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WATER LEVEL MONITORING AND DAM GATE CONTROL OVER IOT

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ABSTRACT: *The cradle of our project is based on methodology of IOT. Water level in a dam needs to be maintained effectively to avoid complications. The quantity of water released is hardly ever correct resulting in wastage of water & it is impossible for a man to precisely control the gates without knowledge of exact water level and water inflow rate. We have designed a system in which real time things are interconnected to web . Water level sensors are placed in dam to serve the same purpose automatically and forward the status to nodeMCUesp8266. Microcontroller which process the data coming from sensors and upload the status of water level on web. By this project each and every variation of water level is informed to control room through the internet (using blynk application) and nearby people can be informed in time thus saving lots of lives and avoiding the unpleasant scenarios and also this system consist of dam health monitoring system by crack detection. And previous data is stored in app which helps in proper management.*

I. INTRODUCTION

Dams are the major sources of water supply to cities; they also play a vital role in flood control and can assist river navigation. Most of the dams are built to serve more than one purpose and their benefits are manifold. It is necessary to implement some sort of communication between the metering systems and computer models to provide support in managing the complex systems. In India, nearly 4000 major/medium dams are constructed and many more are in a pipeline. Normally, the range of dam storage capacity of 185 billion cubic meters of water with a surface area of 5,580km (93.4TMCft). During rainfall, for every 9.6mm the rise of

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water level increases by 0.3ft. In the recent analysis by the BC dam safety annual report, from the year 2011-to 2016 number of dam incidents, dam alerts, and dam failures decreased respectively. The growing interest in the Internet of Things has become the right choice for the pre-alert system for monitoring the rise in the water level in dams. The risk rate of sudden flood occurrence opened up a way for the way the need for the realtime dam water level monitoring and a prior alerting system that ensures the public safety. Various efforts have been made until now in monitoring water level and accordingly controlling dam gate. The contribution of work in this area is mentioned below. IoT-based water supply monitoring and controlling system Water is a basic need of every human being. Everyone needs to save the water. Many times with lack of monitoring, overflow of the water takes place. Overflow of tanks can occur because of this lots of water wasted. 2 Another thing is because of overflow in the pipelines with more pressure there is possibility of pipeline damage. Leakage detection is one more problem. All these problems are because of lack of monitoring, manual work and less man power. In this paper a survey of Aurangabad city and field survey have been done, to understand water supply distribution and related problems with the system. After taking a survey they observed that all the work is manual and need a better technology to make proper distribution. Wireless disaster monitoring and management system for dams. This paper suggests architecture to control gate by monitoring high density and then communicate in real time. Considering the recent events that took place on June 2013, a destructible situation has taken place due to heavy rainfall and cloud bursting at various places. Many dams were out of knowledge on various parameters about the flow and discharge from the nearer dams which were affected earlier and due to lack of communication among these dams, lead to considerable damage of property and life. Dam gate level monitoring and control The main objective of this paper is to control the water Level in dam which was implemented using IoT (Internet of Things). The design implementation and control of the programmed monitoring system was developed by this project. The cradle of the project is based on methodology of IOT. For best results, the principle operation of the

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automatic gate control arrangement is subjected to dry running under various possible circumstances, with Proteus as the platform for working. Raspberry Pi based water monitoring and alert system This paper deals with the automatic control of a river system. The system is a cascade of single input-single output (SISO) systems, and can be considered as a single input multiple output (SIMO) system, since there are multiple outputs given by intermediate measurement points distributed along the river. A generic robust design synthesis based on internal model controller (IMC) design is developed for internal model based controllers. The robustness is estimated with the use of a bound on multiplicative uncertainty taking into account the model errors, due to the nonlinear dynamics of the system. Simulations are carried out on a nonlinear model of the river. The industry has always focused to devise engineering methodologies for establishment and modification of relatively easier controlling and automation methods for any scrupulous process. This paper presents the design and implementation of a control system by means of microcomputers and data transmission networks. To verify the principle operation of the Controlling design to be presented a miniature model is experimentally tested using a PC based system. IoT based water level monitoring system for lake. In this paper they have introduced the idea of water level monitoring and management for lake water storage source for villages.

