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ANALYSING AND TREATING THE INDUSTRIAL WASTE WATER USING INTERNET OF THINGS

Chethana V

Assistant Professor
Department of Computer Science and Engineering
Dayananda Sagar Academy of Technology And Management ,Bangalore, Karnataka,India

Abstract: Now a days the major problem, we are facing is contamination of water by the industrial wastages. More than 80% of the world's wastewater flows back into the environment without being treated. The wastewater from industries varies so greatly in both flow and pollution strength. So, it is impossible to assign fixed values to their constituents. In general, industrial wastewaters may contain suspended, colloidal and dissolved (mineral and organic) solids. In addition, they may be either excessively acid or alkaline and may contain high or low concentrations of colored matter. These wastes may contain inert, organic or toxic materials and possibly pathogenic bacteria. These wastes may be discharged into the sewer system provided they have no adverse effect on treatment efficiency or undesirable effects on the sewer system. It may be necessary to pretreat the wastes prior to release to the municipal system or it is necessary to a fully treatment when the wastes will be discharged directly to surface or ground waters. Industrial wastewater, especially from chemical and pharmaceutical production, often contains substances that need to be treated before being discharged into a biological treatment plant and subsequent water bodies. Generally, this can be done close to the site of production itself, in selected wastewater streams before reaching a central treatment plant. And moreover, we cannot use normal methods for removing the toxic substances present in the water. To overcome this problem, we are using IOT technology for monitoring the water. And use filters to remove the chemicals present in the water.

Index Terms - **pH sensor, H202, Gprs, Aurdio, Chloride, LMD35, Pcdtrf.**

I. INTRODUCTION

The chemical industry is of importance in terms of its impact on the environment. The wastewaters from this industry are generally strong and may contain toxic pollutants. Chemical industrial wastes usually contain organic and inorganic matter in varying degrees of concentration. It contains acids, bases, toxic materials, and matter high in biological oxygen demand, color, and low in suspended solids. Many materials in the chemical industry are toxic, mutagenic, carcinogenic or simply hardly biodegradable. Surfactants, emulsifiers and petroleum hydrocarbons that are being used in chemical industry reduce performance efficiency of many treatment unit operations. The best strategy to clean highly contaminated and toxic industrial wastewater is in general to treat them at the source and sometimes by applying onsite treatment within the production lines with recycling of treated effluent. Since these wastes differ from domestic sewage in general characteristics, pretreatment is required to produce an equivalent effluent. In chemical industry, the high variability, stringent effluent permits, and extreme operating conditions define the practice of wastewater treatment. In 1999 proposed concept to select the appropriate treatment process for chemical industrial wastewater based on molecular size and biodegradability of the pollutants. Chemical industrial wastewater can be treated by some biological oxidation methods such as trickling filters. Pollutants with a molecular size larger than 10,000-20,000, can be treated by coagulation followed by sedimentation or flotation. Waste minimization in the production process in chemical industry is the first and most important step to avoid waste formation during the production. Because of the fluctuation in the strength and flow rate, applied dynamic simulation to chemical-industry wastewater treatment to manage and control the treatment plant. Industrial waste should be collected in a manner that avoids unsafe conditions to personnel, equipment, and facilities. Industrial wastes should either be pretreated sufficiently to be accommodated in a domestic wastewater collection and treatment system, or provided with a separate collection and treatment system.

Figure 1.1. Discharge of Untreated Industrial Waste Water

Industrial wastewater treatment covers the mechanisms and processes used to treat water that removes dissolved toxic organic substances and hazardous chemicals and released to the environment. After water treatment process the treated water can be reused for a variety of purpose within the industry. Before Most manufacturing industries release some wet waste to recycle and reuse it but recently the world has been minimizing such production or recycle such waste within the production process. Industrial wastewater treatment describes the processes used for treating wastewater that is produced by industries as an undesirable by-product. After treatment, the treated industrial waste water may be reused or released to a sanitary sewer or to a surface water in the environment. Most industries produce some wastewater. Recent trends have been to minimize such production or to recycle treated wastewater within the production process. So, the aim / what the project does is, it firstly collects water samples. Then using pH sensors and Temperature sensors we detect the amount of pollutants. If the amount of pollutants measured in the previous step is greater than a threshold value (1000mgL), then treat them using filters like chlorine, H2O2.At the same time, since the government should be aware of all this and take actions, we send a report of this to government. Using IOT we strive to achieve this goal which is beneficial to the society.

