IOSR Journal of Engineering (IOSR JEN) **www.iosrjen.org**
ISSN (e): 2250-3021, ISSN (p): 2278-8719
PP 01-05

IOT Based Multiple Tanks water Level Monitoring and Control

Ashfaque Ahmed[1], Siddiqui Ahmed Mohsin [2], Faheem Ansari[3], Shahzad Mobeen[4]
[1,2,3,4](E & TC Department, MMANTC, Mansoora, Malegaon/ SPPU, India)

Abstract: *In this paper the improvement in the previous work is proposed by changing the programming of the 8051 microcontroller and webpage programming. The change in the software programming of 89S52 microcontroller is done and due to which the administrator can control the individual tank water level by turning on/off relays which in turn controls the solenoid valve open/close. In manual mode of administrator login four new tabs will appear on web page labeled as Relay1 On/OFF, Relay2 On/Off, Relay3 On/Off and Relay 4 On/Off. In manual mode set motor on/off button appears on webpage only when all 4 tanks get filled completely with water. The admin can control the individual tank water level without turning motor off each time. The motor will be off manually when all 4 tanks are filled 100% then pump motor can be switched off by using set motor off button.*

Keywords: *89S52 microcontroller, float sensor , Internet of Things ,Solenoid valve, Relay*

I. Introduction

In my earlier paper 4 different tanks water level was observed and controlled through Internet of Things concept. That project employed the use of float sensors in the tanks for measurement of water levels. The 8051 microcontroller is used for gathering data of all float sensors and providing it to ESP8266 Wi-Fi module. Uploading of collected data on server database is done using this Wi-Fi module and displayed on Internet webpage. The guest user is facilitated only to watch different tanks status while administrator is having full authority not only to watch but also control the water level of all tanks by turning motor on/off which pump the water from reservoir to the tanks.

This paper presents the modification in the system operation by changing the embedded C programming. Here the administrator can control the individual tank water level by turning on/off relays which in turn controls the solenoid valve open/close. So that admin can control the individual tank water level without turning motor off each time. The motor can be turned off manually when all 4 tanks relays are off by using set motor off button. In manual mode of administrator login four new tabs will appear on web page labeled as Relay1 On/OFF, Relay2 On/Off, Relay3 On/Off and Relay 4 On/Off. In manual mode set motor on/off button appears on webpage only when all 4 tanks relays gets closed by administrator.

II. Literature Review

2.1 Existing systems

This section describes in short the previous work done the water level control of tanks through various techniques. This paper [1] presents the control of 4 different water levels (25%, 50%, 75% and 100%) of 4 tanks through Internet web page. The 8051 microcontroller is used to control relays, float sensors and motor on or off. The webpage is having two login accounts namely administrator and guest. The administrator login supports two modes Automatic and Manual mode. In automatic mode the pump motor turns off automatically whenever all tanks become full. In manual mode admin can control the tanks water level by turning motor ON/Off manually. The guest user can only monitor the number of tanks water level.

In this paper [2], Narong Aphiratsakun et al., presented to control the level of water in the tank using mobile application and by employing the PID. The sensed water level information by sensor is amplified by amplifier circuit for manipulation. The PLC is used to control the motor and according to the set point entered from mobile application water is pumped into the tank.

This paper [3] presented by M. Bala Krishna et, al., shows the water level control of tank through using mobile middleware application and by controlling motor on and off. The level of water is sensed through this application using sensors and upon filling up of tank completely pump is stopped & message information is sent to registered mobile user about tank status this saves energy and cost.

Capacitance probe is technique is very useful for liquid level measurement. In this technique the level of liquid is measured using metallic electrodes immersed in metallic tank. Since coaxial cable is having both inductance and capacitance effect, it is preferred. The results obtained are linear as explained by Hiranmoy Mandal et. In paper [4].

