Water Quality Measuring Device

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Abstract- *The need for effective and efficient monitoring, evaluation and control of water quality in residential area has become more demanding in this era of urbanization, pollution and population growth. Ensuring safe water supply of drinking water is big challenge for modern civilization. Traditional methods that rely on collecting water samples, testing and analyses in water laboratories are not only costly but also lack capability for real-time data capture, analyses and fast dissemination of information to relevant stakeholders for making timely and informed decisions. In this paper, a real time water quality monitoring system prototype developed for water quality monitoring in Residential home is presented. The development was preceded by evaluation of prevailing environment including availability of cellular network coverage at the site of operation. The system consists of a Raspberry Pi, Analog to Digital Converter, Water quality measurement sensors. It detects water temperature, dissolved oxygen, pH, and electrical conductivity in real-time and disseminates the information in graphical and tabular formats to relevant stakeholders through a web-based portal and mobile phone platforms. The experimental results show that the system has great prospect and can be used to operate in real world environment for optimum control and protection of water resources by providing key actors with relevant and timely information to facilitate quick action taking.*

Keywords- Raspberry Pi, Real-Time, Water Quality, Cloud, Data Visualization, ADC, Cost Effective

I. INTRODUCTION

There were lots of inventions, but at the same time were pollutions, global warming and so on are being formed, because of this there is no safe drinking water for the world's pollution. Nowadays, water quality monitoring in real time faces challenges because of global warming limited water resources, growing population, etc. Hence there is need of developing better methodologies to monitor the water quality parameters in real time.In this system we used several sensors for measuring the physical and chemical parameters of the water. The smart water quality systems consist of a raspberry pi controller.

II. PROPOSED SYSTEM

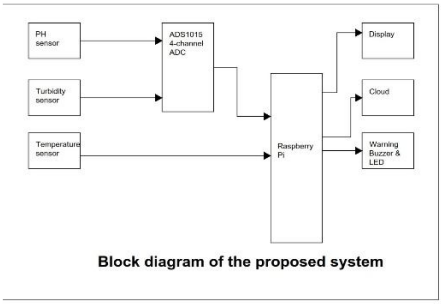

Figure 2.1: System Block diagram

III. PROBLEM DESCRIPTION

Due to the fast growing urbanization supply of safe drinking water is a challenge for the every city authority. Water can be polluted any time. So the water we reserved in the water tank at our roof top or basement in our society or apartment may not be safe. Still in India most of the people use simple water purifier that is not enough to get surety of pure water. Sometimes the water has dangerous particles or chemical mixed and general purpose water purifier cannot purify that. And it's impossible to check the quality of water manually in every time. So an automatic real-time monitoring system is required to monitor the health of the water reserved in our water tank of the society or apartment. So it can warn us automatically if there is any problem with the reserved water. And we can check the quality of the water anytime and from anywhere. By keeping this mind we designed this system especially for residential areas.

IV. PROPOSED SYSTEM

Our goal is to develop a system for real time quality assessment for water health at residential places using Raspberry Pi. pH, Turbidity and Temperature sensors are used to gather the parameters necessary to monitor water health in real time. Following are the objectives of the proposed system. To measure various chemical and physical properties of water like pH, temperature and particle density of water using sensors. Send the data collected to a Raspberry Pi, show the data in display and send it to a cloud based Database using Wired/Wireless Channel. Trigger alarm when any

discrepancies are found in the water quality. Data visualization and analysis using cloud based visualization tools.

