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Research paper

Debris and Eutrophication Control for Industrial Environmental Monitoring Using IoT

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Abstract

Pollution is the major concern of all the nations of the world, especially developing countries. From that air pollution and water pollution is due to industrial and automobile exhaust. multitude sensors that can be set in microcontroller. It can be monitoring the water parameters and gas range in industries. This presentation based on not only monitoring the range of ph value and gas range that release from industry and also control the pollution in order to shutdown the power in industry.

Index Terms: *Transmitter, Receiver, Wireless Personal Area Network, Arduino, Temperature sensor, PH sensor, GSM.*

1. Introduction

Sewage from industries is a complex mixture consists of organic and inorganic impurities, diseases-causing bacteria, virus and other microbes. Sewage is released in to nearby water bodies such as river, pond, lake etc. Discharge of untreated water into water bodies is one of the main sources of water pollution.fig 1.1 shows water pollution is contamination of water by harmful germs and substances. Consumption of water contamination with sewage can make several diseases to all biotic components.

Fig. 1: Sewage From Industry

More than 80% of the marine species(phytoplanktons and zooplanktons) are dead.Aquatic breeds is dramatically reduced in day-today.contaminants mix with water bodies,the aquatic turns into grey color.And also water changes to acidic medium.more acidic creates more issues to marine life.

Air pollution is also major one.These contain toxic gases such as carbon,sulphur and nitrogen.concentration of these gases greater than 10% may create respiratory system and also convulsion. Burning of fossil fuels in industry such as cement industry has release poisonous gas into the atmosphere.

Fig. 2: Release Harmful Gas

Industry plays a vital role in pollution of the country.Fig 2 represent the toxic gases liberates from industry.

Essentially increasing the internal concentration of that contaminated to a dead level, organisms which uses to food chain as also impurities. Mercury from industries acts as biological accumulator such as fish consumption is decreases in the country due to concentration of mercury that can be harmful to all living organisms. So aimed to create a system to monitor the water contaminants automatically and transmit the result to authorized person.

2. Related Work

The previous work of test in water quality nearby industries is to gather water specimen and then examine the water qualities. For that we need to appoint staffs to follow the industrial activities and also that not good method due to the absence of reliability.

Estimate the values of ph and other parameters are so delay. The consequence of these values are sometimes counterfeit. constantly keep watch on analysis is not possible. And also unable to catch up the pollution. It exposes more complicity in way of labour charge and costly materials for analysis. Time is meticulous, here consump more time to calculate the values approximately. It is also another concern in previous work.
It represents most complex process and cost effective method. Accurate values at critical situation cannot be accomplish.

Fig. 3: Water Treatment System

Water treatment system installed in industries currently. But continous monitoring of water treatment in industries is not possible. Another disadvantage of existing is to obtain these values are not accurate and sufficient. To obtain Ph values approximately ,it took several days for travel.

3. Solution-Automatic Monitoring

To overcome this problem, proposed new technology, it appears logical and efficient. It can be done by WIRELSS SENSOR NETWORK. Because hand-operated measurement can leads to take more time and has more work for least information. sensors can be notice the values continually and gather the data must occur by someone operate to setup the data.

4. Proposed Model

The proposed model is cost-less, values can be obtain accuracy. water quality sensors such as PH electrode and air sensor are attached to controller (choosen as, ARDUINO) that store the continous information related to acidic values and toxic gas values collection using multi-gigabyte capacity. Ph electrode is setup in letting out of water in industries. It can be sense the acidic and basic medium of water. Gas sensor can be connect to chimney or other places in industries. It can monitor the concentration of gas range. Both data can be pass to concern person simultaneously by using GSM(Global Mobile System) or IOT(Internet Of Things).To use IOT, values can be shine out in the webpage or set GSM, values can be passes in form of SMS. LCD display is used to show up the values. Buzzer also setup in industry for caution when stop operating the industry. Another advantage of this model is not only monitoring the ph values and gas range, but also control by shut the industries power.