How the liquid level is monitored and controlled in industries where liquid flooding is major issue is explained by Atojoko etc. Passive RFID tags are used for this purpose and signal variations from Alien Reader software determines liquid level [5]. The motor is turned On/Off and tank flooding or overflow avoided that was the cause of the water pollution in industries due to overflow of chemical tanks.

The paper [6] presented by Sojoudizaeh, Sadeq et. al., describes the CMOS chip based on fuzzy logic controller which controls the liquid level in a tank. Valves control the water flow which is controlled by motor. CMOS chip is designed using 0.35 um CMOS technology Chip is 0.42mm in size and power consumption is less.

2.2 Problem statement

In manual mode of administrator login to control particular tank water level user turn On/Off the motor, but this will stop water filling of other tanks.so we need change in 89S52 microcontroller programming so that in manual mode motor will be on continuously till all 4 tanks gets filled completely. To control particular tank water level the provision is provided on web page to turn off/on relays associated with each tank.

III. Proposed System

The proposed system hardware will remain same as previous only we need change in programming of 8051 microcontroller and system webpage. The basic block diagram of this project is shown in figure 2.1. In this project 4 different water levels of 4 tanks are monitored and controlled by controlling motors which pump the water in the tank from reservoir. For sensing water levels in the tank float is used as sensing element. Each float sensor senses the predefined level of water.e.g.25%.

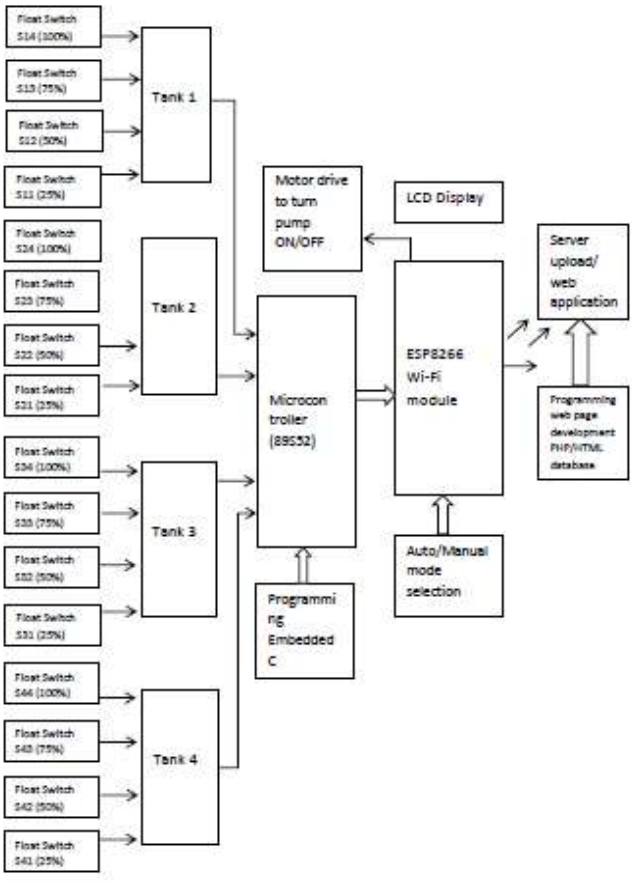

Fig 2.1: Block diagram of multilevel water level control system

Therefore for monitoring multiple level of water we require many float switches. In this project 4 different levels of water is monitored hence 4 float switches required. For monitoring of 4 different water levels of 4 tanks 4*4=16 float switches are used. The water level and motor on/off status is provided to ESP8266 Wi-Fi module which uploads data to server by in built Wi-Fi unit and stored in database that is updated at regular

time interval. 89S52 microcontroller is used for controlling 4 tanks, 16 float sensors, 4 relays through relay driver IC ULN2803, 1 relay used for motor on/off and 4 solenoid valves and LCD display.

