A

Major Project

On

DAM GATE CONTROL SYSTEM USING IOT

Jawaharlal Nehru Technological University, Hyderabad

In Partial fulfillment of the requirements for the award of Degree

of

BACHELOR OF TECHNOLOGY

In

COMPUTER SCIENCE AND ENGINEERING

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CERTIFICATE

This is to certify that the project entitled **"DAM GATE CONTROL SYSTEM USING IOT"** being submitted by **K. SUSWAMBICA (187R1A05L5), P. SHREE RAM(187R1A05M7) &P. SAMEERA JAVARIYA (187R1A05M0)** in partial fulfillment of the requirements for the award of the degree of B.Tech in Computer Science and Engineering to the Jawaharlal Nehru Technological University Hyderabad, is a record of bonafide work carried out by him/her under our guidance and supervision during the year 2021-22.

The results embodied in this thesis have not been submitted to any other University or Institute for the award of any degree or diploma.

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ABSTRACT

Dams are of major importance, primarily because of their use for generating hydroelectricity and irrigation purposes. This has resulted in the construction of a number of dams in potential areasover the years. As there are a lot of risk factors associated with the existence of these dams, it has become the need to develop a proper monitoring system regarding the opening of the shutters thereby managing a system for maintaining a safe water level in dams. Mismanagement of dams can lead to manmade disasters. Currently dams in our state are being monitored and controlled manually. This manual intervention can increase the probability of error and also results in time lag in decision making. The proposed system involves real-time monitoring of water levels of a group of dams under study. Water levels may vary due to drastic changes in water levels of connected rivers or lakes, or due to excessive rainfall in the catchment area. The proposed system is an IoT system which will monitor and send real time parameters related to Dam. The system also includes features like SMS alerts to the people of the locality and SOS to rescue operations in case of adverse weather conditions.

LIST OF FIGURES

FIGURE NO	FIGURE NAME	PAGE NO
Figure 3.1	Project Architecture of Dam Gate Control System Using IOT	7
Figure 3.2	Use case diagram of Dam Gate Control System using IOT	9
Figure 3.3	Class diagram of Dam Gate Control System using IOT	10
Figure 3.4	Sequence diagram of Dam Gate Control System using IOT	11
Figure 3.5	Activity diagram of Dam Gate Control System using IOT	12

LIST OF SCREENSHOTS

SCREENSHOT NO.	SCREENSHOT NAME	PAGE NO.
Screenshot 5.1.1(a)	Model	20
Screenshot 5.1.1(b)	Level 0	20
Screenshot 5.1.2	Level 1	21
Screenshot 5.1.3	Level 2	22
Screenshot 5.1.4(a)	Level 3	23
Screenshot 5.1.4(b)	Alert Message	23
Screenshot 5.1.4(c)	Gate1 Opened	24
Screenshot 5.1.5(a)	Level 4	25
Screenshot 5.1.5(b)	Message	25
Screenshot 5.1.5(c)	Gate1 and Gate2 Opened	26
Screenshot 5.1.6(a)	Crack detection	27
Screenshot 5.1.6(b)	Distance Variation	27

TABLE OF CONTENTS

ABSTRACT i

LIST OF FIGURES ii

LIST OF SCREENSHOTS iii

1. INTRODUCTION 1

1.1 PROJECT SCOPE 1

1.2 PROJECT PURPOSE 1

1.3 PROJECT FEATURES 1

2. SYSTEM ANALYSIS 2

2.1 PROBLEM DEFINITION 2

2.2 EXISTING SYSTEM 2

2.2.1 LIMITATIONS OF THE EXISTING SYSTEM 3

2.3 PROPOSED SYSTEM 3

2.3.1 ADVANTAGES OF PROPOSED SYSTEM 3

2.4 FEASIBILITY STUDY 3

2.4.1 ECONOMIC FEASIBILITY 4

2.4.2 TECHNICAL FEASIBILITY 4

2.4.3 BEHAVIOURAL FEASIBILITY 5

2.5 HARDWARE & SOFTWARE REQUIREMENTS 5

2.5.1 HARDWARE REQUIREMENTS 5

2.5.2 SOFTWARE REQUIREMENTS 5

3. ARCHITECTURE 7

3.1 PROJECT ARCHITECTURE 7

3.2 DESCRIPTION 8

3.3 USE CASE DIAGRAM 9

3.4 CLASS DIAGRAM 10

3.5 SEQUENCE DIAGRAM 11

3.6 ACTIVITY DIAGRAM 12

4. IMPLEMENTATION 13
4.1 SAMPLE CODE 13
5. RESULTS 20
6. TESTING 28
6.1 INTRODUCTION TO TESTING 28
6.2 TYPES OF TESTING 28
6.2.1 UNIT TESTING 28
6.2.2 INTEGRATION TESTING 28
6.2.3 FUNCTIONAL TESTING 29
6.3 TEST CASES 30
7. CONCLUSION & FUTURE SCOPE 31
7.1 PROJECT CONCLUSION 31
7.2 FUTURE SCOPE 31
8. BIBLIOGRAPHY 32
8.1 REFERENCES 32
8.2 WEBSITES 33
8.3 GITHUB LINK 33
9. PAPER PUBLICATION 34
10. CERTIFICATES 41

1.INTRODUCTION

1. INTRODUCTION

1.1 PROJECT SCOPE

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. Inarguably all countries in the world today have dams. However, a very few operate on automated systems, which are more effective and efficient than manual ones. Hence, it would be useful for all countries tostart to use automatic systems for their dams as this will reduce the amount of effort that they're already putting towards dam maintenance.

1.2 PROJECT PURPOSE

So here we are introducing a new method to effectively control the water level in a dam, by automated opening and closing of shutters. We also provide warning messages and alarms to make the nearby people aware about the dam opening. It can ensure a complete protection system andalso a database of people living near the river bank and thereby a proper and effective warning system can be provided.

1.3 PROJECT FEATURES

The main feature of this project is Controlling the levels of water in their dams. The staff is doing the monitoring on a manual basis which is too risky, especially in times of bad weather, having led to the loss of lives in some of the countries where it is being practiced. It is suggested to use a microcontroller kit with power supply. Microcontroller is a device that reads the input, processes the operation and writes the output. Receiving danger warnings and alerts.

2. SYSTEM ANALYSIS

2. SYSTEM ANALYSIS

SYSTEM ANALYSIS

System analysis is the important phase in the system development process. The system is studied to the minute details and analyzed. In analysis, a detailed study of these operations performed by the system and their relationships within and outside of the system is done. A key question considered here is," what must be done to solve the problem? ". The system is viewed as a whole and the inputs to the system are identified. Once analysis is completed the analyst has a firm understanding of what is to be done.

2.1 PROBLEM DEFINITION

In uncertain times like when there are floods or heavy rainfalls due to climate changes suddenly, it becomes difficult to open or close the gates manually. So we need an automation system to control the dam gates in these difficult times. Manually doing it may take a lot of time and is also not safe. So, in an automated system we can alert the people in the surroundings by alarm and send an alert message to the higher authorities to take further precautions.

2.2 EXISTING SYSTEM

Now-a-days water scarcity has become a serious problem in India and there are many factors responsible for this like improper supply of water from the dam, improper water saving systems, etc. But one major factor is the improper opening and closing of the dam gate according tothe level of water in the dam. Also, till date the control mechanism of the dam gates is done manually. But there are lots of errors in the manual method.

2.2.1 LIMITATIONS OF THE EXISTING SYSTEM

- Manually a person should be available all the time.
- During floods and heavy flow of water the cracks may appear on Dams.
- Conserves a lot of time compared to automated systems.

2.3 PROPOSED SYSTEM

The proposed system is mainly concerned with the real time operation of dam gates depending on the level of water. In our system the sensed data is only the level of water in the dam. The system proposed here consists of components which together put the system in action. It consists of sensors. The sensor used here is a water level sensor. The system monitors water level and takes appropriate actions to sidestep an emergency situation from arising. It sends a message to the people and higher authorities when the water level is increased and the gates are about to open.

2.3.1 ADVANTAGES OF PROPOSED SYSTEM

- Manual work will be avoided.
- Alerting people and the head whenever the gates are opened.

2.4 FEASIBILITY STUDY

The feasibility of the project is analyzed in this phase and a business proposal is put forth with a very general plan for the project and some cost estimates. During system analysis the feasibility study of the proposed system is to be carried out. This is to ensure that the proposed system is not a burden to the company. Three key considerations involved in the feasibility analysisare

- Economic Feasibility
- Technical Feasibility
- Social Feasibility

2.4.1 ECONOMIC FEASIBILITY

The developing system must be justified by cost and benefit. Criteria to ensure that effortis concentrated on a project, which will give best, return at the earliest. One of the factors, which affect the development of a new system, is the cost it would require.

