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Hazardous Waste Detector Using PH Sensor

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ABSTRACT: Quality of water is very important aspect in human life. Water may be impure or may contain several types of impurities and it may also contain salt or acidic materials. The presence of salt causes the water to become hard and this hardness of water causes the further process to deteriorate. This research presents a model to measure the hardness of water before sending it for further process. The tested water if contains unwanted impurities may be passed through various chemical process to make it pure and then being used is not hard and harmful, thus resulting in better efficiency in the various applications of water. This research is present a suitable model for water quality testing by checking pH level in different water sample using pH sensor circuit

I.INTRODUCTION

Clean drinking water is a critical resource, important for the health and well-being of all humans. Drinking water utilities are facing new challenges in real time world. Because of more population and limited water resources. Traditional methods of water quality control involve the manual collection of water samples at various locations and at different times, followed by laboratory analytical techniques in order to characterize the water quality. Such approaches are no longer considered efficient.

Although, the current methodology allows a thorough analysis including chemical and biological agents, it has several drawbacks: such a a) The lack of real-time water quality information to enable critical decisions for public health protection (long time gaps between sampling and detection of contamination) b) Poor spatiotemporal coverage (small number locations are sampled) c) it is labor intensive and has relatively high costs (labor, operation and equipment). Therefore, there is a clear need for continuous on-line water quality monitoring with efficient spatio-temporal resolution. US Environmental Protection Agency (USEPA) has carried out an extensive experimental evaluation of water quality sensors to assess their performance on several contaminations. The main conclusion was that many of the chemical and biological contaminants used have an effect on many water parameters monitored including Turbidity (TU), Oxidation Reduction Potential (ORP), Electrical Conductivity (EC) and pH. Thus, it is feasible to monitor and infer the water quality by detecting changes in such parameters

II.HAZARDOUS WASTE

The complexity involved in Hazardous Waste Management is due to the large variation found in its definitions accepted from region to region. Definitions and classification are crucial issues, which govern the course and nature of the hazardous waste management (Maltezou et al. 1989).

The Resource Conservation and Recovery Act formulated in 1976 in the USA, defines hazardous waste to be a solid waste or a combination thereof, which because of its quantity, concentration, or physical/ chemical characteristics may cause mortality or serious irreversible illness or pose a substantial or potential hazard to human health or environment when improperly treated, stored, transported or disposed.

The inclusive/exclusive list approach adopted by several countries for defining hazardous waste involves listing of wastes from certain industries identifying wastes containing specific components or specific waste streams and linking it to processes from which they originate. The criteria for assigning waste to such a list includes toxicity of waste or an extract of waste (obtained by leaching test), corrosivity, reactivity and ignitability.

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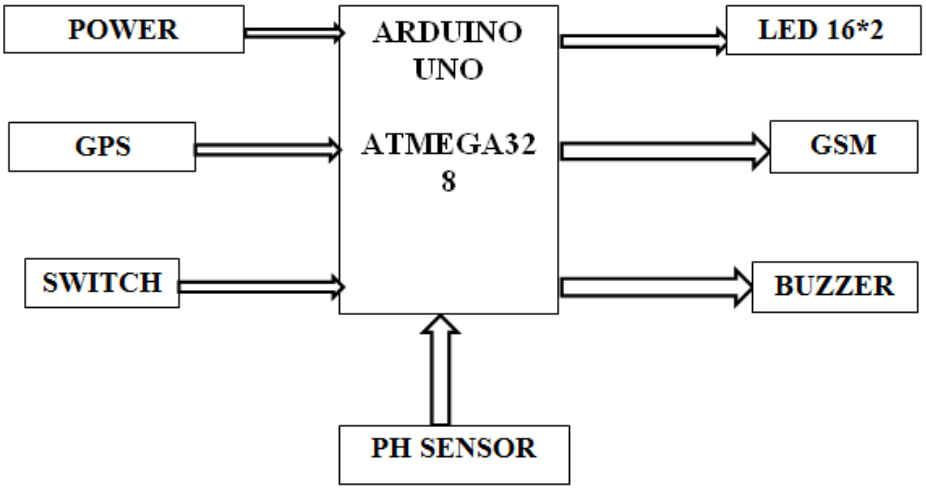
III.PROPOSED SYSTEM

3.1 HARDWARE

For designing this hardware many types of devices are used to make it perfectly working. All the devices are purchased from different manufacturers. These components are soldered on a soldering board the following list of hardware are required for this system.

1. ARDUINO UNO
2. pH PROBE
3. pH SENSOR
4. 16*2 LCD DISPLAY
5. 5V DC POWER SUPPLY
6. LED
7. GPS
8. GSM SIM900

3.2 BLOCK DIAGRAM



BLOCK DIAGRAM DESCRIPTION

i. LCD

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on.
A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data.

