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IoT Based Flood Monitoring and Alarm System

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Abstract: *As we all know that Flood is one of the major well known Natural Disasters. When water level suddenly rises in dams, river beds etc. A lot of Destruction happens at surrounding places. It causes a huge amount of loss to our environment and living beings as well. So in these case, it is very important to get emergency alerts of the water level situation in different conditions in the river bed. The purpose of this project is to sense the water level in river beds and check if they are in normal condition. If they reach beyond the limit, then it alerts people through LED signals and buzzer sound. Also it alerts people through IOT alerts when the water level reaches beyond the limit.*

Keywords: IoT

I. INTRODUCTION

The loss of properties and living population is getting enhanced by every year due to the dynamic alterations in weather conditions which results in heavy floods. Therefore, implementation of an intelligent analysis of flood risk is necessitated for the field of research in Disaster management. This project implements an intelligent IoT-based flood monitoring and alerting system using PIC microcontroller, where water sensors and rain sensors are utilized to alert the authorities regarding the heaviness of rain and monitoring of water level in a dam or river. This system alerts the people in nearby villages since it utilizes IoT system for notifying the village people. This development is supported by the advance of electronics and information technology, so we have built a system which can automatically sense the water level at a reservoir and cannels then send these values to the control room through the IOT along with this it gives an SMS alert through the GSM module.

Flood is a cataclysmic event that routinely happens every single year. During event of a rising water streams out from the waterway and lowers the land that is normally dry. Flood, a characteristic wonder that by and large outcomes from substantial downpours brought about by storm, typhoons, cloud blasting, softening of glacial masses, which surpasses the abilities of water bodies. However, one of the fundamental parts of the wellsprings of ostentatious floods is substantial downpour. There are numerous sorts of flood which are streak flood, flowing flood and storm flood. Flood calamity can be in enormous scope and adequately incredible to convey large obliteration to specific territories. The misfortune is huge in causing lost in existence of occupant, the harm of property and food supply, and annihilation to government framework. Numerous significant advances should be taken to relieve monetary and human misfortunes. The expectation and cautioning framework could can possibly diminish the extraordinary Flood misfortune. There are still a few territories with early flood notice frameworks, however the vast majority of them are not as compelling as possible regularly just present the information to certain associations with little distances. So it requires some investment to send the message to general society dwelling in the encompassing regions in the event of flooding with the goal that individuals couldn't save quite a bit of their property on the grounds that the water level ascents radically in less time. The flooding couldn't by and large be ignored, yet early abnormalities can be made, i.e., early admonition frameworks can be utilized to limit the losses experienced by the local area with the help of consistent observing. Keeping up of key separation from before outrageous damage can give sufficient chance to inhabitants void in the nearby locale. The principle subject of this undertaking is to create and plan a flood recognition framework that will identify naturally and send information through IOT

1.1 Problem Definition:

In a peninsular country like India, with extreme weather and climatic conditions, the occurrence of heavy rainfall is normal. Multiple times, the arrival of very heavy rains results in the heavy discharge of water.Especially, in the

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monsoon which normally begins in the mid of June and lasts till October, thousands of people lost their lives by drowning and their habitats were collapsed. The left our were evacuated by the state and central disaster relief authorities. The severe waterlogging brought daily work to halt. In order to save the lives of the people, their habitat and the economy, the major step is to monitor the data on real time basis and if the situation is reaching a certain threshold, then alert is to be provided to each individual living in the area which is currently at risk. Even if it is difficult to abandon the natural calamity but the mandatory steps are to be taken by the government agencies to shift the population to a safe region and the losses will get reduced to less than 30%.

Flood natural calamity which cannot be avoided totally every year the collateral damages increases due no early warning. To solve this problem, we demonstrate the idea and implementation of a Flood Monitoring and Alerting system using Internet of Things (IOT) technology.

1.2 Objectives

1. To design a flood detection and avoidance system that will detect and send the real time information about the flood to the local Government Unit and nearby residents automatically.
2. To generate the database related to water level, water flow, bend and temperature and its processing using the IoT Cloud server.
3. To design a webpage with a user-friendly interface that will collect the data from cloud server and display the alert of flood and send the SMS to local government unit

1.3 Theme of project:

Flooding is usually brought on by an increased quantity of water in a water system, like a lake, river overflowing. On occasion a dam fractures, abruptly releasing a massive quantity of water. The outcome is that a number of the water travels into soil, and 'flooding' the region. Rivers are involving river banks, in a station. Aside from lack of products and house and office property, streets infrastructure flood water consists of bacteria and sewage flow of waste sites and chemical spillage which leads to a variety of diseases afterwards. Flood predictions need information like: The speed of change in river stage on a realtime basis, which may help indicate the seriousness and immediacy of this threat. Understanding of the form of storm generating the moisture, such as length, intensity and areal extent, which is valuable for discovering potential seriousness of the flood. In this system we make use of a PIC controller with water sensors, rain sensors to predict flood and alert respective authorities and sound instant alarm in nearby villages to instantly transmit information about possible floods using IOT. The water sensors are used to measure water level of 3 different locations. Also 3 different rain sensors are used to measure rain level of those 3 areas. These sensors provide information over the IOT using Raspberry Pi. On detection of conditions of flooding the system predicts the amount of time it would take to flood in a particular area and alerts the villages/areas that could be affected by it. The system also calculates the time it would take for flood to reach them and provides a time to people so that they can evacuate accordingly

II. LITERATURE SURVEY

2.1 Comparison of your system with same system available in market

In developed country like US, Japan etc. the flooding problem is minimized significantly and do not affect much due to availability of emergency system. But the developing countries like India, Brazil etc. is suffering a lot during flood.