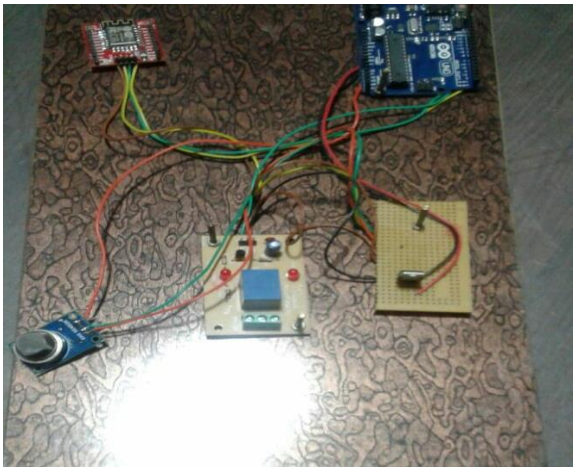


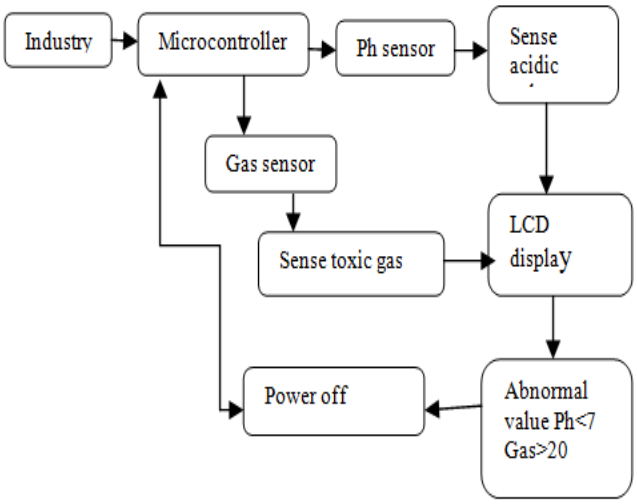
Fig. 3: Working Model

5. Components Used

The hardware setup plays a vital role in the designing process of this vehicle. The following are the building blocks of the vehicle. They are
- ❖ TEMPERATURE Sensor.
- ❖ 16x2 LCD Display.
- ❖ PH Sensor.
- ❖ GSM.
- ❖ ARDUINO microcontroller

In the proposed model, each and every individual water meter is been grouped by an individual network called **WPAN** (Wireless Personal Area Network). Each unit is fixed with Ph Electrodes and water purity sensor.
A numerous of factories are captured simultaneously, hence need for networking. The server unit will send the information in the form of short message to the authorized person, with brief likes ph value and gas range of the industry. The advantage of this system is cost less and high speed data networking and also implement new technology.

Monitoring Unit



Block Diagram Description

ARDUINO Microcontroller

In the system,14 bit digital input/output pins are used. The operating voltage is 5v.Arduino microcontroller is based on ATMEGA328. Many variety of sensors attached to the microcontroller.

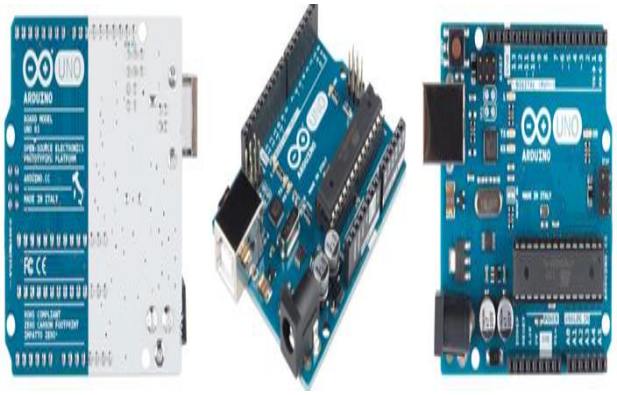
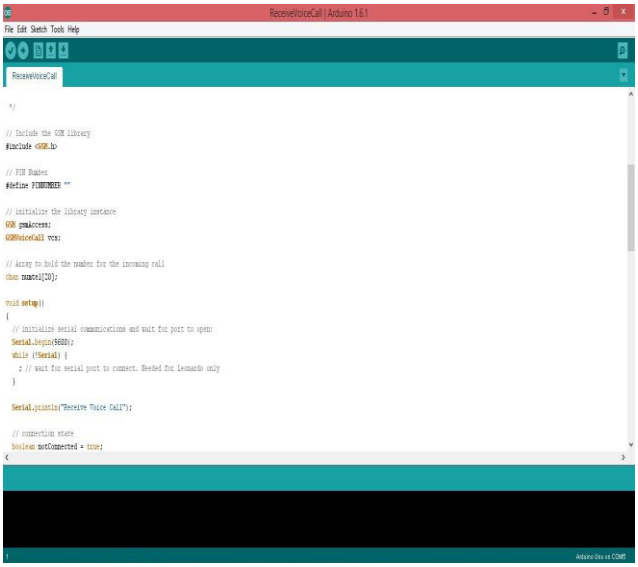


