DEVELOPMENT OF A SYSTEM FOR ESTIMATING THE REAL TIME HYDRAULIC CHARACTERISTICS OF CANAL USING SUITABLE MODERN APPROACH

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Abstract **-** Measurement of hydraulic features such as velocity, depth, discharge, pressure and water level profiles in canals and rivers is sometimes a challenge and problem to hydraulic engineer. Modern approaches are used such as Supervisory control, hydrography surveys, sounding techniques, Internet of things approach. Its mentioned Internet of Things along with other modern computational techniques are now a day's used to expand the research in the domain of water resources and hydraulics. Particularly in the case of canals and river management it is a need to manage the whole network to fulfil the requirements of irrigation and at the same time protecting the areas from flooding. Analysis of the rivers and canals in the Gujarat will be done and analysis of state on wide spectrum of canal network will be identifies which needs to be monitored and managed. A system will form attempt to solve the management problem. Although the software based module, SCADA and IOT will be used which can be expanded to be used in real time flooding and monitoring situations. This system will be developed to assists the real time of water level gauge to monitor and maintain the low levels of canals and regulate the flow in canal.

Index Terms: Internet of Things, SCADA, Automation, Soft Computing, Canals

INTRODUCTION

The management of irrigation in India differs conceptually from that practiced in those advanced countries wherein limited water is not a constraint. Good control, efficient operation and well-executed maintenance of irrigation structures are requisite to the success and sustainability of irrigated agriculture. One of the important objectives in the control of an irrigation system is to provide level of service as agreed with the relevant government and the consumers on the minimum workable cost. So it is challenging for irrigation engineers is to allocate water in an equitable, efficient, reliable and timely way, at the same time as minimizing manpower and operating costs.

One of the main elements contributing to poor performance is the lack of effective water control in irrigation canal networks. With traditional control tools, an open channel water conveyance and delivery system is very hard to control in real situations, in particular for a demand-oriented operation.

The basic control idea of a canal system may be divided into 2 types: discharge and water level management. Both the water level and flow rate have to be controlled in order to deliver the desired quantity of water through regulators.

The general procedure for managing the water level in the tributatries is starts from controlling the water level in the main canal such that the head regulator can be adjusted to control a constant desired flow rate. In a manually operated system, a large number of field operators are required to adjust the regulators continually and simultaneously; this can only be done when demand and supply do not change rapidly.

Flood is also one of the most prominent natural hazard which not only affects human beings and animals but also it destroys the day to day life of many peoples for many days. Water level measurement has been a very

problematic condition during high inflows in the river. It has been seen that the measurement of water level, flow rate of the discharge of river seems to be very tedious. It is necessary to get real time accurate data during the flood time and it is required to extract and analyse real time data of flow rate in the river during high inflows. Developed system is very much helpful in managing the canal's operation and regulation as well. Methodology and system has been incorporated the randomness and uncertainty of the hydrological parameters all the parameters have been studied and analysed.

The problem which has been identified by several attempts and observations in the rivers, canals, streams, estuaries and dams. The proposed approach can be used by researchers to be applied on other hydraulic structures as well. The estimation of real time hydrological parameter is full of randomness, uncertainty, vagueness and non precise due to data unavailability.

II. LITERATURE SURVEY

[1] International Journal of Innovation and Scientific Research ISSN 2351-8014 Vol. 30 No. 3 May 2017, Pp. 364-369. "Dam Automation Using Arduino" by V. Rajendran, J. Shilpa, S. Veeravalavan, and M. Anbarasan. In this paper, Arduino microcontroller used for automatic opening and closing action of gate to control the level and flow of dam.

[2] "International Journal on Recent and Innovation Trends in Computing and Communication"ISSN:2321-8169, Volume:5 February 2017 Issue:2239241. "Design and Development of Smart Automated Door Control System for Dam" by Mukul S. Mahajan and Swapnili P. Karemore. This paper illustrates about control and monitoring system for dam automation using PLC and SCADA.

[3] International Engineering Research Journal (IERJ) ,Volume 2 Issue 1 Page 389-391, 30th March 2016, ISSN 2395-1621. "Automatic Dam Gate Control System Using Raspberry Pi" by Prof. Mrs. S.K. Bhatia, Navale Ravindra, Gawade Ashwini, Shisode Raghuvansh. This paper has developed a mechatronic based module which detects water level in dam, estimates the inflow rate in dam and control gate movement automatically. Raspberry based gate control system is used for managing the flow rate through which its helps in preventing water wastage, indicating about flood to people and ensures efficient usage of water.

[4] International Journal of Innovative Science and Research Technology ISSN No:-2456 –2165, Volume 3, Issue 2, February – 2018. " Automation in Canal Irrigation System" by Dr. D. Sharmila , R. Roshini , S. D. Sowmya , V. Pooja Devi , R. Nikeshvasan . This paper use Texas Instruments Microcontroller board to serves the proper distribution of water based on requirement in the respective areas by focusing soil moisture at various fields

PROPOSED METHOD

In the existing system of the canal water distribution network the canal mechanism are operated manually. During some days, certain area can require much less water due to rain. In such instances the water disbursed in that region may wastage of water. The canal gate are operated manually however this project goals to automate the canal gates.