Every year number of deaths due to flooding keeps increasing in different part of our country. Two years ago the flood occurred in Chennai, the capital of Tamilnadu resulted insignificant loss of life and property. Whenever, flooding happens living area near the riverbank and downstream area are affected severely than others. They need to be alerted much earlier to have extra time to evacuate immediately. During Chennai flood in 2015, fake news were spread for instance, A false message which said two lakes had breached and Chennai had been cut off from rest of the districts, spread panic among commuters, especially those that were stranded for hours together on the arterial Mount Road on Monday night. To avoid this situation we need authorized warning system. Our system provides

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such information so that people can avoid false news .And the system makes use of voice call as it is helpful for people who do not know how to read the text message.

Water Flooding is one of the major disasters occurring in various parts of the world. It is important to monitor the water level variations in rivers, dams, reservoirsetc. In paper [6]. Wireless Sensor Network (WSN) used to monitor flood conditions in the river. This method also be used for real-time monitoring of water conditions like water flow level and precipitation levels. Reservoir is the best infrastructures to resources and plays a major role in flood control. Flood Limiting Water Level (FLWL) is an effective and value approach to provide safeguards to the people from water flood caused suddenly by nature. The proposed system sends as an alert to people when the water level increases from the normal capacity. Advanced sensors are used to identify the level of water accumulated in dams, lakes and without human intervention at any time regardless of the location being installed

Predictive environmental sensor networks provide complex engineering and systems challenges. These systems must withstand the event of interest, remain functional over long time periods when no events occurs that covers large support variety of sensor types needed to detect the phenomenon. Prediction of the phenomenon on the network itself complicates the system further which require additional computation on the microcontrollers and utilizing prediction models that IoT is the latest rapidly growing technology which brings to a new approach such as disaster monitoring. Disaster monitoring technique proposed in monitors the natural disaster activity that the people not able to do in 24 hours. This system will occur flooding and share the information in real time to the people those who are in nearby water bodies [9]. Water Flood occurs when water overflows from different water bodies like river, lake or due to heavy rainfall. Flooding can be very dangerous, when floods happen in an area that people live, the water carries along objects like houses, cars, furniture and even people. It can wipe away property, trees and many more heavy items which causes heavy flow of traffic on the roads. In rainy seasons, the motorists and computers are getting stuck in a flooded areas and getting lost in finding possible routes just to go to their destinations in the correct also difficult to spread the message or to communicate with other. Hence, in order to overcome this problem the “IOT based Flood Detector System” is developed to overcome this problem. It was invented based on problem faced by motorists and commuters when water flood occurs. This will help to avoid the traffic jam since the users have a time to find possible routes before going to be stuck in the flooded area [10][11].

The internet of things (IOT) provides the ability for human and machines to interact from billions of things that include sensors, services or other internet connected things which makes the world as “Smart World”. Internet of Things technology for urban flooding prevention management system discusses the demand and overall design of urban flooding prevention management system. The application process of the internet of things technology in flooding prevention management system is IOT technology brings new approaches such as disaster monitoring. Water flood disaster is the main concern since it can happen every year during the rainy seasons. In [13], water flood detection method monitors an activity that people are not able to do it in 24 hours and sends an alert message with the help of Android Application. The headway of flood early warning technology has grown rapidly. The technology has led to improvements in terms of communication and information. Internet of Things Technology (IoTs) has greatly influenced the development of early warning information systems. In this article a prototype of flood monitoring system based on Google Maps has been designed by integrating ultrasonic sensors as a height detector, Arduino Uno as a processor, U-Blox Neo 6m GPS module and GSM module as the sender of water level and the coordinates to the flooded information system station. The design of the prototype produces flood altitude information along with its location based on Google Maps interface [14] [15].