The following are some of the important financial questions asked during preliminary investigation:

- The costs conduct a full system investigation.
- The cost of the hardware and software.
- The benefits in the form of reduced costs or fewer costly errors.

Since the system is developed as part of project work, there is no manual cost to spend for the proposed system. Also, all the resources are already available, it gives an indication that the system is economically possible for development.

2.4.2 TECHNICAL FEASIBILITY

This study is carried out to check the technical feasibility, that is, the technical requirements of the system. Any system developed must not have a high demand on the available technical resources. The developed system must have a modest requirement, as only minimal or null changes are required for implementing this system

2.4.3 BEHAVIORAL FEASIBILITY

This includes the following questions:

- Is there sufficient support for the users?
- Will the proposed system cause harm?

The project would be beneficial because it satisfies the objectives when developed and installed. All behavioral aspects are considered carefully and conclude that the project is behaviorally feasible .

2.5 HARDWARE AND SOFTWARE REQUIREMENTS

2.5.1 HARDWARE REQUIREMENTS

Hardware interfaces specify the logical characteristics of each interface between the software product and the hardware components of the system. The following are some hardware requirements.

- Processor : i5-10th gen.
- RAM : 8 Gb.
- Ultrasonic sensor
- Water level sensor
- Buzzer
- Arduino Uno
- GSM module

2.5.2 SOFTWARE REQUIREMENTS

Software Requirements specifies the logical characteristics of each interface and software components of the system. The following are some software requirements.

- Operating system : Windows 7 Ultimate.
- Coding Language : Arduino C Language

3. ARCHITECTURE

3. ARCHITECTURE

3.1 PROJECT ARCHITECTURE

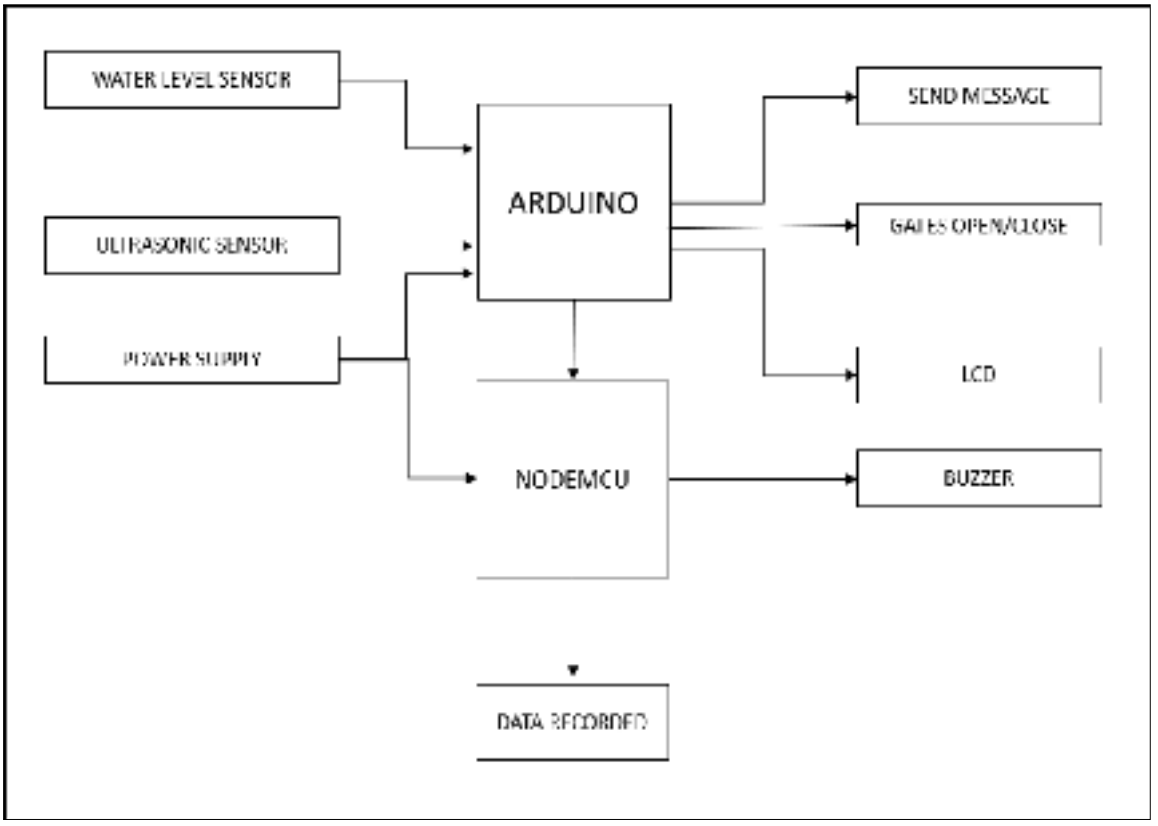


Figure 3.1 Project Architecture of Dam Gate Control System Using IOT

3.2 DESCRIPTION

Initially power supply is given to the model . After the power supply, the sensors and the Arduino is activated . The Water Level Sensor is used for calculating the water value present in the dam . If the water value is less than or equal to 2 , then the water level present in the dam is the safe Water Level . At this value, the dam gates are not going to open and no alert message is sent. If the Water Level in the dam is 3 or 4(since 4 levels has been assigned) , then the water value is displayed on the LCD as Level 3 Gate1 : Opening , and at Level 3 the Gate1 opens after generating the buzzer and sending the alert message that Dam Gates are going to open . At Level 4 , Gate2 opens along with Gate1 by sending the alert message and generating the buzzer. The alert messages here are sent by using GSM Module . Using GSM module an alert messageis sent to the higher authorities and Buzzer sound is played to alert the people in the surroundings so that they can evacuate from that place . The level of water is continuously displayed on the LCD screen(ex: Level 1, Level 2, Level 3 Level 4). The dam gates are also automatically opened in order to reduce the human interaction. Due to this automation , the decisions regarding the dam gates opening or closing would become easier even during the heavy rains or bad weather . There will not be any late in taking the correct decisions regarding the dam operation . The automatic opening and closing of dam gates also reduce man made mistakes . Continuous Water Level value is displayed on the LCD so that the authorities and the people can stay aware of it . This live reading helps people to know if it is safe to stay near the surroundings of the dam .

The Ultrasonic Sensor is used for identifying cracks on the dam . If any crack has been appeared on the dam, then the Ultrasonic sensor identifies the crack and alerts the higher authorities regarding this. By using an Ultrasonic Sensor, the breakdowns on the dam can be identified early. Due to the early identification , the rectification would become easy and proper safety measurements will be taken as soon as it is recognized . Like this without manually operating the dams 24/7 we can use this automated system and lower the risk of danger. It also consumes very less time compared to manually closing the dam gates.

3.3 USE CASE DIAGRAM

In the Use case diagram, we have two actors Automated System and the User. The System calculates thewater level and indicates the user if the water level goes beyond the set point.