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ii) ARDUINO UNO MICROCONTROLLER

In our project we are using Arduino microcontroller to take the values from sensors and for doing ADC operation and for processing those sensor values. In Arduino we have so many families among them we are using Arduino UNO for our project. The Arduino Uno is a microcontroller board based on the Atmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16MHz crystal oscillator. The Uno is the latest in a series of USB Arduino boards, and the reference model for the Arduino platform for a comparison with previous versions. The Arduino Uno can be powered via the USB connection or with an external power supply. The power source is selected automatically.External (non-USB) power can come either from an AC-to DC adapter or battery.

iii) SPECIFICATION OF ARDUINO

1} Microcontroller Atmega328

2} Operating Voltage 5V

3} Input Voltage (recommended) 7-12V

4} Input Voltage (limits) 6-20V

5} Digital I/O Pins 14 (of which 6 provide PWM output)

6} Analog Input Pins 6

7} DC Current per I/O Pin 40 mA

8} DC Current for 3.3V Pin 50 mA

9} Flash Memory 32 KB

10} SRAM 2 KB

11} EEPROM 1 KB

iv) PH SENSOR

PH sensor is a device used for potentiometric pH measurements.
PH sensor would be used to determine the chemical solution in the water. Here by this sensor we can determine whether the water solution is base or acid To be more exact, pH is the measurement of the hydrogen ion concentration, [H+]. Every water solution can be measured to determine its pH value. This value ranges from 0 to 14 pH. Values below 7 pH exhibit acidic properties. Values above 7 pH exhibit basic solution. If solution value is 7 then it is consider as “neutral”.
The PH sensor is made with glass which contains Probe. The probe is a main part in this sensor. While we are measuring the PH value, we need to dip this probe completely into water.PH is one of the most important parameters of the water solutions. Kinetics and equilibrium of virtually every reaction occurring in the water solution depends on the solution pH, and these reactions are not only responsible for a typical chemical applications (like compound synthesis), but also for the way plants absorb nutrients from the soil, water animals grow their shells, our bodies regulate breathing and so on.

IV.RESULT

This research work is used to design the system to study the performance parameter of water to check the quality of water. The designed system is used to test the water for various dose responses for more type of infection in a sample, at the various temperatures. This water quality sensor model is very beneficial for the society in various application of water. This research work is used to design the system to study the water sample. The sample food material is checked under the different atmospheric condition. The impurity is added in the testing material is analyze at the different interval of time of a day by the monitoring pH value and by measuring the hardness of water.

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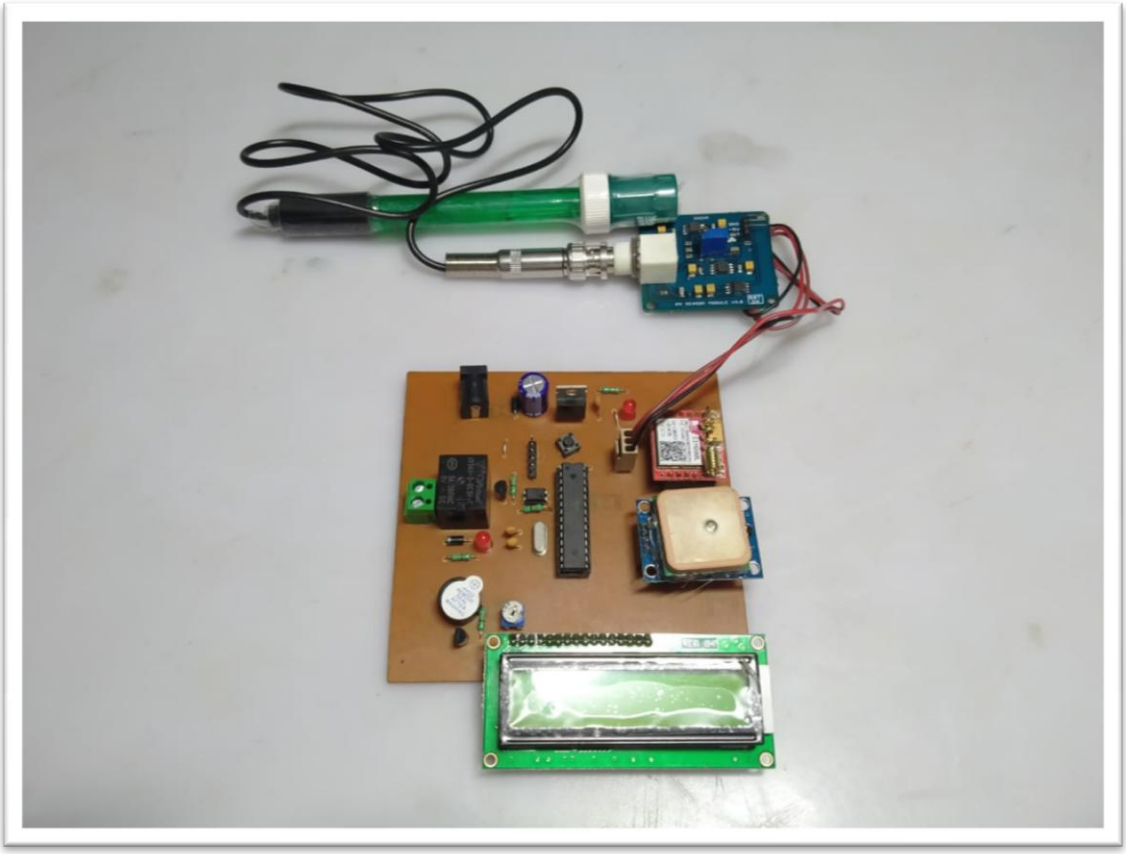

We implemented proposed system for detection of polluted water. We collected various results for different values of pH under different scenarios i.e. by using different types of water samples (neutral, acidic and basic). For neutral water we get pH=7, for acidic and basic water we get pH values less than and greater than 7 respectively. Depending upon the nature of water pH values are displayed on LCD.

V. CONCLUSION

This project presents water pollution detection system using pH sensors. Water quality data is collected by pH sensors and given to the Arduino Uno AT mega 328P microcontroller and communicate the status of the water quality using GSM through smart phones.

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