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INTELLIGENT DAM GATE CONTROL AND WATER RESOURCE ANALYSIS

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Abstract — *The main aim of the project is controlling the dam gate and keeping a check on water levels in dam without the interference of manual labour. This reduces the requirement of full time supervision by the operators in order to control the opening and closing of the gate. The project emphasises on saving of water by determining the exact level to which the water level in the dam has reached using WIFI modem. We use the concept of mechatronics here in order to regulate the working of dam gate by observing the water inflow rate. Sensors are used to indicate the level upto which the water has reached.*

Keywords- MicroController 89C51, Wi-Fi module(HLK RM04), Transformer, Sensors.

I. INTRODUCTION

Dams are typically constructed with a drain or similar mechanism to control water levels in an impoundment for normal maintenance or emergency purposes. By definition, a disaster is any event that causes great harm or damage, serious or sudden misfortune. Dams require certain ancillary structures and facilities to enable them to discharge their operational function safely and effectively. Now a days pathetic condition of dams and corrupted official's irresponsibility may lead to severe threats to living beings. So here we introduce an auto control based dam level monitoring system, to control the dam gate/shutter through IoT device (WiFi). Here we have a system to indicate about the water level in the dam through Wi-Fi modem and controls the dam gate/shutter by sending reply to the same WiFi device from the android device according to the level of the water. For sensing the water level, four copper electrodes (sensors) are used to indicate the water level as 20%, 50%, 70% and full capability of the dam that are connected to the microcontroller unit.

A gate controller is also included in this system, a motor is connected to the shutter and the controller will control this shutter motor through the driving circuit. If the water level in the dam rises to medium level, half of the shutter will be lifted and if the level reaches the full level, complete shutter should be lifted. This can be done by sending a message through the android device to the wifi modem at the dam to control the shutter height by the controller to allow much water to flow by energizing the motor. The shutter moving mechanism is designed with DC motor and is interfaced with the embedded system. Depending up on the water level of the dam, shutter height can be controlled through the android device via WiFi. Wi-Fi is a wireless technology that uses radio frequency to transmit data through the air.

II. LITERATURE SURVEY

This system is mainly concerned on the real time operation od dam gates depending upon the water level.But, many other parameters that has to be considered when this system is implemented in real.In 1986 Davidson proposed a control for the efficient working of hydroelectric power plant .This proposed Visual Display Unit system guided us in making a GUT control panel for operator.A paper was proposed by Xavier Litric rrelated to water management in dam using single input multiple output systems.This SIMO system deals with the real time calculation of outflow and inflow of water in dams. In our system the sensed data is only the level of data in dam.So, the inflow and outflow information can be added to feature to our system so that the dam gate can be more accurate. Also Syed Sheraz Mohani and his group mates had proposed a PC based dam control model wherein they introduced the concept of divison of reservoirs into upper and lower reservoirs and efficiently use the dam water. But the overall control was through PC and needed an operator. In our system we are mainly using microcontroller and a PC for the mode that microcontroller don't support. So this reservoir sub division model can be merged with our system to get efficient resource conserving results.

III. EXISTING AND PROPOSED SYSTEMS

3.1 EXISTING SYSTEM

In the existing system for dam gate water level control they used level Sensors, GSM for the information, Motors and Relays for the movement of the dam gate. Using these the gate of the dam is moved up or down depending upon the level of water.

DISADVANTAGES

- Easy installation with LED monitoring.
- Time consuming.
- It is not flexible.
- Water maximization.