II. LITERATURE SURVEY

In 2018, the author has proposed the approach which gives description for the development of an information system based on the existing systems with the use of some sensors and IoT. This pap er also proposes an idea of collecting and sharing real-time information about water levels to an auth orized central command center through far field communication. In 2019, the author has introduced the use of microcontroller for monitoring and controlling the water distribution management by usage of various sensors, controls valves, automatically and pro actively manage outflow during crisis by using statistical data of the environment. In 2019, the author proposes the use of microcontroller for monitoring and controlling the wat er management by the use of various sensors,

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control valves, automatically manage outflow during high level water crisis by using statistical data of environment. In 2020, the author proposed the application system with the use of Internet of things to ensure safety to the public about the prior alerting of flood occurrence due to the increase in the water level in dams. Cloud database technique is used which encapsulate the periodic monitoring water level data and vicinity information. In 2020, Semantic web technology seems to be in the infant stage as only little efforts have bee n taken on ontology construction with cross-domain application. The core concern of this work is on two decision-making processes namely data filtering and data annotation. Certain process is followed in this work: (i) Pre-processing (ii) Proposed Jaccard Similarity Evaluation (iii) Data filtering and Outlier Detection (iv) Semantic annotation and clustering. In 2021, Industry and Institute both are equally responsible to develop quality students. In this paper, cross domain (Industry domain and Institute domain) ontology based semantic models are dev eloped to bridge the institute-industry gap using Protégé 5.5.0 editor. The classes and sub classes of Industry Institute ontology are designed with the help of domain experts.

III. PROPOSED SYSTEM

The Proposed system implemented a novel idea of automating the process of dam management from collecting the data on water level to controlling the dam gates. The ultrasonic sensor is used to measure the water level. As the water level reaches the first sensor message is displayed in the LCD for the admin. when the water level reaches the second sensor, the dam gate is opened in half and an alert message is displayed on the LCD to the admin. As the water level reaches the third sensor, beyond a critical level, the GSM will inform the residents near the dam that the shutter will open soon. The motor interfaced with the Arduino will be initiated and opens the shutter after providing a final warning message. As the water level reduces, the motor will close the shutters and gets back to the normal stage. The purpose of a water level to control dam gates and to manage water levels in a dam. The control panel can also be programmed to automatically turn on a water pump once levels get too low and refill the water back to the adequate level. It is also known as a

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probe sensor, is what tells the control panel that corrective action is needed. A combination of high and low sensors are used to tell the control panel when water levels are too high or too low. Flex sensor is used to detect damages or cracks and gives information to the authority. Rain detection sensor is used to identify whether the rain is in surrounding area or not. As well the previous data is stored in the application.

SYSTEM ARCHITECTURE

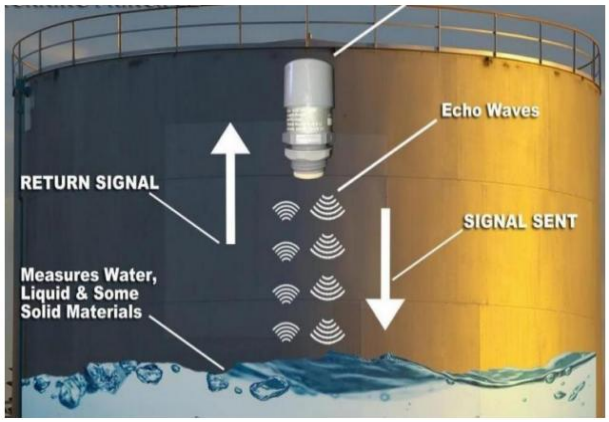
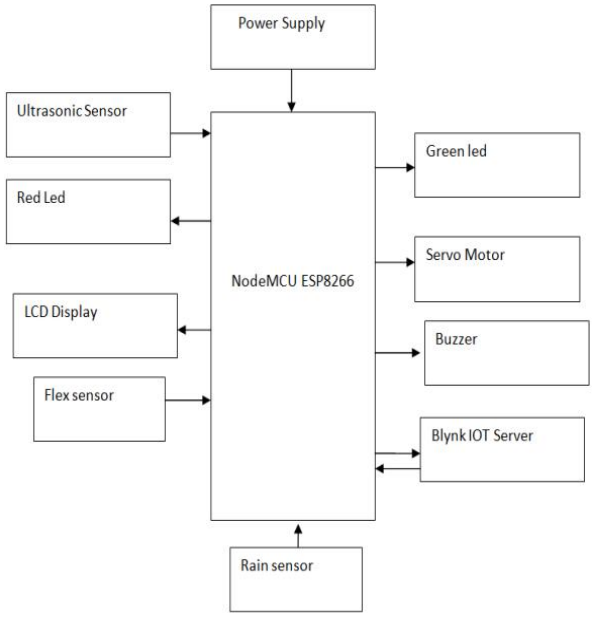