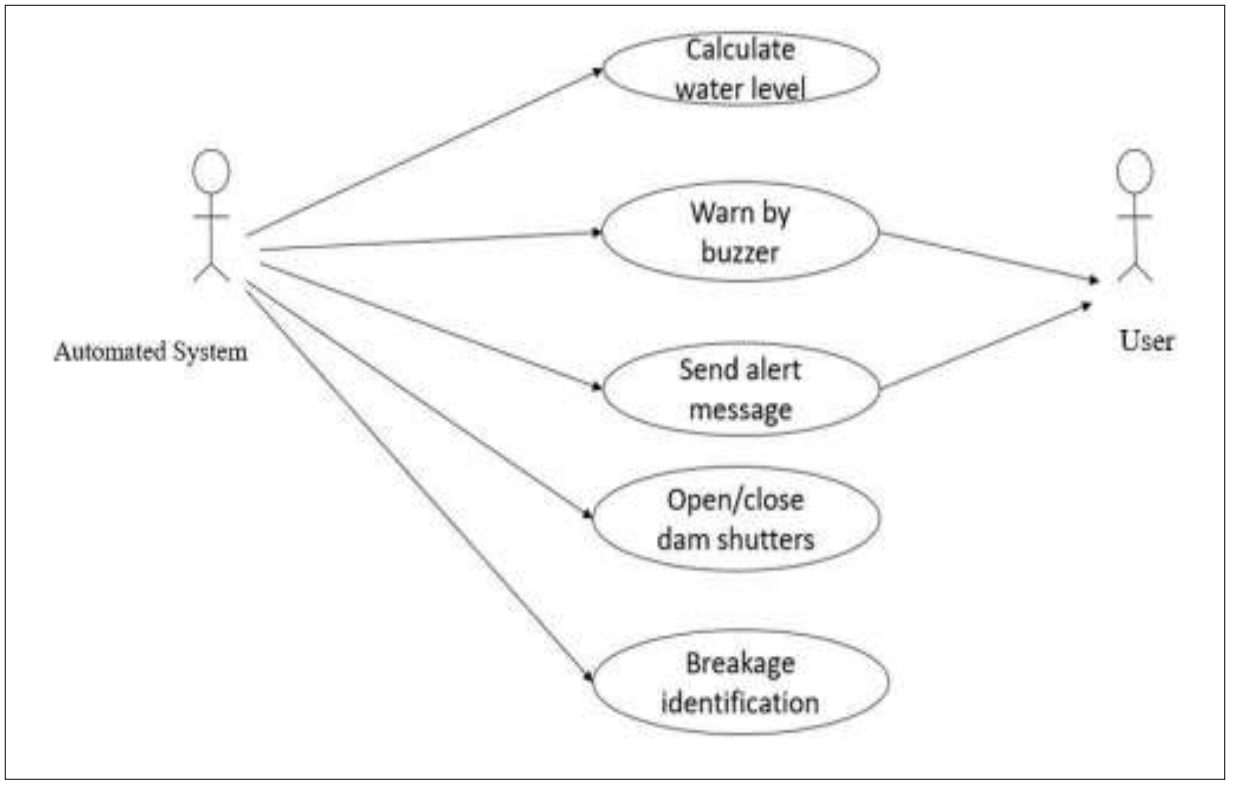


Figure 3.2 Use case diagram of Dam Gate Control System using IOT

3.4 CLASS DIAGRAM

Class diagrams are one of the most useful types of diagrams in UML as they clearly map out the structure of a particular system by modelling its classes, attributes, operations, and relationships between objects. Some of the classes here are Sensor,GSM, LCD.

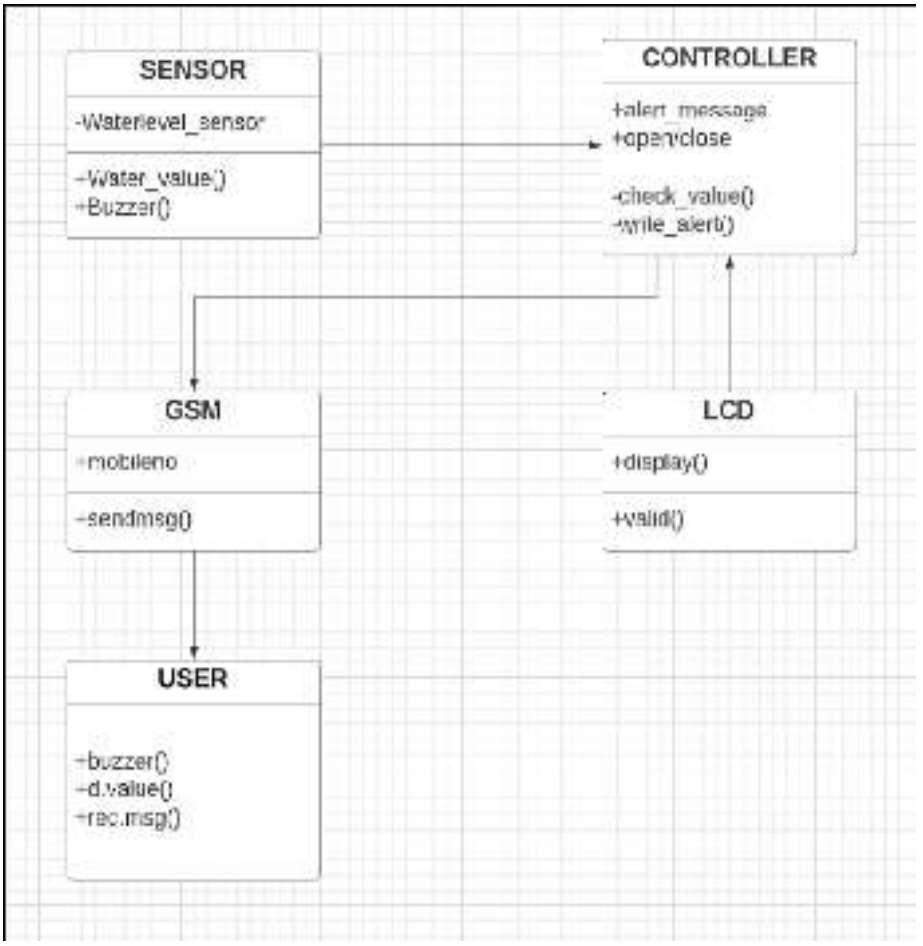


Figure 3.3 Class diagram of Dam Gate Control System using IOT

3.5 SEQUENCE DIAGRAM

It shows the sequence in which different tasks are being carried out. Here the user gives power supply to the system and the water level sensor calculates the level of water in the dam and if the water level is more than the set point then the alert message is sent to the users and a buzzer sound is played, then the gates of the dam are opened.

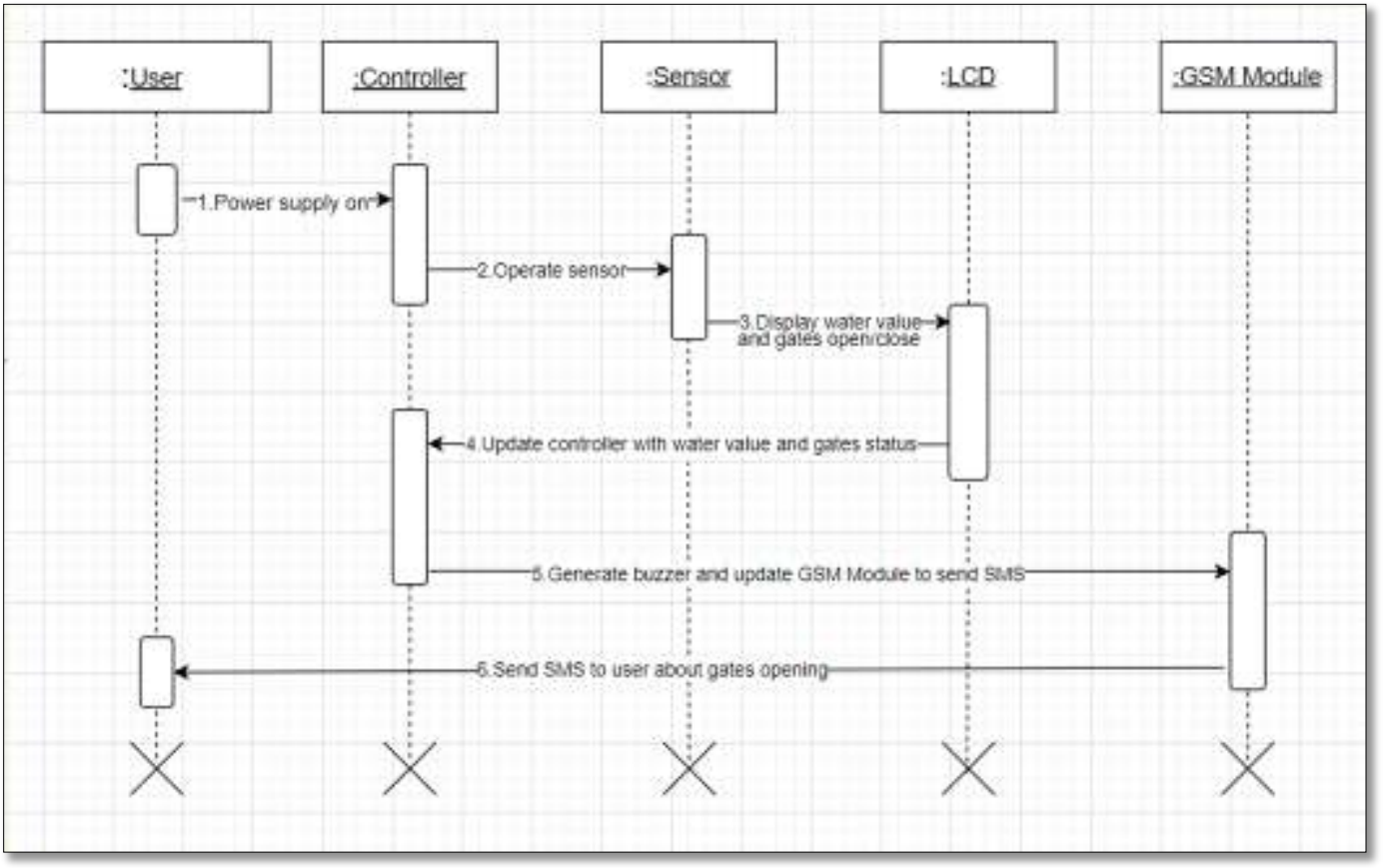


Figure 3.4 Sequence diagram of Dam Gate Control System using IOT

3.6 ACTIVITY DIAGRAM

Activity diagram is basically a flowchart to represent the flow from one activity to another activity. The activity can be described as an operation of the system.

