ISSN: 2454-9940

INTERNATIONAL JOURNAL OF APPLIED SCIENCE ENGINEERING AND MANAGEMENT

E-Mail :
editor.ijasem@gmail.com
editor@ijasem.org

www.ijasem.org

INTERNATIONAL JOURNAL OF APPLIED SCIENCE ENGINEERING AND MANAGEMENT

ISSN2454-9940

www.ijasem.org

Vol 18, Issue 1, 2024

IOT BASED LQUID CYLINDER LEVEL AND LEAKAGE DETECTION USING ARDUINO UNO

Ms. D.Sandya Rani, Assistant Professor, Department Of ECE, SICET, Hyderabad
NR.Rohini, M.Praneetha, S.Nehitha, M.sravya
Department Of ECE, SICET, Hyderabad

ABSTRACT
Water is one of the needs of people. They use water for many daily activities. Water is pumped fro m an underground reservoir to collect at the top of the tank. Using an automatic generator to turn th e pump on and off may cause leaks or waste electricity. The proposed system uses a microcontrolle r to show the user the water level in the water tank and send notifications via mobile phone. Measur e water quality (e.g. pH) and notify the user via text message if it is lower or higher than normal. W ater detection is done using water flow sensors that detect water flow. In case of a leak, users will b e informed via mobile phone. It also helps save water and electricity.

Keywords: wastewater, ultrasonic sensor, mobile phone and SMS, water flow sensor, pH sensor.

I. Introduction

Water is the most important thing in human life. People need water for almost daily activities such as cleaning, washing, bathing, irrigation and work. However, as the world population increases, cle an water decreases.Water is a valuable product that is needed everywhere, but since it is used so mu ch, it is necessary to use time carefully to avoid minor problems in the future. Our world and our so cieties face the overuse of water for domestic or commercial purposes, and this is a major problem affecting the sustainability of our environment. Water scarcity or scarcity can be caused by current climate change, such as climate change (rain or floods), increased pollution, and increased human d emand for water. Add lots of water and use it. Since water is one of the scarce resources, it is impor tant to use it correctly and keep our use in different areas under control.If we continue to waste wat er, it will become a very dangerous problem in the future. We must start saving water ourselves. Th ere are many ways to purify water. Imagine water flowing out when the tank is full. So our way is t o reduce water wastage in this case. In addition, water leakage is another problem that when there is a leak somewhere, we cannot solve it in the first place, but when it becomes a big problem, it cause s a lot of waste of water. Therefore, it is best to take immediate action if a leak occurs.This article b uilds a wireless multisensor network to measure water in a water tank and detect leaks. All data fro m the sensors are processed, analyzed and sent wirelessly to reporting nodes. The remainder of this article is organized as follows. Chapter 2 examines the activities involved in the investigation. Secti on III describes the production process. Section 4 covers the experimental setup, Section 5 includes future sources, Section 6 contains results, and data can be found in Section 7.

I. relatedworks

1) Automatic water tank filling system controlled by sensor using Arduino as home appl ication.The system uses ultrasonic sensors and automatic switching module water flow s ensors and Arduino microcontroller design and water pump switching. Material used to build the model of automatic water tank filling machine.
Materials (a) water pump, (b) SRD05VDCSLC relay, (c) plastic housing, (d) 10 kΩ pote

ntiometer, (e) printed circuit board (PCB), (f)) male-female cable, (g) male-male cable, (h) Arduino Uno microcontroller, (i) LCD 16×2 display and (j) ultrasonic sensor HCSR04 module Group.It can help people identify drinking water. This model can be used to solve the problems of water pump

II.

III. Fig. Requirements IRMA Architecture

2) Innovative shunt measurement for residential micro leakage detection.

