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Maintaining Floodgates for Water Conservation at Dams

Pidakula Sharmila[1], G Santhosh Reddy[2]

[1]M. Tech Student, ECE, SVS Group of Institutions, Telangana, India

[2]Assistant Professor, ECE, SVS Group of Institutions, Telangana, India

Abstract: ***Once the level within the dam surpasses certain level, the dam is at risk of collapsing. To avert this, we ought to constantly monitor dam level to ensure that dam structure doesn't cave in underneath the pressure from the water. A dam is really a barrier that impounds water or subterranean streams. The primary water quality related parameters that should be supervised are Temperature, Turbidity and ph. This paper describes the theoretical aspects associated with the work we're doing and also the particulars concerning the illustration showing the automation of dam gates. Dams generally serve the main reason for retaining water, while other structures for example floodgates or levees (also referred to as dikes) are utilized to manage or prevent water flow and drainage into specific land regions. You can do this by manipulating the ton gates when the level surpasses certain limits. This suggested mechanism of dam gate control cuts down on the water wastage and efficient use of available water is ensured. Also water as being a scarce resource, it might be essential to preserve and keep its quality. To do so, various water related parameters ought to be under constant check and evaluation. Floodgates sometimes will also be accustomed to lower water levels by permitting more water to circulate right into a ton bypass or detention basin.***

Keywords: ZigBee communication, GSM Modem, AT89rdv51 Microcontroller

1. Introduction

This project is definitely an AT89rdv51 microcontroller based dam gate control system which will help in keeping track of the frequent use of water sources from dam for irrigation reasons and efficient operation of dam gate based on the degree of water and will help with showing about ton to individuals residing in the nearby. Even the PLC based product is huge and therefore appropriate for major dams because of its cost. For medium and small dams like irrigation dams doesn't need such huge PLC systems. To reduce these complaints a mechatronic control product is suggested within our project. The control mechanism from the dam gates are carried out by hand and taking advantage of PLC. But there are numerous errors in manual method. Water level is detected in line with the feedback in the mechanism used. Within the situation of major dams, nearly real-time structural monitoring from the dams can help to eliminate losing human lives or qualities as well as in the situation of small irrigation purpose dams, real-time monitoring might help in lessening the harm caused towards the crops by providing a sign once the level within the dam surpasses a particular threshold and with respect to the level from the dam, gates could be controlled. Additionally towards the automation from the dam gates, a predefined SMS will be delivered to all of the concerned authorities once the level crosses the greatest mark [1]. Together with these level sensors, sensors to determine various pollution related parameters can be found. Ecological variables like temperature, turbidity and pH will also be measured to get a precise picture from the dam qualities. When the plethora of these values crosses a particular undesired threshold, a predefined SMS is going to be sent utilizing a GSM modem to any or all the concerned authorities to enable them to go ahead and take necessary actions.

2. Previous Study

Floodgates sometimes will also be accustomed to lower water levels by permitting more water to circulate right into a ton bypass or detention basin. Additionally to spillways, openings through dams will also be needed for drawing off water for irrigation and water supply, for making certain the absolute minimum flow within the river for riparian interests downstream, for producing power, as well as for evacuating water and silt in the reservoir. Floodgates are adjustable gates accustomed to control water flow and drainage in ton obstacles, reservoir, river, stream, or levee systems. They might be made to set spillway crest levels in dams, to regulate flow rates in sluices and canals, or they might be made to stop water flow and drainage entirely included in a levee or storm surge system. These gated openings normally are fitted with coarse screens in the upstream ends to avoid entry of floating and immersed debris. Provision to clean these screens is important. Within the paper by Srikanth Anumalla1, in which at numerous locations in Nebraska where groundwater level monitoring systems are deployed, level is generally measured using pressure transducers. . Commercial methods to this issue use radio spectrum or cellular technology to transfer the information to some remote location. The large costs associated with cellular phone and employ of those technology is a significant limitation for his or her use within realistic situations. Someone periodically drives to those locations to download data from all of these sensors onto a pc. The downsides of the process would be the delay in accessibility to the information and also the costs Within this project; they suggested a brand new system for sensing the groundwater level data in tangible-time using Field Programmable Gate Arrays and Wireless LANs (IEEE 802.11). The primary purpose of their project would be to demonstrate the suggested system having a low-cost prototype implementation which could acquire, transfer and display (or

archive) groundwater level data from remote locations. In 1986 Davidson, E.G.2 suggested a control system for efficient working of hydroelectric power plant with the aid of Visual Display Models (VDU's).This suggested VDU system led us for making a Graphical user interface for monitoring purpose. A paper was suggested by Xavier Litric3 to make use of SIMO systems for water management in dam. This SIMO system handles the actual time calculation from the upstream and downstream flow from the water in dams. By watching these 4 elements and accordingly operating the gates could be transported out. The machine we suggested could be merged using the above pointed out system for effective operation of dam gates. Marcel Nicola, Florin Velea4 have suggested a method for effective charge of Hydropower Dam Spillway using PLC/SCADA system. But lately Montanhydraulik5 manufacturing company has installed a PLC based control system for controlling the whole process of dam gates. This technique was effectively placed on a sizable scale in foreign nations and also the only dam in India where this technique is installed is Indira Sagar Dam in Madhya Pradesh [2]. However this PLC based product is pricey and effectively relevant for major dams and never for medium and small dams like irrigation dams. Some suggested a protection for that dam gates which transformed some drawbacks of other existing system like not discovering anomalies, for example uneven movement of gates, problems in drive gearwheel etc. Within our paper we've provided the limit switches for correct movement of gates. Therefore we may use their system with this system to beat other anomalies too. Major dams and never for medium and small dams like irrigation dams.