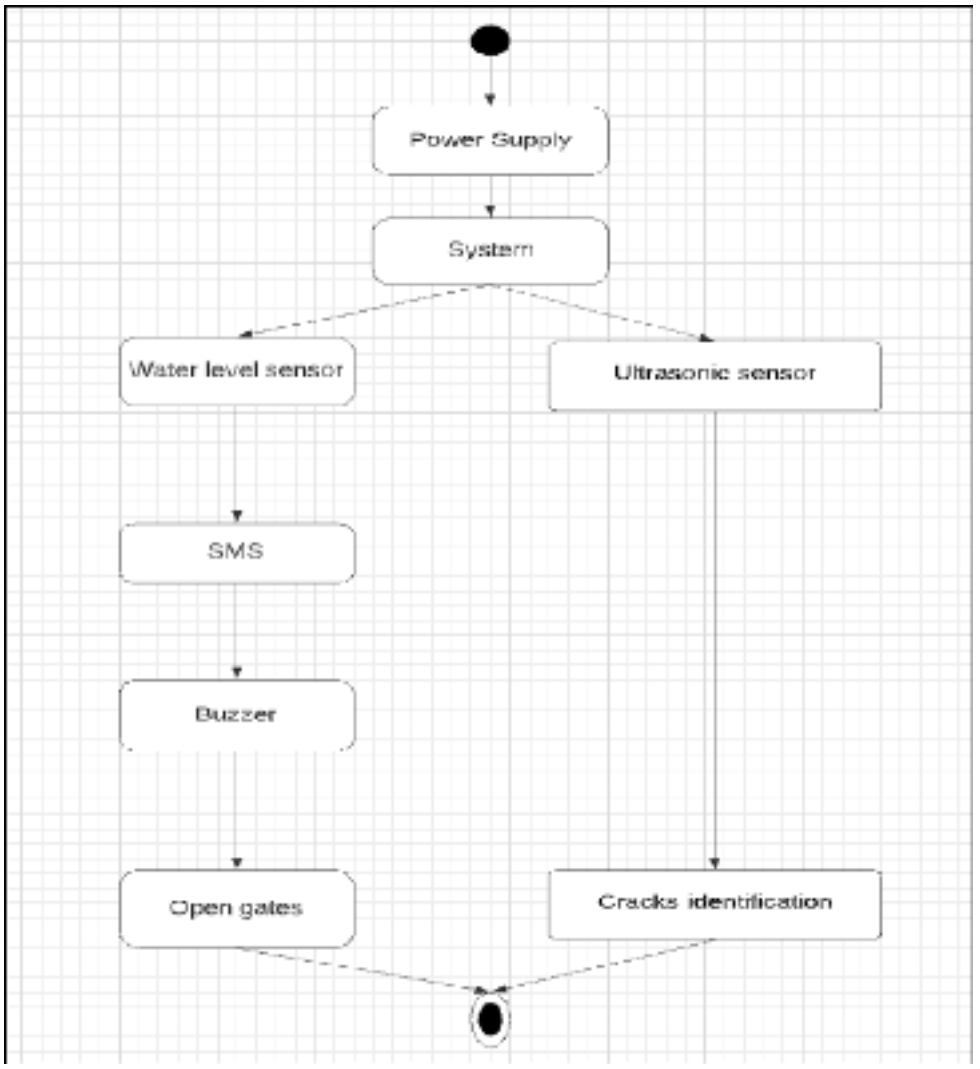


Figure 3.5 Activity diagram of Dam Gate Control System using IOT

4.IMPLEMENTATION

4. IMPLEMENTATION

4.1 SAMPLE CODE

```
#include <Servo.h> #include
<LiquidCrystal.h>#include
<Wire.h>
#include <SoftwareSerial.h>
#define echoPin 7
#define trigPin 4 bool
status = LOW;long old
= 0;
String i2cData = "";
int pos = 0;  // variable to store the servo positionint
levP[4] = {A0, A1, A2, A3};
const int rs = 8, en = 9, d4 = 10, d5 = 11, d6 = 12, d7 = 13 ;
LiquidCrystal lcd(rs, en, d4, d5, d6, d7);
SoftwareSerial HSerial1(2, 3);
Servo gate1;
Servo gate2; void
setup() {
Serial.begin(9600);
while (!Serial) {
;
}
for (int i = 0; i < 4; i++)pinMode(levP[i], INPUT_PULLUP);
pinMode(trigPin, OUTPUT);
pinMode(echoPin, INPUT);
gate1.attach(5);
gate2.attach(6); lcd.begin(16,
2); gate1.write(180);
gate2.write(10);
Wire.begin(8);
Wire.onRequest(requestEvent);
HSerial1.begin(9600);
}
void loop() { long
value = 0;
for (int i = 0; i < 4; i++) { int
v = digitalRead(levP[i]);
value = value + v;
}
value = 4 - value;
int d = getDistance();
```

```
i2cData = "level:" + String(value) + ",distance:" + String(d) + ";";
lcd.setCursor(0, 0);
lcd.print("                ");
String data = "Lev : " + String(value) + " Dis : " + String(d);
lcd.setCursor(0, 0);
lcd.print(data);
// Serial.print("DAM Level : ");
// Serial.println(value);
if (value == 1 || value == 0 && status) {
gate1.write(180);
gate2.write(10);
lcd.setCursor(0, 1);
lcd.print("                ");
}
else if (value == 2 && status) {
Serial.println("DAM Gates are going to open");
gate1.write(180);
gate2.write(10);
send_sms("7330864686", "DAM Gates are going to open");
//   delay(3000);
//   send_sms("7330864686", "DAM Gates are going to open");
lcd.setCursor(0, 1);
lcd.print("                ");
lcd.setCursor(0, 1); lcd.print("Gates :
going to open");status = LOW;
}
else if (value == 3 && status) {
//Serial.println("Opening Gate : 1");
gateF1("open");
lcd.setCursor(0, 1);
lcd.print("                ");
lcd.setCursor(0, 1);
lcd.print("Gate1 : Opened");
}
else if (value == 4 && status) {
//Serial.println("Opening Gate : 2");
gateF2("open");
lcd.setCursor(0, 1);
lcd.print("                ");
lcd.setCursor(0, 1);
lcd.print("Gate2 : Opened");
}

if (value != old) {
old = value; status =
HIGH;
}
delay(500);
```

```
}
void gateF1(String s) {
status = LOW;
if (s.indexOf("close") != -1) {
gate1.write(180);
Serial.println("closing gate 1");
return;
for (int i = 10; i <= 180; i += 1) {
gate1.write(i);
delay(15);
}
}
if (s.indexOf("open") != -1) {
gate1.write(10);
Serial.println("Opening gate 1");
return ;
for (int i = 180; i >= 10; i -= 1) {
gate1.write(i);
delay(15);
}
}
}
void gateF2(String s) {
status = LOW;
if (s.indexOf("open") != -1) {
Serial.println("opening gate 2");
gate2.write(180);
return ;
for (int i = 10; i <= 180; i += 1) {
gate2.write(i);
delay(15);
}
}
if (s.indexOf("close") != -1) {
Serial.println("closing gate 3");
gate2.write(10);
return ;
for (int i = 180; i >= 10; i -= 1) {
gate2.write(i);
delay(15);
}
}
}
void upload(long x) {
Wire.beginTransmission(8); /* begin with device address 8 */
Wire.print(String(x)); /* sends hello string */
Wire.endTransmission();  /* stop transmitting */
}
void requestEvent() {
```

```
Serial.println(i2cData);
Wire.print(i2cData);  /*send string on request */
}
void send_sms(String no, String msg) {
no = "91" + String(no);
HSerial1.println("AT"); //Handshaking with SIM900
updateSerial();
delay(500);
HSerial1.println("AT+CMGF=1"); // Configuring TEXT mode
//Serial.println("AT+CMGF=1"); // Configuring TEXT mode
updateSerial();
delay(500);
HSerial1.println("AT+CMGS=\"+" + no + "\"");
//Serial.println("AT+CMGS=\"+"+no+"\"");
updateSerial();
delay(500);
HSerial1.print(msg);
updateSerial();
//Serial.print(msg);
delay(500);
HSerial1.write(26);
updateSerial();
}
void updateSerial()
{
return;
delay(500);
while (Serial.available())
{
HSerial1.write(Serial.read());//Forward what Serial received to Software Serial Port
}
while (HSerial1.available())
{
Serial.write(HSerial1.read());//Forward what Software Serial received to Serial Port
}
}
int getDistance()
{
long duration; // variable for the duration of sound wave travel
int distance = 0;

// Clears the trigPin condition
digitalWrite(trigPin, LOW);
delayMicroseconds(2);
digitalWrite(trigPin, HIGH);
delayMicroseconds(10);
digitalWrite(trigPin, LOW);
// Reads the echoPin, returns the sound wave travel time in microseconds
duration = pulseIn(echoPin, HIGH);
```

```
// Calculating the distance
distance = duration * 0.034 / 2; // Speed of sound wave divided by 2 (go and back)if
(distance > 90)distance = 90;
return distance;
}


#include <Wire.h>
#include <ESP8266WiFi.h> #include
"Adafruit_MQTT.h" #include
"Adafruit_MQTT_Client.h"

/************************ WiFi Access Point
*********************************/

#define WLAN_SSID      "project"
#define WLAN_PASS      "123456789"

/************************ Adafruit.io Setup
*********************************/

#define AIO_SERVER     "io.adafruit.com"
#define AIO_SERVERPORT  1883                   // use 8883 for SSL
#define AIO_USERNAME  "Suswambica_111"
#define AIO_KEY        "aio_ivSq89ofBZarodIyjPclur6jUoFH"

/************ Global State (you don't need to change this!) ******************/

WiFiClient client;
Adafruit_MQTT_Client mqtt(&client, AIO_SERVER, AIO_SERVERPORT,
AIO_USERNAME, AIO_KEY);
Adafruit_MQTT_Publish level = Adafruit_MQTT_Publish(&mqtt,
AIO_USERNAME "/feeds/level");
Adafruit_MQTT_Publish stat = Adafruit_MQTT_Publish(&mqtt, AIO_USERNAME
"/feeds/status");

int period1  = 1000;
unsigned long time_now1 = 0;
int period2 = 3000;
unsigned long time_now2 = 0;
int l = 0;
int d = 0 ;
bool f1 = LOW, f2 = LOW;
bool f11 = LOW, f22 = LOW;
#define buz D3
void setup() {
```

```
Serial.begin(9600); /* begin serial for debug */
while (!Serial) {
;
}
pinMode(buz , OUTPUT);
Wire.begin(D1, D2); /* join i2c bus with SDA=D1 and SCL=D2 of NodeMCU */digitalWrite(buz,
LOW);
Serial.print("Connecting to ");
Serial.println(WLAN_SSID);
WiFi.begin(WLAN_SSID, WLAN_PASS);
while (WiFi.status() != WL_CONNECTED) {
delay(500);
Serial.print(".");
}
Serial.println(); Serial.println("WiFi
connected");
Serial.println("IP address: "); Serial.println(WiFi.localIP());
}
void loop() { String
data = "";
MQTT_connect();
if (millis() >= time_now1 + period1) {
time_now1 += period1;
Wire.requestFrom(8, 22); /* request & read data of size 13 from slave */if
(Wire.available()) {
data = Wire.readString();
}
if (data.indexOf("level:") != -1) {
l = data.substring(data.indexOf("level:") + 6, data.indexOf(',')).toInt();
d = data.substring(data.indexOf("distance:") + 9, data.indexOf(';')).toInt();
Serial.println("level : " + String(l) + " Distance : " + String(d));
// feeds[i].publish((char*)Red.c_str());if
(l != 2)f1 = HIGH;
else{
if (f1) {
stat.publish("Gates are opening");
f1 = LOW;
digitalWrite(buz, HIGH);
delay(500);
digitalWrite(buz, LOW);
}
}
if (d > 10){f2 =
HIGH;
}
else{
if (f2) {
stat.publish("DAM Crack detected");f2
= LOW;
```

```
digitalWrite(buz, HIGH);
delay(500);
digitalWrite(buz, LOW);
}
}
}
}
if (millis() >= time_now2 + period2) {
time_now2 += period2; level.publish(l);
}
}
void MQTT_connect() {
int8_t ret;
// Stop if already connected.if
(mqtt.connected()) { return;
}
Serial.print("Connecting to MQTT... ");
uint8_t retries = 3;
while ((ret = mqtt.connect()) != 0) { // connect will return 0 for connected
Serial.println(mqtt.connectErrorString(ret));
Serial.println("Retrying MQTT connection in 5 seconds...");
mqtt.disconnect();
delay(5000); // wait 5 seconds
retries--;
if (retries == 0) {
// basically die and wait for WDT to reset mewhile
(1);
}
}
Serial.println("MQTT Connected!");
}
```

