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Dam Gate Control System using IOT

Jonnadula Narasimharao¹, Suswambica Kolkuri², Shree Ram Ponugoti³, Sameera Javariya Palagiri⁴

¹Associate Professor of Dept of CSE, CMR Technical Campus, Medchal, Hyderabad

^{2, 3, 4}B.Tech Student, Dept of CSE, CMR Technical Campus, Hyderabad

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.

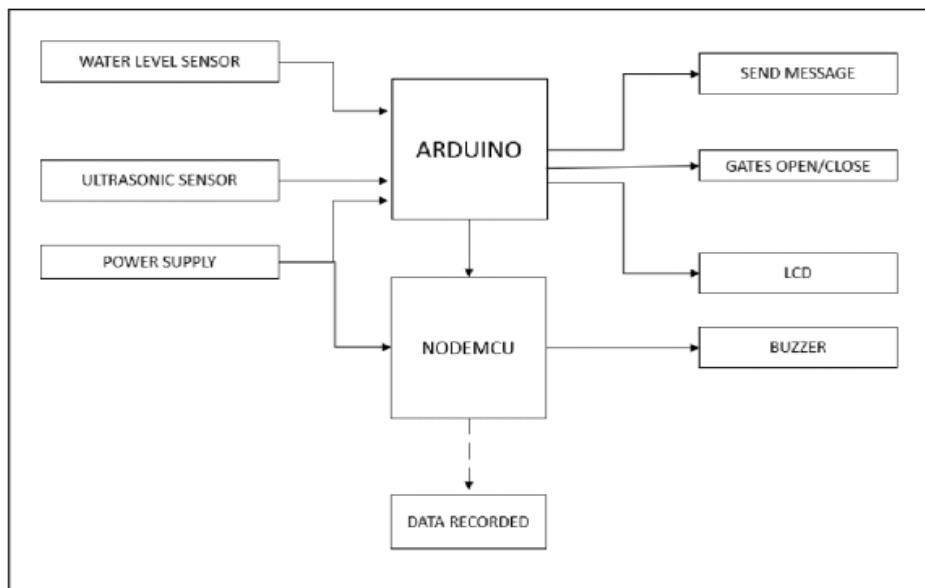


Figure 3.1 Project Architecture of Dam Gate Control System using IOT

IV. RESULT

A. 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.

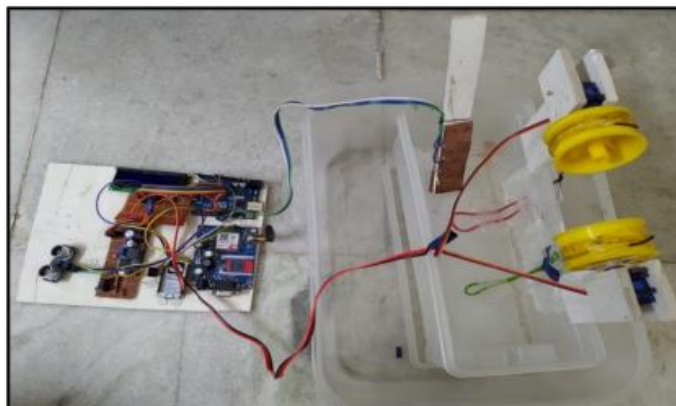


Figure 4.1(a) Model

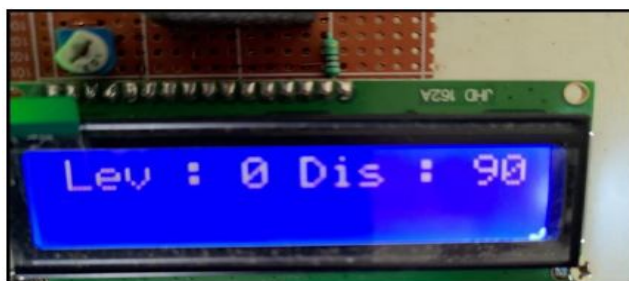