Fig.1 Dam Water Level Monitoring and Controlling system

The purpose of a water level to control dam gates and to manage water levels in a dam. The control panel can also be programmed to automatically turn on a water pump once levels get too low and refill the water back to the adequate level. It is also known as a probe sensor, is what tells the control panel that corrective action is needed. A combination of high and low sensors are used to tell the control panel when water levels are too high or too low

BLOCK DIAGRAM



SERVO MOTOR

A servo motor is an electrical device which can push or rotate an object with great precision. If you want to rotate and object at some specific angles or distance, then you use servo motor. It is just made up of simple motor which run through servo mechanism. We can get a very high torque servo motor in a small and light weight package. Doe to these features they are being used in many

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applications like toy car, RC helicopters and planes. Servo motors are rated in kg/cm (kilogram per centimeter) most hobby servo motors are rated at 3kg/cm or 6kg/cm or 12kg/cm. This kg/cm tells you how much weight your servo motor can lift at a particular distance. For example: A 6kg/cm Servo motor should be able to lift 6kg if the load is suspended 1cm away from the motors shaft, the greater the distance the lesser the weight carrying capacity. The position of a servo motor is decided by electrical pulse and its circuitry is placed beside the motor.

It is a closed loop system where it uses positive feedback system to control motion and final position of the shaft. Here the device is controlled by a feedback signal generated by comparing output signal and reference input signal. Here reference input signal is compared to reference output signal and the third signal is produces by feedback system. And this third signal acts as input signal to control device. This signal is present as long as feedback signal is generated or there is difference between reference input signal and reference output signal. So the main task of servomechanism is to maintain output of a system at desired value at presence of noises.

Working principle of Servo Motors

A servo consists of a Motor (DC or AC), a potentiometer, gear assembly and a controlling circuit. First of all we use gear assembly to reduce RPM and to increase torque of motor. Say at initial position of servo motor shaft, the position of the potentiometer knob is such that there is no electrical signal generated at the output port of the potentiometer. Now an electrical signal is given to another input terminal of the error detector amplifier. Now difference between these two signals, one comes from potentiometer and another comes from other source, will be processed in feedback mechanism and output will be provided in term of error signal. This error signal acts as the input for motor and motor starts rotating. Now motor shaft is connected with potentiometer and as motor rotates so the potentiometer and it will generate a signal. So as the potentiometer's angular position changes, its output feedback signal changes. After sometime the position of potentiometer reaches at a position that the output of potentiometer is same as external

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signal provided. At this condition, there will be no output signal from the amplifier to the motor input as there is no difference between external applied signal and the signal generated at potentiometer, and in this situation motor stops rotating.

