AUTOMATED DAM CONTROLLING SYSTEM USING DRAUGHT ANALYSIS

[1]KESTHARA V,[2]CHANDAN SHARMA B R K,[3]SUHAS S KASHYAP,[4]PRAJWAL TELKAR,[5]PRADEEP S

[1]Asst.Professor,[2345]UG Student
[1]Department of Electronics and Communication Engineering,
[1]Dr Ambedkar Institute of Technology, Bangalore,India

Abstract: The aim of this project is to propose an automated system for Dam Water management which uses Draught analysis as a parameter to use the Dam water effectively. The prototype uses IoT to gather information about Dam water Status and send the data to the cloud then retrieving it on a website built for monitoring the Dam water. The prototype involves in channelizing and controlling the Dam water. It would be responsible for collecting the moisture value at different places and calculating the amount of water required for that particular area with help of robust algorithm , then distribution of water accordingly hence paving way for effective utilization of water , water distribution would be controlled with help of solenoid valves, the idea of development of website for Dam water status can serve as a transparent tool for users to view Dam water data along different channels and the water being distributed to other places.

Index Terms - **Dam water management, Moisture levels, Automation, Microcontroller**

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. These water resources available through dams are one of the main sources available for the usage to industries, livestock, irrigation etc. Dam water management is a tedious and long term process which has to be improved step by step. A new system for dam water monitoring and management should be established which can control Dam water by efficiently distributing to Draught based places and monitor the water through them in real time and can allow to effective dam water usage with the data of water distribution presented on website. Our prototype demonstrates channelizing and distribution of dam water to those places wherein scarcity is detected, this can be done with the help of soil moisture sensors established at the places communicating wirelessly. We can get information on the water availability in a particular region and route the water to that area if there's scarcity. This helps a lot in irrigation. Use of Wireless sensors network with software for dam water management helps in improving the functionality of dams. This project gives an outline for the analysis of draught areas and development of an automated Decentralized system to channelize the Dam water accordingly also an information system based on the existing systems with the utilization of some sensors and IoT.. This project also proposes a development of automated water dispensing system using the robust algorithm and Data structure by doing so, the operation of Dams all over the country can be decentralized and automatized.

II. OBJECTIVES

1. To develop an Automated Control system for Dam operation.
2. To develop an efficient Algorithm to Channelize Dam Water based on Drought analysis.
3. Using IoT to transfer Real-Time data from the Dam Environment to Cloud and retrieving it.
4. Develop a Web Based Application to monitor Drought conditions as well as Real-Time Dam operation
5. Use of the reservoir efficiently by producing water resources only to required areas based on draught conditions.

III. MOTIVATION

There are over 5200 dams currently in India and 70% of dams serve the purpose of irrigation and hydroelectricity. Some dams serve water to multiple states hence effective distribution of water between the states plays a vital role. There are some dams in India which wherein Dam water is flows interstate, Distribution of the same water for interstate Dams should be fair and Decentralized because the dam water should be served the most to the place which is affected by draught A recent issue of Dam water distribution on 2018 also served as a motivation for development of this prototype to decentralize the Dam water and distribution of the Dam water based on drought analysis.

IV. LITERATURE REVIEW

[1] proposes a dam monitoring system which takes safety and water management as parameters describing those as extremely important both conditions like water scarcity and excess of water , basic idea of that project describes the IoT in Dam water management and system concentrates storing and retrieving the information from and to the cloud , it employs vibration sensor and ultrasonic sensor to find abnormal changes in the dam and reports the same. [2] gives an outline for development of an information system based on the existing systems with utilization of sensors and IoT, it also proposes an idea of collecting and sharing real-time information about the water levels to administrator of the dam, based on the data administrator could take a call to open or close the gates. [3] Based on ASP.NET technology, this paper puts forward a design idea of integrated monitoring platform for water and builds the overall architecture of water monitoring platform, and realizes the whole architecture of water monitoring platform. A reservoir dam monitoring platform has been designed in this project to enhance emergency response capability. The system includes Web management system, data acquisition system and database.[4], the project proposes a basic idea is to describe possibilities of IoT applications in Dam Safety and water management. Here the entire dam and the main pipeline is sensed 24x7 through various sensors. The wireless sensor nodes connected with each other and transmits the data to a gateway. Common storage space as a database stores and provides on line information to the observer.[5] gives an idea for the implementation of an information system based on the traditional systems with the utilization of some sensors and IoT. In this paper they have introduced an automatic system where the dam water level is raised above a threshold value, messages will be send to the mobile numbers [6] focus on to reduce the problems faced by Dam authorities of manual operation of gates ,concept of this system is to develop a web portal which will monitor and give authentic time parameters related to Dam and weather conditions like water level, rain fall, gate position, temperature, humidity etc. This system proposes a GUI Software which will provide two types of facility for operating of the software i.e. Autopilot mode and Manual data mode. At back end of the software it takes parameter information from the related sensors then loaded to database, The database is then retrieved on web-portal and further decision making based on data could be taken by authorities.