The development of disaster information and communication system has been conducted by research by previous researchers. System research and development has undergone many developments beginning with analog technology up to web-based digital technology to mobile applications (Nasution et al., 2017). Technological switches have made step-by-step shifts like flood early warning systems that transmit flood height data onto real-time (Satria et al., 2017b). In the study using a single sensor that is ultrasonic sensors as input components and output components using Ethernet as a web server. In addition to the use of web-based output, there is GSM-based disaster information system including prototype fire monitoring information system Building Based GSM Module (Dewi et al., 2017). The research produces output in the form of sending fire data sent through GSM module with output in the form of fire location information in the form of google maps. Other studies have done similar things in the use of Google

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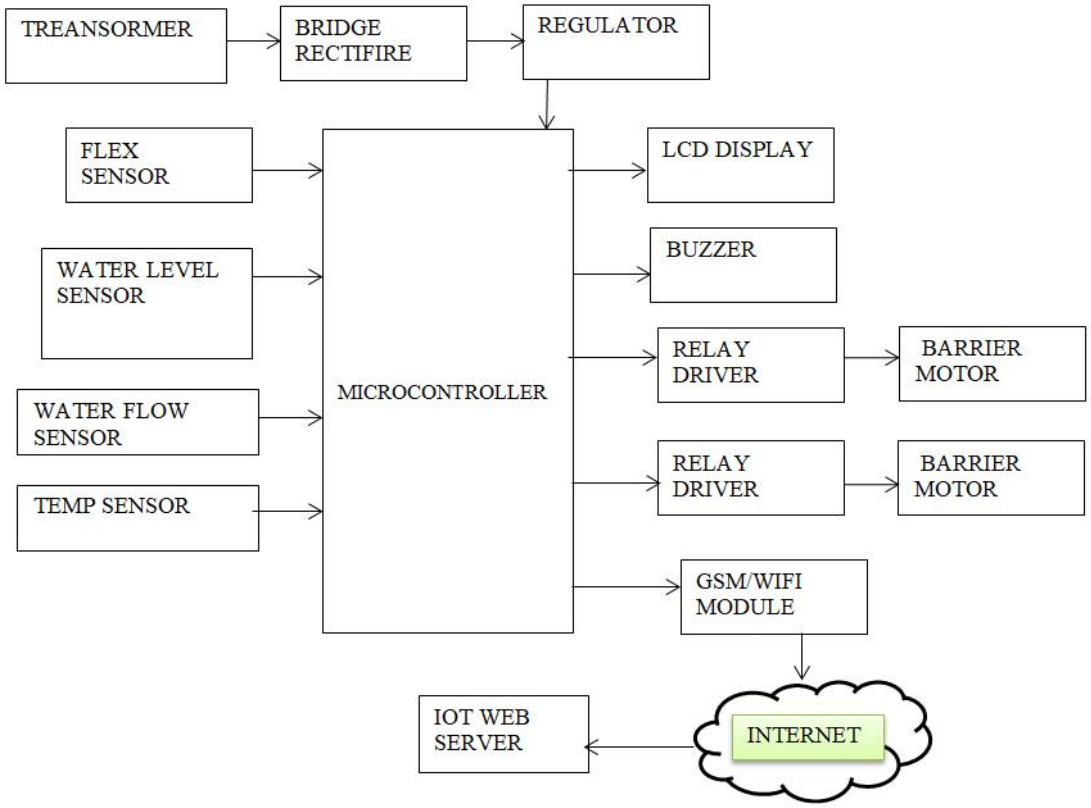
Maps location-based information systems in flood detection systems (Satria et al., 2017a). Research using GSM has been built by (Azid et al., 2015) (Kuantama et al., 2013) and (Piller et al., 2015). In the study, the flood height data is sent to the flood information system server through the GSM network module. In the study sent SMS in the form of landslide symptoms of the disaster information system station. The use of disaster communication and information technology has built several studies using GSM. In contrast to the current emerging technology has made the service of the internet-based communication system of things (IoTs). It is seen that the current warning system has been using an integrated internet technology model with disaster detection equipment (Poslad et al., 2015). Based on previous research, it is necessary to develop and other innovations for a flood early warning system concept internet of things (IoTs).

III. SYSTEM DESIGN

3.1 Block Diagram



3.2: Water level sensor signal Conditioning:

The sensor is made from two copper plates which had dimensions, for every plate, are 0.4 m in height (h), 0.015 in width, and 0.001 m in thickness. Both plates separated 0.01 meter from each other and insulated with plastics to avoid direct contact with another substances. It helps to give some room for another substance infiltrated between plates and to reduce, or even remove, the possibility of electrical short-circuit between two plates when ac input is applied. In the experiments, capacitive sensor is used to measure liquid level inside a container with 30 cm of maximum depth. The type of liquid used is water (r ε = 80.1 in 20° C). Figure 2 shows when the sensor is placed inside of water container. All experiments are conducted on room temperature.

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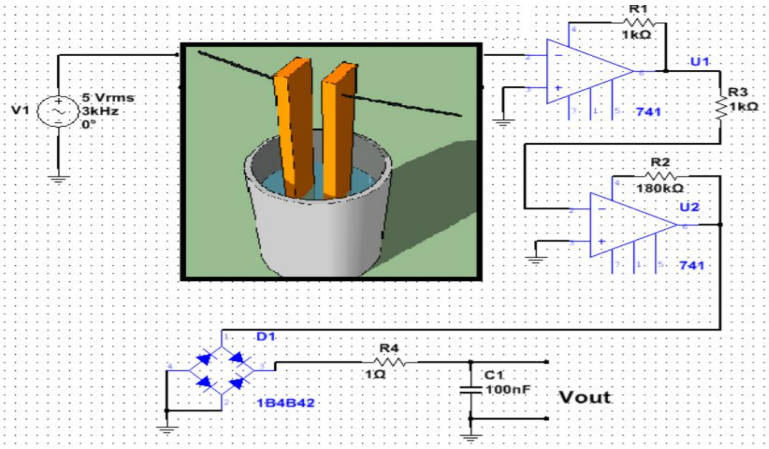