The server web page is having unique domain and display the water level and motor on/off status of each tank. There is provision to access server web page using two login accounts namely admin and guest. Admin is provided separate login id and password and having authority to monitor as well as control the water level of tanks by turning motor On or off. He/She can set the visibility of tanks for guest user both in auto and manual mode. The guest is also provided separate login id and password and having the limited authority to monitor the water level of tanks which are made visible by admin for guest users.

While accessing web page through admin login 2 modes available namely Auto mode and Manual mode. In Auto mode, motor is ON continuously till all 4 tanks are filled completely, then motor turns off automatically. In auto mode user only monitors level of each tank. In Manual mode admin can change the water level of tanks by turning motor on/off manually which pump the water from reservoir to the tank. There is facility to set the tank which should be visible to guest. It is also having multiple buttons. After pressing Auto Mode button system switches to auto mode, 'set motor on' and 'set motor off' buttons will disappear from web page. On pressing Manual Mode button all buttons are displayed on web page and system switches to manual mode. **'**Set motor On' button is used to turn ON motor manually. 'Set motor Off' button turns OFF motor manually. 'Set visibility' button when pressed displays the list of tanks and admin can select the tanks which should be made visible to guest.

3.1 Modified Flow chart of system (Manual Mode)

The modified system flowchart for manual mode of administrator login is as shown in figure 3.1

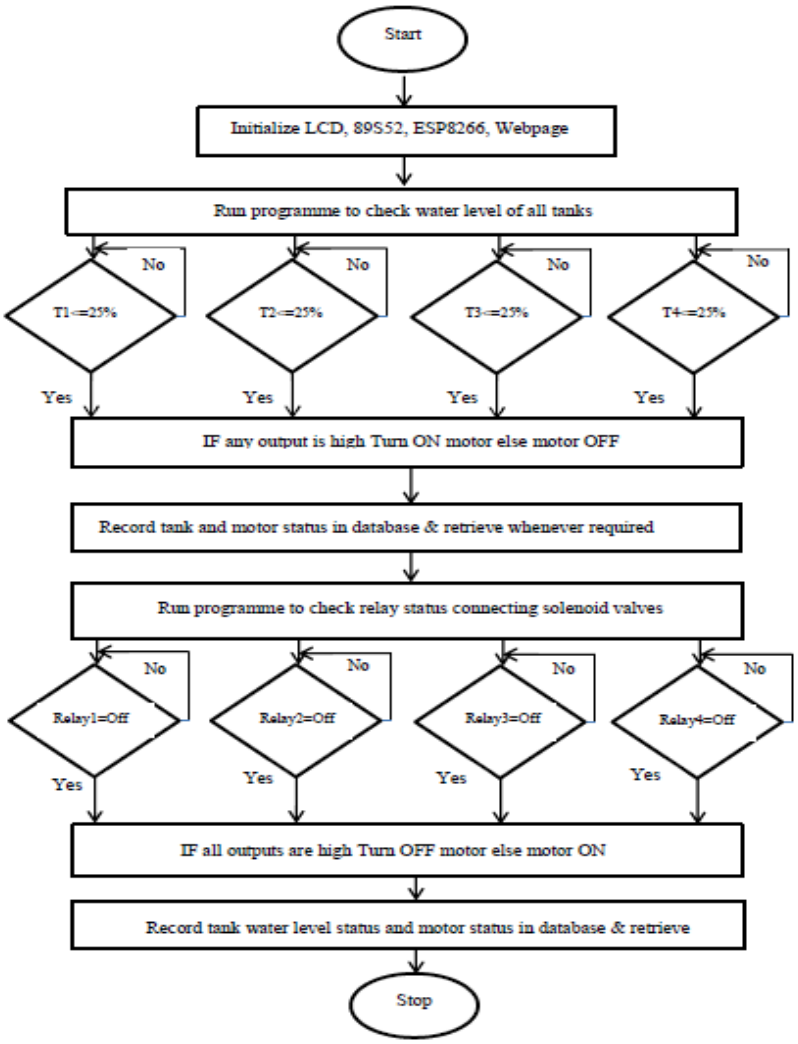

Fig 3.1: System flowchart of manual mode

3.2 Algorithmic Steps

The algorithm for the flowchart shown in fig 1.1 is described below.

