IoT based Filter Testing and Monitoring

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***Abstract*: Water is more essential for human life and health. A monitoring system based on a wireless sensor network and IoT is required to establish a good quality of water. An intelligent electronic monitoring technique in which the application displays the parameters such as pH value, dissolved oxygen content and conductivity level of drinking. These parameters of water are sent to the IOT server. With the help of a wireless GSM (Global System for Mobile communication), the customer will be informed about the condition of the filter, and the service provider is immediately informed of replacing the filter. The esp8266 12e module is used to connect Wi-Fi module and GSM.**

Keywords – Internet of Things (IoT), Sensor, Water purification, GSM module.

I INTRODUCTION

Pure and clean drinking water isn't available now a days. It is very important to each one of us to know about the purification techniques to provide a good quality of water to our generation. One of the common methods of purification is to add chlorine in water. There are many water purifiers with filters such as Ultra Violet, Reverse osmosis, Activated carbon, Ion exchange resin filter. Water purification process removes the suspended solids, gases, chemicals and other undesirable materials in water. The side effects of drinking the contaminated water leads to diarrhea, vomiting, typhoid fever, nausea and more. The use of microcontroller which in cooperates pH sensor, dissolved oxygen sensor and conductivity sensor to monitor the good quality of water is essential.

II LITERATURE SURVEY

GSM based smart water purifier *pooja, prince (published on 2016)* In this project, microcontroller 8051 which controls all the modules such as GSM (SIM900), Max232, LCD, ADC (0808), Temperature sensor, TDS sensor, Gas sensor, Optocoupler, Relay, Motor, Buzzer, Power supply. TDS level of water is measured along with the temperature level of water and in addition to that gas leakage in the kitchen can be detected. When the measure value exceeds the reference value, buzzer gives an alarm and the LCD displays the message. These values are interfaced with ADC0808. GSM is connected to microcontroller Max232 through which an alert message is sent for the user about the filter condition. This will reduce the botheration of user about the maintenance and service of the purifier.

A comprehensive monitoring and controlling system for multifunctional direct drinking machine based on IoT *Kun Xia, Hongen Li, Anghui Chen, Bangzheng Liu, Shaohua Li (published on 2018)* This paper includes remote monitoring and controlling system based on Internet of Things (IoT). The value of temperature sensor, flowmeter and water level gauge are sent to the local control system and are managed in the cloud by General Packet Radio Service (GPRS) network and Wireless Fidelity (Wi-Fi). It is user friendly and easy to operate in real time. Radio frequency identification (RFID) and mobile payment technology are used to find the automatic user identification. This system realizes the functions of connecting user and Internet of Things.

III PROPOSED METHODOLOGY

The quality of water is monitored by measuring the pH level, dissolved oxygen content and conductivity value of water using sensors. The service provider and the customer will get an alert message about the condition of the filter when the measured value exceeds the reference value. An application based on IoT will provide the values of sensor through a microcontroller interfaced with Wi-Fi module esp8266 12e.

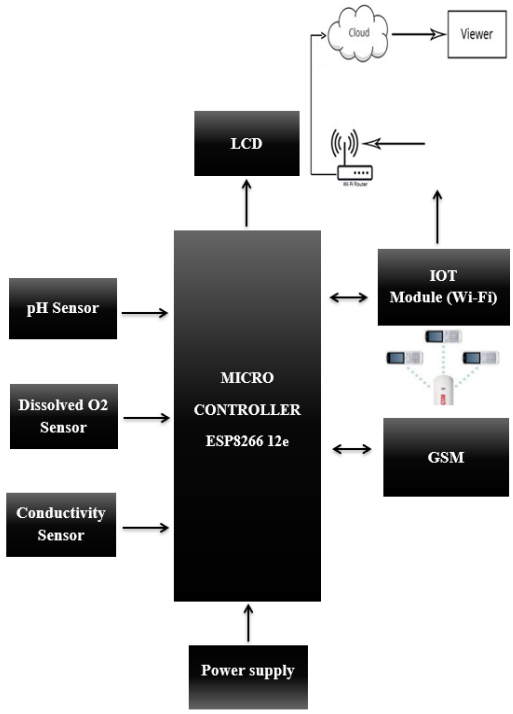

Fig.1.Block diagram of IoT based filter testing and monitoring.

The proposed system shown in fig 1. monitors the quality of water by measuring the different values of pH, dissolved oxygen content and conductivity by using the sensors. These sensors are interfaced with a microcontroller esp8266 12e which also acts as an Wi-Fi module. GSM (SIM800L) is interfaced with the microcontroller to send messages for the service provider and customer about the filter condition. An application which continuously monitors the filter condition and gives the current update of the water purity level. The values are displayed in LCD. When the condition of filter is worse an alert message will be sent to both customer and service provider. Thus, maintenance of the filter and service can be improved from this method.

COMPONENTS AND REQUIREMENTS

The major components employed in this method are,

- ESP8266 12E
- pH sensor
- Dissolved oxygen sensor
- Conductivity sensor
- GSM (SIM800L)

ESP8266 12E

The ESP8266 12E shown in fig 2. Wi-Fi module with integrated TCP/IP protocol enable the microcontroller to access the Wi-Fi network. This module contains a preprogram through which Arduino device can be easily interfaced. The ESP8266 12E chip has 17 GPIO pins.

