

# AUTOMATION AND OPTIMIZATION OF MULTIPLE GATE CONTROL FOR CANALS

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**Abstract:** Water plays a very important role in a human life. A dam is a massive barrier built for the protection of an area from water overflows as well as for use for other reasons such as land irrigation and hydroelectricity generation. Very few dams operate on automated systems, which are more effective and efficient than manual ones. Hence, it would be useful for all to start to use automatic systems for dams as this will reduce the amount of effort that already putting towards dam maintenance. In addition, the same will help spare the many lives that are often taken by overflow and like recent accident in Pune. It is not only complex to manually control a dam, but also time-consuming and excessively risky in times of bad weather. This is the main reason of why most of the governments and water supply companies today continue to face the problems when it comes to the control management of dams.

The main aim of this project is to develop a automatic based system which will detect the level of water and estimate the water inflow rate in a dam by adding gates in canal after particular distance and thereby control the movement of gates automatically in a real time basis which offers more flexibility. Water use and water transfer can be conveniently managed through automation process. This system also reduces wastage of water by supplying water as per need.

**KEYWORDS:** Canal irrigation, flow measurements, Raspberry pi, water inflow, VNC viewer.

## 1. INTRODUCTION

Canal irrigation is widely used source of water for irrigation. So management of irrigation canal water is crucial factor in overall irrigation development. The conventional method is used to deliver water as per demand by the water users (farmers) in form of rotations. The conventional system involves lot of weaknesses, including forecast and actual flow or discharge. Errors may introduce in flow measurements and water content in reservoirs, also imbalances due to human and natural intervention are not considered in the conventional system. Due to this, users at the tail end endure more or shortage water. To provide efficient delivery and avert imbalance, canal automation plays crucial role in irrigation.

Water is becoming a scarce resource and water districts are under pressure to use water more judiciously. Improved operation of water resources facilities, such as canals and

reservoirs, has been touted as necessary for making proper use of these limited water supplies. Operation of irrigation water delivery systems can be improved by providing canal operators with better tools for determining control actions. One such tool is computerizing automatic control of canal gates.

Nowadays, there are growing concerns and periodic warnings that we are moving into an era of water scarcity. In many parts of the world, irrigation systems are performing well below their potential. With increasing demand for food and competing use within the water sector, the pressure is on irrigation professionals to manage water efficiently. If manually operated, the irrigation systems efficiency is not more than 40%, which can be enhanced by 10% through some automation. The proposed schematic automates the canal actuator mechanism which is operated according to the user demand for water discharge and available water deposited in the storage. This is fully automated system which actuates the canal gates in proportion with system input requirements like water quantity to be discharged and time for which the gate is to be kept open.

For this purpose Raspberry pi plays major role in this project. It is a specially used for the control and operation of canal system. Raspberry pi is known as small single board computer developed in United Kingdom. It is small in size and also it has reduced input-output. Also it has increased the capabilities of general purpose input output known as (GPIO). It was recently launched with the version of WiFi and Bluetooth capabilities.

## 2. BLOCK DIAGRAM

The system consist of raspberry pi, Dc motor, motor driver and node MCU. When we get demand from user or we release the water according to region, that commands are given to Raspberry pi, it sends the signal to canal gates which are connected to Dc motor. Dc motor is drive in either direction by motor driver which contains the capabilities of driving two motor on single motor driver. Node MCU is connected to each gate which is used for communication. Raspberry gets demand from regional office. Also level sensor is used for detecting level of water according to which the water is released. Depending on water level gate opening is decided. It is opened in certain degree.

### 2.2.1. Raspberry pi

The Raspberry Pi is a Master card estimated single-board PC created in the UK by the Raspberry Pi Foundation with the aim of advancing the educating of essential software engineering in schools. It is the centre of the entire framework. The employment of Raspberry pi in this framework is handling expansive amounts of information and furthermore it will keep fundamental point of vehicles which are in the framework. The Raspberry Pi is a decent decision for a web server that won't get excessively activity and just uses around 5 Watts of energy.