5. RESULTS

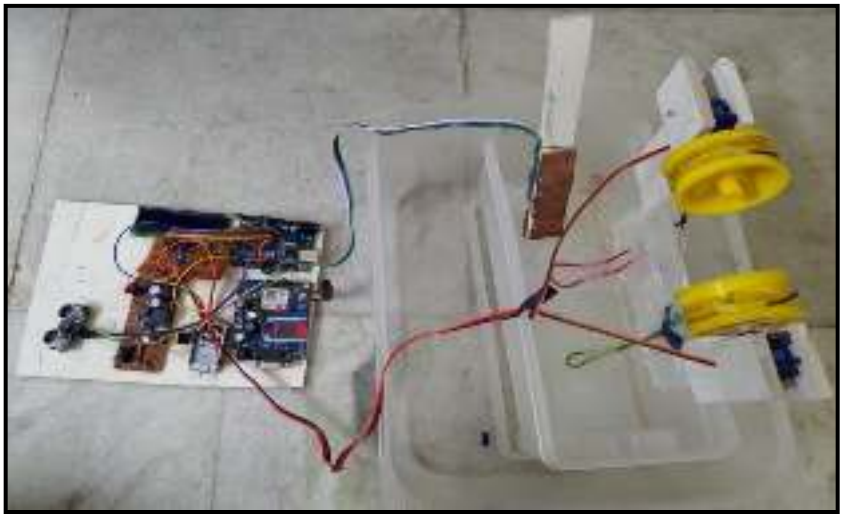
5. RESULTS

5.1 SCREENSHOTS

5.1.1 LEVEL 0:

After the power supply is given, the water level sensor is placed in the dam. If there is no water present in the dam or the water level is less than the assigned set point , then the LCD displays as Lev : 0 and no alert message or buzzer is generated.

The image below shows the power supply given.



Screenshot 5.1.1(a) Model

Screenshot 5.1.1(b) Level 0

5.1.2 LEVEL 1:

If the water level in the dam reaches the level value 1, then Lev : 1 is displayed on LCD which means that the water level present in the dam is the safe level. As a result there will be no alert message and buzzer.

Screenshot 5.1.2 Level 1

5.1.3 LEVEL 2:

If the water level in the dam reaches the level value 2, then Lev : 2 is displayed on LCD which means that the water level present in the dam is the safe level. As a result there will be no alert message and buzzer.

Screenshot 5.1.3 Level 2

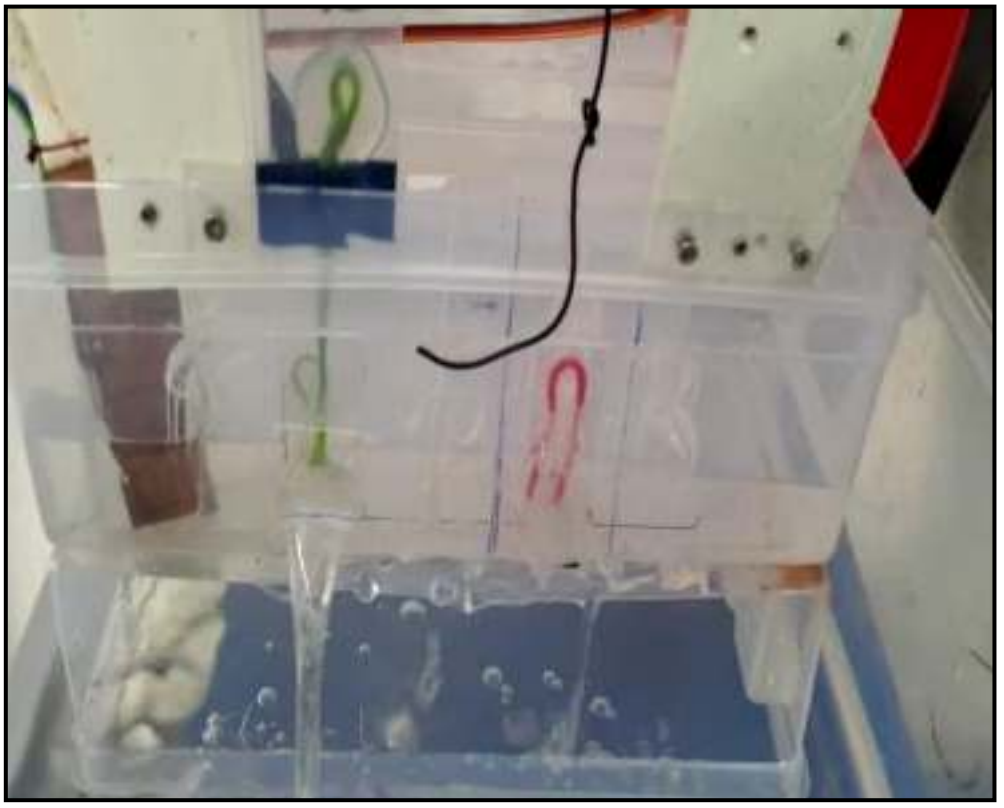
5.1.4 LEVEL 3

If the water level in the dam reaches the level value 3, then Lev : 3 along with Gate 1 : Opened is displayed on LCD which means that the water level present in the dam has reached the unsafe level. As a result, there will be an alert message sent to the people and the authorities and a buzzer is generated. Along with it Gate 1 is going to open.

