Phoenix: International Multidisciplinary Research Journal
Vol 1, No. 2, April-June, 2023
ISSN:2583-6897

APPROACH FOR DETECTING WATER LEVEL AND QUALITY WITH ALERT MESSAGE

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https://doi.org/10.5281/zenodo.7860957

Abstract

Approximately 97.5% of the water on Earth is salt water and the remaining little amount of water is fresh water that can be consumed by humans. With this less percentage of fresh water, we humans have to be very careful with the proper usage of water. Water should be saved at any cost for living a problem-free life and even saving our future generations. Water level detection is a vital activity that ensures less wastage of water through water tanks and it has to be ensured to detect when the water has reached a level and switch it off. Water purity again plays the most important role in our daily lives. The water we consume daily in form of food, drinks, and even normal water form, either builds or breaks our body internally. Lack of purity in water affects our lives in different ways and can even cause major health-related issues which can even be incurable.
Water is the only future and to save it and maintain its purity is our responsibility as human beings.

Keywords—water wastage prevention, water purity, effects

1. Introduction

This project addresses the most pressing issues concerning the water we use in our daily lives for a variety of purposes. Irrigation is the most water-intensive activity performed in the world, accounting for the majority of all activities. Water, along with temperature, sun, and soil, is an essential component for growing crops. Water is used extensively in irrigation methods, and there may be significant water loss if proper precautions are not taken promptly.
Dairy industries, textile manufacturing, and other industries use a large amount of water to produce their products, so using only what is needed is critical.
Many private houses and flats that have water tanks connected to the water supply branch also waste a lot of water if they forget to off the water motor.

Water purification is another important topic to look into. The water we use in our daily life is polluted and harmful to our hair, body, and even our health. Checking the purity of water before using it is crucial or it may lead to different health hazards.
This project deals with water detection when the water reaches a certain level and indicates through a buzzer making noise and switches off the water supply directly. This project can be used to detect the water level and predict the Flood that might occur in the future. Measuring the tide and waves of the sea or ocean can be predicted when a flood or any other disaster is likely to occur and then required measures can be taken.
Water tank monitoring and irrigation can also implement in this project to use as much water as required and thus save water from being wasted.

Many factories use water in huge amounts to produce their products and using water only as much as it's required is important. Many private houses and flats that have water tanks connected to the water supply branch also waste a lot of water if they forget to off the water motor.
Purified water is equally important as saving water. The water we use in our daily life is polluted and harmful to both, our hair, body, and even our health. This project will help us in checking the purity of water and then we can decide whether to use it or not. This project deals with water detection, which indicates when the water reaches a certain level by making noise and switching off the water supply directly. This project can be used to detect the water level and forecast a flood in the future. By measuring the tides and waves of the sea or ocean, it is possible to predict when a flood or other disaster is likely to occur and then take the necessary precautions.Water tank monitoring and irrigation can also be used to implement this project and use as much water as needed, saving water from being wasted.
Many factories use a lot of water to make their products, so using only what is required is critical. If the water motor is not turned off, many private homes and apartments with water tanks connected to the water supply branch waste a lot of water. This will be accompanied by a text message sent to the user's phone number.
Water purification is just as important as water conservation. Our drinking water is polluted and harmful to our hair, body, and even our health. This project will help us determine the purity of water so that we can decide whether to use it or not.

2.Objective

The goal of this project is to create a model that would show how much water would be saved from spilling, how clean and transparent the water is, and also how to inform the owner of the updates.

3.Literature Review

In response to tidal levels at the coastline and variable weather conditions, this research paper examined the installation and design of an Internet of Things-based marine notification system. The two IoT platforms used in this study to display the model's results included Thing Talk and the Blynk Application. A cylindrical building with a water entry, a float, a microcontroller circuit set up with an ultrasonic sensor, and a huge water container to simulate onshore circumstances make up the suggested model configuration. The microcontroller receives one input from the ultrasonic sensor, which detects the level of water. [1]

Floods have caused tremendous harm to both human life and property during the past few decades. The essential window of time for evacuation is determined by alert systems. This work suggests a wireless sensor network model that evaluates changes in weather predictions to past data to identify flood disasters. Data has been collected for sea-level air pressure and rainfall from the Google API, as well as for air pressure at sea level, water level, wind speed, temperature, humidity, and precipitation from sensors placed at various sites throughout the study region. [2]

