Dam Automation and Application Using IOT-(A Prototype Model Study)

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Abstract-We here proposed an automatic dam water level monitor and gate opening application using IOT with model study. The basic idea is to describe possibilities of IOT applications in dam monitoring and safety. Here sensor is used to sense the water level and then the dam gate are open when the water reaches the full reservoir level (FRL). The sensor is used to measure at three different levels to check the water level and provides alert accordingly. When the water level reaches the first sensor, it is sensed and a yellow alert is given to the authorities and when it reaches the second higher level, an orange alert is given. When it exceeds maximum water level, a red alert is given and the sensor provides a signal to the micro controller and the dam gates are open automatically.

Keywords- Dam automation, IOT, alert, sensors

I.INTRODUCTION

Dam plays a major role in our life as they are used for purposes such as flood control and generation of electricity. There are approximately 5200 major and minor dams in India. Now a days the dam authorities are facing many problems as the weather conditions are not stable and also the monitoring of dams cannot be done continuously by them. Manual observations takes more time and this can also cause loss of real time data and sometimes became the reason for upcoming disaster.

The prototype model study will help in reducing these problem which are faced by the dam authorities. The project is to implement the applications which will monitor the water level, indicate to the authorities and also the gates will be open automatically when the water exceeds the certain level. The internet of things is chosen for monitoring and alerting on real time basis.

II.LITERATURE REVIEW

Water level monitoring and controlling of dam gate is a very important part regarding dam as it helps the authorities to reduce their manual work. This dam automation application detects the increase in water level and controls from flood by automatic opening of dam gates. Using this system, the man power and risk can be reduced.

There are different components used for this applications:

1. *Ultra sonic sensors (SR04)*

The ultra-sonic sensor is used to monitor the water level and it is fixed on the top scale of the dam. Whenever the water reaches a certain level of the Dam scale then the data from the sensor is transferred to NODE MCUV2.

2. *Node MCUV2(ESP8266 MOD)*

WIFI module ESP8266 is used to collect the data from web server. The status of the water quantity and water level of dam are updated to the web server continuously by WIFI module.

3. *Relay(5V)*

Relay are used for controlling the opening and closing gate according to the detector level of water in the dam.

4. *Buck converter*

The buck converter is a ubiquitous DC –DC converter that converts high voltage to low voltage effectively. It is a class of switched mode power supply (SMPS) typically contain at least two semiconductor and at least one energy storage element.

5. *Transformer (12V 2A)*

Transformer is used to increase and decrease existing voltage to the required voltage level for application in electrical circuit.

6. *LED and Buzzer*

It is used to give alerts when the water levels in dam reaches its ultimate level. The LED are placed on three particular levels and it gives alert followed up with a distinct sound from the buzzer.

7. *Gate control*

The proposed Dam automation application system has totally two gates. The two gates are control automatically. Dam gates are automatically opened by motor.

8. *Dam gate arrangement with motor*

The dam gate is arranged using a DC motor to open and close the gate.

III.METHODOLOGY

WORKING:

In this project we propose an idea of monitoring and controlling the water in a common gravity dam using internet of things. This system consists of both software and hardware which is used for automation and it helps to reduce the manual effort. In this project we monitor the water level which is detected by using sensors.

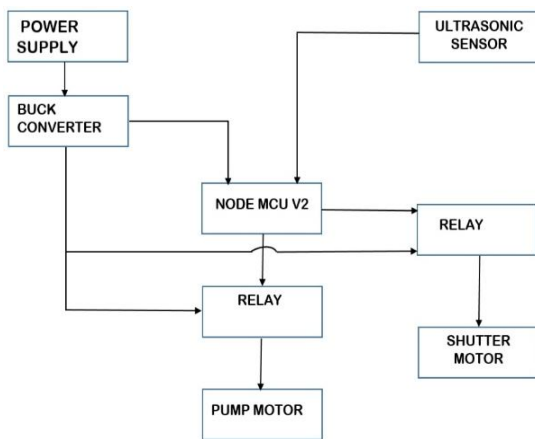Figure 2: Dam Prototype

FLOWCHART:

Fig:1

The sensor is placed and when the water level reaches the first level, the rate of increasing the water level is measure by the application along with which a yellow alert is given to the authorities. When it reaches the next successive level, an orange alert is given and when it reaches the maximum water level, a red alert is given and an information signal is send to the motor which automatically opens the gate. The dam gate can be controlled by turning the ON and OFF buttons in "BLYNK". When we press the ON button the dam gates is

opened and when we press OFF the gates is closed. The gates can be controlled by the authorities from anywhere.