Screenshot 5.1.4(a) Level 3

Screenshot 5.1.4(b) Alert Message

After the alert message and the buzzer generation the Gate1 is opened.

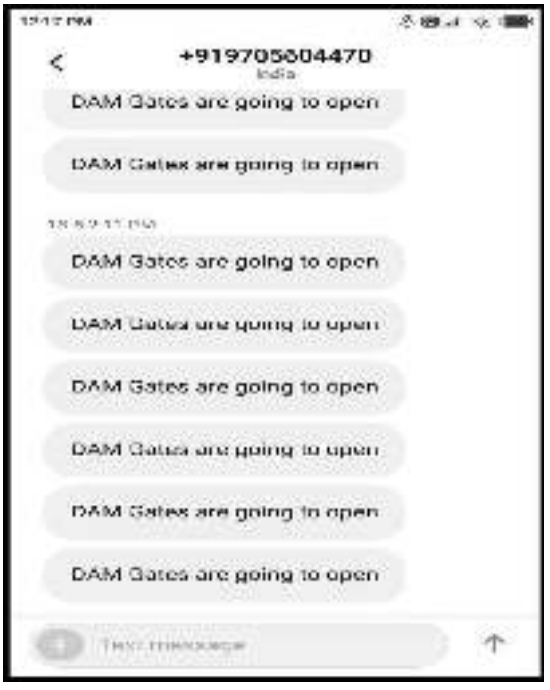


Screenshot 5.1.4(c) Gate1 Opened

5.1.5 LEVEL 4:

If the water level in the dam reaches the level value 4, then Lev : 4 along with Gate 2 : Opened message is displayed on LCD which means that the water level present in the dam has reached the unsafe level. As a result, there will be an alert message sent to the people and the authorities and a buzzer is generated. Along with Gate 1, Gate 2 is also going to open.

Screenshot 5.1.5(a) Level 4



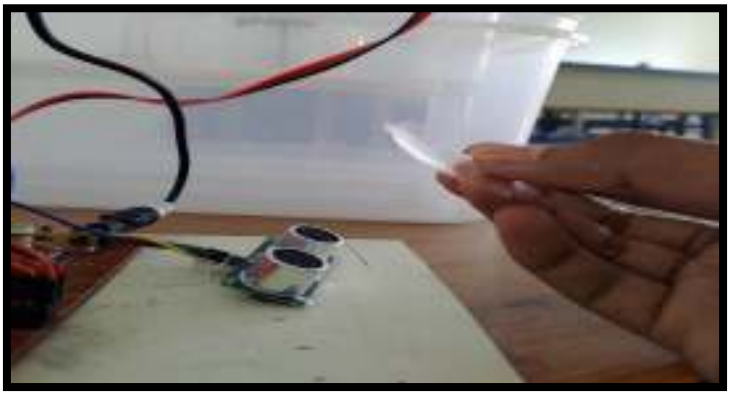
Screenshot 5.1.5(b) Message

After the alert message and the buzzer generation the Gate1 along with Gate2 is opened.

Screenshot 5.1.5(c) Gate1 and Gate2 Opened

5.1.6 CRACK DETECTION

The Ultrasonic Sensor is used for crack detection. If any cracked item is brought near the ultrasonic sensor, then the ultrasonic sensor detects that item and generates the buzzer.



Screenshot 5.1.6(a) Crack Detection

The above diagram shows the cracked item brought close to the Ultrasonic Sensor, then the distance varies and the crack is detected.

Screenshot 5.1.6(b) Distance Variation

6. TESTING

6. TESTING

6.1 INTRODUCTION TO TESTING

The purpose of testing is to discover errors. Testing is the process of trying to discover every conceivable fault or weakness in a work product. It provides a way to check the functionality of components, subassemblies, assemblies and/or a finished product. It is the process of exercising software with the intent of ensuring that the Software system meets its requirements and user expectations and does not fail in an unacceptable manner. There are various types of tests. Each test type addresses a specific testing requirement.

6.2 TYPES OFTESTING

6.2.1 UNIT TESTING

Unit testing involves the design of test cases that validate that the internal program logic is functioning properly, and that program inputs produce valid outputs. All decision branches and internal code flow should be validated. It is the testing of individual software units of the application .It is done after the completion of an individual unit before integration. This is a structural testing that relies on knowledge of its construction and is invasive. Unit tests perform basic tests at component level and test a specific business process, application, and/or system configuration. Unit tests ensure that each unique path of a business process performs accuratelyto the documented specifications and contains clearly defined inputs and expected results.

6.2.2 INTEGRATION TESTING

Integration tests are designed to test integrated software components to determine if they actually run as one program. Testing is event driven and is more concerned with the basic outcome of screens or fields. Integration tests demonstrate that although the components were individually satisfactory, as shown by successfully unit testing, the combination of components is correct and consistent. Integration testing is specifically aimed at exposing the problems that arise from the combination of components.

6.2.3 FUNCTIONAL TESTING

Functional tests provide systematic demonstrations that functions tested are available as specified by the business and technical requirements, system documentation, and user manuals. Functional testing is centered on the following items:

Valid Input	:	identified classes of valid input must be accepted.
Invalid Input	:	identified classes of invalid input must be rejected.
Functions	:	identified functions must be exercised.
Output	:	identified classes of application outputs must be exercised.
Systems/Procedures	:	interfacing systems or procedures must be invoked.

Organization and preparation of functional tests is focused on requirements, key functions, or special test cases. In addition, systematic coverage pertaining to identifying Business process flows; data fields, predefined processes.

6.3 TEST CASES

Test	Description	Action	Expected Result	Actual Result	Result
Water Level Sensor	Water Level Sensor is used for identifying the water level in the dam.	Based on the water level the dam gates are going to open/close.	Dam gates should open for water level greater than 2 and remain closed for water level less than 2.	Same as expected.	Pass
Ultrasonic Sensor	Ultrasonic sensor is used for crack identification.	If any cracked item is brought near then the Ultrasonic Sensor identifies it.	The cracked item is identified.	Same as expected.	Pass
GSM Module (Global System for Mobile communication)	GSM Module is used for sending and receiving messages.	If the water level is greater than 2 then the message is sent that the gates are going to open.	The messages are sent based on the water level in the dam.	Same as expected.	Pass

7. CONCLUSION

7. CONCLUSION & FUTURE SCOPE

7.1 PROJECT CONCLUSION

- This dam gate control system reduces the water wastage.
- There is not much requirement of human laborer's for monitoring the level, just one operator is sufficient.
- Operation execution time is less.
- Automatic opening of gates based on the water level reduces the man-made mistakes and involves fewer human efforts.
- Gives proper alert for the authorities and the people nearby.

7.2 FUTURE SCOPE

- Since wired technology is used in our system there is scope to further modify it by using wireless technology.
- A centralized control of all the dams in a state using other wireless technology under central government can be beneficial to whole country.