When it rains, an aircraft's runway is designed to keep it dry in order to avoid hydroplaning. A plane hydroplanes when it runway slips because of standing water. Ditjen Perhubungan Udara NO. KP 212, as to Derektorat Bandara rules. As of 2017, runways must meet the technical standard of having no more than 3 mm of stagnant water on the ramp in order to accommodate aircraft flights and landings. The Mega Microcontroller analyses and delivers the collected data to the thing talk via the network connection, in the construction of the water level sensor model on the runway. [3]

Disasters involving flooding have evolved into a category that the Indonesian government has prioritized on a national scale. It was emphasized to all parties that disaster mitigation solutions should be available in measures to lessen the number of flood victims, both short-term and long-term. Building a flood alert system is the goal of this study for short-term disaster mitigation programs by leveraging GSM connectivity between Systems for flood detection and wireless flood alarms. An ultrasonic sensor is used as a water level detector, a flood warning system that uses a transceiver GSM module serves as the data connection channel, and a microcontroller as the data controller. made up of a GSM (Global System for Mobile Communications receiver module, an electronic alarm, and an Arduino microcontroller. [4]

Indonesia is a country with distinct seasons, from April to September, they experience the summer season and the remaining months experience, the rainy season, which causes flooding in a number of Indonesia's major cities where the issue starts with an accident, the exhaust Carbon Dioxide gas on the car does not burn entirely, which causes puddles to meet the segments of road, which results in roadways becoming mangle. Hence, this increases air porosity, where the issue first appears after a traffic accident. To solve this problem, we developed a platform for spotting potholes and keeping track of road conditions. [5]

Every industry, including school buses, transportation, and logistics, requires a vehicle. As a result, vehicle tracking, monitoring, and control are required for security and safety reasons. The safety of their children is one of the most important concerns for parents. A tracking, monitoring, and controlling system (TMCS) is introduced and developed to address such issues. It's based on an open-source platform with an Atmega328 microcontroller, no GPS, SIM 800, and a single-channel relay. It sends the user a short message informing them of their current location. [6]

Over the past ten years, numerous plasmonic devices with carefully considered designs have displayed astounding functions in fields like information, and photodynamic therapy conversion to solar energy. Because of its high potential indesalination, sterilization, and other applications, Recent years have seen a lot of interest in plasmon- enhanced sunsteam production. For the first time, we present an asymmetric plasmon structure (APS) that is suitable for both contamination detection and solar water purification. This is created by tightly packed metal nanoparticles ego into porous templates. Effective solar steam can be produced by the APS. The excellent performance insolar thermal conversion and chemical sensing is due to broadband and efficient optical emission and significant local field enhancement [7]

Vehicle tracking systems are popular because they can be used for retrieval and avoiding theft. This project designed and constructed a vehicle tracking and accident alarm system using technologies (VTAA). A microcontroller, a GSM module, A GPS receiver a push button to activate an accident alert, all are included in this project. The GPS module receives the system's current location coordinates. The GSM module serves as the transmission and reception of data that the user controls using a command line. The push button, the microprocessor, the SIM900, the GPS receiver (sensor), and its integration with the GSM module make up the hardware component. [8]
Natural catastrophes are common and frequently happen everywhere in the world. Indonesia includes flooding, which frequently happens at night and when the resident is not in a location where fatalities and material losses are usual. The objective of this study is to deploy a prototype system that uses alarm sounds or SMS messages to alert people to before the water enters the area or where their dwellings are, there maybe a chance of flooding. When it detects flooding, the Arduino microcontroller will be used in this flood-cutting early warning prototype system to precisely regulate the ultrasonic sensor, which will serve as a water level detector, and the buzzer sensor, which will serve as an alarm or sounder. [9]

We present an Arduino-based water level detecting system in this paper. It is composed of Bluetooth and Arduino is used. The Arduino tracks the water level after receiving level data from the sensors and using preconfigured level indicators. The Arduino command is sent to the Bluetooth module and sends it via Bluetooth to the registered mobile device.
As an additional indicator, a buzzer is used. [10]