Figure 3.3.1: Water Level Signal Conditioning

Capacitive sensor is a passive sensor [1, 7]. Therefore, it needs some signal conditioning device(s) to obtain other quantities (voltages or currents) which can be processed on the other conditioning or processing devices. In this research, there are three types of signal conditioning circuits: (1) linearization circuit; (2) Op-Amp inverting amplifier circuit; and (3) rectifier (see figure 3). The sensor is located between power source and linearization circuit. Linearization circuit is a circuit which used to obtain linear correlation between its input and output signal. It used as the feeder of other devices. It consists of resistor, Op-Amp device, and the capacitive sensor. As the ac input applied, the output equation can be expressed as equation (6) where f is the input frequency, Rl is the value of resistor in the circuit, Vil represent ac input signal, and Vol is the output of linearization circuit. Assuming the values of Vil , Rl , and f are constant, the value of Vol is proportional to C .

ol = 2π lVfCRV il

Other signal conditioning devices which are used in these experiments are operational amplifier and rectifier. Operational amplifier is operated on the inverting mode since it has linear amplification characteristics (equation (7)) where Rfa in the value of feedback resistor, Ria in the value of feedback resistor, and Voa represents the output voltage value of the amplifier. In the other hand, rectifier circuit is used to convert ac signal into dc to approach compatibility with data acquisition or processing devices

Flex sensor signal conditioning:

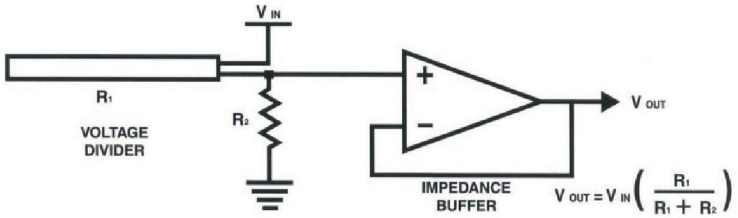

Figure 3.3.2: Flex Sensor Signal Conditioning

You have probably noticed that the Arduino doesn't have a port to plug in a sensor and measure its resistance. We need to condition the signal to be something that our acquisition hardware can handle. We are going to take a very simple approach here and use only a voltage divider circuit. This is a common technique that we will see again.

A voltage divider consists of two resistors in series. If we put a voltage Vin Vin at the top of the series resistor string and ground the other end, the output at the junction of the two resistors will be:

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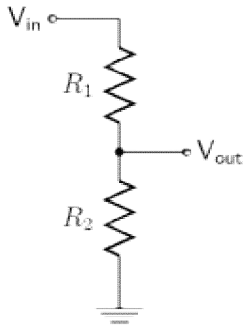

$$V_{out} = V_{in} \frac{R_2}{R_1 + R_2}$$

We will implement the resistor divider by making R1R1 in the circuit above be the flex sensor. As it flexes, the resistance will increase. This increase in R1R1 will make the output voltage of the circuit go down towards ground. Ideally there would be a buffer circuit in between the voltage divider and the acquisition system, but for this particular setup and application it is not necessary. The voltage divider is designed to give us a wide range of output voltages, but some other sensors with smaller changes in resistance (such as strain gauges) would need amplification in addition to buffering. That's coming in another activity though. We can represent our system with the schematic below.

Flow meter signal conditioning:

