensor by using conducting wires. In this paper we have designed the sensor to measure water up to four levels. Take 4 segments of insulated conducting wires. Tore out the ends ofthese wires, approximately 1cm. Adjust the length of the wire segments according to the water levels. In the following diagram it has been displayed with 4 different colours. The wire with Black colour is connected to buzzer. The wires with colours Yellow, Red, &Green are adjusted to check Level1, Level2, Level3 and Level4 respectively.

Water level indicator works through the following circuit diagram. Here this circuit is connected to 9 volt dc voltage source. The positive end of the dc source is conneted to the over head water tank and the negative end of the dc source is connected the diode leds and the buzzer accordingly. The other end of the leds are connected to the 220 ohm resistors and the resistor ends are connected to the separately to the over head water tank. The buzzer's other end is connected to the over head water tank here the resistor is not connected. One switch is connected between the positive voltage source of the circuit and the battery

3. Working Principle

- When the water stared filling to the over head water tank then the green led glows.
- Next when the level reaches upto the mid level of the over head water tank then yellow led glows.
- After that the red led glows that the tank is going to be full or full.
- At last the buzzer sounds when tank is going to be over flow.
- All the data is go to the server with the help of NodeMCU. It take the data with the help of its digital pins. After taking the data it send it to the cloud.That is provide by the Arduino.

4. Applications

Water level Indicator can be used in Hotels, Factories, Homes, Apartments, Commercial complexes, Drainage, etc. It can be fixed for single phase motor, three phase motors, fuel level indicator in veichles.liquid level indicator in the huge container companies on the tank walls. The water level indicator circuits are used in factories, chemical plants, and electrical substations and in other liquid storage systems. There are many possible uses for this simple system, examples include monitoring a sump pit (to control pump activation), rainfall detection, and leakage detection. Electronic water level circuits have the capability of alerting if there is a water leak somewhere in the factory. When the water level is too high or too low or exceeds the higher limit, it can detect the water level easily by hearing an alarm sound or from different colors of a light bulb. We can also measure the fuel level in motor vehicles and the liquid level containers which are huge in the companies. The water level alert system in industries can notify the user with an alarm when the water level reached is too high or too low; systems may be wired or wireless. They are used in factories such as electrical substations and in other liquid storage systems which have many uses like flood warning, management of water wells, and locating water. Smart Cities on the east coast of the USA deploy flood warning systems that monitor water levels using Industrial IoT sensors.

5. CONCLUSION

The water level Inndicator employs a simple mechanism to detect and indicate the water level in an over head tank or any other water container. The sensing is done by using a set of four probes which are placed at four different levels. We can conclude that this system is very beneficial in rural as well as urban areas. It helps in the efficient utilization of available water sources. If used on a large scale, it can provide a major contribution in the conservation of water for us and the future generations. In these days, when the Earth's reserve of consumable water is decreasing every moment, every drop has its value. Water level controller is a simple yet effective way to prevent wastage of water. Its simplicity in design and low cost components make it an ideal piece of technology for the common.

In future, we want upgrade this circuit with some sensor which can automatically stop the power supply of the driving pump or motor. As a result the future circuit is not very cheaper the present one, but we try our best to

- Make it simple,

- Easy to use,

- Easy to install,

- To make Available for all,
- Try to smaller than the present one.

6. References

[1]. Fundamentals of Electronic circuit design – Hongsen Ma

[2]. Introduction of Electronics -Yatindra Nath Singh

[3]. https://en.wikipedia.org - Wikipedia

[4]. www.google.co.in –Google

[5]. Joydeep Kumar Chakraborty, "Water Level Controller"

[6]. Rex Niedermeyer, "Aquarium Water Pumps"