Waste water Quality Monitoring and Overflow Detection Using IOT

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ABSTRACT

Our system design is to improve the importance and the necessity to increase the efficiency of cleaning process of the residual waters from waste industry. With rapid economic development and urban growth, water shortage and resource pollution is now a serious problem for urban water supply in many Chinese cities. At same time, with enlargement of urban areas and increase of sealing areas (reduction of green spaces, new road and building construction etc.), runoffs of rainwater increase greatly, which lead to the increase of frequency and intensity of urban floods. The majority of water used for indoor domestic purposes is normally discharged after use as waste water. This wastewater is collected by sewer system and treated at a centralized wastewater treatment plant, then discharged into the waters. Also little polluted rainwater is collected and discharged from residential areas into the waters as early and much as possible. This water management method in urban areas has led to a range of water crises, including floods and scarcity. Therefore, new concepts to ease this situation should be developed. As alternative water management method, domestic wastewater and rainwater can be collected, treated and reused on site, thereby promoting more water efficient use. On-site water management at this level offers the opportunity to provide benefits for the consumer and the environment. The principal of innovative water management is to minimize the consumption of drinking water and the production of storm water and wastewater cost-effectively. In this study innovative water management concept will be introduced, which could alleviate the situation of water problems caused by conventional centralized water system as well as insufficient wastewater treatment system in India..

KEYWORDS: Water quality monitoring and controlling, IoT, Physiochemical sensor, Cloud, location through GPS, Pipelines.

I. INTRODUCTION

Clean drinking water is the most value resource for humans[5]. Any imbalance in the water quality would seriously affect the health condition of the humans. Now a day's drinking water utilities are facing various challenges in real time due to limited water resources, global warming, growing population and pollution .Hence there is need of better methodologies for real time water quality monitoring.

As the recent survey of WHO estimated that in India 77 million people face problems due to unsafe drinking water and 21% of the diseases are related to impure water[1]. WHO also estimated that 1600 people die every day in India due to diarrhoea.

Conventional method of water quality monitoring involves the manual collection of the water at different areas and this water is tested in laboratory. This approach takes long time and high cost. Although the current methodology have so many drawbacks : viz a) Laborious b)absence of water quality information in real time c) poor spatial coverage d) lack of controlling unit to control the flow of the water in pipeline for safe supply of the drinking water[2]. The online water monitoring technologies have made a significant progress for source water surveillance and water plant operation. The use of their technologies having high cost associated with installation and calibration of a large distributed array of monitoring sensors. The algorithm proposed on the new technology must be suitable for particular area and for large system is not suitable. By concentrating on the above issues, this paper designed and developed low cost system for real time water quality monitoring and controlling using IoT[6]. In our design, physical and chemical parameters of the water are measured by physiochemical sensors. The sensed values are processed by AURDINO IDE. **Arduino** consists of both a physical programmable circuit board (often referred to as a microcontroller) and a piece of software, or **IDE** (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board

A. Objective:

• Further we can extend the quality detection by finding other parameters like salinity, turbidity, and dissolved ions[3].

• Along with the continuous monitoring we can also including messaging technology which used to send messages to the corresponding authorities[3].

• Other than the quality monitoring we will perform some tasks for without wastage of water i.e..

motor on and off while tank is full it will off and it is empty it will on and if pipelines has been blocked alert message and location will send.

B. Scope:

• Finding the quality of water as water quality is one of the main factors to control health and the state of diseases in people and aquatic animals and many agricultural lands. To improve the life of water bodies[3].

• The target about this paper is on discover those water personal satisfaction parameters like ph. substance Also disintegrated oxygen done water[4].

II LITERATURE SURVEY

TITLE: A Low Cost System for Real Time Water Quality Monitoring and controlling using IOT

***AUTHOR*:** K. Gopavanitha ; S. Nagaraju

Water is a prerequisite element required for humans and therefore there must be mechanisms put in place to vigorously test the quality of drinking water in real time. This paper proposes a low cost system for real time water quality monitoring and controlling using IoT. The system consist of physiochemical sensors which can measures the physical and chemical parameters of the water such as Temperature, Turbidity, Conductivity, pH and Flow.