The power is passed to buck converter where the 12V current is converted to 5V. This current is supplied to Node MCU V2 and the ultrasonic sensor is connected to Node MCU which is used for water level reading.

The Node MCU gives the switch command to the relay for switching the shutter motor for opening the gates. The buck convertor passes 5V power to the relay for switching the pump motor.

IV.MODEL PROTOTYPE SYSTEM

The system is all about monitoring and controlling the water level and overflow of water in dams by using IOT with application of android system.

- **Dam monitoring and controlling:**

From this application, the authorities can control and monitor the dams remotely. It can reduce the manual effort and also gives a real time accurate data.

- **Alerting the authorities when the water reaches peak level:**

When the water reaches the level 1 sensor, it gives a yellow alert to the authorities and it will be displayed in the application with an alerting sound.

When it reaches the level 2 sensor, it gives an orange alert which indicate the authorities to be cautious.

When the water reaches above the full reservoir level, it gives a red alert to the authorities and by using the application they can open the gates automatically.

- **Dam gate opening through application:**

When the red alert is indicated to the authorities the dam gate is opened automatically which reduces the manual effort and helps the authorities in reducing the risk of floods.

CODE:

The code used for monitoring the water level:

```
#define  BLYNK_PRINT  Serial        //
Comment this out to disable prints and
save space
 #include <ESP8266WiFi.h>
 #include <BlynkSimpleEsp8266.h>
 #define TRIGGER_PIN 14 // D5 _NodeMcu
Pin
 #define ECHO_PIN      12 //D6 _NodeMcu
Pin
char auth[] =  "*******"; // Blynk Key
 char ssid[] = "********"; // Wifi SSID
char pass[] = "********"; // Password
(WIFI)
```

```
BLYNK_READ(V1) {
double duration, distance;
digitalWrite(TRIGGER_PIN, LOW); // Get
 Start
delayMicroseconds(2);   // stable the
linedigitalWrite(TRIGGER_PIN, HIGH); //
sending 10 us pulse
delayMicroseconds(10);      // delay
digitalWrite(TRIGGER_PIN,   LOW);    //
after
 sending pulse wating to receive
signals
 duration = pulseIn(ECHO_PIN, HIGH); //
calculating time
  distance = (duration / 2) / 29.1; //
single
 path
Serial.print(distance);
delay(100);
Blynk.virtualWrite(V1, distance);
 }
void setup() {
Serial.begin(115200);   // Open serial
monitor
 at 115200 baud to see ping results.
pinMode(TRIGGER_PIN,           OUTPUT);
pinMode(ECHO_PIN, INPUT);
Blynk.begin(auth, ssid, pass); //
}
void loop() {
Blynk.run(); // Keep looping
}
```

BLOCK DIAGRAM:
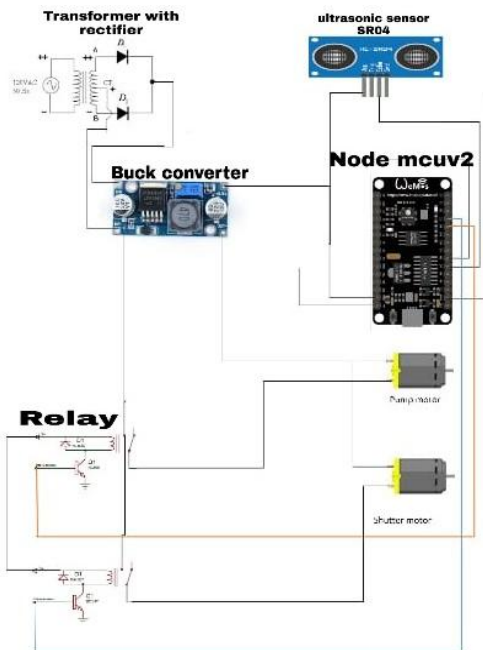
It is represented by the block diagram as shown below:
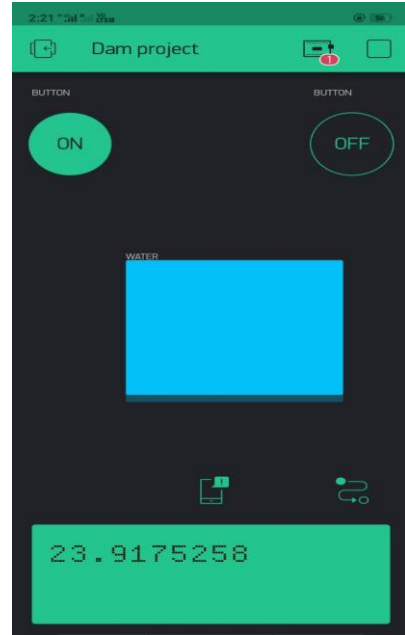