A new microleak detection system using ultrasonic sensors in a new configuration is proposed for home applications. The Micro Leak Detection System is highly functional and practical: USBpowered voltmeter, USBpowered flow meter and USBpowered switch. These systems can prevent water leaks from all over the world.This article briefly reviews current water flow systems and suggests the need for advanced water flow sensing equipment. In addition, remote testing investigated total water flow, which was found to be 3ml/m² per year, equivalent to twothirds of the UK's average daily water use. Further research will investigate remote monitoring of water use and water leakage in agriculture and industry.

INTERNATIONAL JOURNAL OF APPLIED SCIENCE ENGINEERING AND MANAGEMENT

ISSN2454-9940

www.ijasem.org

Vol 18, Issue 1, 2024

a)Measurement principle.(b) Probe board.(c) Flat surface PTFE housing. (d) Inline Tee fitting.

3) A design of water tanks monitoring based on mobile devices.

It is interesting that in this article a system that monitors the water level of the water tank is used. T he name of the system is: Water Tank Monitoring Interface (IRMA) and has the following structur:

1) Electronic equipment, including an ultrasonic sensor (USA) mounted on the water tank, is conne cted for one. Arduino microcontroller board (AMB), connected
2) The application is installed on the computer server (SM) to take and control the measurement of the water level of the water tank to make recommendations
3) mobile interface . < br > The main purpose of IRMA is to manage water tanks, collection and tra cking orders.

When the user receives a notification (via SMS or PNS), it usually takes a few minutes for the user to respond. If the user cannot respond, the IRMA system has the ability to work on behalf of the use r and cut off the water. This task is possible because electric actuators can open and close valves to control the flow of water, and if a leak is detected, the system can preserve the wastewater and prev ent it from being lost further.

