

# Automatic Flood Gate and Flood Control System

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## ABSTRACT

Flood is an overflow of huge amount of water covering large areas causing destruction at the places affected. Many regions across the globe face the problem of floods each year. Flood occurs due to excessive downpour and lack of proper drainage system. The severity of flood may vary from region to region and the destruction caused due to the same varies accordingly. The civic bodies have a major role to play when it comes to minimizing the effect of floods, especially in areas that are known to be vulnerable to flooding.

The first thing that needs to be done is to identify how often floods take place in the area and based on that flood risks are either done away with or lessened to the highest extent possible. There should be proper models for assessing possibilities of rise in water level and good coastal development programmers. There should be river level and rainfall gauges that can help in predicting major floods.

Flood barriers exemplify the automation of flood control solution for the sake of quick but efficient response. These ones are self-activating, self-closing floodgates built on the top portions of large buildings. These flood barriers can rise automatically with the rising flood waters or by push button in advance keeping you in control for complete peace of mind.

**Keywords**—Autonomous Floodgate, Arduino Uno, Motor Driver Controller.

## I. INTRODUCTION

Flood barriers are one of our most popular flood defense options. The barrier consists of two flood seals installed on each side of the door and a PVC flood board which is cut on site to the perfect size. Our removable flood barriers are lightweight and easy to slot into place, saving valuable time when it comes to poor flood conditions. Building a home at a higher elevation, though a preferable choice, doesn't make the home "flood-proof" and isn't always an option. Even located on a hill, there is a chance of future flooding and run-off, which is what, makes it so important to protect their property from future disasters.

Water management system is currently an issue of growing concern. Reasonably limited water supplies, preservation and durability policies along with the infrastructure complexity for achieving consumer and irrigation requirements with quality levels help to make water management a challenging regulation problem. Water supply, treatment, transportation, and distribution are typically operated separately, by diverse authorities. Planning and managing of these subsystems have different objectives and timescales. Faced with the rising demand in case of saving water, hydraulic engineers employ automatic control techniques to acquire a better performance in the real-time functioning of open-channel systems.

To overcome these problems, an autonomous dam gate system has been proposed and developed in this paper that will be able to open and close gates automatically when it is necessary and subsequently reduce tidal water effect. After taking into consideration all limitations, An Arduino based autonomous dam gate technique has been designed using a low-cost sensor which offered better water level detection as well as consequently will be utilized to protect lowland areas from tidal water or excessive water during the flood as well as proper drainage issue.

## II. LITERATURE SURVEY

In the paper titled, “Design and Development of an Autonomous Floodgate.” Shubhangi Kharche et al. designed an AT89S51 microcontroller is used in this project to reduce the problems faced in the PLC based project. This control system gives the exact concept of interfacing a high voltage electrical device or DC motor to personal computer system. This system facilitates to control the gates of dam depending on the water level automatically. [1]

In the paper titled, “Designing the monitoring system for an automated dam.” Mansoor Ebrahim et al. using microcomputers along with data transmission networks. A miniature dam model is constructed , experimentally tested with the help of a PC based system to verify its operational principle. [2]

In the paper titled, “Low-Cost Automatic Gates for Irrigation Canals”. Fresno et al. designed the Autonomous gate based on a Bureau of Reclamation (BOR) design . The design was modified to mount the gate to a canal check structure and to be operated with a simple 12volt linear actuator. [3]