V. BLOCK DIAGRAM

The proposed block diagram (**Fig.1**) consists of a soil moisture sensors for gathering Land moisture levels, a ultrasonic sensor to measure the water availability, a microcontroller (Arduino UNO R3) for implementation of algorithm to check and act upon the sensor values, a Wi-Fi module (ESP8266) for sending the data to cloud, relays and solenoid valve for operating the respective channels based on moisture values.

VI. METHODOLOGY

Microcontroller(Arduino UNO R3) will be programmed initially to check the soil moisture sensors data as well as overall Dam water present with ultrasonic sensor , the data would matched with the algorithmic data and based on optimum values of algorithm the solenoid valve would open or close with help of relay based on moisture values present at the particular area , the data would be then sent to database through Wi-Fi connection with help of Wi-Fi module(ESP8266) module which sends the individual soil moisture data at the places installed as well as the Dam water which would be allocated to respective channels. An algorithm to be built for Dam water distribution across different channels and testing of the algorithm to its efficient use to be done.

The web application will be built with help for visual studio code editor using HTML, CSS, and JavaScript for user interface and to retrieve the data from firebase database to the web application.

These processes will be executed in a loop with a time delay to gather sensor value hence working in a Real-Time environment.

Test the prototype repeatedly to find out optimum values for which actuators should be triggered. Obtain the optimum values of the Moisture levels and the source code is altered using these values .Working of microcontroller (Arduino UNO R3) and Wi-Fi module and the web interface is verified and the project is real-time implemented

VII. AUTOMATED SYSTEM

7.1 Algorithm**:**

The Algorithm serves as main key component for the prototype, algorithm starts with gathering the total water available in the dam initially, then checks for the soil moisture present at the different places where the water should be channelized, we have considered the 1/4th of the total dam water to be allotted for distribution to channels, considering moisture values being mapped on scale of 0-25 the water distribution would occur concurrently based on moisture values. The algorithm for this prototype has been considered to run in loop for every 5 seconds. Soil moisture values serve as key component for this algorithm determining the exact amount required for each channel

7.2 Software integration

Fig.2. indicates the flowchart of software implementation both Arduino UNO microcontroller and node mcu(ESP8266) Microcontroller(Arduino UNO) works as the brain for this prototype, it starts with collection of soil moisture data from respective areas and a check for soil moisture is done based on which the relay is triggered switching on/off the respective solenoid valves, the data is then serially communicated to node mcu(ESP8266)

ESP8266 module would be responsible to gather the serially communicated data which consists the soil moisture data at respective areas, water required for those areas which would be sent to the database and then retrieve the data to website, the website can be viewed as in the **fig.3.**

VIII. HARDWARE IMPLEMENTATION

The soil moisture sensors connected to microcontroller with analog pins, ultrasonic sensor connected to microcontroller pwm pin, relay connected control solenoid valves, the microcontroller connected serially to ESP8266 for serial communication of sensors data to retrieve to cloud and then to website completes the hardware implementation as shown in **fig. 4**

IX. ADVANTAGES

- Decentralization of Dam could be possible
- Helps in distribution of water to draught based lands hence helping for irrigation and other purposes
- Automated Dam water control helps using Dam water resource efficiently
- Water status through each channel can be monitored

X.LIMITATIONS

- precision soil moisture sensors should be used which serves for long run of system
- Placement of sensors should be tried, tested and calibration of soil moisture sensors required timely.