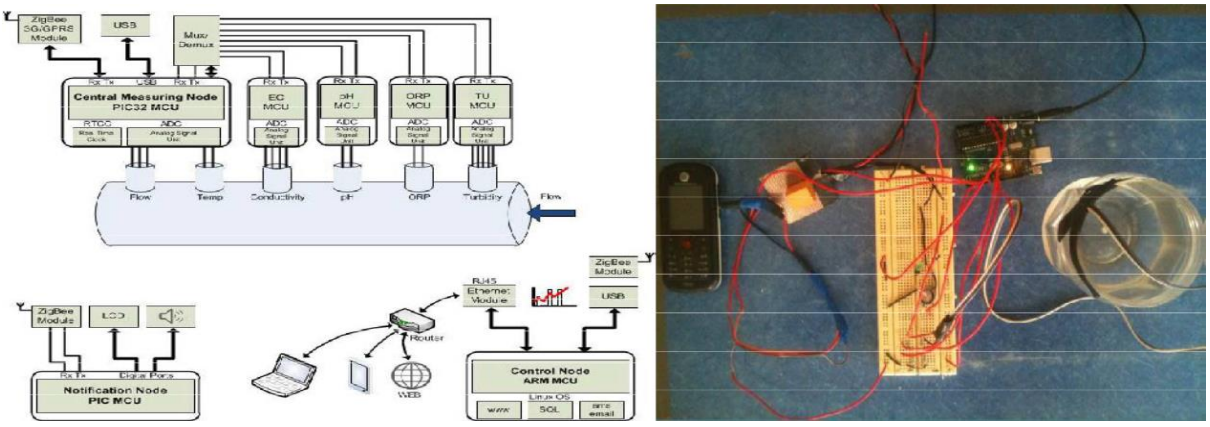


Fig. 1. System architecture working system

4) A Low-Cost Sensor Network for Real-Time Monitoring and Contamination Detection in DrinkingWaterDistributionSystems.The system architecture consists of the following three su bsystems: The central measurement unit (PIC32 MCUbased board), which acts as the sensor node, collects water quality measurements from sensors, uses algorithms to measure water qu ality and send data to other nodes. The control node (based on the ARM/Linux platform) stor es the measurement data from the central measurement of the central database and finally the gateways enable the sending of visual information (graphs) and email/SMS notifications. The micro notification node (PIC MCU based board) receives messages from the central measure ment via interconnected ZigBee RF transceivers and various interface peripherals (LED, LCD , buzzer).Two event detection algorithms were developed to combine online multisensor meas urement to measure water pollution when abnormality is detected. The purpose of event analy sis is to trigger the alarm when there is a rapid and significant change in the parameters of the water quality indicator. The first detection algorithm is represented by the vector distance alg orithm (VDA), and the second event detection algorithm is represented by the polygon area al gorithm (PAA).PIC32 MCU based board for collecting water quality measurements from sen sors. The production process has low cost and low energy consumption

INTERNATIONAL JOURNAL OF APPLIED SCIENCE ENGINEERING AND MANAGEMENT

ISSN2454-9940

www.ijasem.org

Vol 18, Issue 1, 2024

5) Automatic Water Level Controller with Short Messaging Service (SMS) Notification.The system is battery operated and has four synchronized subcircuits; sensor circuit, control circuit, SMS circuit and relay drive circuit. The sensor detects the water level in the tank a nd continuously feeds it into the control system. The load event is checked when the system enco unters a null event (A0). When there is no reduction, the relay coil is energized and the pump ope rates.SMS messages will only be sent when the controller encounters loading issues. When the ta nk is full, the pump stops (A1).Arduino Uno, an open source electronic device, was used as the c ontroller of the systemThe system produces no noise and has good flexibility. Automatic water le vel control systems can be used in homes, offices, swimming pools and even businesses. Since w ater is used as the medium, extra care is required.

6) Design and Implementation of Low Power Wireless Sensor System for Water Quality Monitoring.The proposed wireless sensor system consists of TB8830 (DC to DC converter) MPC 82G516A (8bit microcontroller) and is used to control the sensor device to receive water quality, the input voltage of TB830 is transparent. Input voltage of the ADC. It is also used to control the nRF24L01 to receive and transmit wireless signals. PIC12F629 (8bit microcontroller) Here PIC1 2F629 is programmed as a timer.When both MPC82G516A and nRF24L01 are in sleep mode, PI C12F629 starts counting for 5 minutes. After the calculation is completed, the PIC12F629 will en able the MPC82G516A's external interrupt pin, wake up the MPC82G516A, and return the nRF2 4L01 and nRF24L01 (2.4 GHz wireless transceiver) to the original mode.The input frequency of TB8830 is 0.9VGHz 3.0V and the output voltage is fixed at 3.0V. Replicate nodes are not connec ted to any sensor devices and only receive and transmit.

III. PROPOSED METHODOLOGY

Three modules were used in this project. The first module uses an ultrasonic sensor to detect the wa ter level in the water tank. The second module uses a flow meter to detect the flow of water. The thi rd module uses a pH sensor to measure the pH of the water.Here the system uses Arduino to interac t with the sensors used in the project. The system also includes a GSM module to send messages w hen detecting and pH. GSM can also be used for voice calls with metered levels.

A) Water level detection

The water meter must have a water tank to store water, an ultrasonic meter to control the water leve l, and a GSM module that can make voice calls to the user. Arduino is used to interact with the ultra sonic sensor and GSM module to produce results.In this system, an ultrasonic sensor is used to cons tantly control the water level. The ultrasonic sensor has four pins connected to the Arduino. Trigger pin of UV sensor is connected to Pin 7 of Arduino, Echo pin of UV sensor is connected to Pin 8 of Arduino, ground pin and VCC pin of UV sensor are connected to ground and VCC. of Arduino resp ectively. needles.

