IOT based Flood Monitoring System Using LPC2148

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Abstract: The most important thing immediately before, during and after a disaster occurs is the dissemination of information, a deployment of devices enabled by IOT (Internet of Things) could bring benefits in terms of giving to people information opportunity for making decisions in face of this disaster. In this paper the implementation is done by using Arm7 LPC2148, water level sensor, vibration sensor, temperature sensor, GSM modem Relay drivers, LCD Display. The sensors are connected to the microcontroller and the sensors will continuously be monitored by the microcontroller through IOT based the ip address will be created. Whenever the ip address is entered in the smart phone the status of the sensors will be displayed later when the vibration sensor is activated the buzzer will be activated and alert message will be delivered to the monitoring station and through the mobile app the consult person will alert the population through GPRS Technology.

Keywords: LPC2148, IOT, GSM, LCD.

I. INTRODUCTION

Flooding is the most common natural disaster worldwide happens without prior warning. Floods have been known to do some significant damage. They destroy homes, crops, cars, buildings and anything in their path. Animals and people get caught in the current of the flowing water and can’t get out before rescue attempts are made. Although flooding was an abnormal phenomena ages ago, but now it is considered a life treating natural disaster for the mankind [1]. Flooding has always resulting in enormous anxiety on countries across the continent where by lost of life’s, people displaced, agricultural land submerged in mud’s, roads, bridges and houses washed away [2,3]. As a result of flooding, the damages on properties are clearly visible. Many individual and organization required to spend time and afford to reduce the overhead on the flood restoration plans for the infected locations and as well as for the victims. Most of these plans involve big amount of money and lots of human force such as rescue workers, doctors, nurses, engineers and etc. Other than the human forces, the government has to spend a big amount of money in various restorations of physical structures in the flood infected locations. If only early flood warning system has been effectively utilized, these losses can be reduced and appropriate steps in fighting against the flooding scenario can be taken in the shortest time within the available resources. In this project, we are using microcontroller which contain all the operations in regarding the dam as shown in Fig.1. For this process, we require the components such as Micro controller LPC 2148, vibration sensor, temperature sensor, water level sensor, Relay drivers, GSM modem, 16x2 LCD display, Buzzer These sensors are placed in different threshold levels are connected to the controller. If for supposed the level crossed the sensors at level-1, the information is passed to the controller and then the controller check for the precautions instructions which are given by the developer.

![System Requirement](image)

II. RELATED WORK

In most places, rainfall is likely to occur irregularly and in widely different amounts from one time to another. As a result, the streams which carry the surface run of fluctuate greatly in the amount of water they carry. Thus, floods can be expected to occur at intervals as a normal part of the cycle in [4]. In [5] the author stated that floods are the second-most widespread natural disaster on Earth. It happens when water overflows or soaks land that is normally dry. There are few places on Earth where people don’t need to be concerned about flooding. Generally, floods take hours or even days to develop, giving residents time to prepare or evacuate. Sometimes, floods develop quickly and with little warning. Flooding may result from the volume of water within a body...
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of water, such as a river or lake, which overflows or breaks levees, with the result that some of the water escapes its usual boundaries, or may be due to accumulation of rainwater on saturated ground in an area flood. It can also arise from abnormal heavy precipitation, dam failures, rapid snow melts, river blockages in [6]. Impacts of Flood Events. Floods are among the most dramatic forms of interaction between man and its environment. They are always associated with heavy loses of life and property, misery hardship disease and at times, famine. There are two main causes of flood which are natural and man-made. Some examples of natural causes are heavy rainfall and overflowing of riverbanks which usually results to perennial flooding.

Also, heavy rainfall accompanied by flooding cannot only cause tremendous damage to buildings and homes, but also kill woody and herbaceous plants in [7]. In [12] the author stated that sirens are designed to provide a very rapid alert to potentially threatened populations. They are currently the only reliable means of alerting outdoor populations. Some sirens are used in making an effective FWS. Furthermore, a local flood warning system helps in increasing lead time for watches and warnings at locations subject to flood risk. The information can be used to predict whether a flood is about to occur, when it will arrive, and how severe it will be. Organizations and individuals are given notice by the system so they can protect themselves and their property. Floods impact on both individuals and communities and have social, economic, and environmental punishment. The consequences of floods, both negative and positive, vary greatly depending on the location and scope of flooding, and the susceptibility and value of the natural and constructed environments they affect. Floods can also traumatize victims and their families for long periods of time. The loss of loved ones has deep impacts, especially on children. Displacement from one's home, loss of property and disruption to business and social affairs can cause continuing stress.

III. EXISTING SYSTEM

A water level measurement enables to know the amount of water that have a river, it also to know what level it can become dangerous because it may cause an overflow, therefore, cause floods. Saving level values can make predictions for future levels and behaviors in the water level of rivers, lakes, lagoons, ponds, and dams. Different types of water level measurement systems are used in industry and research which are shown below. These can find directly measuring the height of the liquid by drawing up to reference line, other measuring hydrostatic pressure, some more which are based on a float system whose displacement caused by the same liquid is quantified or also those that exploit the electrical properties of a liquid. Traditional systems for measuring water level have existed for decades. Next, we present the most typical ones.

A. Limnimeter Rule Meter

Rule for graduating that is set in a river and used to read the fluctuations of the water levels as shown in Fig.2.

B. Liquid Level Meter

This device measures directly the height of liquid taking into account a reference of level measurement of a container as shown in Fig.3.