Figure 4.1(b) Level 0



Figure 4.2 Level 1



Figure 4.3 Level 2



Figure 4.4 (a) Level 3

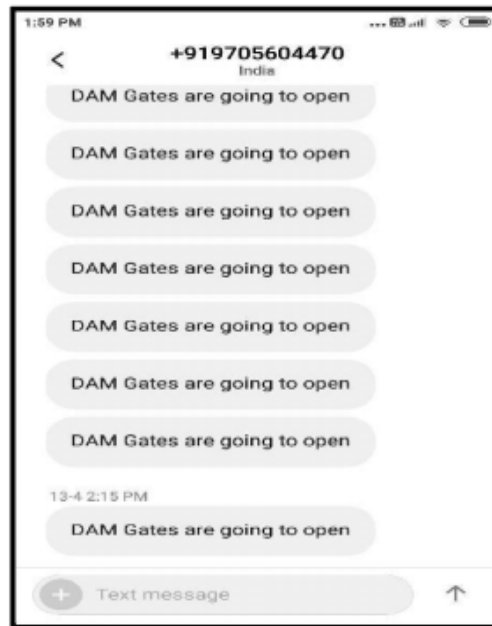


Figure 4.4 (b) Alert Message

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

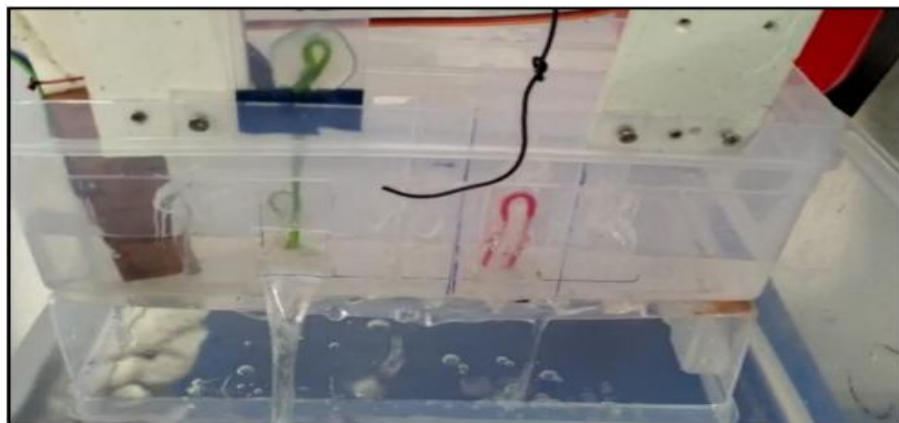


Figure 4.4 (c) Gate 1 Opened



Figure 4.5 (a) Level 4

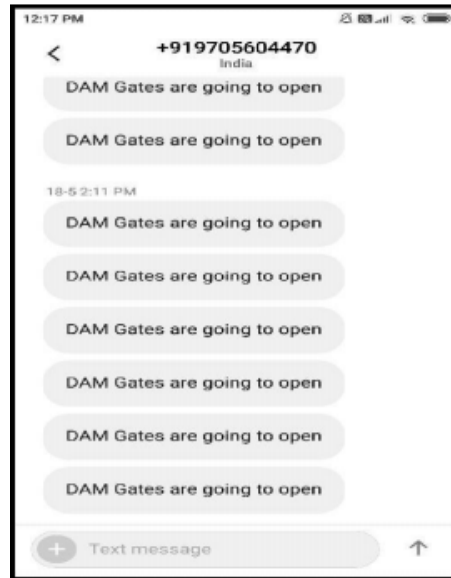


Figure 4.5 (b) Message

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

B. 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.

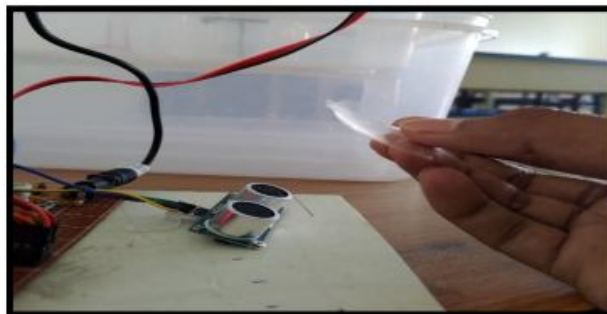


Figure 4.6(a) Crack item

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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