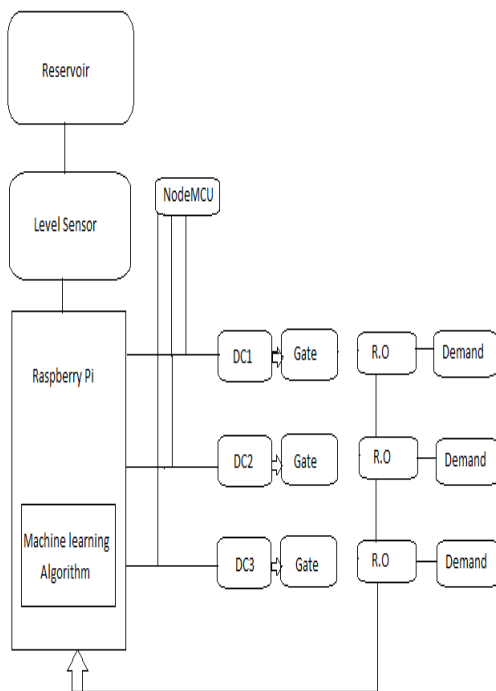


FIG.2.1 BLOCK DIAGRAM

### 2.2.2. VNC viewer

VNC viewer is used for accessing our chosen computer like windows Pc, Linux machine etc. It is simple to use and install. It allows you to access and control your mouse and keyboard as if your sitting in front of your computer. It also let you view your computer desktop even though your not sitting in front of it.

### 2.2.3. Motor Driver

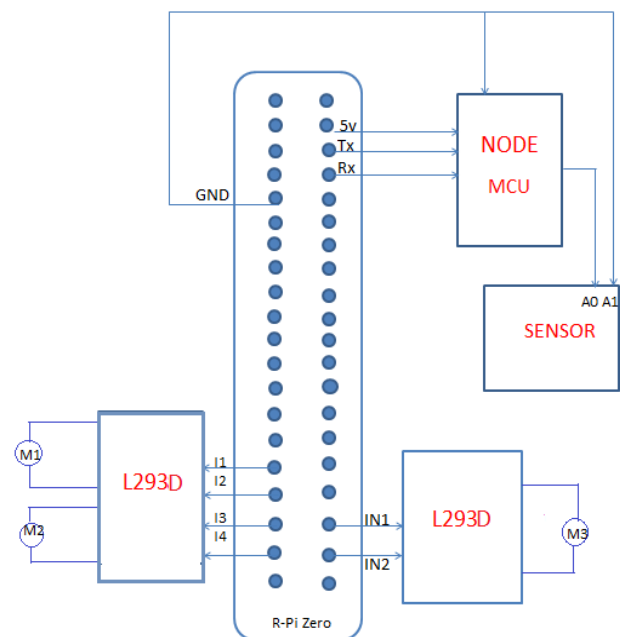
L293D is a typical motor driver which drives it in either direction. It is 16 pin IC which can control two motors simultaneously in any direction. It works on concept of H-bridge which allows voltage to flow in either direction. H-bridge IC is ideal as it drives dc motor in either direction also voltage is used to rotate the motor in either clockwise or anticlockwise direction. As it has small size, it is widely used in various robotics application. The IC of motor driver

contains two H-bridge circuit which controls two motors simultaneously.

### 2.2.4. Node MCU`

It is open source IOT platform which includes firmware which runs on Wifi. The name itself refers to the firmware rather than the developments kit. It is widely used in IOT applications. As node MCU is open source its hardware can be modified, build etc.

### 3. Interfacing Diagram



### 4. FINAL OUTPUT



FIG.4.1final output

## 5. CONCLUSION

Hence, we have made prototype of canal automation using the acrylic sheets. Our main controller is raspberry pi , and node mcu is connected to raspberry. According to the requirements node mcu controls the motors and also satisfies the long distance communication requirement. We have also successfully optimized the water usage.

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