TITLE: IoT based Automation of Real Time In-Pipe Contamination Detection System in Drinking Water

AUTHOR: S. Kavi Priya, G. Shenbagalakshmi, T. Revathi

With the recent advancement in the communication technologies, the real time in-pipe water quality monitoring system is gaining more importance. This work describes the recent development in the field of in-pipe real time contamination detection system. In addition, a contamination detection system is developed based on the emerging Internet of Things technology. The system samples the water at regular time intervals supplied through pipelines to the consumers/public.

***TITLE*:** Water Quality Monitoring System Using IOT

AUTHOR: Kamarul Hafiz Kamaludin ; Widad Ismail

Water pollution has been an increasing problem over the last few years. Water personal satisfaction may be a standout amongst those primary variables with control wellbeing and the state for sicknesses "around kin what's more animals. Lakes and waterways would those fundamental wellsprings about drinking water, which impressively rely on upon water personal satisfaction (refers of the physical, chemical, What's more living aspects about water). The objective of this water quality monitoring system using internet of things is to find the quality of the water i.e. how the pH content varies and sending message to the corresponding authorities.

TITLE: Wastewater treatment plant SCADA application

AUTHOR: Bogdan Humoreanu, Ioan Nascu,

The efficient administration and treatment of municipal and industrial wastewater is crucial to sustaining community health and a clean, safe environment. Applying standard SCADA solutions has a positive impact on the operations, maintenance, process development and savings for the wastewater treatment plants (WWTP).

TITLE: Fault detection in a wastewater treatment plant

***AUTHOR*:** Imen Baklouti ; Majdi Mansouri ; Hazem Nounou ; Mohamed Ben Slima ; Ahmed Ben Hamida

In this paper, Unscented Kalman filter (UKF) based Exponentially Weighted Moving Average (EWMA) is proposed for fault detection in a Wastewater Treatment Plant (WWTP). In the developed UKF-based EWMA, the UKF technique is used to compute the residual between the true and the estimated variable and the EWMA control chart is applied to detect the faults.

TITLE: Energy audit model for a waste water treatment plant

AUTHOR: F.M.Sanchez ; A.Filgueira ; M.A.Seijo ; M.E.Munoz ; E. Munoz

All sectors of industry have to save energy so that they are more competitive and can follow recommendations about the environment. For this reason, a study has been carried out on a model for audits. A practical tool is offered to companies and state entities, enabling them to work with greater accuracy and reliability when meeting requirements to monitor their energy consumption and optimise usage.

CHARACTERISTICS OF AN EMBEDDED SYSTEM

Single-functioned – An embedded system usually performs a specialized operation and does the same repeatedly. For example: A pager always functions as a pager.

Tightly constrained – All computing systems have constraints on design metrics, but those on an embedded system can be especially tight. Design metrics is a measure of an implementation's features such as its cost, size, power, and performance.

Reactive and Real time – Many embedded systems must continually react to changes in the system's environment and must compute certain results in real time without any delay

Microprocessors based – It must be microprocessor or microcontroller based.

Memory – It must have a memory, as its software usually embeds in ROM. It does not need any secondary memories in the computer.

Connected – It must have connected peripherals to connect input and output devices.

Microprocessors based – It must be microprocessor or microcontroller based.

Memory – It must have a memory, as its software usually embeds in ROM. It does not need any secondary memories in the computer.

Connected – It must have connected peripherals to connect input and output devices.

HW-SW systems – Software is used for more features and flexibility. Hardware is used for performance and security.

III. EXISTED SYSTEM

In this existing system, no automation systems are there to detect flow and the odour. The main advantage of this system is highly accurate and it can covers wide area. The drawback in this model is its cost. Second, the relative progressions computed starting with adaptively changed lingering chlorine estimations were quantitatively identified with contaminant chlorine reactivity over drinking water. The drawback in this model is it should be highly maintained, so the cost increases. No automated system is provided.

Conventional systems depend on gathering water Also investigate in the water would not best unreasonable as well as way this absence ability free of charge constant information catching. This framework comprises for Arduino micro controller, water caliber sensors what's more a remote organize association module. It detects water temperature, broken down oxygen, ph. Furthermore electrical conductivity progressively. It disseminates the majority of the data over

graphical and even formats to pertinent stakeholders through a web-based portal What's more cell phone platforms. The primary focal point may be sensing sullying during different junctions. The system is more reliable, autonomous and flexible. The disadvantage is too expensive and low capture rate is found.