XI.FUTURE SCOPE

Our proposed system gives basic ideas about using the advanced technology to build a Automated system for Dam water management using draught analysis, though we think our system can solve the complexity of Dam water allotment to Dam authorities with evolving technologies the we believe the prototype could be much more improvised

The factors at which we see the future work to be carried out are:

- Robust soil moisture sensors can help gather precise data hence much more efficient use of algorithm could be made
- distance can also play a vital role , using optical communication can be helpful to transfer moisture data faster to microcontroller giving way for faster activation of actuators

Considering the above points we feel that there is scope for this domain in coming years to build an efficient model to overcome these factors.

XII.CONCLUSION

The automated Dam water controlling prototype was successfully implemented with algorithm to distribute the Dam water based on soil moisture values , this project helped us learn all the fundamentals of sensors and how they impact for the system as it is a very vital component which determines the efficiency of the system we ran more and more trials to make sure the sensors are responding properly, it also helped us learn about relay as it's also very vital component in IoT, automation industry.

This prototype also provides information of the Dam water status and water flowed across the channels giving clear picture of dam water being used in a efficient way , with this knowledge imparted on us, gives us confidence and hope to solve a more and more realistic problem and make the world a better place to live
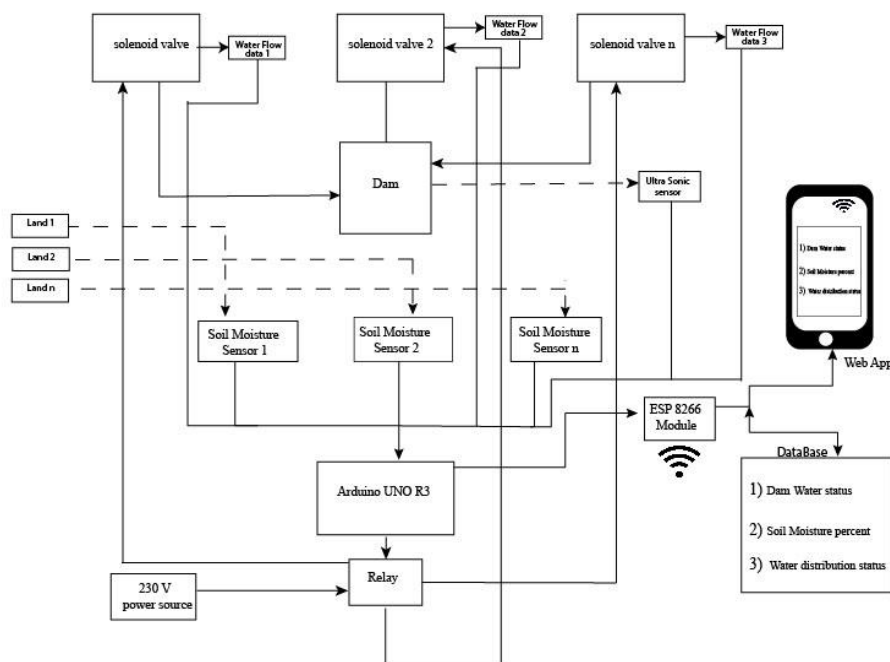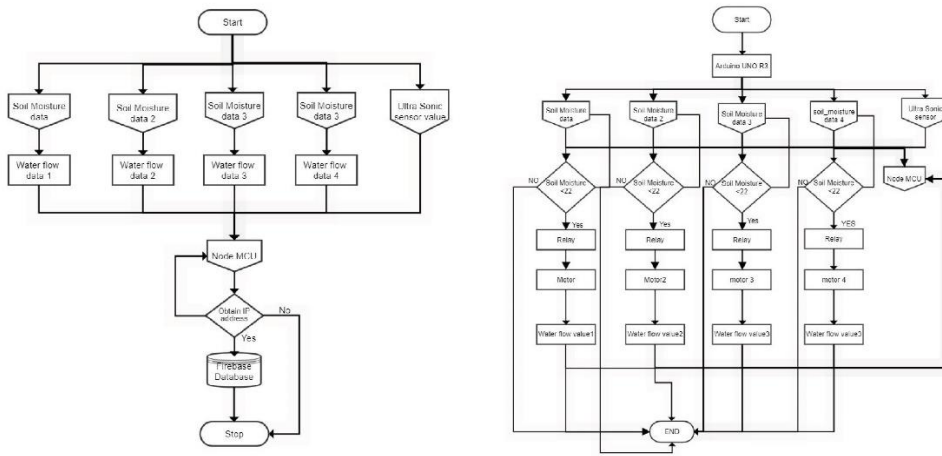
XIII.Figures