4. Diagramatic Represenatation

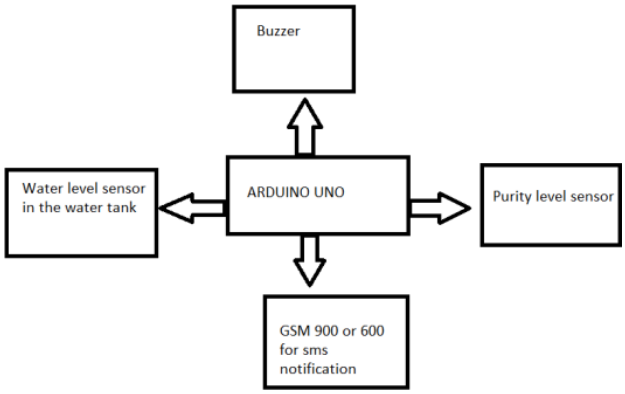


Fig 1.1(Representation through a Block Diagram)

In above figure 1.1, we can see the block diagram representation of the project. This diagram shows how the connections would be done in the hardware.

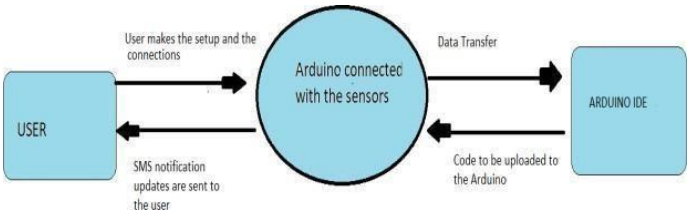


Fig1.2 (Data Flow diagram)

In the above figure (fig1.2), we understand how the data flows. The Arduino is connected to the sensors and the codefrom the software is uploaded onto the
Arduino. The sensors are activated and the output is sent to the user via sms.

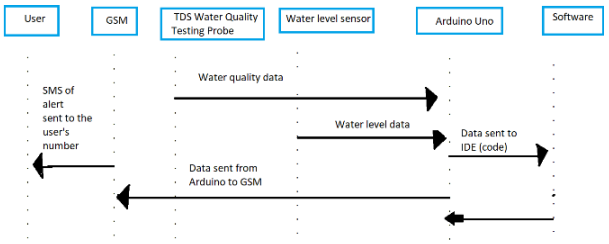


Fig 1.3(Sequence diagram)

In the above diagram, the proper flow of the data from the software to the hardware is explained.

5. Software Represenatation

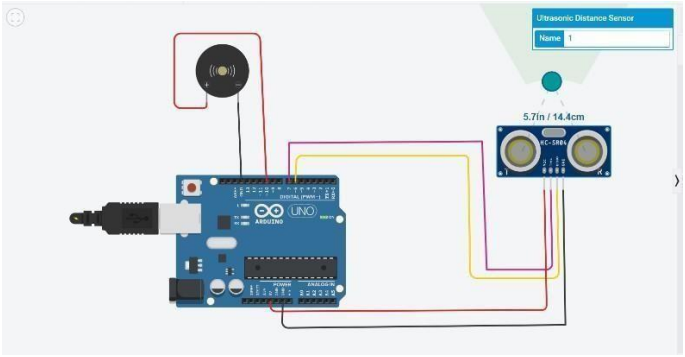


Fig 1.4

In the above figure 1.4, the software representation of the ultrasonic distant sensor with buzzer and Arduino is shown. The connections are done completely and the code is written systematically. When we start the simulation, and the ultrasonic waves at a distance find an object in its path i.e. the buzzer, the buzzer starts to make noise. This part depicts the level of water in the tank and when level the of water reaches it's maximum, the buzzer will start making noise.