3. System Design

In an exceedingly simplistic form, a microcontroller system could be seen like a system that reads from (monitors) inputs, performs processing and creates to (controls) outputs. The creation of water sensor is digital output. Therefore, the creation of this sensor goes straight to the microcontroller. Within our project, we're using microcontroller (AT89V51), GSM modem, XBee module, power, stepper motor, level sensor, temperature sensor, pH sensor, turbidity sensor and ADC0808. Therefore we have to convert these analog values into digital values before hooking up towards the microcontroller. ADC0808 can be used for this function. These values are going to be sent with a transmitting XBee module to some computer for monitoring purpose. A Graphical user interface like Visual Fundamental can be used within our task for exhibiting the on the pc. A receiving antenna is attached to the computer to get values in the site [3]. When the values received are over a harmful level a SMS is going to be sent with the GSM modem. Also, the gate from the dam is controlled instantly through the microcontroller with respect to the level arrived at. To resolve the issue associated with collapsing of dam because of storage water beyond its capacity, we've suggested automating the ton gates. We are fixing level sensors on several levels on dam walls. Once the water reaches these levels, these sensors will be sending signal towards the microcontroller. The microcontroller will execute the predefined instructions kept in it. This predefined instruction handles opening of ton gates. Once the level reaches the very first level, the gates will open and increase a particular height. Once the level reaches the 2nd level, the gates will further move upwards. In the same manner when the gate reaches the ultimate level, the gates are going to be opened up completely. Once the water starts receding, the gates will begin closing up. Also, the sensors for that other atmosphere parameters will continuously send the towards the Graphical user interface through XBee module. Graphical user interface utilized in our project is Visual Fundamental. It'll display real-time values of various parameters as well as which level the dam water has arrived at. We've set threshold levels for the parameters. Once the values exceed the brink levels, a note level is going to be sent through GSM modem towards the concerned authorities. A predefined message may also be sent once the gates are opened up. Within this project work we're using AT89v51 micro-controller. This micro-controller plays a significant role. Micro-controllers were initially utilized as components in complicated process control systems. However, due to their small size and occasional cost, Micro-controllers are actually also getting used in government bodies for individual control loops. ADC0808 can be used to transform the analog values in the sensors to digital values. The high temperature, pH and turbidity sensors provide with analog values whereas water sensors give digital values, so they are connected straight to the microcontroller. ADC0808 requires an exterior clock. The utmost clock frequency that may be given is about 164kHz. We made a decision to provide a clock frequency ok 100kHz. This clock frequency is accomplished by utilizing RC oscillator having a NOT gate which functions as a Schmitt Trigger. We use CD4066B that has four quad bilateral switch each with independent controls. Each switch is going to be linked to particular predefined levels. As water achieves these levels, the microcontroller controls the dam gates. LM35 can be used that is a built-in circuit sensor you can use to determine temperature by having an electrical output proportional towards the temperature (in oC). LM324 can also be used that is an operational amplifier with true differential inputs. LM324 can be used to amplify the electrical output caused by the high temperature sensor before passing on to ADC0808. The turbidity sensor contains an easy sensitive device i.e. a photograph-resistor (LDR) along with a power Brought. The Brought and also the photo-resistor are fixed at ten or twenty yards apart in a way that water can flow together. The greater turbid water, the less light in the Brought light will achieve the photo-resistor. As water turbidity increases, less light will achieve the photoresist or, and resistance increases. pH sensor measures the pH value and converts it to current signals. The pH is measured utilizing a pH electrode. This electrode the converts the pH value into corresponding current value [4]. This current level may be the amplified using operational amplifier, TL062. Because the pH electrode was costly, for demonstration purpose we've directly succumbed the current value towards the ADC. The gates present on dams focus on the key of hydraulics. For demonstration purpose, we're utilizing a stepper motor along with a wooden gate. The gates is going to be controlled based on which level water has arrived at. The parameter values in the sensors in the dam site are send towards the Graphical user interface in the concerned personnel's office using XBee Module [4]. Two modules are utilized, one as transmitter and yet another as receiver. The

transmitter module is attached to the microcontroller in the dam site and also the receiver module is attached to the computer at work.

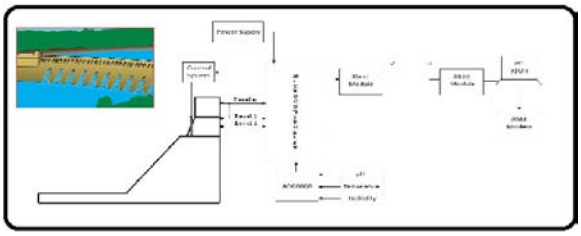

Figure 1: Framework of the system

4. Conclusion

Transmission and reception of information in the sensors towards the Graphical user interface using XBee modules is shown. Automation of ton gates once the level from the dam surpasses the predefined threshold values can also be shown. The machine effectively provides real-time monitoring from the turbidity, level; temperature and ph. Sensors for calculating various pollution parameters like pH, temperature, and turbidity were effectively implemented. A predefined SMS using GSM modem is distributed when the supervised parameters goes past the number. Hence applying this monitoring system we are able to have real-time monitoring of numerous parameters and based on these findings the concerned government bodies are alerted to accept precautionary measures. The thresholds for that various parameters receive below. Within our system, only if the dam reaches the predefined levels, a reminder message is send in addition to shown on the Graphical user interface. For any more effective system, the present level may also be shown on the Graphical user interface. Additionally a WSN network could be developed composed of numerous nodes, whereby through routing of information a bigger part of the reservoir could be covered. Yet another quantity of parameters for example conductivity, dissolved oxygen in water may also be measured. Our bodies is though suggested just for the correct charge of gates but further it may be extended for correct supply of water for irrigation and also to homes too by applying additional system.

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