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2. https://r.search.yahoo.com/_ylt=AwrwXxSC25Vi6E0Afx7nHgx.;_ylu=Y29sbwMEcG9zAzQEdnRpZAMEc2VjA3Ny/RV=2/RE=1654017027/RO=10/RU=https%3a%2f%2fwww.skyfilabs.com%2fproject-ideas%2fiot-based-dam-water-monitoring/RK=2/RS=GVlnXZ43lwvuz.tMb6DZX_CEva0

8.3 GITHUB LINK

https://github.com/Suswambica/Dam-Gate-Control-System-Using IoT.git

Sample Code Link

https://docs.google.com/document/d/1YbyNZx6UVkvGtsLtebG04GhVkUJzCoVX_7SEcUKy RFU/edit?usp=sharing

9. PAPER PUBLICATION

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DAM GATE CONTROL SYSTEM USING IOT

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ABSTRACT

Dams are in the main used for producing hydroelectricity and for irrigation purposes. This utilization has resulted within the construction of a variety of dams in potential areas over the years. As there are plenty of risk factors related to the existence of those dams, it's became the necessity to develop a correct automatic monitoring system regarding the opening of the dam gates thereby managing a system for maintaining a secure water level in dams. Mismanagement of dams can also bring about manmade disasters. The dams that are present now are monitored and controlled manually. This ends up in pause in deciding. The proposed system involves real-time monitoring of water levels of the dam. Water levels may also range because of drastic adjustments in water levels of linked rivers of lakes, or because of the immoderate rainfall withinside the catchment area. The proposed system is an IoT system which is able to monitor and send real time parameters associated with Dam. The system also includes features like SMS alerts to the people of the locality and higher authorities, live display of water level and also the early-stage crack identification so as to scale back the risks of cracks which can lead to dam failure.

Keywords: Buzzer, GSM Module, Node MCU, Water Level, LCD.

I. INTRODUCTION

A dam could be a massive barrier built for the protection of a vicinity from water overflows still as to be used for other reasons like land irrigation and hydroelectricity generation[5]. Inarguably all countries within the world today have dams[7]. However, a really few treat automated systems, which are more practical and efficient than manual ones[6]. Hence, it'd be useful for all countries to begin to use automatic systems for his or her dams as this can reduce the quantity of effort that they're already putting towards dam maintenance and water outflow[8].

II. LITERATURE SURVEY

Now-a-days water scarcity has become a heavy problem in India and there are many factors accountable for this like improper supply of water from the dam, improper water saving systems, etc.,[3]. But one major factor is that the improper opening and shutting of the dam gate consistent with the extent of water within the dam. Also, till date the control mechanism of the dam gates is completed manually. But there are plenty of risk factors that are related to manual method[4]. In uncertain times like when there are floods or heavy rainfalls because of climate changes suddenly, it becomes difficult to open or close the gates manually[2]. So, we want an automation system to regulate the dam gates in these difficult times based on water level[10]. Manually doing it should take lots of your time and is additionally not safe. So, in an automatic system we are able to alert the people within the surroundings by buzzer sound and send an alert message to the higher authorities and people nearby to take further precautions and transparent to public[1]. By using Ultrasonic Sensor Crack identification will also become easy[9].

III. PROPOSED SYSTEM

The proposed system is mainly concerned with the real time operation of dam gates depending on the level of water. In our system the sensed data is only the level of water in the dam. The system proposed here consists of components which together put the system in action. It consists of sensors. The sensor used here is a Water Level Sensor. The system monitors water level and takes appropriate actions to sidestep an emergency situation from arising. It sends a message to the people and higher authorities when the water level is increased and the gates are about to open. And Ultrasonic Sensor is used for crack identification on the dam. Whenever the Ultrasonic Sensor identifies the crack on the dam, then the buzzer is played in order to alert the higher authorities.

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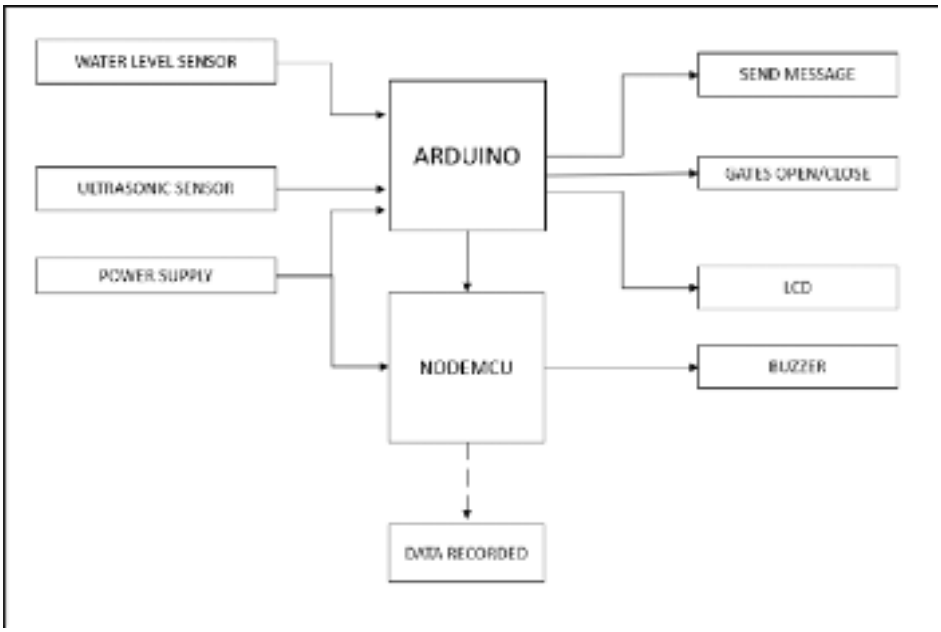

Figure 3.1: Project Architecture of Dam Gate Control System using IOT

IV. RESULT

4.1 LEVEL 0:

After the power supply is given to the controller, the water level sensor is placed in the dam. If there is no water present in the dam or the water level is less than the assigned set point, then the LCD displays as Lev:0 and no alert message or buzzer is generated. The same is done for Level 1 and Level 2. For Level 3, the LCD displays Gate1:Opened and Level:3 and the buzzer is generated along with it the alert message is sent to the higher authorities and people nearby. The Gate1 opens and the water flows from the dam. For Level 4, the LCD displays Level:4 and Gate2:Opened. In such a case, the buzzer is generated and alert message is sent. Gate2 along with Gate1 opens at a time and the water flows from both the gates.

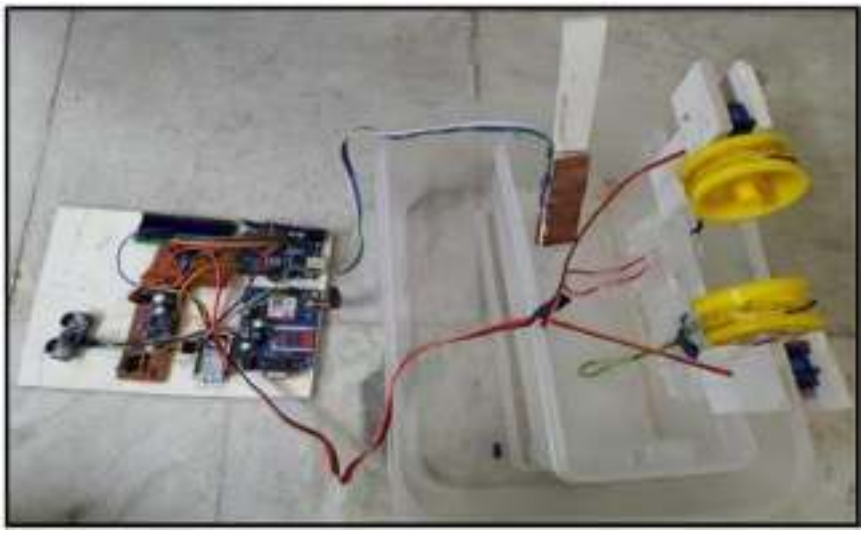

Figure 4.1(a) Model

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Figure 4.1(b) Level 0

Figure 4.2 Level 1

Figure 4.3 Level 2

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Figure 4.4 (a) Level 3

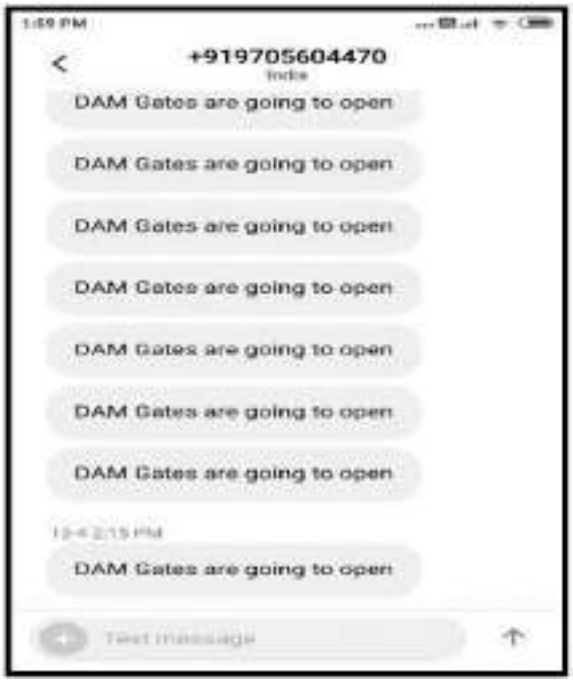

Figure 4.4 (b) Alert Message

After the alert message and the buzzer generation the Gate 1 is opened.