Fig. 4 calling on level detection

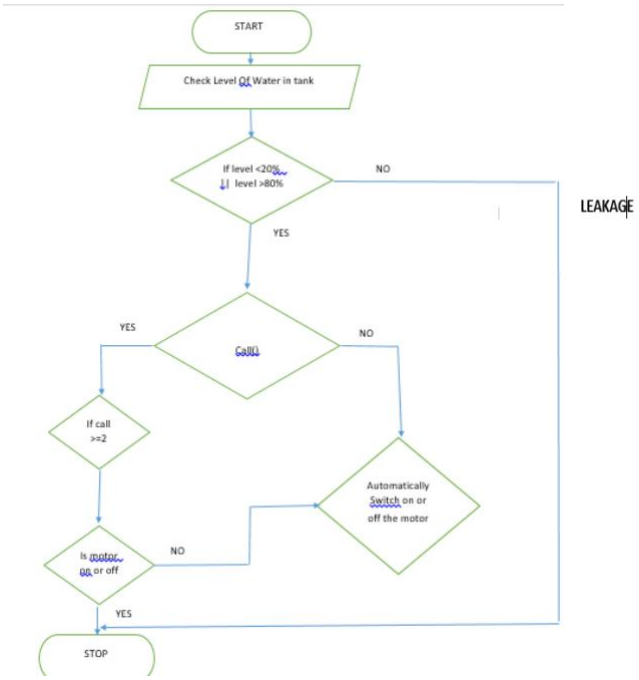
INTERNATIONAL JOURNAL OF APPLIED SCIENCE ENGINEERING AND MANAGEMENT

ISSN2454-9940

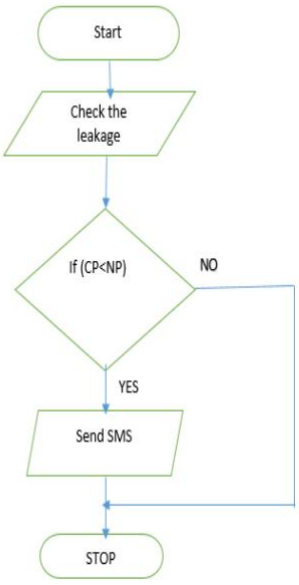
www.ijasem.org

Vol 18, Issue 1, 2024

f the water level is 80% of the total length of the tank, the tank is empty and when the water gets lo w, the system will remind the user to turn on the engine. When the water reaches 20% of the total le ngth of the tank, the tank is full and the system warns the user to turn off the engine as the water rea ches the maximum level.Provide alert notifications to users by making a voice call to a specific use r. GSM will call the user when the water level reaches 20% or 80%. Therefore, the user can turn the engine on and off depending on the situation.



Flowchart 1: water level detection



Flowchart 2: water leakage detection

2) Water leakage detection

The water leak detection system requires a water flow meter to measure water leakage in the pipeli ne, an Arduino used to connect to the water flow meter, and a GSM module used to send messages. Here the system calculates the flow of water through the pipe using a flow meter. Flow meters are b uilt in circulation. These circles start rotating when water passes through the water meter. We can c alculate the current by counting the number of rotations of the circle in one minute. The calibration constant of the flow meter is 7.5/4.5.
When calculating the flow rate of water, use the following formula:
Q = n/c,
Where, Q = liquid flow rate,
c = calibration coefficient 7.5/4.5
After detecting the flow, the system compares the current flow with the normal flow. If the current flow is less than the normal flow, the system detects a leak in the pipeline.When the system detects a pipeline leak, it notifies the user by sending a message that there is a leak in the pipeline. water ta nThe message is sent by the GSM module.

3) water quality detection

The water quality test device must have a pH sensor probe to test the pH value of water. The pH se nsor measures the value and converts it into the appropriate problem. We use Arduino and GSM m odules to send messages to the user.We can connect PH's A0 pin to Arduino's pin 3 and pH's GND pin to Arduino's GND pin.