1. Start
2. System initialization
3. Run programme for sensing water level of all tanks.
4. If T1<=25%
5. OR
6. T2<= 25%
7. OR
8. T3<= 25%
9. OR
10. T4<= 25%,High
11. Start motor
12. Else
13. Motor Off
14. Record Tank water level and motor status in database & retrieve
15. Save recorded data in server database and display on webpage, LCD
16. Run programme to check relay status connecting solenoid valves.
17. If Relay 1=OFF
18. AND
19. Relay 2=OFF
20. AND
21. Relay 3=OFF
22. AND
23. Relay 4=OFF, High
24. Turn OFF motor
25. Else
26. Turn ON motor
27. Record Tank water level and motor status in database & retrieve
28. Save recorded data in server database and display on webpage, LCD
29. Stop

3.3System Hardware

The hardware of the system is shown in figure.

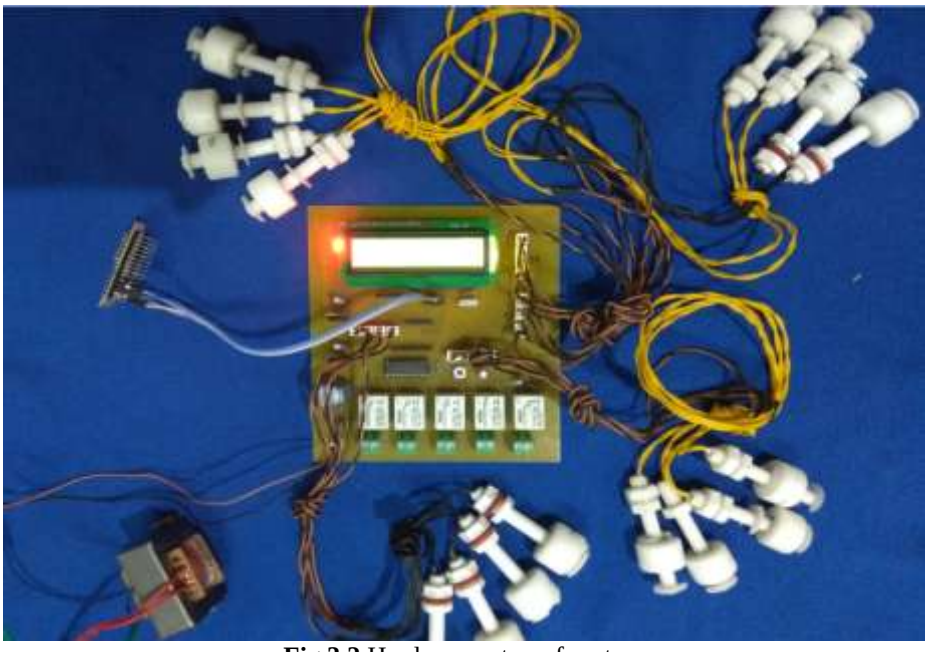

Fig 3.2 Hardware setup of system

3.4 Modified Webpage display of system (Manual Mode)

Figure 3.3 shows the modified web page layout for Manual mode. In webpage the Set Motor ON and Set Motor OFF buttons will appear only when all 4 relays will be off.