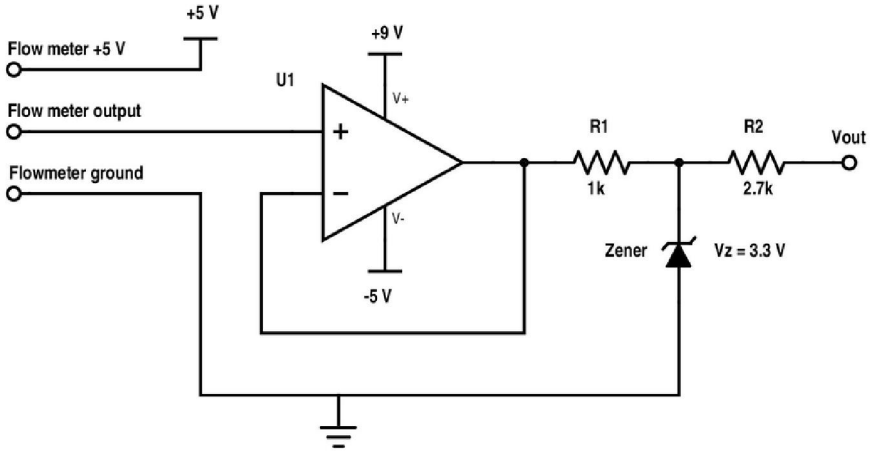

Figure 3.3.3: Flow Meter Signal Conditioning

A voltage to frequency converter or conditioner adapted for use with electromagnetic flow meters produce signal whose output frequency is related to measured flow while compensating for power frequency interference and variations in magnet current or magnetic induction B. The driving signal is summed with a feedback signal and coupled to a sampling integrator which drives the detector. The output of the detector (which may be integrated) is provided as the input to a VCO for producing the desired output signal. The VCO output is also coupled into a feedback circuit to which is also coupled a reference voltage which is at least proportional to the magnetic induction B or magnet current I. In one embodiment of the invention, an up/down counter is up counted using the VCO's output as a clock for a fixed time and is then down counted by a clocking signal related to power main's frequency. The time required for the down count operation is used to meter the feedback voltage to the summing junction at the input of the integrating sampler. This metering of the feedback voltage may be eliminated by the use of a multiplying DAC which produces an analog

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voltage corresponding to the product of the reference voltage and the count attained in the up/down counter which is modified so as to eliminate the necessity for down counting and is rather reset at the beginning of each integration period.

3.3 Survey of components required for your system:

3.3.1 PIC 18F4520

It is an 8-bit enhanced flash PIC microcontroller that comes with nano Watt technology and is based on RISC architecture. Many electronic applications house this controller and cover wide areas ranging from home appliances, industrial automation, and security system and end-user products. This microcontroller has made a renowned place in the market and becomes a major concern for university students for designing their projects, setting them free from the use of a plethora of components for a specific purpose, as this controller comes with inbuilt peripheral with the ability to perform multiple functions on a single chip PIC18F4520 is a PIC microcontroller, introduced Microchip, and mainly used in automation and embedded systems. It comes in three packages known as PDIP, QFN, and TQFP where the first one is 40-pin (mostly used) while other two come with a 44-pin interface.

This microcontroller version comes with CPU, timers, 10-Bit ADC and other peripherals that are mainly used to develop a connection with external devices.

This PIC version, like other models in the PIC community, contains everything that is required to make an embedded system and drive automation.

The PIC18F4520 contains 256 bytes of EEPROM data memory, 1536 bytes of RAM, and program memory of 32K.

It also incorporates 2 Comparators,10-bit Analog-to-Digital (A/D) converter with 13 channels, and houses decent memory endurance around 1,000,000 for EEPROM and 100,000 for program memory.

The Enhanced Universal Asynchronous Receiver Transmitter (EUSART) feature is useful for developing the serial communication with other devices.

Photograph 3.3.1(a): PIC 18f4520 microcontrooller

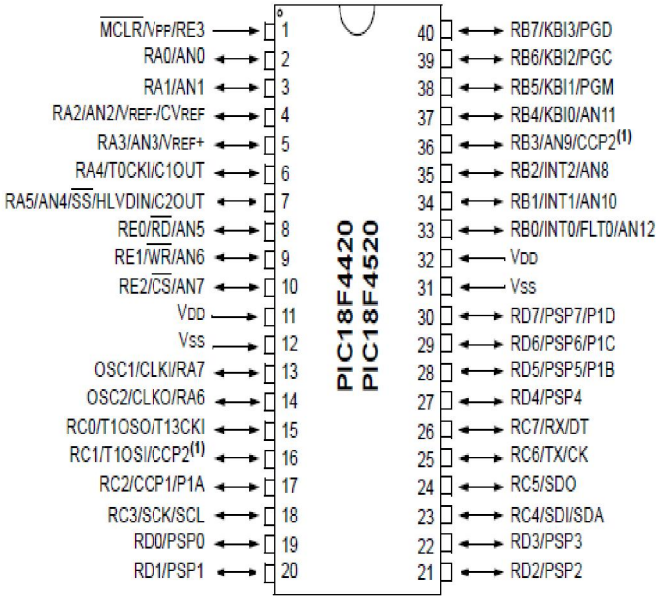

Figure 3.3.1(b): Pin Diagram PIC 18f4520 microcontroller

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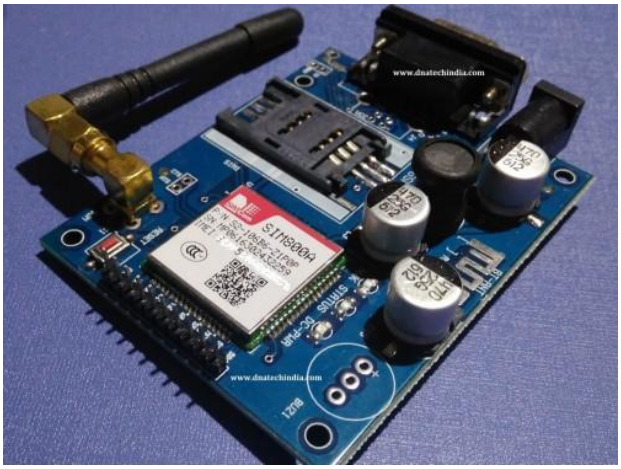
3.3.2 GSM :



Photograph 3.3.2: GSM Module

This GSM modem has a SIM800A chip and RS232 interface while enables easy connection with the computer or laptop using the USB to Serial connector or to the microcontroller using the RS232 to TTL converter. Once you connect the SIM800 modem using the USB to RS232 connector, you need to find the correct COM port from the Device Manger of the USB to Serial Adapter. Then you can open Putty or any other terminal software and open an connection to that COM port at 9600 baud rate, which is the default baud rate of this modem.Once a serial connection is open through the computer or your microcontroller you can start sending the AT commands. When you send AT commands for example: "AT\r" you should receive back a reply from the SIM800 modem saying "OK" or other response depending on the command send.