3.2 PROPOSED SYSTEM

- Microcontroller is the central unit of the current project which has a control over all the functions to be performed by different devices used.
- DC Motor is one of the most important electromechanical device used to either open or close the dam gate.
- An L293D H-bridge is used to drive the motor and to regulate its movement in clockwise or anticlockwise direction
- The LCD used in the proposed system is a 16 x 2 bit LCD. It is used in order to display information regarding the level of water once the kit is turned on.
- We use the WIFI module to establish a connection between the working model and the android device being used.
- The sensors used in this project are the copper electrodes.
- The inputs and outputs are interfaced by using keil μ vision software.
- The extreme ends upto which the gate can be opened or closed is based upon the placing of limit switcheS
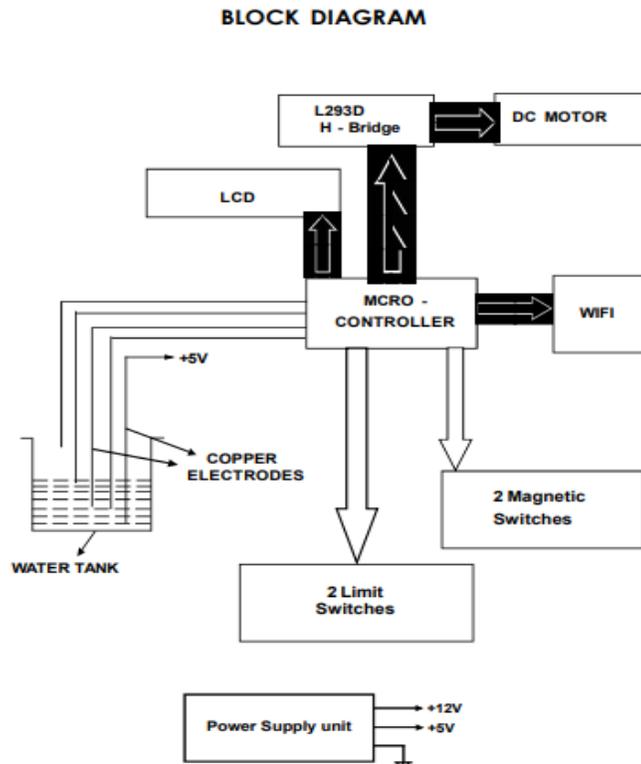
BLOCK DIAGRAM

Fig 1 : The above figure shows the block diagram of dam gate resource analysis
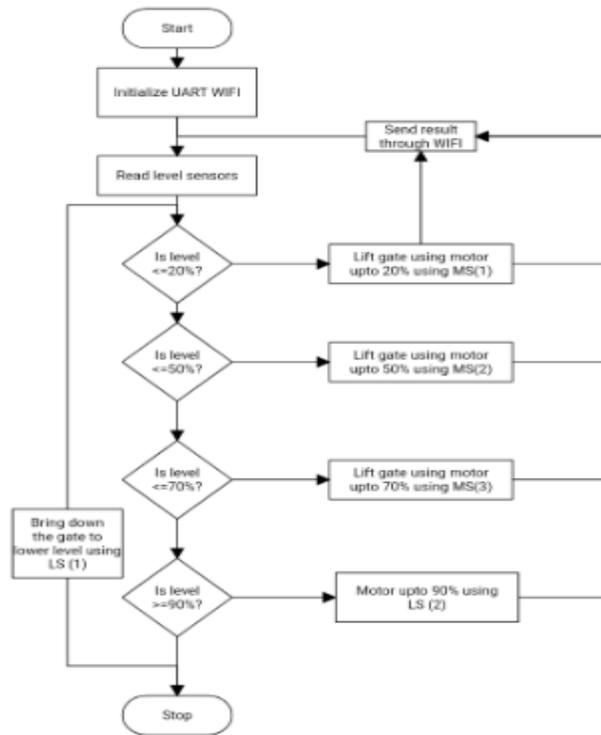
Fig 2: The Flow charts describes the different levels reached by the water and the level to which the gate is to be opened.
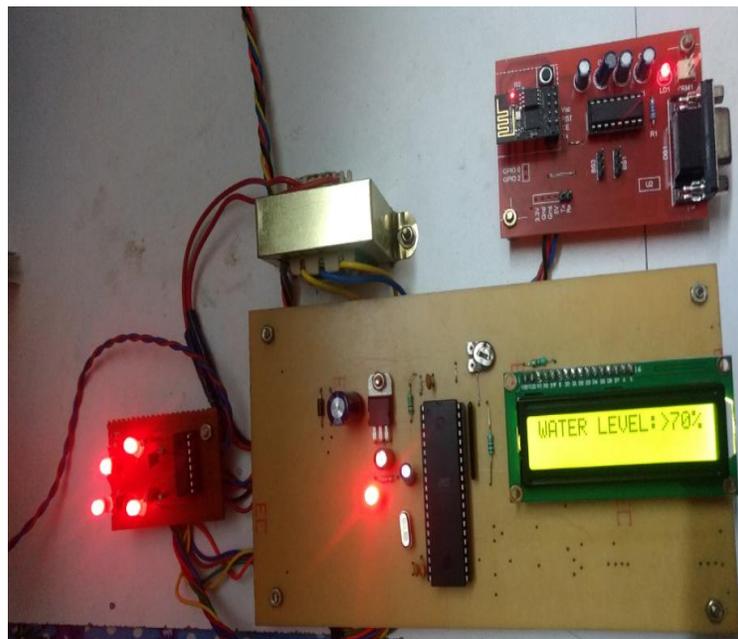
IV. ANALYSIS