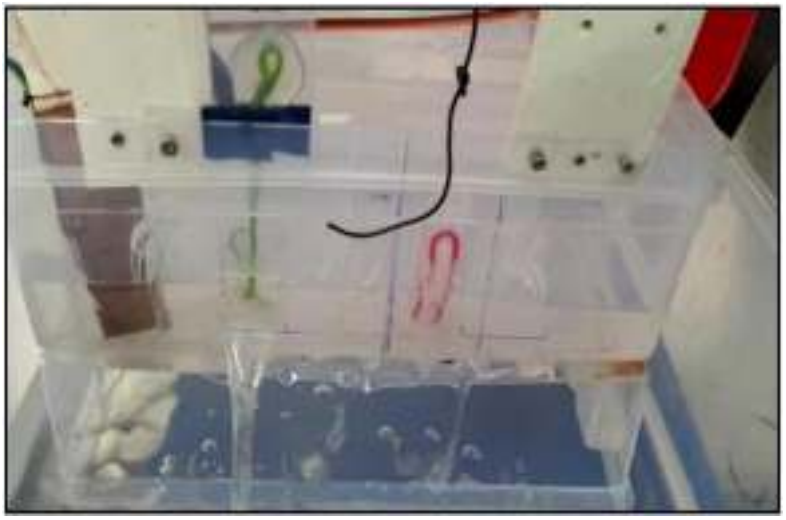

Figure 4.4 (c) Gate 1 Opened

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Figure 4.5 (a) Level 4

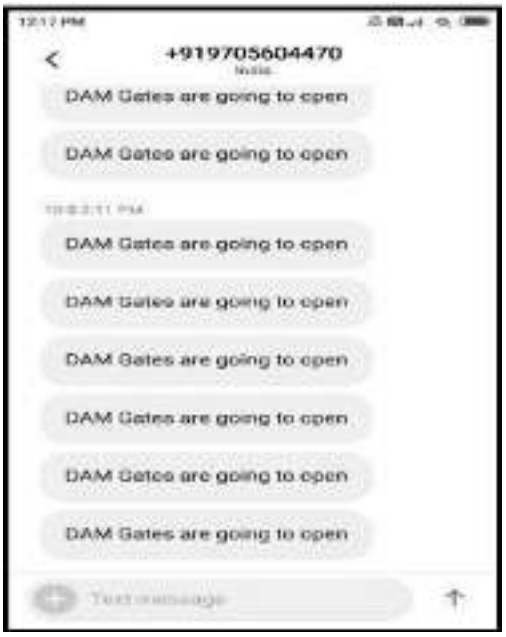

Figure 4.5 (b) Message

After the alert message and the buzzer generation the Gate 1 along with Gate 2 is opened.

Figure 4.5 (c) Gate 1 and Gate 2 Opened

4.6 CRACK DETECTION

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The Ultrasonic sensor is used for crack detection. If any cracked item is brought near the ultrasonic sensor, then the ultrasonic sensor detects that item and generates the buzzer.

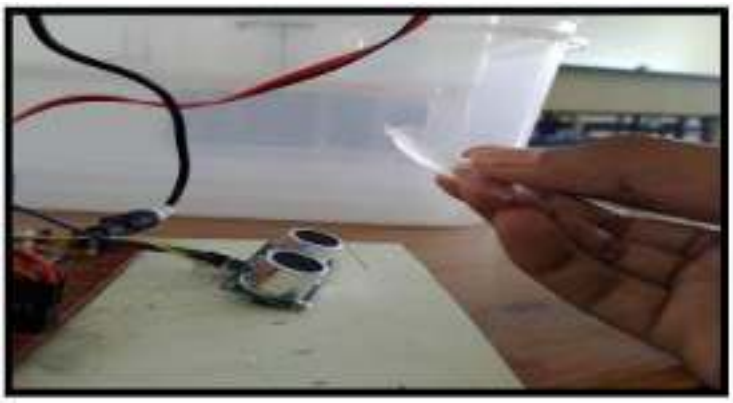

Figure 4.6(a) Crack item

The above diagram shown the cracked item brought close to the Ultrasonic Sensor, then the distance varies and the crack is detected.

Figure 4.6(b) Crack Detection

V. CONCLUSION

The proposed automatic dam gate control system reduces the water wastage and automatic opening of dam gates is possible based on the water level present in the dam. There is not much requirement of human laborer's for monitoring the level, just one operator is sufficient. Operation execution time is less. Automatic opening of gates based on the water level reduces the man-made mistakes and involves fewer human efforts. Gives proper alert for the authorities and the people nearby. The crack identification also helps in preventing the dam failure.

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10. CERTIFICATES

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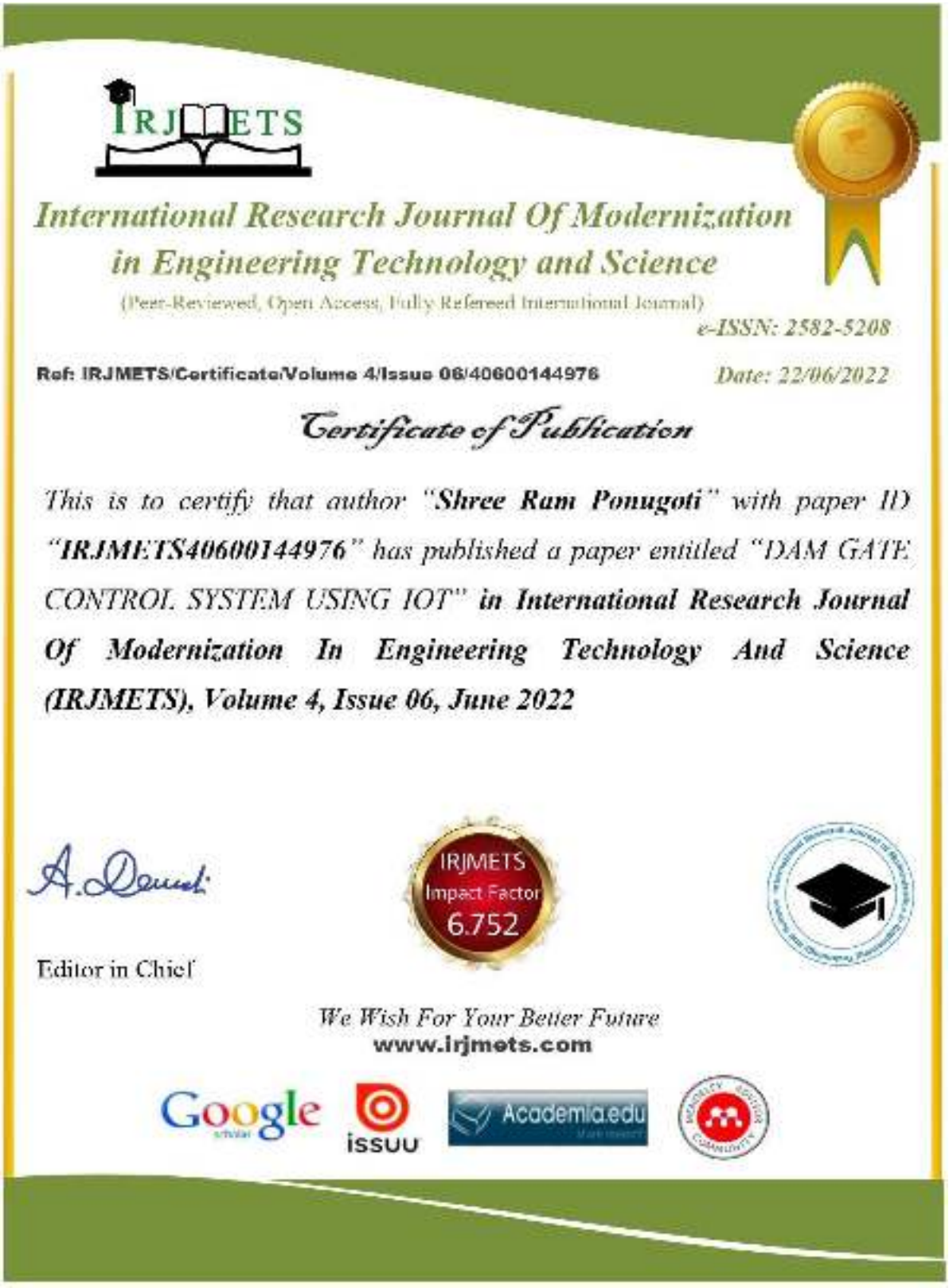

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