SIM800 is a complete Quad-band GSM/GPRS solution in a LGA type which can be embedded in the customer applications. SIM800H support Quad-band 850/900/1800/1900MHz, it can transmit Voice, SMS and data information with low power consumption. With tiny size of 15.8*17.8*2.4 mm, it can fit into slim and compact demands of customer design. Featuring and Embedded AT, it allows total cost savings and fast time-to-market for customer applications.

Features of SIM800A

- Bands: GSM 850MHz, EGSM 900MHz, DCS 1800MHz, PCS 1900MHz
- GPRS class 2/10
- Control via AT commands (3GPP TS 27.007, 27.005 and SIMCOM enhanced AT commandset)
- Supply voltage 3.4-4.4V
- Coding schemes: CS-1, CS-2, CS-3, CS-4 Tx power: Class 4 (2W), Class 1 (1W)
- Small package: 23 * 23 * 3mm
- Low power: down to 1mA in sleep mode
- TCP/IP AT firmware
- Operating temperature: -40C to +85C
- Audio channels which include a microphone input and a receiver output.
- One SIM card interface.

.

Modem Features

- High Quality Product (Not hobby grade)
- Quad-Band GSM/GPRS 850/ 900/ 1800/ 1900 MHz
- RS232 interface @ RMC Connector for direct communication with computer or MCU kit
- Configurable baud rate

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- SMA connector with GSM Antenna.
- SIM Card holder.
- Built in Network Status LED
- Inbuilt Powerful TCP/IP protocol stack for internet data transfer over GPRS.
- Audio interface Connector
- Normal operation temperature: -20 °C to +55 °C
- Input Voltage: 5V-12V DC

3.3.5 Water level sensor:

Photograph 3.3.5: Water Level Sensor

A float switch is a device used to sense the level of liquid within a tank, it may actuate a pump, an indicator, an alarm, or other device.

A float switch is a device used to sense the level of liquid within a tank. The switch may actuate a pump, an indicator, an alarm, or other device. Use them with hydroponics, saltwater tank, freshwater tank, gardening, aquariums for power head control, pet bowls, fish tanks, filtration, heating, pumps, ponds, basement alarms, boats, air condition drain pans, pressure washers, carpet cleaning mach, reef aquarium, fluid control, ice machines, coffee pots, marine, automotive, automobiles, tropical fish tanks, evaporator coils, condensation line, in relays, or what ever your project may be. It can be easily converted from normally open to normally close by inverting the float.

Note: because the current that the switch can carry is much little(0.5A), you must use a relay or contactor when it is connected by a load, relay and contactor are not included here.

3.3.6 16*2 LCD Display:

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on.

A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD. Click to learn more about internal structure of a LCD.

The purpose of using 16x2 LCD in our project is to display all the parameters of electricity meter and is connected to the port 0 of ARM microcontroller.

FEATURES:

- 16x2 matrix
- Low power operation support: 2.7 to 5.5V.

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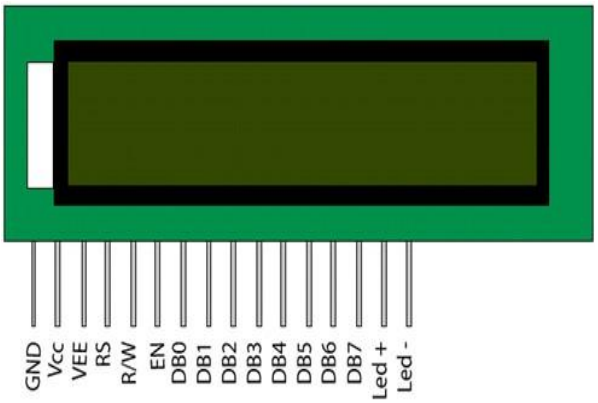
- Duty cycle: 1/16
- Connector for standard 0.1-pitch pin headers.