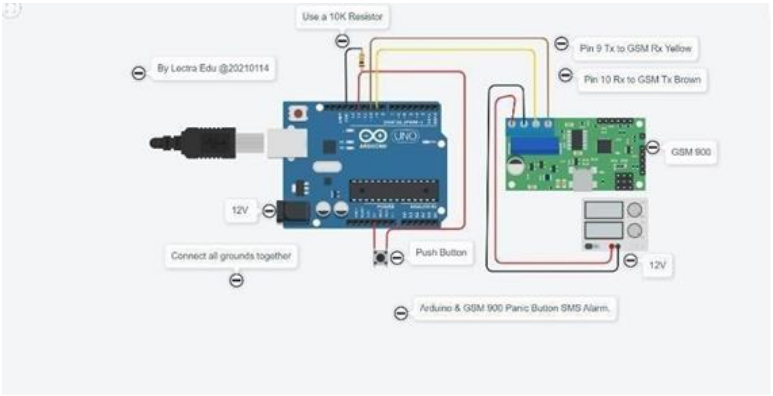


Fig 1.5

In the above figure 1.5, we can observe that a GSM 900 module is connected to the Arduino and simulation is the started. When the simulation is in process, the GSM module will send a text like “Water is filled, please the of the motor”.

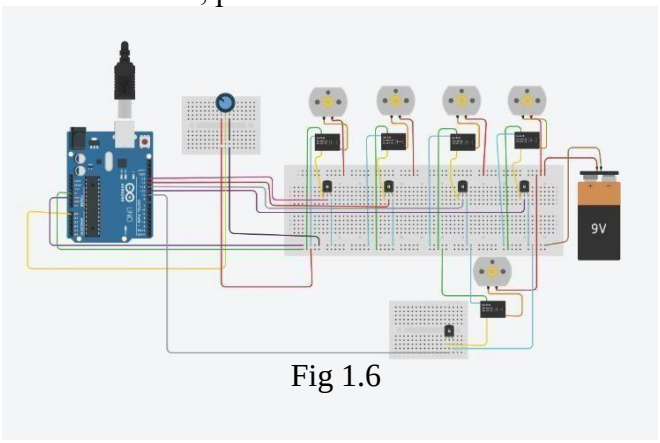


Fig 1.6

In the above figure, we can observe the software representation of the water quality monitoring system. All the connections are made and then we simulate the process.

We need to measure the ph level of the tank's water. If the (ph< 6.5), then its quality is said to be good.

6. Discussion

Based on recent technologies, there has been a lot of improvement in the field of IOT, and with this project, we canalso be a part of the contribution. The other technologies usedifferent platforms and techniques to solve the water overflowing problem. This project mainly focuses oncombining the three different aspects which include, the waterlevel, quality, and then the alert message. With the working of this project, we can assume the results to be about 90% accurate.

7. Implementation

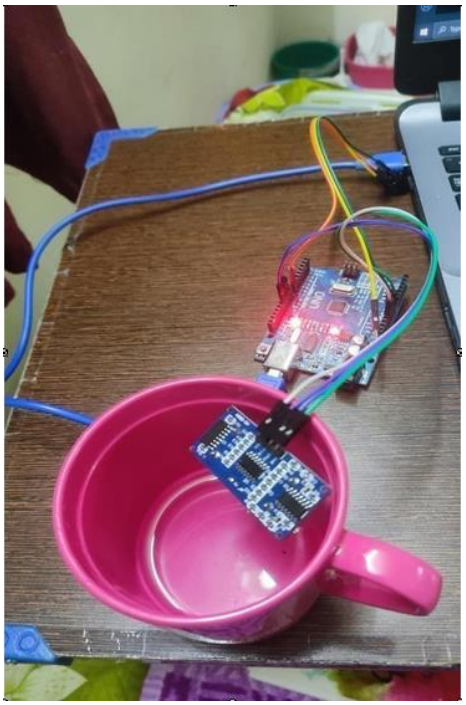
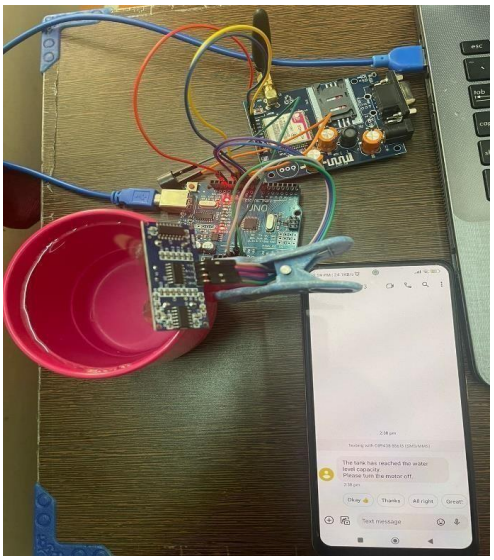


Fig 1.7

In the above figure (1.7), the implementation of the water level detector has been shown
The diagram represents the water level detector, where we can see an ultrasonic sensor. Arduino and a water cup. As soon as the water level starts to increase in the cup, the ultrasonic sensor starts to make the noise. It works as an indicator to let the owner know that the water tank has to be turned off.