Fig: 3

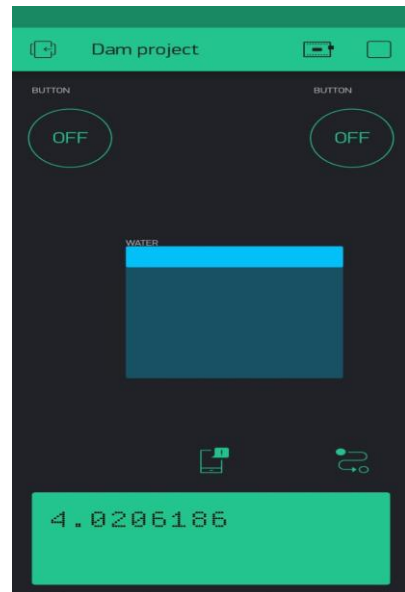OUTPUT:

Figure 4: Mobile application

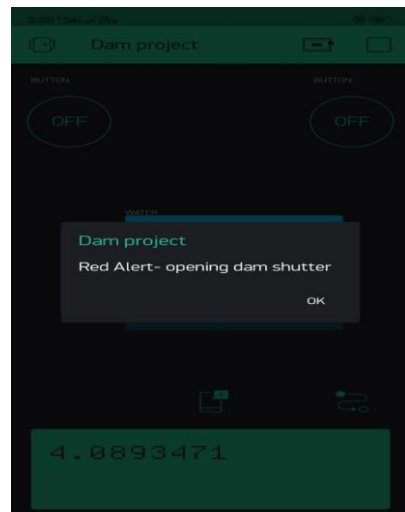Figure 5: Water level indicating using "Blynk"

Figure 6: Alerting and Dam gate opening indication

V. COMPARISON OF PROJECTS

The advantages of our prototype model system when compared to others are:

- Our prototype system have real time water level monitoring and the water level will be indicated to the authorities continuously.

- It is an automated process where the dam gates will be opened automatically and the control can be done by the authorities using an application.

- It also have LED and buzzer system which indicates the rise of water level and gives early alert to the authorities so that they can move the people to a safer place before opening of gates which helps in reducing effects of flood to an extent.

VI. APPLICATION AND USES

- By using this idea we can reduce the man power required at each and every dam . Since this is a fully automated project, any kind of human activity can be avoided. So the possibility of faults has also decreased.

- During times of natural disaster like floods this method vary help full as we don't need to any

  have human to control near the actual site of the dam.

- The alarm given to the particular authorities can take the necessary steps and give instructions to the people,

VII. FUTURE SCOPE

We can record the real time data in the automation application. Also by comparing with dam prototype, this idea can be implemented in existing dams.Also can go for total six gates. In that two is automatically operated and one is semi-automatically operated and the remaining two is manually operated.

VIII. CONCLUSION

Water is the most basic need in everyone's life. But the excess of water will also adversely affect human life. We here try to overcome these problems by proposing a dam automation application. This propose automated mechanism of water level monitor ,control and alerting system using sensor , NODE MCUV2 in dams ensure efficient as of available water resources and it will generate more precise and accurate result which is one of the best method overcome manual judgement. There is no requirement of manual effort to monitoring thelevel, everything is automatically operated.

The main advantage is that this system can be controlled by anywhere. It is based on IOT, so the speed of data transmission will be high and probability of loss in real time data will be less.

IX. ACKNOWLEDGEMENT

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