IV. PROPOSED SYSTEM

An outline of the grouping from claiming developments alternately movements of people or things included previously, an intricate framework alternately action. A graphical representational of a PC program for connection to its arrangement for works. Sensor based intelligent system is implemented here to detect the flow, pressure and odour. Purity of the water can be measure. The main advantages of this water quality monitoring sensors are given here.

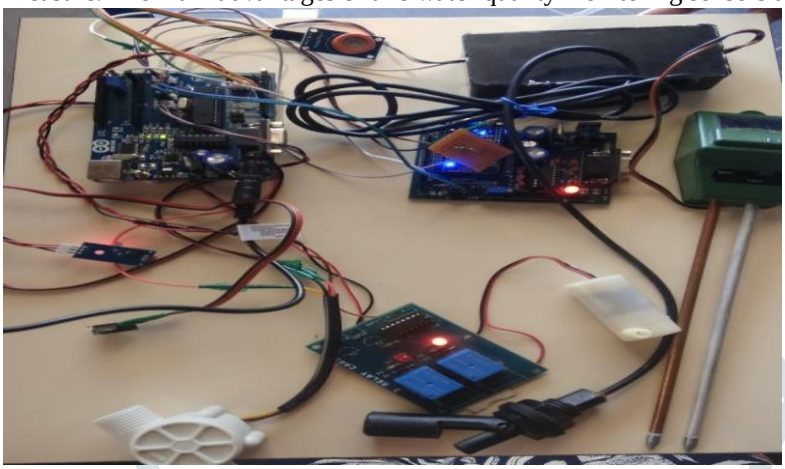

Fig 1: proposed system

Outputs can be appeared as shown below:

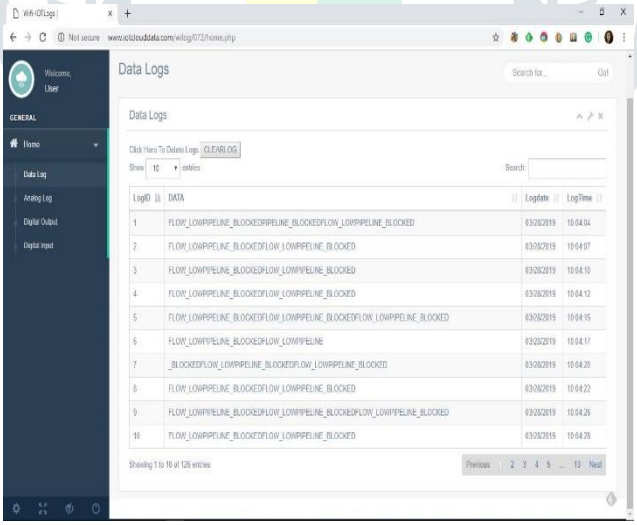

Fig 2:Data Logs during overflow of water

It can be operated automatically. More operations can be performed using Automation. Has intelligence to avoid flooding of field or area.

DESCRIPTION :

After completing the project practically we had achieved three functionalities

1.If any pipeline has been blocked photo(LDR) sensor will capture the light in that pipeline. Temperature sensor will sense the temperature of the water, flow sensor will perform that the water is flowing correctly and pressure sensor will sense that water is flowing perfectly without any problem and if any problem occurs we can get message in cloud.

2. It will shows that the water having any dust particles or any gas detection (gases like methane), we are using amplifier to convert milli volts to volts when we are measuring the PH meter.

3. Here we are detecting the water level in tanks and bore wells etc for that we are using water level sensor and we are using pump motor to taking the water into tanks.

This three functionality alerts and messages can be stored in cloud.

METHODOLOGY:

Here we are using Arduino board in that microcontroller is in built in it. We can connect the sensors which are required to the ports. The sensors are water level sensor, gas sensor, PH sensor, photo sensor, pressure sensor, flow sensor temperature sensor etc are used.