The fig 1.8 displays the water level detector with an sms notification as soon the water reaches a certain level.

Using GSM module and buzzer connected to the Arduino, helps in making a noise continuously for the owner to know that the tank has reached a certain level and prevent it form overflowing . Adding to that, there is an sms sent to the owner's number for then to get aware of the situation.

8.Proposed Methodology

Working with GSM module for SMS and notification in our phone when connected to Arduino (microcontroller). After connecting, we have write our code in IDE and tested the module.
For the water level detector sensor, we use the ultrasonic sensor and buzzer connected to the Arduino. The water is heightened if the level has reached a certain level, the buzzer will go off.
The water purity sensor or turbidity sensor will be connected to the Arduino and the sensor will be inside the tank to check for the purity of the water.

a)A water level indicator's operation is actually fairly straightforward. Sensor needles are used by water level signs to show the amount of water in a storage tank. To set off an alert or sign, these small devices relay data back to the controller board. As previously noted, the control unit can be set up to switch on the circulation pump periodically when the water needs to be refilled.

The GSM module is managed by a tiny chip during sending, receiving, and processing of AT signals. The firmware is in charge of managing tasks involving communication between the host server and the device.
All incoming SMS are processed, the fresh configuration is obtained and saved from the host, warn/notification Texts are sent when data warn/exceed limit numbers, and SMS data are sent at predetermined intervals based on the setup. A transportable and mobile radiation tracking method with a rapid emergency warning at elevated levels of radiation will be created by combining this module with a radiation sound alarm/monitoring device.

GSM Module startup:

We need to lock it after installing the GSM module with the sim SIM card. Connect the adapter to the module to turn it on. After some time, watch how quickly the LED blinks.
When the connection is made properly, The LED will begin to continuously blink every three

seconds.
We might try dialing the module's mobile number that is associated with the card. If we hear a ring, the module has successfully established a wireless connection.

There are two ways to connect GSM modules to an Arduino.

1.In any case, the GSM module and Arduino communicate serially. The serial pins on your Arduino both Rx and Tx must be used consequently. The Tx pin of the GSM module can therefore be connected to the Rx pin of the Arduino, and the Rx pin of the GSM module to the Tx pin. Now, join the ground pins of the Arduino and the GSM module.

1. For serial communication, a different approach is applied and two digital pins on the Arduino is used . To follow this approach, we must select two ports of the Arduinothat support PWM. This way is made feasible via theArduino Software Serial Library. The additionaldigital pins on the board can be used for serial data transfer thanks to an Arduino library called Software Serial. The library controls hardware-based serial communication in addition to duplication.

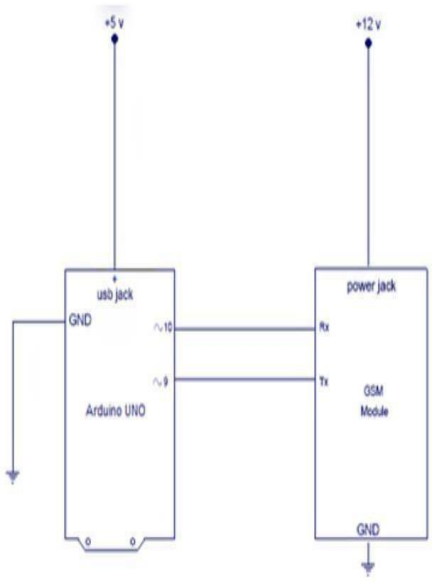


Fig 1.9

The program has two goals, which are listed below: -

1. Send a message using the program to a specific mobile number, using a GSM module and an Arduino.
2. Receive data using an Arduino and a module , get sms to the SIM card that is installed in the module.

c) Water turbidity, a crucial metric for assessing the quality of the water, quantifies the cloudy nature of the water. Numerous tiny particles floating in water that are undetectable to the human eye generate turbidity. Small particles, also known as colloidal particles, sink down extremely slowly or not at all while bigger ones settle down quickly.

