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IoT based early flood detector and avoidance

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ABSTRACT

Flooding may be a phenomenon which has attracted global attention as a result of its negative impact on the society. Developing nations like India are predicted to experience increased flood occurrences within the coming decade. The events of flooding are unlikely to vary, however, its impact on our society are often alright reduced. There are some places that are more susceptible to flooding than other places, the implementation of flood alert systems near any major water area or body of water provides critical information which will protect property and save lives. Hence, we are designing this project to tell the people about the upcoming flood by making use of the concept of Internet of Things. For that purpose, we are getting to use an android Application to intimate the users. This Project focuses on providing early detection of flooding and therefore the measures to minimise and avoid floods. The system involves the deployment of sensor nodes at specific flood vulnerable locations for real-time flood monitoring and detection. Flood events concerning flash flooding and run-off water or overflow are successfully monitored in real time which saves individuals many times to organize against predicted flood occurrence, saving them from the aftermath of flood disaster.

Keywords— *Arduino, Android, BLYNK IOT, ESP8266 Wifi Module, Moisture Sensor, Ultrasonic Sensor*

1. INTRODUCTION

In India, the rainy seasons occur annually from June to October. Early rainfall is typically in June with full commencement in July, and stops within the months of October annually, with a couple of showers in November. Flooding may be a phenomenon which attracts global interest. It leads to tremendous environmental destruction and loss of lives. Flooding is a result of substantial rainfalls, structural failures and an outsized number of human factors. Floods believe precipitation amounts and rates, topology, geology, land use, and antecedent moisture condition.

In the year 2018 Severe flooding affected Indian state of Kerala thanks to unusual high rain during monsoon season. It was the worst flooding in Kerala in nearly a century. In which over 374 people died within fortnight. Thirty-five out of 42 dams within the state open for the primary time in history. Kerala received heavy monsoon rainfall on the mid evening of August and leading to dams filling to capacity within the first 24 hours of rainfall the state received 310 mm of rain.

The events of flooding is unlikely to vary, however, its impact on our society are often alright reduced. Efficient forecasting and early warning systems can help mitigate the consequences of flooding. The concept of Internet of things are often wont to collect Real time information from a good range of environmental phenomenon.

To develop a true Time Solution to Flood detection and avoidance Using IoT and Sensor Network, we proposed a flood detection and avoidance model which needs attention to 3 basic factors: Data collection via water level sensors, processing, and therefore the dissemination of flood warning information. While automated flood warning systems are often surprisingly expensive to implement, the first factor determining cost for any such system is that the number of Sensor site locations.
To tackle the problem of detection of the flooding, we are using the Y89 Moisture sensor's which will act as the water level sensor. Where the resistance value is going to be proportionate to the moisture within the soil.

For making this project IOT compatible we are using the ESP 8266 WIFI module which can allow our project to speak to different elements using Wi-Fi connectivity for internet. An 16x2 LCD is employed in order that the knowledge and acknowledgement of the operation of the project are often displayed on the board itself. The Android application is developed using the BLYNK IOT platform in order that the various sensors are often integrated with the Android Application on a smartphone.

2. LITERATURE REVIEW

Research [1] Wireless sensor networks for flash-flood alerting. Paper presented at the Devices, Circuits and Systems, 2004. Proceedings of the Fifth IEEE International Caracas Conference on.

More research [2] has been conducted on Urban flash flood monitoring, mapping and forecasting via a tailored sensor network system. Paper presented at the Networking, Sensing and Control, 2006. ICNSC'06. Proceedings of the 2006 IEEE International Conference on.

More research [3] has been conducted with reference of the Urban flash flood monitoring, mapping and forecasting via a tailored sensor network system. Paper presented at the Networking, Sensing and Control, 2006. ICNSC'06. Proceedings of the 2006 IEEE International Conference on.

Next research [4] has been conducted a flood detector was made using Arduino and temperature sensor the project was working but we used LM35 since The LM35 boasts a rather higher temperate range at -55°C to 150°C versus the 40°C to 125°C range of the TMP36.

3. DESIGN METHODOLOGY

3.1 Block Diagram

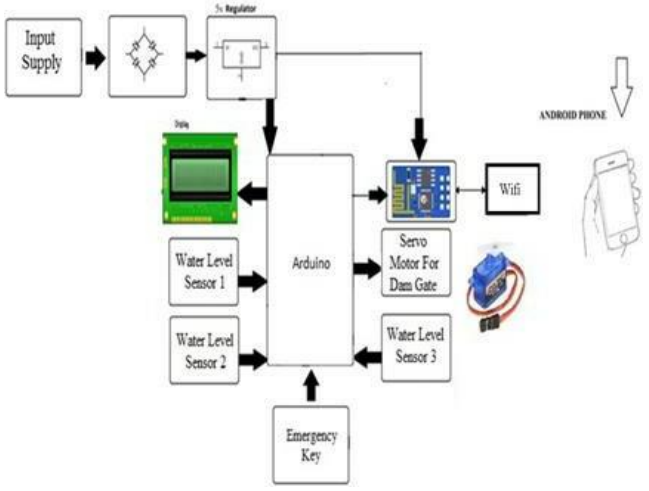

Fig 1.

As we follow along the diagram it's evident the the CPU used here is that the Atmels ATmega328p which may be a single chip CPU and every one the various modules and sensors are connected to it. We are employing a pair of the Y89 soil moisture sensors to detect the water level in accordance with the bottom, whereas for determining the reference of the water level during a stored water body like Dams or reservoirs we've used an HC SR04 Ultrasonic Sensor. The 16x2 LCD display is employed to work out the operation status of the project on the board and therefore the connectivity to the web is formed possible through the ESP 8266 Wi-Fi module. The provision to disperse the critical level of water within the water body is being realised through connecting a servo motor which represents the heavy-duty motors which will be wont to control the Dam gates because the need arises. For alerting the users within the area of the flood the BLYNK IOT platform and therefore the Android application on the smartphone is getting used where all the alerts for the user are often delivered and therefore the data about the crisis can disaster control are often obtained by the user as necessary. Submit your manuscript electronically for review. prepare it in two-column format, including figures and tables (until it doesn't fit properly and data is not visible).