Based on the sensor values from the sector the canal gates are operated automatically. Whenever there may be rainfall in the canal the water level inside the canal rises so the water from the reservoir needn't be distributed in this vicinity. The rain water inside the canal itself may be used. The canals level is also monitored constantly when the level rises beyond the specified level in the canal gate opens automatically. The level of the branch canals, distributaries, minors is also monitored constantly. They additionally have gates which might be manually controlled presently. Based on the extent of the water in those canals and distributaries the gates are managed automatically. The dam gates are operated manually the usage of hydraulic system.

In this project, our main goal is to automate the dam gates. Usually sluice gates are used in dams. The sluice gates open and close in a shutter mechanism. According to the extent of the reservoirs and the canals the gate

is opened or closed. We are supplying water based on the requirement of the vicinity so here wastage of water is prevented.

Various phases of proposed method:

Phase I: Collection of the River/ Canal's real cross sectional details, which will be entered in the software in advance to assume a real run in the canal.

Phase II: Surveys of the Gauge-Storage and Gauge Discharge has to be done for the river/ Canal precisely so that the water level values will directly reflect the values of storage and discharge accurately.

Phase III: Mechanism of measurement of water level gauge must be developed. The measurement may be done manually or any automatic based system may be installed. **Phase IV:** Analysis and calibration of the Software based features must be done with reference to the water level. Actual results and software based results must be calibrated.

PhaseV: Validation of the real-time hydrological and hydraulic features of the canal or river must be done for a longer period to prove satisfactory performance of software.

ALGORITHM PROCEDURE

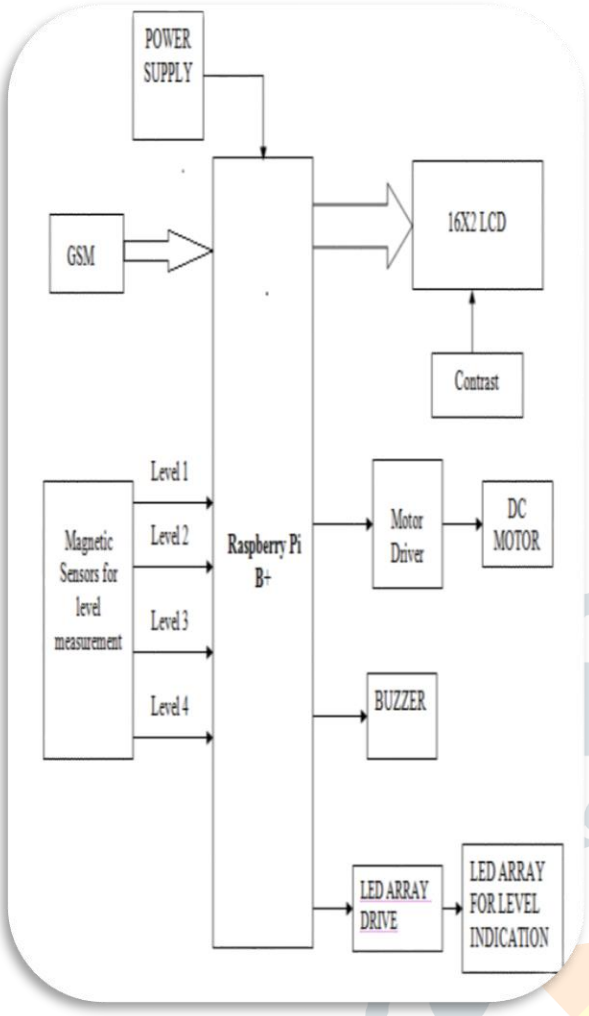
Step1: A sensor senses the various stages of water.

Step2: Whenever the water level rises or decreases and comes in touch of any sensor then the circuit is complete.

Step3: The water level rises above the highest stage or decreases beneath the bottom threshold stage then the sensor circuit triggers the raspberry pi.

Step4: Raspberry pi will drive the DC motor via the motor motive force relay circuit.

Step5: The dam gate linked to the DC motor will managed and it's going to get opened or closed according to the water level.



The water level at distinctive level is sensed through which the gate is closed or open. That is while the water is rises to level 3 the closed dam shutter is completely opened, for stage 2 gate is partly closed at the same time as for stage 1 the gate is absolutely closed. Dams are generally built with a drain or similar mechanism to govern water stages in an impoundment for normal maintenance or emergency purposes.

CONCLUSION

Nowadays, computer technology plays an crucial role in remote
monitoring and control, which may be useful in water management. Canal Management and monitoring of river plays a vital role in protecting the floods and
governing irrigtation requirements time to time. An automatic canal system can improve irrigation canal management, substantially increase water use efficiency and at the same time, save on manpower and reduce construction costs. The results of the Software framework has given potential of modern techniques such as Internet of Things and SCADA to be used extensively in the field of monitoring of water resources. The developed system can be applied in any river or canal whether lined or unlined under any conditions. The developed system is a combination of Modernization/Automation, water resources, hydraulic features and surveying to the ground extent.

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