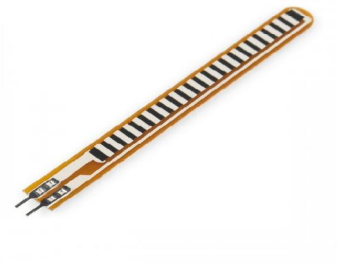


Photograph 3.3.6: 16*2 LCD Display

Pin no.	Symbol	External connection	Function
1	Vss	Power supply	Signal ground for LCM
2	V_{DD}		Power supply for logic for LCM
3	V_0		Contrast adjust
4	RS	MPU	Register select signal
5	R/W	MPU	Read/write select signal
6	E	MPU	Operation (data read/write) enable signal
7~10	DB0~DB3	MPU	Four low order bi-directional three-state data bus lines. Used for data transfer between the MPU and the LCM. These four are not used during 4-bit operation.
11~14	DB4~DB7	MPU	Four high order bi-directional three-state data bus lines. Used for data transfer between the MPU
15	LED+	LED BKL power supply	Power supply for BKL
16	LED-		Power supply for BKL

Table 3.3.6: Pin Diagram of Display

3.3.7 Flex Sensor:



Photograph 3.3.7: Flex Sensor

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Flex sensors are usually available in two sizes. One is **2.2 inch** and another is **4.5 inch**. Although the sizes are different the basic function remains the same. They are also divided based on resistance. There are LOW resistance, MEDIUM resistance and HIGH resistance types. Choose the appropriate type depending on requirement. Here we are going to discuss 2.2inch Flex sensor that is **FS-L-0055**.

Where to Use FLEX SENSOR

For understanding the use of FLEX SENSOR consider:

Case1: Where you want to check whether the surface of a device or thing is leveled or not. Say you want a device to check whether a window or door is open or not. At that time a Flex sensor could be used. The sensor could be fixed at door edge and when the door opens the Flex sensor gets flexed. With the sensor being flexed its parameters changes which could be designed to provide an alert.

Case2: Where you want to measure the FLEX or BENT or ANGLE change of any instrument or device. The **FLEX SENSOR internal resistance** changes almost linearly with its flex angle. So by sticking the sensor to the instrument, we can have the flex angle in electrical parameter of resistance.

How to Use FLEX SENSOR

As mentioned earlier, FLEX SENSOR is basically a VARIABLE RESISTOR whose terminal resistance increases when the sensor is bent. So this sensor resistance increases depends on surface linearity. So it is usually used to sense the changes in linearity.

As shown in the above figure, when the surface of FLEX SENSOR is completely linear it will be having its nominal resistance. When it is bent 45º angle the FLEX SENSOR resistance increases to twice as before. And when the bent is 90º the resistance could go as high as four times the nominal resistance. So the resistance across the terminals rises linearly with bent angle. So in a sense the FLEX sensor converts flex angle to RESISTANCE parameter.

3.3.8 TEMP SENSOR (LM35) :

The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in ° Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling. The LM35 does not require any external calibration or trimming to provide typical accuracies of ±¼°C at room temperature and ±¾°C over a full -55 to +150°C temperature range. Low cost is assured by trimming and calibration at the wafer level. The LM35's low output impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy. It can be used with single power supplies, or with plus and minus supplies. As it draws only 60 µA from its supply, it has very low self-heating, less than 0.1°C in still air. The LM35D is rated to operate over a 0° to +100°C temperature range.

Features

- Calibrated directly in Celsius (Centigrade)
- Linear + 10.0 mV/ C scale factor
- 0.5 C accuracy guaranteeable (at +25 C)
- Rated for full -55 to +150 C range

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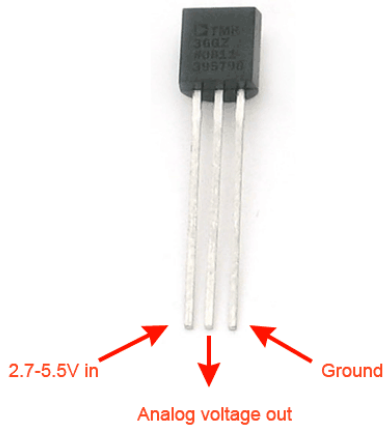
- Suitable for remote applications
- Low cost due to wafer-level trimming
- Operates from 4 to 30 volts
- Less than 60 A current drain
- Low self-heating, 0.08 C in still air
- Nonlinearity only 1/4 C typical
- Low impedance output, 0.1 W for 1 mA load



Photograph 3.3.8 : Temp Sensor

3.3.9 Water Flow Meter:

Photograph 3.3.9: Water Flow Meter

Working of Sensor

Water flow sensor consists of a plastic valve body, a water rotor, and a hall-effect sensor. When water flows through the rotor, rotor rolls. Its speed changes with different rate of flow. The hall-effect sensor outputs the corresponding pulse Signal.

Reading Water Flow rate with Water Flow Sensor This is part of a project I have been working on and I thought I would share it here since there have been a few threads on how to read water flow rate in liters per hour using the Water Flow Sensor found in the Seeed Studio Depo. It uses a simple rotating wheel that pulses a hall effect sensor. By reading these pulses and implementing a little math, we can read the liquids flow rate accurate to within 3%. The threads are simple G1/2 so finding barbed ends will not be that hard. Hardware Installation You will need Seeeduino / Arduino ,Water Flow Sensor,10K resistor,a breadboard and some jumper wires. Wiring up the Water Flow Sensor is pretty simple. There are 3 wires: Black, Red, and Yellow. Black to the Seeeduino's ground pin Red to Seeeduino's 5v pin The yellow wire will need to be connected to a 10k pull up resistor.and then to pin 2 on the Seeeduino