II. INTERNET OF THINGS

IoT (Internet of Things) are associated with huge number of objects with sensing elements. In IoT network ultimate goal is to provide worldwide network for interconnected objects, where as object information is integrated in processing network. It is desirable to eliminate duplicate data or redundant data at the level of sensor to overcome from power consumption as well as time delay in each densely distributed node. IOT technology is used to achieve good result in monitoring applications. IoT in water treatment uses the concept of smart sensors installed at various points in the water system. These sensors collect data and send it back to the monitoring systems. This data could include, water quality, temperature changes, pressure changes, water leak detection, and chemical leakage detection. In the simplest form, IoT in water treatment lies a reliable communication technology that is used to send data from physical objects over a wireless channel to a computer with smart analyzing software. In fact, a sensor solution can measure liquid flow and can be used by a water utility company to track the flow across the whole treatment. IoT can also play a role in leak detection and send an immediate alert to a remote dashboard. These notifications are immediate for a problem to be detected. Now, it allows to address the issue faster, find a solution, and move on to the next task. IoT is poised to make wastewater management safer and more efficient. Operators are testing out water sensors, safetycontrols, and predictive maintenance.

III. PROPOSED SYSTEM

3.1Hardware design:

The key parameters monitored in the proposed system are conductivity, turbidity, water level and PH. The block diagram of the proposed system is shown in Fig. 2. A controller forms the central part of the IoT enabled water quality monitoring system. The measured parameters can be viewed by using LCD. The data from the sensors are sent to the cloud using the controller. Threshold is set in the cloud based on the standards provided by WHO. Message is sent from cloud to the users mobile if the value exceeds the threshold. A mobile application has been developed in which values obtained by each sensor in the cloud can be viewed. This can be used by both the water quality monitoring authorities as well as users.

Conductivity is the measure of solutions ability to carry current. This parameter is used to determine the salt content in the water. In the proposed design, YL-69 is used to measure the conductivity of the water. It consists of two electrodes, when placed in water a potential is generated which is proportional to conductivity. It is measured in seimens per cm. Acceptable range of conductivity is from 300 to 800 µ seimens per cm.

pH measures amount of acid or base in the solution. Three in 1 ph. meter with inverting operating amplifier is used to measure ph. Inverting Op-amp is used to boost the voltage from mV to voltage range. pH sensor consists of two electrodes which is reference electrode and pH electrode also known as measuring electrode. When placed in the solution pH electrode develops a potential that is proportional to ph. The value ranges from 0 to
14. The acceptable range of pH for drinking water is 6.5 to 8.5.

Turbidity is a measure of cloudiness in the water. Opto electronic devices such as LDR and LED are used to measure the turbidity. Light is transmitted and reflected by suspended solids and reflected light is received by the sensors. An LDR is high resistance semiconductor. If light falling on the device is of high frequency, photons absorbed by the semiconductor gives the bound electrons enough energy to jump into the conduction band. In the proposed system distance between the LED and LDR is 9 cm

3.2 Software design:

Arduino is an open-source electronics platform based on easy- to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing.

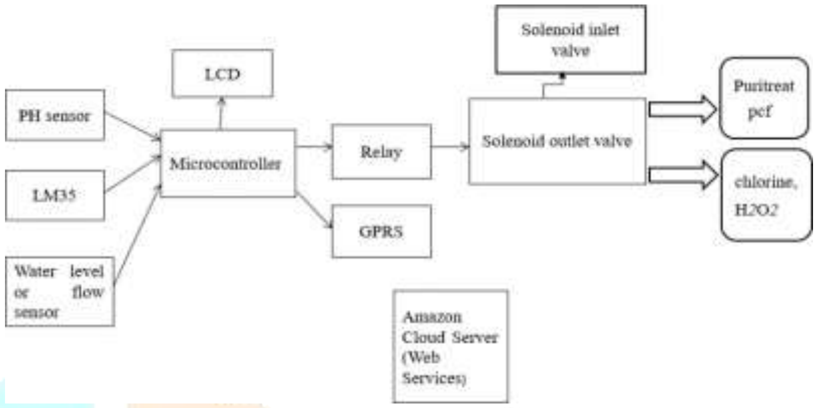

Figure 3.1 Block Diagram of Proposed System

Circuit Diagram:

The execution of the projected system is shown in Figure. 3.2. It consists of pH, temperature, electric conductivity (EC) and turbidity sensors. The sensor data are processed in the Arduino module and shifted by means of the ESP8266 WIFI data transfer unit to the main server. The authorized users can access this data by sorting their account using a User ID and password. The collected data is, undergoing various stages such as process, analysis, transmit and finally display the data in real time users. The ESP8266 is a self-contained SOC Wi-Fi Module with integrated TCP/IP protocol stack. It permits the microcontroller unit to right of entry to the Wi-Fi network. This low-cost Wi-Fi microchip is manufactured by M/S Espruino [5]. The Arduino microcontroller unit is based on embedded trace support and real time emulation. This ESP8266 uses serial transmitter/receiver (Tx/Rx) for sending and receiving the data in Ethernet buffers, and serial commands to uncertainty and modify the configurations of the Wi-Fi module.