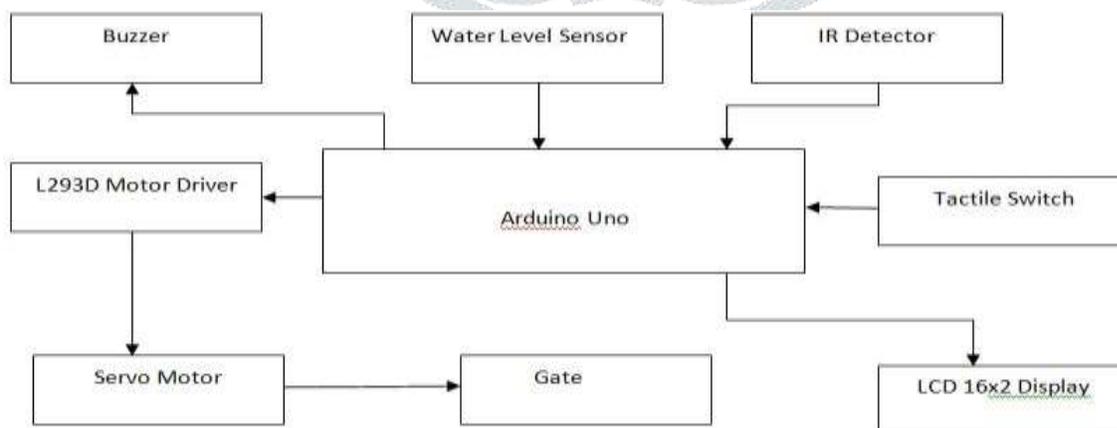
In the paper titled,” Operation of Spillway Gates– How to Avoid the Problems and Pitfalls”. Peter Allen et al. designed spillway gates that are normally operated and the systems necessary to operate the spillway gates effectively. This design was made using an embedded systems uses a microcontroller that accurately controls the motors and actuators through motor drivers which rises the flood gate as water level increases.[4]

In the paper titled,” N Fabrication Of Manually Controlled Drainage Cleaning SYSTEM”,Ganesh U L, et.al. Showed the usage of mechanical drainage cleaner to replace the manual work required for drainage cleaning system. Drainage pipes are very dirty. Sometimes it is harmful for human life while it is need for cleaning drainage system. To overcome this

problem, they implemented a mechanical semi-automatic drainage water cleaner and so the water flow is efficient because of regular filtration of wastages with the help of that project.[5]

## III. PROPOSED SYSTEM

### • BLOCK DIAGRAM



**Figure 1: Block Diagram of Proposed System**

Proposed system consists of water level sensor, tactile switch, L293D motor driver, servo motor, IR sensor and 16/12 LCD

## Water Level Sensor

The sensor has a series of ten exposed copper traces, five of which are power traces and five are sense traces. These traces are interlaced so that there is one sense trace between every two power traces. Usually these traces are not connected but are bridged by water when submerged.

## Tactile Switch

Tactile switch is a switch whose operation is perceptible by touch. Tactile Switch Functions. Click Response. The click response of the button lets the user feel the response of the operation from the switch.

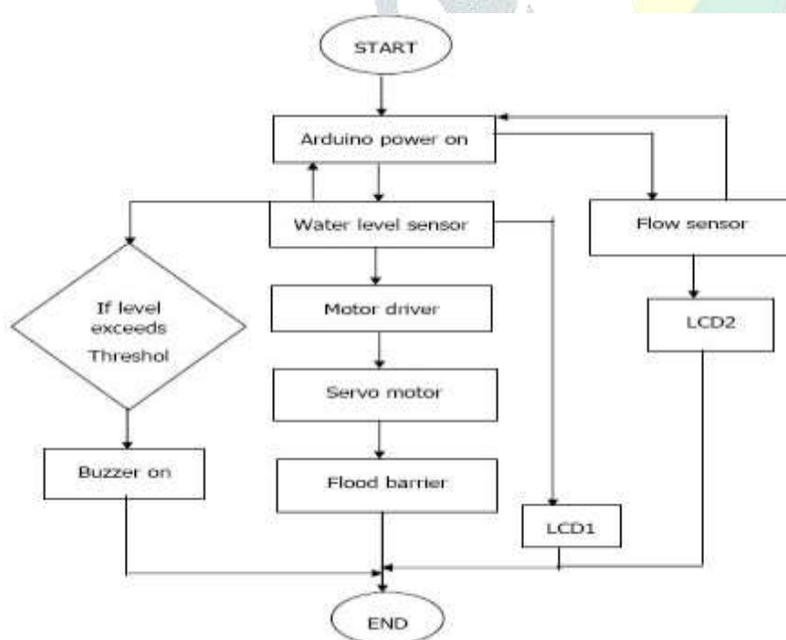
## IR Sensor

IR sensor is an electronic device, that emits the light in order to sense some object of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. Usually, in the infrared spectrum, all the objects radiate some form of thermal radiation.

In this block diagram, Arduino uno is employed as the processor. Power supply is provided 9v Ac supply to Arduino.