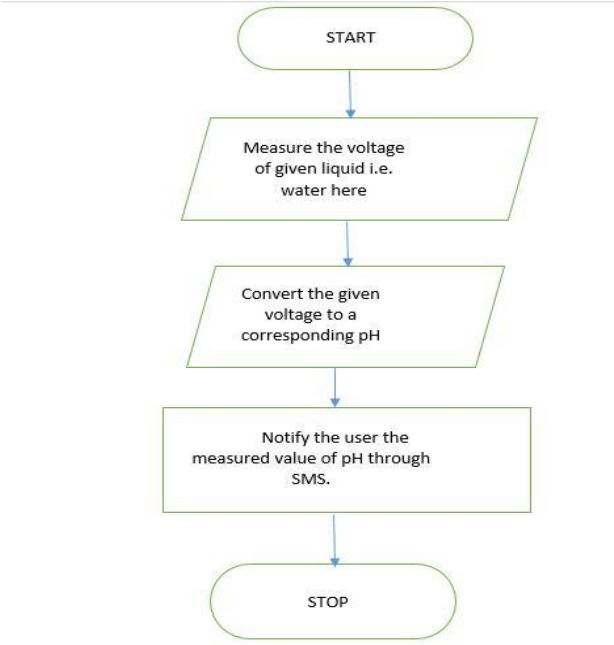


Fig. Flow chart of quality detection
pH represents the concentration of hydrogen [H] + ions present in water. pH will measure how acid ic/alkaline the water is. PH range is 0-
14. A pH value less than 7 indicates that the water is acidic, a HH value above 7 indicates that the water is alkaline, and a value above 7 indicates that the water is neutral.

The pH probe will measure the difference between two electrodes, a reference electrode (silver / sil ver chloride) and a glass electrode sensitive to hydrogen ions. We need to use electricity to make th e light and we can use the sensor with a microcontroller like Arduino.

The probe will oscillate between positive and negative. 0 represents a pH value of 7.0. For use with Arduino this circuit will add an offset value to the value measured by the probe so that the ADC only needs to samples positive voltage values.

IV.EXPERIMENTAL RESULTS

The three modules described above use the following requirements, some of which are most of the three modules: 1) Arduino Uno r3 for the interface, 2) GSM module. Other required parts are: 1) Ultrasonic sensor, 2) Water flow sensor, 3) pH sensor probe, 4) Male to male connecting cable, 5) Male to female connecting cable, 6) Adapter, 7) BNC connector, 8) DC engine.

The configuration of the above three modules is as follows:

Fig. Figure 1 shows a liquid level measuring device that uses an ultrasonic sensor to measure the liquid level and notify the user by calling the liquid level.

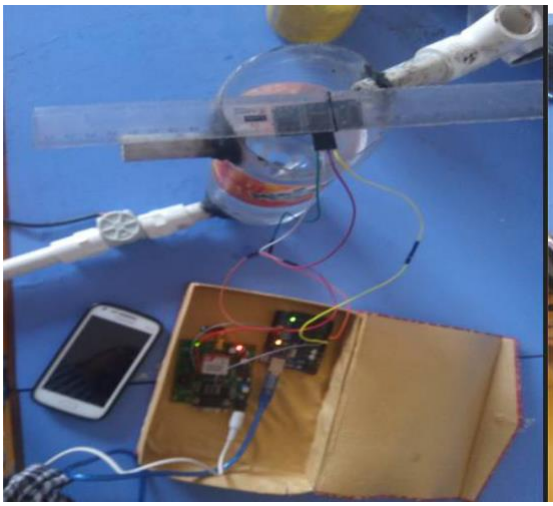
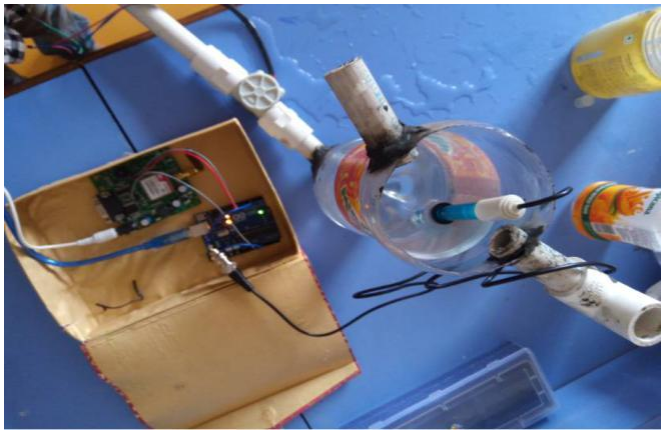