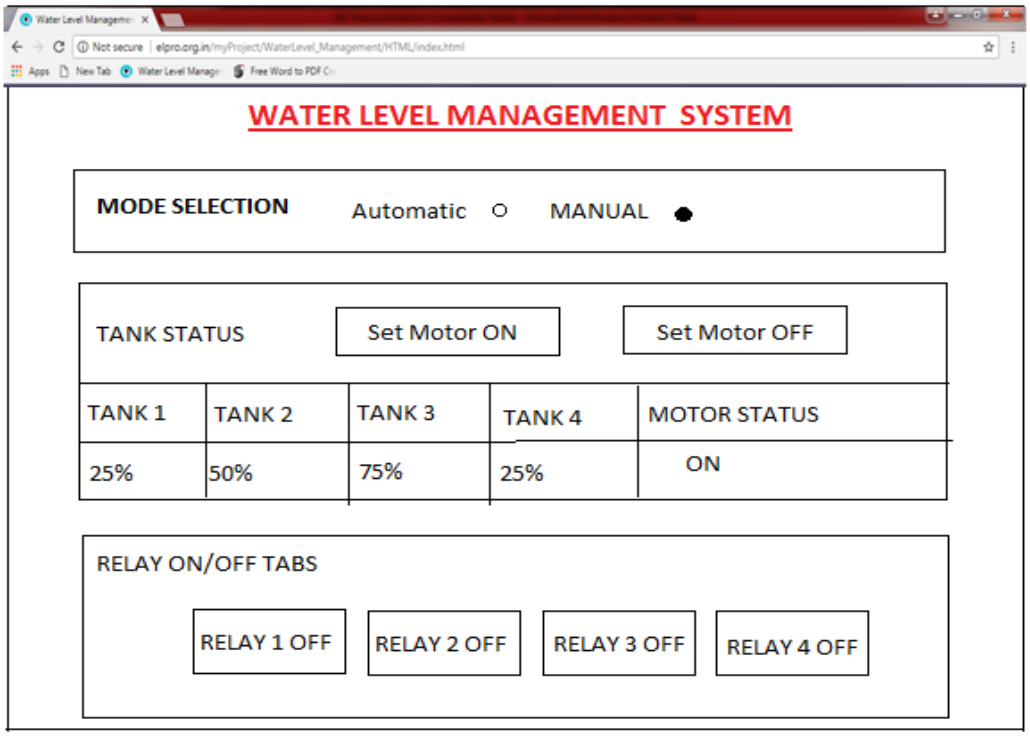

Fig 3.3: Modified Webpage display

IV. Conclusion

Thus by implementing above idea the problem of controlling of particular tank water level in manual mode of administrator login will be resolved. The administrator now not only monitor but also having full provision to control individual tank water level from the tanks connected in IoT based Multiple Tanks Water Level Control System.

References

[1]. Ashfaque Ahmed; Vijay D. Chaudhari et., Multilevel Water Level Control and Monitoring of Multiple Tanks, International Journal of Advances in Scientific Research and Engineering (IJASRE),Volume 4,Issue 1,Jan. 2018.

[2]. Narong Aphiratsakun; Warranipit Suvittayakul; KanyanatSaingam, AU water level process control system , Electrical Engineering/Electronics, Computer Telecommunications and Information Technology (ECTI-CON), 12th International Conference , 2015.

[3]. M. Bala Krishna; Deepanshu Goyal,, Mobile middleware application and services for real-time water pump system , Signal Processing and Integrated Networks (SPIN) 2nd International Conference, 2015.

[4]. Hiranmoy Mandal, Satish Chandra Bera, An improved technique of measurement of liquid level in a storage tank , Automation, Control, Energy and Systems (ACES), First International Conference , Feb. 2014.

[5]. A. Atojoko; M. Bin-Melha; E. Elkazmi; M. Usman; R. A. Abd-Alhameed; C. H. See, Liquid level monitoring using passive RFID tags, ,Design and Test Symposium (IDT) 8th International, Dec. 2013.

[6]. Sojoudizaeh, Sadeq, Aminifar; M. A. Daneshwar; GhaderYosefi, Design of a new intelligent CMOS controller chip for control water level in tanks ,Education Technology and Computer (ICETC) 2nd International Conference, June 2010.