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DAM LEVEL CONTINUOUSMONITORING, CONTROLLING AND ALERTING SYSTEM USING GSM

Mr. Abhishek S Umachigi[1], Mr. Santosh Yelkar[2]
Prof. Mrs. Deepali M Yewale[3], Ms. Rucha A Dhamdhere[4]
Department of Electronics and Telecommunication Engineering
AISSMS Institute of Information Technology,
University of Pune, India.

Abstract: ***Dam automation relates only to the operation of opening and closing of the gates. The authorities need government letter to alert the people residing near the river banks. Also maintaining the status of the dam is another big task. This procedure is very time consuming and sometimes proven to be helpless to save lives. These days due to global warming it is seen that there is uneven rainfall pattern. This has severely affected the inhabitants. In case of flood situations a lot of human efforts will be required for the reestablishment of the lives. So this project will give the detailed modeling of the system which will alert the authorities about the overflow of the dam. The system will include water level monitoring of dam site and respective action on the gates of the dam.***
Index Terms: Geared DC motor, GSM, Micro-controller, Resistive sensor.

I. INTRODUCTION

In this project we are checking the level of dam continuously. Hence for achieving this purpose we have designed a resistive type sensor. In such type of sensor the level of dam is sensed and the corresponding resistance changes which gives corresponding current change. This current change is given to the I to V convertor. The output of the convertor is analog output which should be converted to digital signal using Analog to Digital Convertor. This digital signal is fed to the microcontroller and the level is displayed on the LCD. When this level reaches above 60% of the dam level the lower gates are opened and the water is allowed to pass through those gates. In case of the inflow being excessive and the lower gates are not sufficient enough to pass the water and maintain the level, the upper gate is opened. This is the safety gate that is in the cases of flood this gate will be opened for the water to flow and to maintain the dam to a safe level. At this time an alert message will be sent through GSM to the concerned authorities regarding the dangerous level.

A. Objectives

To develop a simpler and relatively inexpensive dam automation system for operating gates and alerting people residing near river banks using GSM and microcontroller. At present the automation is done through PLC's but using that technology becomes more bulky and it requires the knowledge about the PLC's.

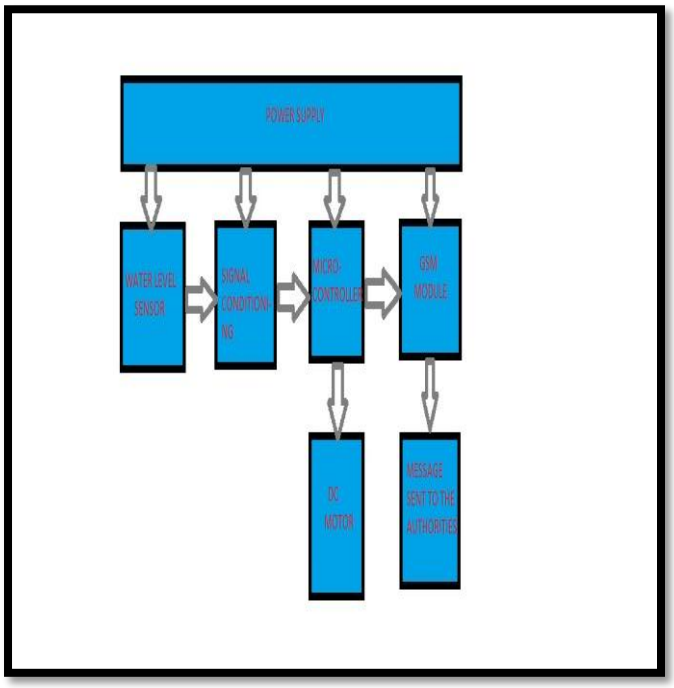

Fig.1: Block Diagram of system

II. SENSOR

In this type of sensors two Cu plates of 2mm thickness and height 30cm are taken. The distance between these two plates is maintained at 2cm. One of the plates is given a supply of +5v and the other plate is kept at a ground potential. Initially when there is no water between the two plates there is no contact between them so no current flows. As the water level rises the current starts' flowing increasingly. This happens because as the level rises the current takes a path where it has to overcome lesser resistance than the one it had taken before. Here both the plates are taken to be of Cu because the output readings that were recorded were seen to be almost linear and steady. Multiple combinations of Cu and Al were also taken but it was found that no steady readings were recorded. This happens because the conductivity of Cu is better than other elements.

I= V/R
V= Voltage in V
I= Current in A
R= Resistance in Ω

Here current is inversely proportional to the resistance. So when the level of the dam changes the resistance also changes. The resistance and level are inversely related to each other. So when level increases the resistance decreases. When the voltage is kept constant the current will increase when the resistance will decrease which means that the current increases with increase in the level.

A. Table of readings

Water level in cm	Output current in mA
0	0
1	0.23
2	0.47
3	1.1
4	2.1
5	2.6
6	3.3
7	3.8
8	4.3
9	5
10	5.7
11	6.4
12	6.8
13	7.6
14	8.3
15	9.6
16	9.9
17	10.7
18	11.5
19	12.2
20	12.8
21	13.6

Table 1: Analysis of water level sensor using copper plates

III. SIGNAL CONDITIONING

The output of sensor is current. The variations are in mA. So to interface it with micro-controller we need to digitize it. Since current transmission is easier than that of voltage, we carry the signal in current form then convert it to voltage with simple I to V converter having suitable gain or a simple resistor can be connected to the output of sensor and voltage can be measured across it. This output is given to the ADC for digitization. The output of ADC is fed to micro-controller for further processing.

IV. MICRO-CONTROLLER

The output of ADC acts as an input to micro-controller. Micro-controller is the heart of system. It is used for level comparison and operation identification. It compares the current level of dam with the programmed levels and decides the operation to be taken on the gates. There are doors on two different levels of dam. The upper level door is used only in heavy rainfall, while lower door is used to regulate the water level as per the need. This is sequential operation. Consider the initially the water level is zero. As the level increases and reaches the level of 60% which is the level to which water should be maintained continuously. If the level continues to increase above 60% the lower gate will be opened in four steps. The first step will be till 65%. Second from 65%-70%. Third step is between 70%-80% and the final step will be between 80%-90%. That is if the level is between 80%-90% the lower door will be complete opened. If the water level continues to rise above 90% even after opening lower gate completely, the upper gate will be opened completely. At the same moment the alerting message will be sent to authorities regarding flow of water.

V. GEARED DC MOTOR

These motors are used to drive the gates of dam .The doors are operated in steps by giving time delay. The time required to open the door completely is taken into account to decide the rpm of motor. Motor with 500rpm is enough to open the gates and close them with in specified time.

VI. GSM MODULE

As soon as the upper door is opened the message is fired to the authorities regarding the level and flow of water. For this we are using GSM module which is interfaced with micro-controller.

VII. ACKNOWLEDGEMENT

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VIII. CONCLUSION

From the analysis it is found that copper is better conductive material which can be used for continuous water level sensor. This sensor gives linear changes proportional to the level of water in the dam. Using this sensor we have automated the dam and designed a closed loop system for controlling, monitoring and alerting.

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