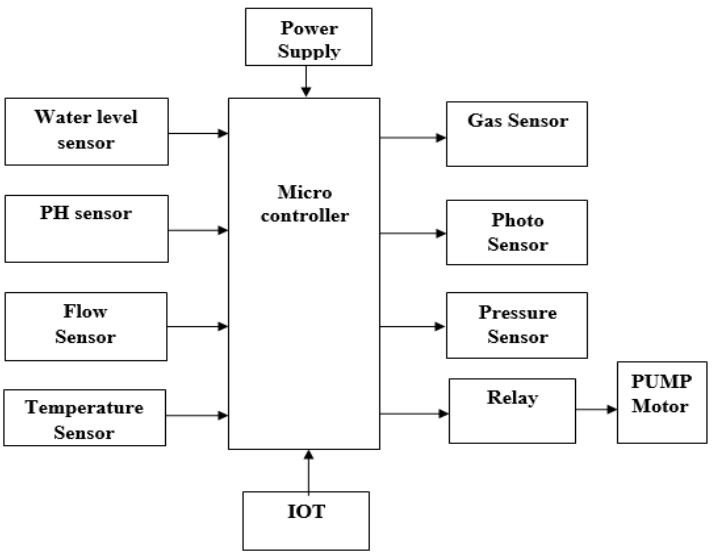

Fig 3: Block Diagram of Arduino

WORKING PRINCIPLE:

These projects mainly the system is microcontroller for designed with multiple levels and sensors. We are interfacing a multiple sensor such as water level, pressure sensor, temperature sensor, gas sensor, etc…Water level sensor is used here to indicate the level of water in an area and a pressure sensor connected to measure the amount of pressure when the flow got blocked. To detect whether the water flow is normal in pipelines in parallel a photo sensor will be there to detect the edges of the pipelines are opened or blocked with the help of the reflection of light in water. After stored in a container to complete stagnant process PH meter is used here to measure the amount of purity. If it is abnormal the water will tends to boil with an amount of some degree Celsius where the temperature sensor detects at the same time with the help of MQ5 sensor module will measure the amount of odour in water. Finally, Relay will get ON so that the water will be pumped out by using the pump motor.

Modules and its description:

Water level sensor: it is used to detect the level of substances that can flow. Such substances that can flow. It includes liquids, slurries, granular materials and powers. such measurements can be used to determine the amount of materials within a closed container or the flow of water in open channels.

***PH sensor*:** it provides a value as to how acidic or alkaline a liquid is and it is used to measure the concentration of hydrogen ions. It measures the hydrogen-ion activity. It is the combination of electrodes.

Flow sensor: water flow sensor consists of a plastic body, a water rotor, and a hall-effect sensor. When water flows through the rotor, rotor rolls. it is used to measure the flow rate, often for a fluid. These will sense the velocity of air movement.

***Temperature sensor*:** it is used to measure the temperature through an electrical signal it requires a thermocouple or RTD. A thermocouple is made from two dissimilar metals that generate electrical voltage in direct proportion to changes in temperature.

***Gas sensor*:** it is used to detect the gas leakage. It is suitable for detecting H2, LPG, CH4, Alcohol, Smoke or Propane. In water we can detect methane gas as waste water measurement.

***Photo sensor*:** A photo sensor is an electronic component that detects the presence of visible light infrared transmission IR and ultraviolet energy. It is also known as LDR(light dependent resistor) sensor. Photo resistor is a light- controlled variable resistor.

***Pressure sensor*:** it is for pressure measurement of gases or liquids. Pressure is an expression of the force required to stop a fluid from expanding. It is usually stated in terms of force per unit area. A pressure sensor usually acts as a transducer. It generates a signal as a function of the pressure imposed.

CONCLUSION:

Usage of recycled water for purposes like gardening, watering plants and vegetables, washing cars, cleaning of house and Firefighting. The reuse of recycled water decreases the usage of drinking water for these purposes which indirectly helps in decrease of water scarcity. The deployment of sensors in the waste water treatment plan leads to automation of the plant which leads to efficient use of the plant. By smart waste water treatment biggest challenge of water scarcity for smart cities can be solved.

This system is used in many fields like water distribution system, industries and aqua farming. This monitoring and controlling process can be performed at anytime and anywhere in the world. In future, we can include biological sensor for better detection of contaminants in water and can install the system in several locations for high spatiotemporal coverage.

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