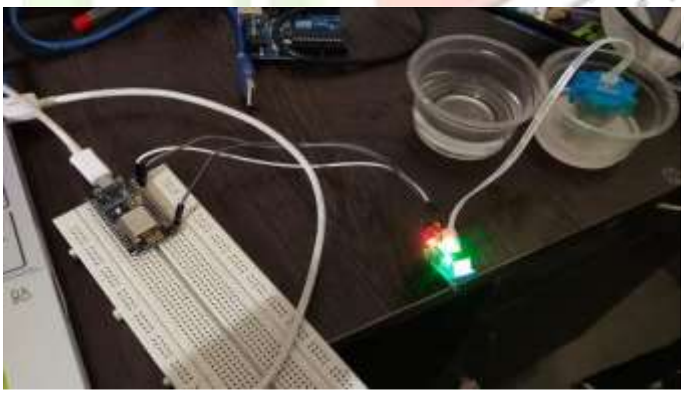

Figure 3.2. Execution of the proposed project

Data sent from the controller are stored in Cloud server. Cloud offers a platform for developers to capture data and turn it into useful information. The features include a real-time dashboard to analyze data or control devices and share the data through public links. Data stored in the cloud can be used for detailed analysis. The cloud is programmed to send alert SMS messages whenever the monitored parameter exceeds the threshold limit. The Table 8 presents a summary of useful features of cloud platform.

The system is connected to the cloud using the following steps:

- Connect to the access point using ssid and password through mobile phone or personal computer.
- The controller is then connected to the access point using Wi-Fi connection.
- Login to cloud platform, where a token is generated
- Use the token id in the program.
- Data from the controller are loaded into the cloud.

Data can be viewed on the cloud platform

IV. EXPERIMENTAL AND DATA RESULTS

Thing Speak Thing Speak™ is IoT analytics podium services which allow us to cumulative, imagine, and analyze the live data streams in the cloud. As a result, it is easy to transfer the data to Thing Speak from our device. Thing Speak can post the measured data to store in the cloud [8]. So, the instantaneous visualizations of real time live data and alerts will be given to the authorities using web services.Thing Speak software permits the Authorized users to access the measured data by logging on and get results as shown in Figure 4.1.and

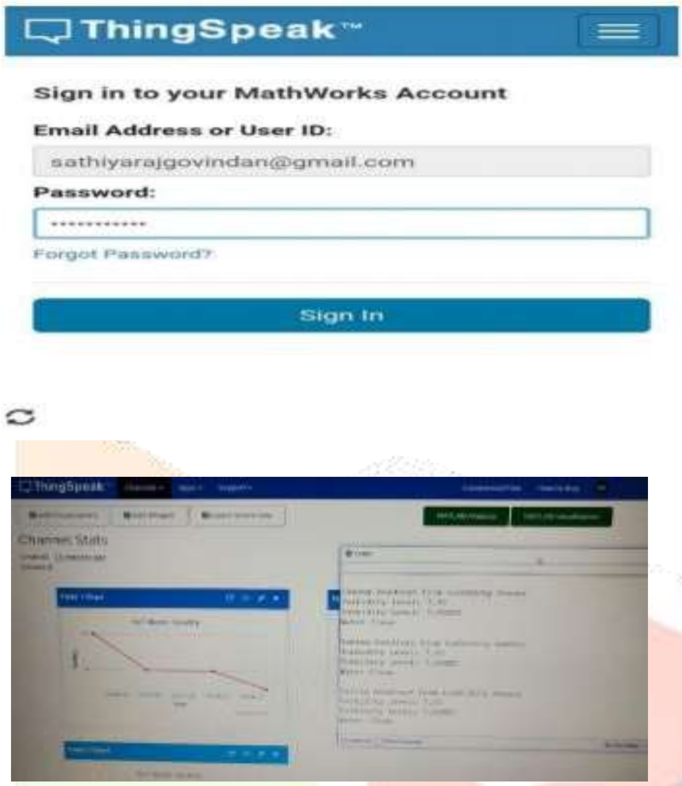

Figure 4.1 Log in page of Think Page

V. CONCLUSION

The water quality parameters such as pH, turbidity, temperature and electric conductivity are observed and tested in real time. Based on the measured data, corporation officials will track the pollution level occur in the water bodies. It will help them to take proper steps to control the pollution level within the threshold limit. This approach of using IOT to solve the problem of water pollution can be a great step against global warming as well. The proposed approach is an economical and effective way.

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