Fig.1 level Detection

Fig 2. Leakage Detection

Figure 2 shows the detection device that detects leaks from the water source and sends a warning message to the user via the user's mobile phone.

Figure 2 3 includes a good setup (e.g. pH detection) that detects the pH value of a particular liquid using a pH sensor probe and notifies the user when it is less or more than specified.



INTERNATIONAL JOURNAL OF APPLIED SCIENCE ENGINEERING AND MANAGEMENT

ISSN2454-9940

www.ijasem.org

Vol 18, Issue 1, 2024

Fig.3 Quality detection

Fig.5 SMS on Leakage detection

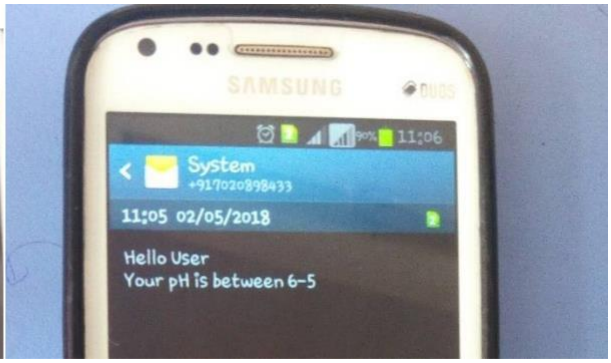


Fig. 6 SMS on Ph detection

V. FUTURE SCOPE

The application process may be better in the future because here we use mobile devices to inform users and mobile applications may also be used in the future. Also, in our system, we only notify one or two users, but in the future, with the help of satellites, we can prioritize many users and notify those users only in the designated area and close to our system (still in the detection environment). Test pH only, but in the future test for chlorine, salinity, turbidity, etc. We can also test many quality parameters such as:

VI. conclusions

The system will detect the water in the water tank and inform the user as a mobile phone call, allowing the user to turn the pump on and off. This will free users. Additionally, the system will instantly notify users when there is a leak, which will help solve the problem. Water analysis will help ensure the health and safety of users.

This can be noisy as many systems use LED or buzzer systems for notifications. Also, the ringtone is useless when no one is home. This problem is solved in this system with the help of mobile devices. It easily helps in reducing water wastage and also helps in reducing energy consumption. and monitor users' health. The proposed process can be used in many places such as food factories, chemical plants, various industries with many liquid containers

References

[1] T. Lambrou, C. Anastasiou, C. Panayiotou and M. Polycarpou, “Low-cost sensor network for real-time monitoring and detection of pollution in drinking water,” IEEE Sensors Magazine, vol. 14. Hayır. Sayfa 8. 2765 – 2772, 2014.

[2] Los Gamma-Moreno, A. Corralejo, A. Ramirez-Molina, J. A. Torres- Rangel, C. Martinez-Hernandez, M.A. Juarez, “Design of mobile based water tank monitoring system”, IEEE 2016.

[3] EkaCahyaPrimaa,*, Siti Sarah Munifahab, Robby Salamb, Muhamad HaidzarAzizb , Agustin Tia Suryanic, “Tsis siv neeg lub tank ntim dej siv qhov kev tswj

[4] SanamPudasaini*, Anuj Pathak*, SukirtiDhakal**, Milan Paudel*, Level Controller (SMS) Notification with Short Message Service for “Automatic Water Supply”, IJSRP, Volume 4, Issue 9, Xyoo The year is 2014.