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IV. PROJECT PLAN

Week No.	Action plan
1	Searching of Project information
2	Collection of components requiredfor project
3	Designing of PCB, printing of copper for interior layer
4	Etching, drilling, layer alignment ofPCB
5	Mounting components on PCB as per circuit diagram
6	Soldering components on PCB
7	Software Development for the project
8	Testing circuit is proper or not
9	Troubleshooting for any problems
10	Checking project is properly working or not if not then correct
11	Presentation of report
12	Presentation of PPT
13	Checking project from project guide
14	Checking report & PPT fromproject guide
15	Confirmation from project guide,co-ordinator , HOD
16	Submission of Project model,Project report, PPT

V. ADVANTAGES & APPLICATION

5.1 Advantages

- Timely detection of possible flood risks and floods.
- Flood sensors help you stay ahead of potential hazards and can help minimize damages and expenses.
- To reduce or prevent the detrimental effects of flood waters.

5.2 Application

Applicable at:

- Dam
- River
- Cannel

VI. CONCLUSION & FUTURE SCOPE

6.1 Conclusion

Nowadays the Internet Of things (IoT) is broadly used in worldwide, this system will display the data of the water level measured on lcd display. This project can be very helpful to the Meteorological Department to continuously monitor the dams and river beds water level. With this project it can save many people lives by giving alerts when the water level crosses beyond the limit. This project is very cost-effective, flexible and productive in areas where flood conditions happens everytime

REFERENCES

[1]. Zahir, Shahirah Binti, et al. "Smart IoT Flood Monitoring System." Journal of Physics: Conference Series. Vol. 1339. No.1. IOP Publishing, 2019.

[2]. Priya, S. Jana, et al. "Flood monitoring and alerting system." International Journal of Computer Engineering & Technology (IJCET) 8.2 (2017): 15.

[3]. Hughes, Danny, et al. "An intelligent and adaptable grid-based flood monitoring and warning system." Proceedings of the UK eScience All Hands Meeting. Vol. 10. 2006.

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[4]. Fowdur, Tulsi Pawan, et al. "Performance analysis and implementation of an adaptive real-time weather forecasting system." Internet of Things 3 (2018): 12-33.
[5]. Thielen, Jutta, et al. "The European Flood Alert System-Part 1: Concept and development." Hydrology & Earth System Sciences 13.2 (2009).
[6]. H. McMillan, J. Freer, F. Pappenberger, T. Krueger, and M. Clark, "Impacts of uncertain river flow data on rainfall-runoff model calibration and discharge predictions," Hydrological Processes, vol. 24, no. 10, 2010, pp. 1270–1284.
[7]. F. Pappenberger et al., "Visualizing probabilistic flood forecast information: expert preferences and perceptions of best practice in uncertainty communication," Hydrological Processes, vol. 27, no. 1, 2013, pp. 132– 146.
[8]. M. Ancona et al., "On the design of an intelligent sensor network for flash flood monitoring, diagnosis and management in urban areas position paper," Procedia Computer Science, vol. 32, 2014, pp. 941– 946.
[9]. M. Borga, E. Gaume, J. D. Creutin, and L. Marchi, "Surveying flash floods: gauging the ungauged extremes," Hydrological processes, vol. 22, no. 18, 2008, p. 3883.
[10]. E. Gertz and P. Di Justo, Environmental Monitoring with Arduino. O'Reilly,2013.
[11]. Sadeka Sultana, TawhidaAkand, MrinmoyDey "Design and implementation of Flood detection security system using Node MCU" 2016 9th International Conference on Electrical and Computer Engineering (ICECE), 20-22 Dec. 2016, DOI:10.1109/ICECE.2016.7853980, IEEEXplore.
[12]. Nikolay N. Bakin,Vasiliy I. Tuyev, Eduard F. Yauk "Arduino IDE" 2011 International Conference and Seminar on Micro/Nanotechnologies and Electron Devices Proceedings, 30 June-4 July 2011, DOI:10.1109/EDM.2011.6006944. ISSN: 1815-3712, IEEEXplore.
[13]. R. Vajeth, D. Dama,"IoT based flood detection using ultrasonic sensor", 2004 IEEE Africon. 7th Africon Conference in Africa, DOI:10.1109/AFRICON.2004.1406747,INSPEC Accession Number: 8304644, IEEE Xplore
[14]Asadullah, M. et al., (2017), "Smart Home Automation System Using Bluetooth Technology 2017", International Conference on Innovations in Electrical Engineering and Computational Technologies (ICIEECT), pp. 1–6.
[15]Azid, S. et al., (2015), "SMS Based Flood Monitoring and Early Warning Systems",ARPN Journal of Engineering and Applied Sciences, 10(Vol. 10, No.15), pp. 6387–6391. Available at: www. arpnjournals.com.
[16]Bahagia, S. D. and Ahmadian, H. (2017), "Perancangan Sistem Informasi Manajemen Data Korban Bencana Berbasis Mobilr Android",Jurnal Manajemen dan Akuntansi, 3(2), pp. 22–30.