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Smart Flood Monitoring and Forecasting Weather Conditions Using IOT

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ABSTRACT

These days normal calamities like flooding turn up drastically, and it genuinely impacts the way of life. In this paper the improvement of flood monitoring system utilizing IOT to monitor the circumstances close by the reservoir with the assistance of Arduino, and the compactible sensors, for example, level, temperature, humidity and flow distinctly presented. First and foremost, the hardware unit is placed in the flood prone areas, the Wi-Fi module (NodeMCU) act as the transmitting unit and the sensors associated with the system measures the corresponding parameters. Then the precisely estimated boundaries are shown through the LCD show and passed to the IOT web application. Here the thingspeak web application is used to store information in channel and through web application we can monitor the data.

Keywords : Arduino, GSM, Ultrasonic Sensor, Rain Drop Sensor.

I. INTRODUCTION

Regular calamities happen wherever on the planet, and which influences the human existence and the nation's economy. Any country's economy and prosperity depend on horticulture; thus, farmers need to be vigilant. watchful to shield the yield from flooding. To recognize and keep away from flood like heartbreaking calamities as quickly as possible, current world innovation assumes an indispensable part. With the use of an IOT-based early flood related parameter watching and detection system and its avoidance using the Arduino project, it is suggested that we can avert natural disasters brought on by flood.

Floods are the natural disasters with creates the severe damage to the urban/rural sectors. In India, the agriculture sector has the highest impact due to the floods. Every year, 400 million hectares of Indian land is affected due to the floods. As majority of the people are in the cities, due to the floods they don't get the water information easily and quickly [1][2]. These mostly cause the property loss, Citizen Work loss or human loss. In this proposed design, the alerting the system by monitoring near the dams regarding the status of the floods with sensors in the main objective. The reason behind this is that flood is very spontaneous disaster and government agencies have to follow multiple steps before reaching to a decision. In this case, awareness among the people is very

necessary along with the government official so that a comprehensive and better result can be achieved. In our system, it is combined with calamity prediction through weather forecasting. The flow of water is sensed by water flow sensor which will ultimately help in evaluating the intensity of flood and water level by the help of ultrasonic sensor which will be done by propagating sound waves.

II. EXISTING SYSTEM

The design of a flood management system has been approached in numerous ways by researchers and engineers around the globe. Since we use wireless electronic gauges in our situation, the data collected may be transmitted to our specialized flood management server using a customized data queue service. Due to the on-field sensor module's low power requirements, this not only lowers the implementation cost but also improves maintainability. This project's technology has low power requirements, is easier to maintain, and is incredibly inexpensive because it enables the deployment of the sensors at any desired position. Due to the lack of a multi-tiered structure, our system should have lower latency and use fewer resources.

Disadvantages:

- ✓ Due to longer distance (range), siren cannot be heard
- ✓ Alarms can be disabled sometimes

III. Proposed System

The parameters including water flow rate, water level, and environmental rain intensity are measured in the suggested system employing ultrasonic sensors, flow sensors, and raindrop sensors. A message and the values will be uploaded if any value is too high using GSM and buzzer alert will be given.

Block Diagram:

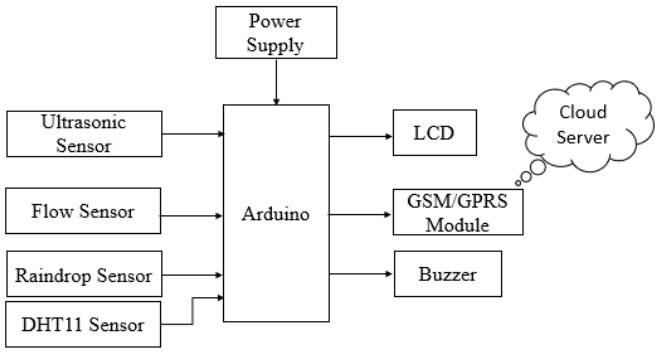


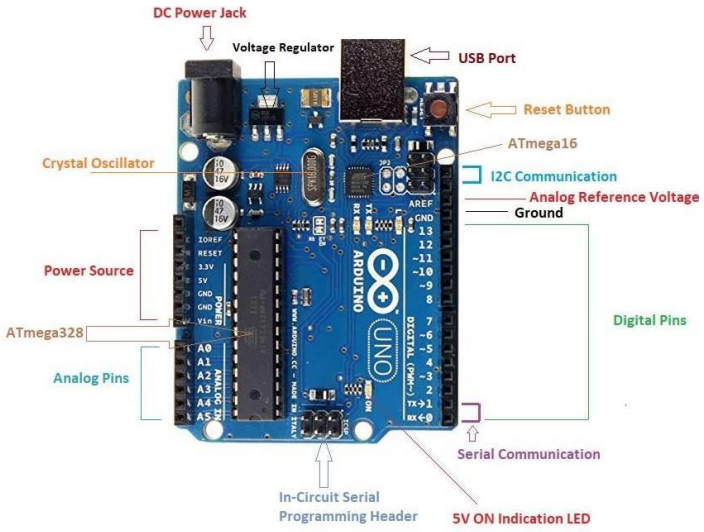
Fig 1 : Block Diagram

Hardware Requirements:

A) Arduino UNO:

A highly useful addition to the electronics is Arduino Uno, which has an Atmega328 microcontroller, 14 digital I/O pins, and 6 analogue pins. It also encourages serial communication using Tx and Rx pins.

There are many versions of Arduino boards introduced in the market like Arduino Uno, Arduino Due, Arduino Leonardo, Arduino Mega, however, most common versions are Arduino Uno and Arduino Mega. If you are planning to create a project relating to digital electronics, embedded system, robotics, or IoT, then using Arduino Uno would be the best, easy and most economical option.



Arduino UNO

Fig 2 : Arduino UNO

B) DHT11 SENSOR:

The DHT11 is a fundamental, minimal expense computerized temperature and mugginess sensor. It utilizes a capacitive moistness sensor and a thermistor to gauge the encompassing air, and lets out a computerized signal on the information pin (no simple info pins required). It's genuinely easy to utilize, yet requires cautious timing to get information. The main genuine drawback of this sensor is you can get new information from it once at regular intervals.

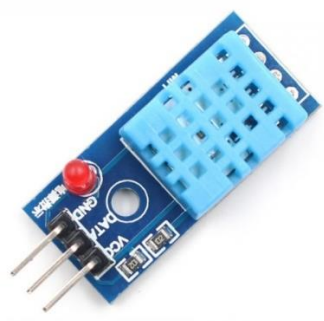


Fig 3 : DHT11

C) Ultrasonic sensor:

An ultrasonic sensor is an electronic device that measures the distance of a target object by emitting ultrasonic sound waves, and converts the reflected sound into an electrical signal. Ultrasonic waves travel faster than the speed of audible sound (i.e., the sound that humans can hear). Ultrasonic sensors have two main components: the transmitter (which emits the sound using piezoelectric crystals) and the receiver (which encounters the sound after it has travelled to and from the target).

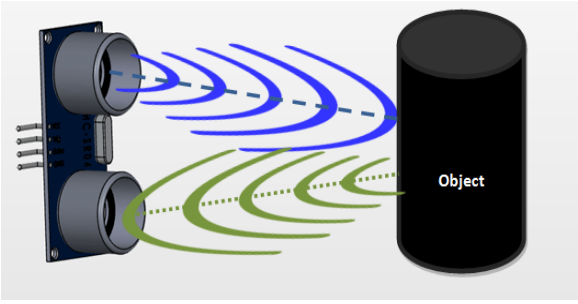


Fig4: Ultrasonic sesnor

D) LCD:

LCD (Fluid Gem Show) is the advancement used in scratch cushion shows and other tinier computers. Like development for light-creating diode (Drove) and gas-plasma, LCDs grant introductions to be significantly slimmer than advancement for cathode pillar tube (CRT). LCDs use extensively less power than Drove shows and gas shows since they fill in instead of radiating it on the rule of impeding light. A LCD is either made with a uninvolved grid or a grandstand network for dynamic system show. Similarly insinuated as a pitiful film semiconductor (TFT) show is the powerful system LCD.

Fig 5 : LCD

E) Flow Sensor:

A flow sensor (more commonly referred to as a "flow meter") is an electronic device that measures or regulates the flow rate of liquids and gasses within pipes and tubes. Flow sensors are generally connected to gauges to render their measurements, but they can also be connected to computers and digital interfaces. They are commonly used in HVAC systems, medical devices, chemical factories, and septic systems. Flow sensors are able to detect leaks, blockages, pipe bursts, and changes in liquid concentration due to contamination or pollution.

Fig 5 : Flow sensor

F) Raindrop Sensor:

Raindrop Sensor is an instrument utilized for detecting precipitation. It comprises of two modules, a downpour board that recognizes the downpour and a control module, which looks at the simple worth, and converts it to a computerized esteem. The raindrop sensors can be utilized in the car area to control the windshield wipers consequently, in the agribusiness area to detect downpour and it is likewise utilized in home robotization frameworks.