3.2 Flow Chart

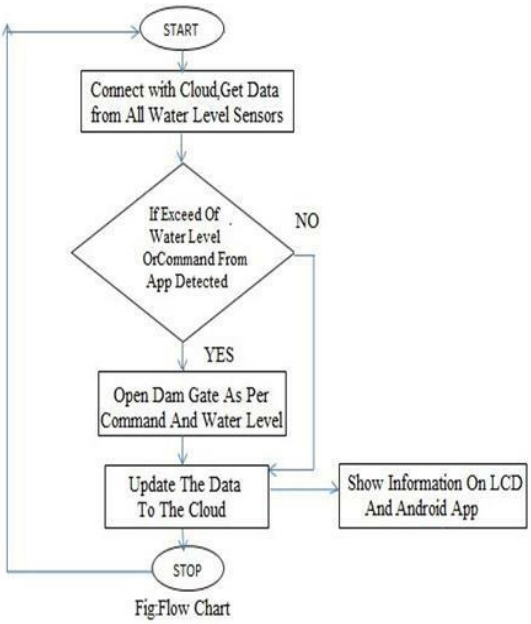

Fig 2.

Once we activate the circuit the ESP 8266 WIFI module will attempt to establish an Wi-Fi connection and once the connection is successful and therefore the circuit is connected to the internet and cloud services the info from all the relevant sensors are going to be logged, this data will then be compared with the reference safe and important values saved on the cloud, if the values from the sensors is beyond the critical value then the data are going to be updated on the cloud, the user are going to be alerted on the android app via a push notification and if required the Dam gates would be opened via the servo motor and therefore the water are going to be let loose to the extent that the dam is under critical limit. Now, if the values are well under the security range then the info will only be updated on the cloud and therefore the information are going to be displayed on the LCD display also because the graphical interface of the Android application on the user's smartphone.

4. HARDWARE DETAILS

4.1 Ultrasonic Sensor HC SR04

Fig 3.

The HC SR04 Ultrasonic sensor is used to determine the water level in a contained water body such as Dams or Reservoirs. It can be Powered the using a regulated +5V through the Vcc ad

Ground pins of the sensor. The sensor works with the straightforward high-school formula that is:

Distance = Speed × Time

4.2 Soil Moisture Sensor

The soil moisture sensor consists of two probes which are wont to measure the volumetric content of water. The two probes allow the present to undergo the soil then it gets the resistance value to live the moisture value.

Fig 4.

4.3 ESP8266 WIFI Module

Fig 5

The ESP8266 Wi-Fi Module may be a self-contained SOC with integrated TCP/IP protocol stack which will give any microcontroller access to your Wi-Fi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor.

4.4. SG90 Servo Motor

Fig 6.

Servo motors have a geared output shaft which may be electrically controlled to show one (1) degree at a time. For the sake of control, unlike normal DC motors, servo motors usually have an additional pin aside the two power pins (Vcc and GND) which is the signal pin.

5. SOFTWARE DETAILS

5.1 Arduino IDE

Fig 7.

Arduino IDE is an open source software that is mainly used for writing and compiling the code into the Arduino Module. It is a politician Arduino software, making code compilation too easy that even a standard person with no prior technical knowledge can get their feet wet with the training process. It is easily available for operating systems like MAC, Windows, and Linux and runs on the Java Platform that comes with inbuilt functions and commands that play an important role for debugging, editing and compiling the code in the environment. This environment supports both C and C++ languages.

5.2 Eagle Software

EAGLE stands for Easily Applicable Graphical Layout Editor, EAGLE may be a scriptable electronic design automation (EDA) application with schematic capture, computer circuit board (PCB) layout, auto- router and computer-aided manufacturing (CAM) features.

5.3 BLYNK IOT Platform

Blynk was designed for the Internet of Things. It can control hardware remotely, it can display sensor data, it can store data, visualize it and do many other cool things. There are three major components in the platform:

- Blynk App- allows to you create amazing interfaces for your projects using various widgets provided.
- Blynk Server- liable for all the communications between the smartphone and hardware. we can use Blynk Cloud or run your private Blynk server locally. It's open-source, could easily handle thousands of devices and may even be launched on a Raspberry Pi.
- Blynk Libraries- for all the favoured hardware platforms - enable communication with the server and process all the incoming and outcoming commands.

6. RESULT

The existing problems faced by the authorities for disaster control associated with floods are often overcome by using the proposed model. The project is often successful in engaging the users and keep them informed with all the required information needed during the time of crisis. The water managing authorities also because the users are going to be ready to monitor the knowledge in real time, moreover when this model is employed for an extended time due to the mixing of the cloud services all the info are going to be logged and saved on the servers.

The status of the operation is often observed on the circuit of the project itself because the 16x2 LCD display will indicate the mode of operation which may be beneficial for certain operators where safety protocol requires a person to keep personal electronic devices like phones away from the operating area.

7. CONCLUSION

When this project is compared to the prevailing practices which are getting used for estimation of water level in water bodies and control and management very significant improvement in efficiency will be noticed. The system is

comparatively inexpensive to supply install and maintain and there's no cost involved for the user to use the Android application also because the cloud service as any working internet connection can do the job, because the mobile app is backward compatible towards android 4.0 (version Ice-cream sandwich) approximately 89% of android users can use the appliance.

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