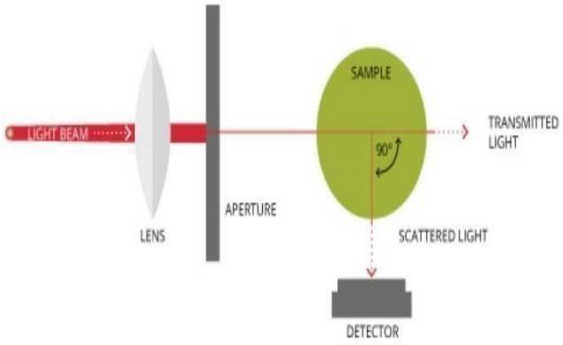


Fig 1.10

Human-induced turbidity in rivers and lakes is frequently brought on by industries including agriculture, mining, and building. Sediments from farms, industrial facilities, and cities can all be carried up by storms after a rainstorm.

The turbidity sensor's operating system is as follows: The amount of light transmission through a particular quantity of water is influenced by the quantity of dust contained. As the volume of dust increases, the amount of light that enters the water sample decreases. An infrared pair tube is located inside the sensor. The spectrum of light transmitted through a given volume. The fewer rays are transmitted into the water more polluted it is.

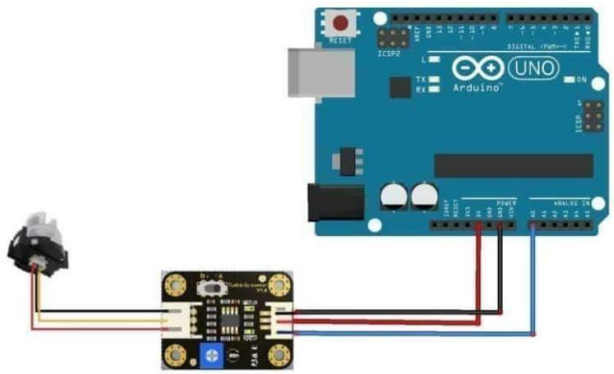


Fig 1.11

As seen in the picture, we need to connect the Arduino A0 pin and the analogue VCC of the Arduino 5V and GND to the analogue output of the turbidity sensor.

How Does a Turbidity Sensor Work?

To determine how much light can pass when it traverses a sample of water, the quantity of debris in the water is operated by the sensor. A rise in soil depth is minimized as light passes through. The quantity of light that passes through determines how turbid the wash water is by measuring the turbidity with the sensor.

9. Proposed System

1. Ultrasonic Sensor

Fig 2.0 (Ultrasonic Sensor)

Using Ultrasonic Sensor and Arduino is the easiest way to implement the water level approach for this project. The goal is to inform the user how much water is in the overhead water tank. By switching this project ON when the water level is low and OFF when the level is high, it may be further improved to regulate the water level in the tank. In order to avoid water waste in the above tank, the Arduino level of water monitor is helpful. This project can operate up to 100 meters away wirelessly, making installation simple.

Trigger and Echo are the two apertures on an ultrasonic sensor. Sound waves with high frequencies are produced by Trigger. The tank is traversed by these sound waves from top to bottom. Echo waves are produced when sound waves strike water and are reflected back. Echo waves are taken in by the Echo opening. The time between Echo and Trigger is measured by the water level sensor Arduino. The time is directly related to this distance travelled.

1. Arduino Uno

Fig 2.1

Arduino, the system's brain, analyses the sensor data. For the intent of creating projects, Arduino is a free hardware platform that is easily accessible to hobbyists & beginners throughout the world. It has a microcontroller, which manages data processing and helps the Internet of Things system's efficient operation. By modifying a small bit of code, Arduino enables the creation of a number of Internet of Things projects. It has 14 digital input/output pins, 6 of which can be used as PWM outputs, 6 analog inputs, a USB port, a power jack, and a reset button. Simply connect a USB cable, an AC-to- DC adapter, or a battery to get it started. It comes with everything required to support the Arduino.