V. FUNCTIONAL DESCRIPTION

Raspberry Pi

The Raspberry Pi 3 Model B features a quad-core 64-bit ARM Cortex A53 clocked at 1.2 GHz. This puts the Pi 3 roughly 50% faster than the Pi 2. Compared to the Pi 2, the RAM remains the same – 1GB of LPDDR2-900 SDRAM, and the graphics capabilities, provided by the Video Core IV GPU, are the same as they ever were. The Pi 3 now includes on-board 802.11n WiFi and Bluetooth 4.0. WiFi, wireless keyboards, and wireless mice now work out of the box.

pH Sensor

The pH (always written little p, big H) of a substance of how many hydrogen ions in a certain volume of water. 'pH' stands for potential of hydrogen. The definition pH is minus the logarithm of hydrogen ion activity in the solution. pH is gram equivalent per liter of hydrogen ion concentration in a solution. pH has a property of multifunctional in nature, it can test light, pH and soil. It varies between 0 to 14. It is the logarithmic measurement of moles of hydrogen ion concentration per liter of solution. The solutions having pH value between 0 to 7 are acidic solutions, with large hydrogen concentration. Whereas the solution having pH value between 8 to 14 are basic solutions, with small hydrogen concentration. Solutions having pH value of 7 are neutral solutions. Measuring the pH gives the alkalinity or acidity of a solution. This sensor is essential to monitor pH level of soil for optimal growth of crops according to the requirements.

Temperature sensor

The DS18B20 digital thermometer provides 9-bit to 12- bit Celsius temperature measurements and has an alarm function with nonvolatile user-programmable upper and lower trigger points. The DS18B20 communicates over a 1- Wire bus that by definition requires only one data line (and ground) for communication with a central microprocessor. In addition, the DS18B20 can derive power directly from the data line ("parasite power"), eliminating the need for an external power supply.

Water level sensor

Float level switch is a simple structure, easy to use level control devices, it does not provide power, no complicated circuit, it has a smaller volume than the general mechanical switch, long working life and other advantages. As long as the material selection is correct in shape, and the nature of any liquid or pressure, temperature can be used, which in the shipbuilding industry, generating equipment, petrochemical, food industry, water treatment equipment, dyeing and finishing industry, hydraulic machinery, etc. have been widely applications.

CO2 Sensor

The MQ-6 Gas sensor can detect or measure gases like LPG and butane. The MQ-6 sensor module comes with a Digital Pin which makes this sensor to operate even without a microcontroller and that comes in handy when you are only trying to detect one particular gas. When it comes to measuring the gas in ppm the analog pin has to be used, the analog pin also TTL driven and works on 5V and hence can be used with most common microcontrollers.

Turbidity Sensor

Turbidity is the quantitative measure of suspended particles in a fluid. It can be soil in water or chocolate flakes in your favorite milk shake. While chocolate is something we so want in our drinks, soil particles are totally undesired. Keeping aside the potable purposes, there are several industrial and household solutions that make use of water in some or other manner - for instance, a car uses water to clean the windshield, a power plant needs it to cool the reactors, washing machines and dish washers depend on water like fish.

GSM Module

SIM800 is a complete Quad-band GSM/GPRS solution in a SMT type which can be embedded in the customer applications. SIM800 support Quad-band 850/900/1800/1900MHz, it can transmit Voice, SMS and data information with low power consumption. With tiny size of 24*24*3mm, it can fit into slim and compact demands of customer design. The modem needed only 3 wires (Tx,Rx,GND) except Power supply to interface with microcontroller/Host PC. The built in Low Dropout Linear voltage regulator allows you to connect wide range of unregulated power supply (4.2V -13V). Featuring Bluetooth and Embedded AT, it allows total cost savings and fast time-to-market for customer applications.

VI. CONCLUSION

Monitoring of real time quality of Water from reserve tank of house and colony makes use of PH, turbidity and temperature sensor with Raspberry Pi and existing Cloud

system for data analytics. The system can monitor water quality automatically, triggers alarms immediately to prevent any health hazards and it is low in cost and does not require people on duty. So, the system is likely to be more economical, convenient and fast. The system has good flexibility. Only by replacing the corresponding sensors and changing the relevant software programs, this system can be used to monitor other water quality parameters. The operation is simple. The system can be expanded to monitor hydrologic, air pollution, industrial and agricultural production and so on. It has widespread application and extension value.

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