IV. RESULTS

OUTPUT SCREENS

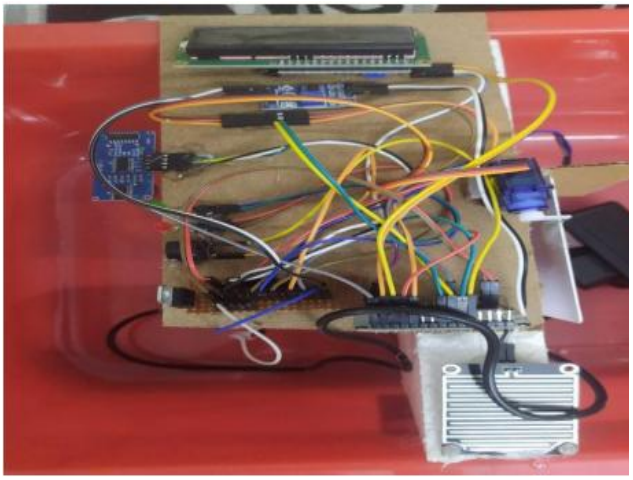

Fig.2 IOT based water level monitoring

Fig.3 Notifications in mobile or PC

Fig.4 Water level increase alert in app

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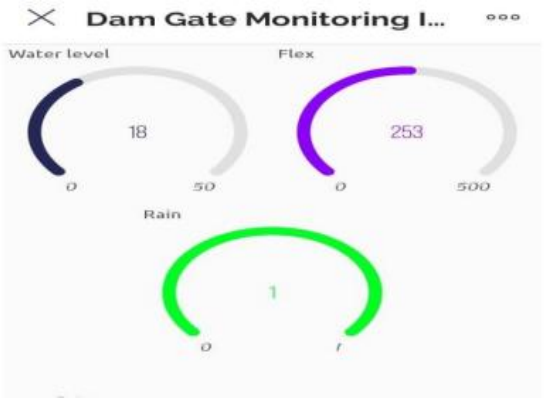

Fig.5 Range -1 indicates no rain

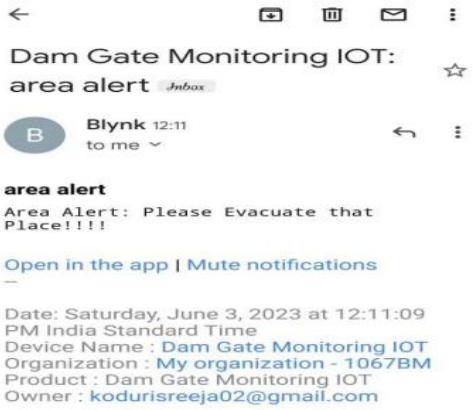

Fig.6 Indicates risk to particular areas

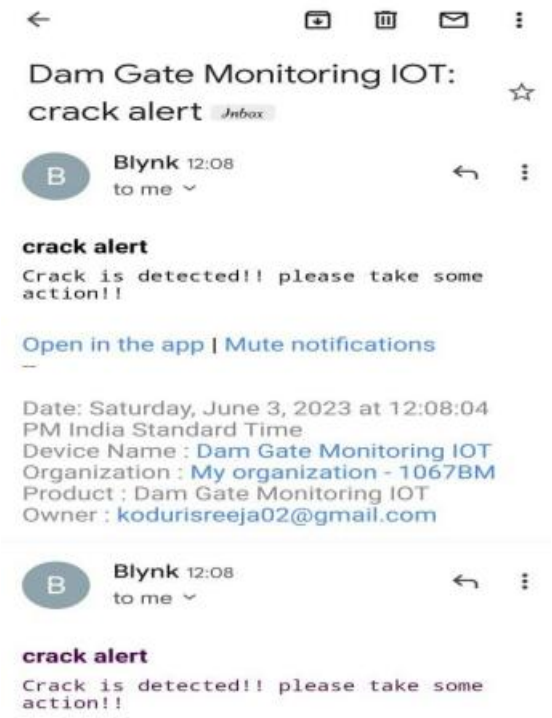

Fig.7 Crack detection

V. CONCLUSION

The proposed system has presented to use a thin client and a server application and it has suggested to use HTTPs communication. A real-time system has been used for monitoring screen to monitor the water level at every moment and the alert system has reported to send an information and also display warning in case the water level increases and also crack detection. This will be used in proper dam maintenance and also helps in saving lives in the surrounding area.

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