C. Sounding Line Meter

It is a rod or ruler which is inserted into a reservoir, the water level is determined directly by measuring the length that is wetted by the liquid as shown in Fig.4.
IV. PROPOSED SYSTEM

The LPC2148 microcontrollers are based on a 16-bit/32-bit ARM7TDMI-S CPU with real-time emulation and embedded trace support. On-chip static RAM is 8kB to 40Kb and the on-chip flash memory is 32 Kb-512kb wide interface/accelerator enables high-speed 60 MHz operation. In-System Programming (ISP)/In Application Programming (IAP) via on-chip boot loader software as shown in Fig.5. Single flash sector or full chip erase in 400 ms and programming of 256 bytes in 1 ms. USB 2.0 Full-speed compliant device controller with 2 kB of endpoint RAM. Single 10-bit DAC provides variable analog output (LPC2142/44/46/48 only). Two 32-bit timers/external event counters (with four capture and four compare channels each), PWM unit (six outputs) and watchdog. Low power Real-Time Clock (RTC) with independent power and 32 kHz clock input.

These types of provisions vary with different modules. Lots of varieties of GSM modem and GSM Modules are available in the market to choose from.

A. Liquid Crystal Display (LCD)

LCD (Liquid Crystal Display) is a viewer module which is widely used because it simple looks. The most widely LCD module used today is M1632 LCD because the price is quite cheap. M1632 LCD display is an LCD module with 2X16 (2 rows X 16 columns) with low power consumption. The module is equipped with a microcontroller specifically designed to control the LCD. The LCD module used is shown in Fig.6.

B. GSM Module

A GSM Module is basically a GSM Modem (like SIM 900) connected to a PCB with different types of output taken from the board – say TTL Output (for ARM 7, 8051 and other microcontrollers) and RS232 Output to interface directly with a PC (personal computer) as shown in Fig.7. The board will also have pins or provisions to attach mic and speaker, to take out +5V or other values of power and ground connections.

C. The Microcontroller and Mobile Phone

Due to the highly static damage nature of the LPC2158 microcontroller, the prototype board has been implemented. The prototype board has a MAX232 chip on board, which is a RS232 transmitter and receiver and this allows the microcontroller, to communicate with mobile phone serially. A mobile phone is interfaced with microprocessor to send emergency SMS. The microcontroller, as well as the mobile phone are both Data Circuit.

D. Temperature Sensor

The LM35 series are precision integrated-circuit temperature devices with an output voltage linearly proportional to the Centigrade temperature. The LM35 device has an advantage over linear temperature sensors calibrated in Kelvin, as the user is not required to subtract a large constant voltage from the output to obtain convenient Centigrade scaling.

LM35 device makes interfacing to readout or control circuitry especially easy as shown in Fig.8. The device is used with single power supplies, or with plus and minus supplies. As the LM35 device draws only 60 μA from the supply, it has very low self-heating of less than 0.1°C in still air. The LM35 device is rated to operate over a −55°C to 150°C temperature range, while the LM35C device is rated for a −40°C to 110°C range (−10° with improved accuracy). The LM35-series devices are available packaged in hermetic TO transistor packages, while the LM35C, LM35CA, and LM35D devices

Fig.5. LPC2148 Microcontroller.

Fig.6. LCD Display.

Fig.7. GSM Module.

Fig.8. Temperature Sensor.
are available in the plastic TO-92 transistor package. The LM35D device is available in an 8-lead surface-mount small-outline package and a plastic TO-220 package.

E. Lm35 Temperature Sensor

The LM35 is an integrated circuit sensor that can be used to measure temperature with an electrical output proportional to the temperature (in °C). It can measure temperature more accurately than a using a thermistor. The sensor circuitry is sealed and not subject to oxidation. The LM35 generates a higher output voltage than thermocouples and may not require that the output voltage be amplified. The LM35 has an output voltage that is proportional to the Celsius temperature. The scale factor is .01V/°C. LM35 is a piezo electric vibration sensor. It is a low-cost cantilever-type vibration sensor loaded by a mass to offer high sensitivity at low frequencies. Useful for detecting vibration and ‘tap’ inputs from a user. A small AC and large voltage (up to +/-90V) is created when the film moves back an forth. A simple resistor should get the voltage down to ADC levels. Can also be used for impact sensing or a flexible switch.

F. Magnetic Water Level Sensor

Level sensors detect the level of liquids and other fluids and fluidized solids, including slurries, granular materials, and powders that exhibit an upper free surface. Substances that flow become essentially horizontal in their containers (or other physical boundaries) because of gravity whereas most bulk solids pile at an angle of repose to a peak. The substance to be measured can be inside a container or can be in its natural form (e.g., a river or a lake). The level measurement can be either continuous or point values. Continuous level sensors measure level within a specified range and determine the exact amount of substance in a certain place, while point-level sensors only indicate whether the substance is above or below the sensing point. Generally, the latter detect levels that are excessively high or low.

V. RESULTS

By using this system, we can alert the more number of population whenever a disaster occur in a particular area. This graph represents to the status of the sensor.

VI. CONCLUSION

According to definitions of IOT, if we consider a sensor as an element of IOT which enables to communicate its current status and be published on Internet, then our proposal is very close to what we are intending to achieve within the concept of Internet of things. The alert will be sent to the concern station through GSM. Hence, people can be opportunely informed when rising river levels, so inhabitants can make a decision and start preparing to evacuate their homes if necessary. We can further extend our work by spreading the information to surroundings using GPRS technique.

VII. REFERENCES

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