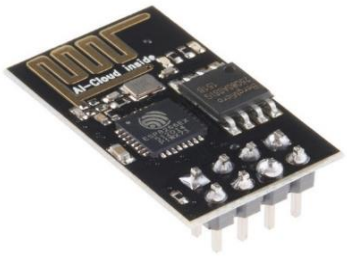

Fig.2 ESP8266 12E

The following pin description shown in fig 3 explains the features of ESP8266 12E chip pinout,

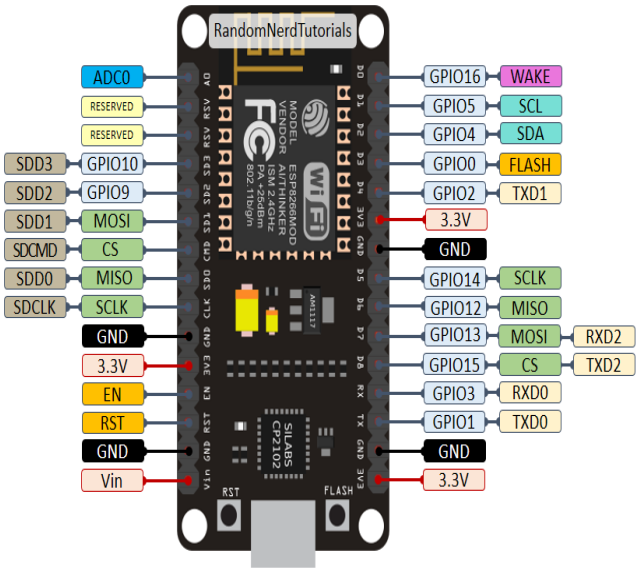

Fig.3 ESP8266 12E Pin description

pH sensor

pH is the hydrogen ion concentration in any solution. It varies between 0-14. Measuring the value of pH gives the measure of alkalinity or acidity of solution. When the pH lies between 0-7 the solution is acidic with large hydrogen ion concentration whereas the solution having pH value between 8-14 are basic with small hydrogen ion concentration. The pH value of 7 is neutral. The pH value between 6.5-8.5 is considered as the normal drinking water quality.

Dissolved oxygen sensor

Dissolved oxygen (DO) sensor shown in Fig 4 measures the amount of oxygen content dissolved or carried in liquid process. The sensor consists of potassium chloride (KCl) solution which acts as an electrolyte. When the oxygen flows through the membrane and the current flow between the electrode is measured which is proportional to concentration of dissolved oxygen. The optimal level of dissolved oxygen content is 0-27ppm.

Fig.4 Dissolved Oxygen sensor

Conductivity sensor

Conductivity sensor shown in fig 5 is used to determine how well the solution conducts an electric current. The current flows by the ion transport. When the solution contains more ions then the conductivity of the solution is high.

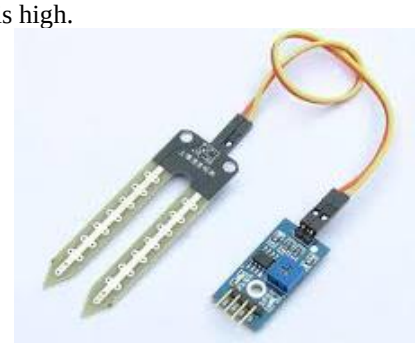

Fig.5 Conductivity sensor

GSM (SIM800L)

Global System for Mobile communication shown in fig 6 is used for transmitting mobile voice and data service. GSM is widely accepted and used globally. It makes use of Time Division Multiplexing Access (TDMA) technique for transmitting data.

Fig.6 GSM (SIM800L)

IV RESULTS AND DISCUSSIONS

The most basic need of people is good quality of drinling water. The water quality parameters are measured quickly in a real time process. The This paper ensures the monitoring of water quality for domestic and industrial purpose. The quality of water is monitored through LCD display as shown in fig 7.

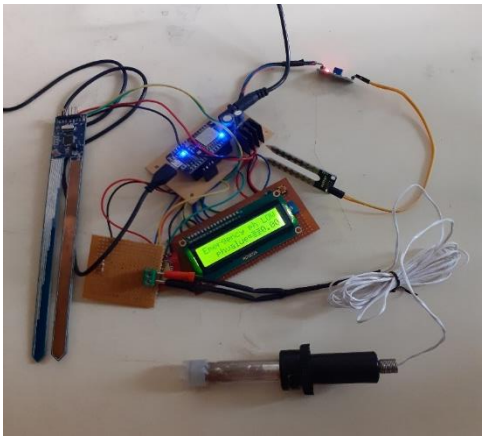

Fig.7 LCD displays the values of water content

The below results shown in Fig 8 shows the range of values for good drinking water. When the pH value lies between 6-8, dissolved oxygen content lies between 0-27 and conductivity is 1 then the water is good for drinking.

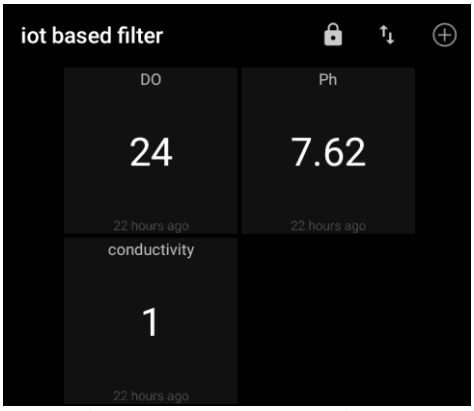

Fig 8. Software displaying the values of water content

V CONCLUSION

Thus, with the help of this technique the service provider will be able to know about the condition of the filter without any human interference and provide a quality service. The filter quality can be monitored regularly and reduces the botheration about the maintenance and service of the filter replacement. It also reduces the rising customer complaints and provides healthy water to drink.

VI REFERENCES

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