Features of Arduino:

a) GND: Abbreviation for Ground we may ground our circuit by connecting it to any of the Arduino's GND pins. The GND pins are numerous.

b) 5V & 3.3V: The majority of the microcontroller's essential components run on 5 or 3.3 volts.

c) The signal from an analog sensor, such as a temperature sensor, can be read by these pins and converted into a usable digital value.

d) Online: The electronic pins are situated across from analog pins (0 through 13 on the UNO). Both digital output and digital input, such as assessing if a button has been depressed, are possible with these pins.

e) AREF is an acronym for analog reference. There are times when it is possible to specify an external reference voltage as the highest limit for the analog input ports (between 0 and5 Volts).

f) Button as a Reset:

Like the original Nintendo, the Arduino has a reset button. Pushing it will restart any running code on the Arduino and briefly connect the reset pin to the neutral. This can be quite useful if your code is not repeating but you still want to test it numerous times.

g) LED Power Indicator
This Light should turn on each time you plug your Arduino into a power source. A decent potential if this light is not on, then something is wrong. Recheck your circuit now!

h) LEDs TX RX

The letters TX and RX stand for transmit and receive, respectively. These markings are widely used in electronics to indicate the pins that are utilized for serial communication. In our example, TX and RX are displayed twice on the Arduino UNO: once next to the TX and RX indication LEDs, and again by digital pins 0 and 1.

i) Major IC

Integrated circuits, or ICs, are dark objects with all metal legs. Think of it as the brain of the Arduino. Depending on the type of board being used, the Arduino's principal integrated circuit (IC) varies slightly, but it frequently comesfrom the ATmega family of ICs made by the ATMEL business.

3.GSM

Fig 2.3 (GSM)

The term "global delivery model" (GDM) refers to a technique of project execution that makes use of resources located at many locations throughout the world.

The most widely used of the three digital wireless communication technologies—GSM uses a variant of time division multiple access. GSM converts data to an electronic form, compresses it, and delivers it travels down a channel with two additional streams of user data, each in its own time slot. It operates in the 900 MHz or 1,800 MHz frequency range.

The administration and support subsystem, the network switching subsystem, and the base station subsystem (BSS) are the four different parts that make up the GSM network and cooperate to operate as a whole. (OSS).

Hardware is used to connect the mobile device to the network. The customer identity module (SIM) card sends identification information about the mobile user to the network.

To facilitate the delivery of mobile services, callers' whereabouts are tracked via the NSS component of the GSM network architecture, sometimes referred to as the core network. Mobile carriers are the NSS's legal owners. Center for Mobile Switching (MSC), a component of the NSS, and Home Location Register (HLR). These parts carry out a variety of tasks, including SMS and call routing, and SIM card-based caller identification and retention.

1. Turbidity Sensor

Within the turbidity sensor are a light transmitter and receiver. Since the dispersion of clear seas, light is at its weakest, and the light sensor receives the maximum amount of light. The amount of light that reaches the light receiver decreases as the turbulence of the water rises. When the received light falls below a specific threshold, the sensor activates.

The "analog-digital" button on the amplifier board, which ostensibly switches between analog and digital modes, is an intriguing addition. The output value decreases when in the analog mode under conditions of high turbidity, according to the official wiki. The output pin goes high whenthe onboard potentiometer-set turbidity threshold value is reached in digital mode.

The amount of dust present affects the amount of light that passes through a specific volume of water. The turbidity sensor measures the amount of light that is transmitted to determine the turbidity of the water. The amount of light that penetrates the water sample is reduced as the dust concentration rises. The sensor contains an infrared pair tube. The spectrum of light that passes through a certain amount of water depends on how polluted the water is. The filthythe water is, the fewer rays are being transmitted into it.

Fig 2.4 (Turbidity Sensor)

10. Conclusion

This project mainly focuses on combining the three different aspects which include, the water level, quality, and then the alert message. Keeping in mind the problem of water wastage and the quality, which is very important in this era. We will try solving all these three problems in one single project.

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