Figure 1
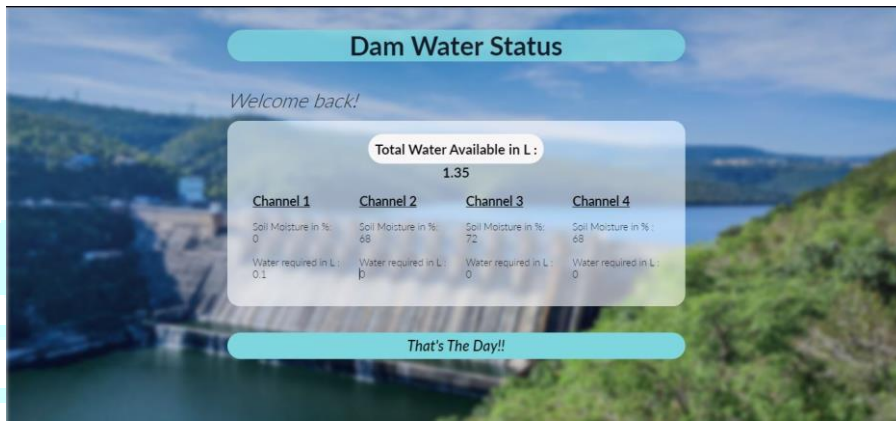
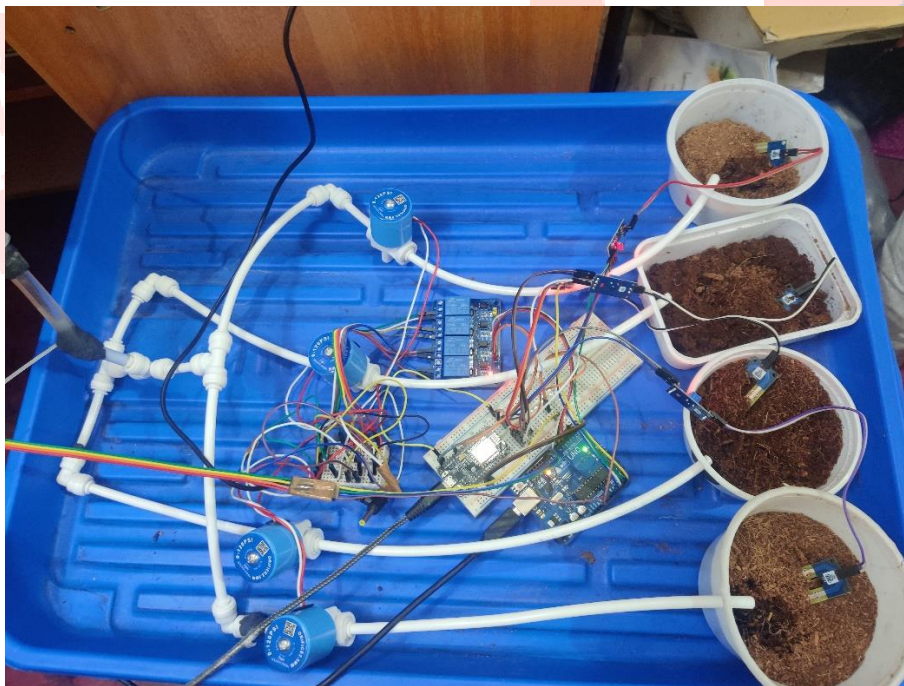**Figure 2**

Figure 3

Figure 4

XIV. REFERENCES

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