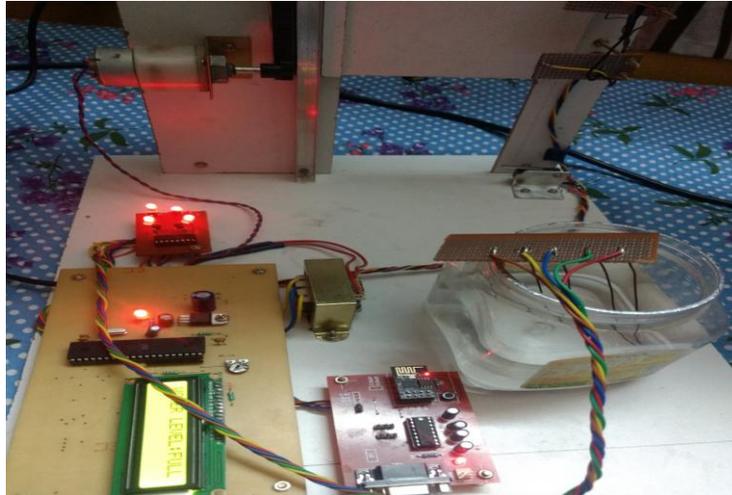**Fig 3:LCD display in the initialisation of the kit**

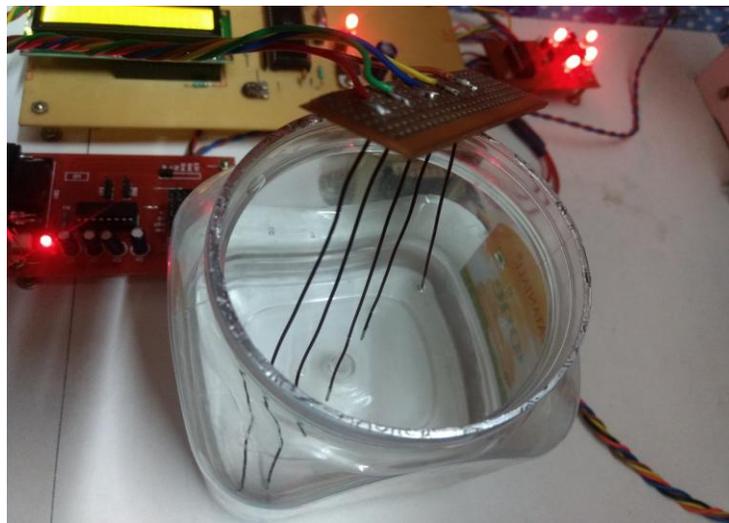**Fig 4:Indicating the water level through LCD**

Fig 4:Copper electrodes as sensing elements

The water level at different levels is sensed according to which the gate is controlled to close or open. When the water is filled to full capacity of the dam the dam shutter is to be fully opened, for mid level (50% or 70%) the shutter gate is partially closed while for low level the shutter gate is fully/completely closed. Opening or closing the dam shutter gates manually requires lot of effort, there by this project will help in that concern and the level of the water is continuously monitored through the electrodes and informs to the android device via WiFi. The dam shutter height can be controlled by sending a reply message to the WiFi modem depending on the water level at the dam.

V. CONCLUSION

The project work successfully designed and developed for the demonstration purpose prototype module is constructed and results are found to be satisfactory. We have given lot of importance for the mechanical structure; for this purpose lot of mechatronics books related to the electromechanical structures are referred, and a good-looking robust mechanical structure is designed. All electronic hardware including mechanical transmission section is mounted to this structure. A small DC motor with built-in reduction gear mechanism are used to drive the dam shutter to and fro through rack and pinion mechanism.

The major and critical task is preparing the software for performing the tasks depending on the inputs. The performance of the machine purely depends on the software (code) we define in the controller. The technology utilized here is for developing the prototype module only; it has to be enhanced to develop it into a real working system.

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