Water level sensor used to detect water level as well as DC motor along with gear rack system is implemented in the system to open or closed gates. Micro switch and push switches are used for switching operation. A level sensor to identify the water level of a dam and that should be giving information to the corresponding authority people by using a GSM modem. The basic operation of control unit is the controlling water pump by arduino which is programmed by particular program. Water pump are connected with an output pin of arduino via a relay circuit which is connected with a transistor .A water level sensor will monitor the level of the liquid. Depending on the need, it can be configured to perform a variety of functions for different situations.

## 2. FLOW CHART



**Figure 2: flowchart of proposed system**

The flowchart shown in Fig 2. The starting conditions all the values are reset. The water level sensor to sense the water level in the dam . If the dam is not to be fill, then the alarm in off condition and the gate valve in closed position. Otherwise, the dam water level increases beyond the limit, the buzzer starts to give an alarm

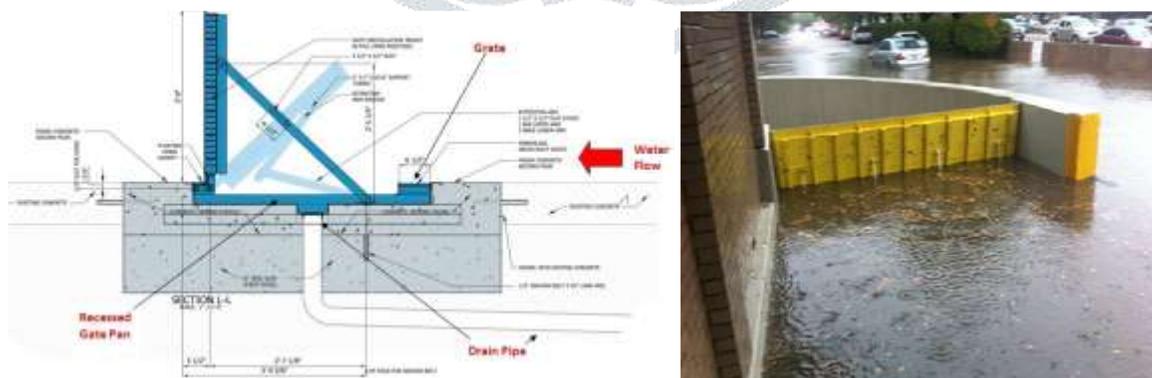
indicating the rise in water level. The message was send to the person and valve are open automatically. After the completion Process was stopped.

#### IV. APPLICATIONS

- The above mentioned method will ease the process of water level management on a large scale. We can solve many water related issues by this method. By installing a central command center we are decreasing the manpower required at each and every dam. Since this is a fully automated project, any kind of human intervention has been avoided. So the possibility of faults has also decreased.
- In cases of emergency, the override capability will be given to an authorized personnel who can change the command if required. In places where there are issues of water distribution between two areas, this method helps in maintaining neutrality as the command is with the central command center and neither of the areas involved in the fight can give the command.
- During times of natural disasters like floods, this method will be very helpful as we don't need to have any human to control near the actual site of the dam. Any command required for the gate opening or gate closing can be given from remote center. This also reduces the response time as the water level data near command center is real time and the decisions are taken almost instantaneously.
- Since the data of water levels near all the dams throughout the country are at the same place, a quick decision on the routing of flood water can also be taken. This helps in decreasing the losses due to floods to a significant extent.

#### V. EXPECTED OUTCOME

In our project, the autonomous flood barrier is designed to stop the excess water entering the houses through barrier that does not allow the water entering inside during floods. And it also can be use as the autonomous gate that pulls down the gate once any vehicle is sensed through the IR sensor and allow the vehicle to enter inside the primises. The figure shows the expected outcome of the project is shown below



**Figure 3: expected outcome of proposed system**

## VI. CONCLUSIONS

Water is one of the primary resource for human survival. But unfortunately a mammoth amount of water is being squandered by uncontrolled use. There are certain automated water level monitoring systems in practice but they are used for various applications and have some shortness in practice. The main motto of this research work is to establish a flexible, economical and easy configurable system which can solve our water distribution problem between two regions and safeguard the low lying areas from floods etc. among many other issues. Using of a micro controller to manage the data and to reduce the cost. This type of system is more helpful in situations like floods where the automated gate lifting system will check the water levels and react according the situation. This could have a substantial benefit to the research work related to the efficient management of water at dams by reducing the manual work This project involved designing and development of automatic water level control system had exposed to the better way of software and hardware architecture that blends together for the interfacing purposes. The system employs the use of advance sensing technology to detect the water level..

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