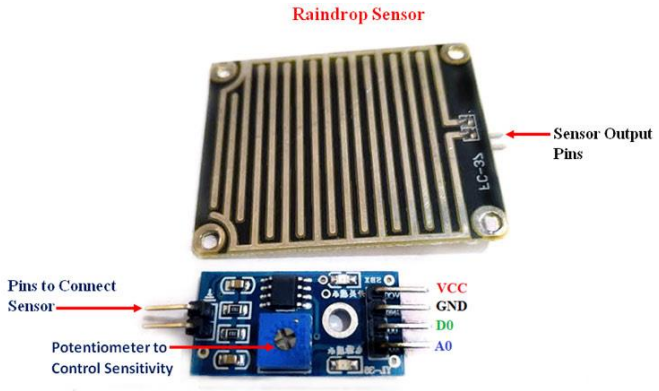


Fig 6 : Rain drop sensor

G) GSM/GPRS Module:

GPRS Modules are one of the commonly used communication modules in embedded systems. A GPRS Module is used to enable communication between a microcontroller (or a microprocessor) and the GPRS Network. Here, GSM stands for Global System for Mobile Communication and GPRS stands for General Packet Radio Service.

A GPRS MODEM comprises of a GPRS Module along with some other components like communication interface (like Serial Communication – RS-232), power supply and some indicators. With the help of this communication interface, we can connect the GSM GPRS Module on the GPRS MODEM with an external computer (or a microcontroller).

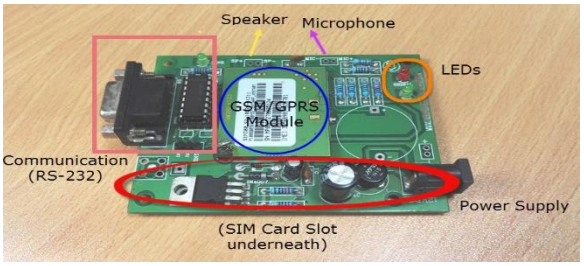


Fig 7 : GSM/GPRS Module

Software Requirements

A) Arduino IDE:

Arduino IDE is an official programmer released by Arduino.cc that is primarily used for creating, compiling, and uploading code to Arduino devices. IDE stands for Integrated Development Environment. With this open-source software, which is immediately available to install and begin compiling the code on the move, nearly all Arduino modules are compatible. a description of the Arduino IDE the open-source programming environment Arduino IDE is primarily used for authoring and compiling code into the Arduino Module. Because it is official Arduino software, code compilation is so simple that even the average individual without specialist knowledge can get started.

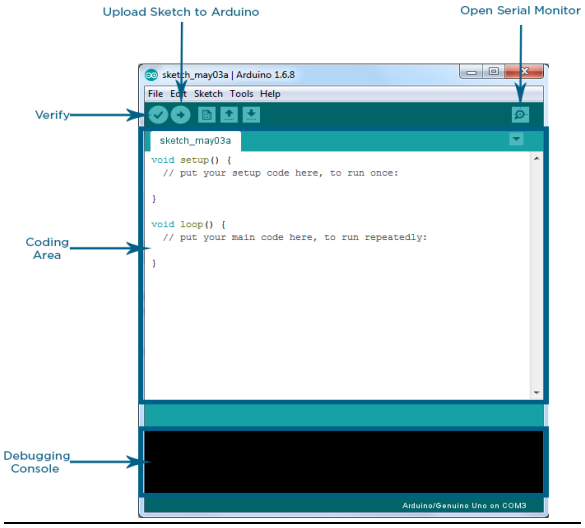


Fig 7 : Arduino IDE

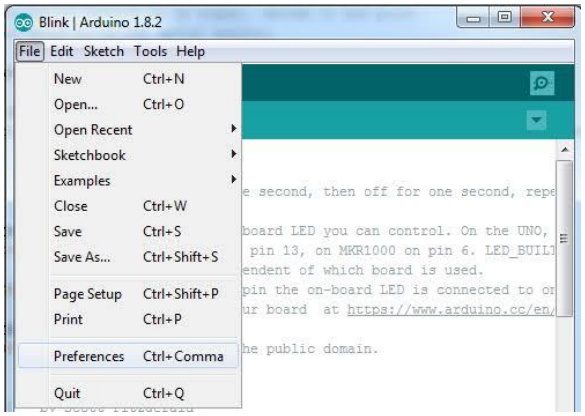


Fig 8 : Arduino IDE

Advantages

- Reliable
- Smart
- Automatic Uploading to cloud server

Applications

- To save lives of human and animal

IV. CONCLUSION

The outcomes of this project are temperature, water flow, humidity and rain fall detection. DHT11 sensor measured the temperature of the climate for forecasting, water flow of water measured by water flow sensor for estimating flow rate and by using rain drop sensor amount of rain fall has been measured. These data have uploaded to the web server through GSM module where we can monitor the data continuously.

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