Fig. 4: ARDUINO UNO

The chosen of microcontroller depends on cost and new technology. The system is ease to handle and can be understand by all.the programme of arduino UNO is arduino software. It can be download and installed in it for purpose of programming. This software is open-source .Arduino software can be implement to use in various electronics devices such as windows and Linux. It can be accessed by users conveniently. use C,C++ language to write the arduino programs in the way ease to handle and access.



Gas Sensor

Information from the gas sensor will be saved with muti-storage card. In this specification, Gas range can be shown up with LED starts blinks. This method is simple way to display the harmful gas values. The specific sensors can minimize the time consumption and also users can easily sense the gas range accurately.

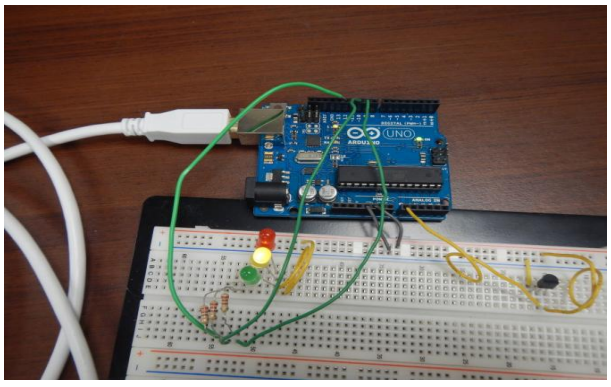


Fig. 5: Temperature Sensor

Fig 5 shows gas sensor connect in board. calibration of sensors should be easily achieved intially. By using gas sensor in this project,to monitore the toxic gases such as carbon-di-oxide,carbon monoxide which release from industries.At higher concentration of carbon gases,it leads to more adverse.Concentration>10% may cause convulsions,coma and death.Thus by monitoring gas range is mandatory that release from industries.

PH Sensor

Now-a -days, ph value is most essential thing to be monitored and limited .A Ph measurement loop is essentially a battery. It has two terminals. One is the positive terminal to measure electrode and another terminal is negative terminal to reference electrode. Ph is a scale that used to measure the concentration of OH- ions and H+ ions present in the water. The module is mainly used to detect the infrared light. The neutral solution of ph is 7.The ph value of water undergoes less than 7,it will be acidic in nature. Acidic water can adversely affect the living organisms. Using ph electrode ,to sense the ph value in water which release from industries.

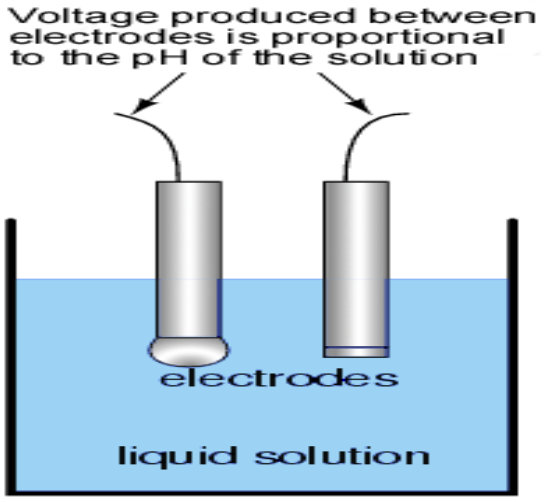


Fig. 6: Sensor

GSM Service

Global System for Mobile Communication uses carrier frequency of 900MHZ.GSM is used to send acidic value and toxic gas range to authorized persons.GSM represents 2G(second Generation),it can be used all over the world. Three TDMA and one CDMA involve in 2G.It is open standard. It provides data rate higher and higher quality of signal and also enhances digital services.

Fig. 7: GSM Modem

6. Test Setup

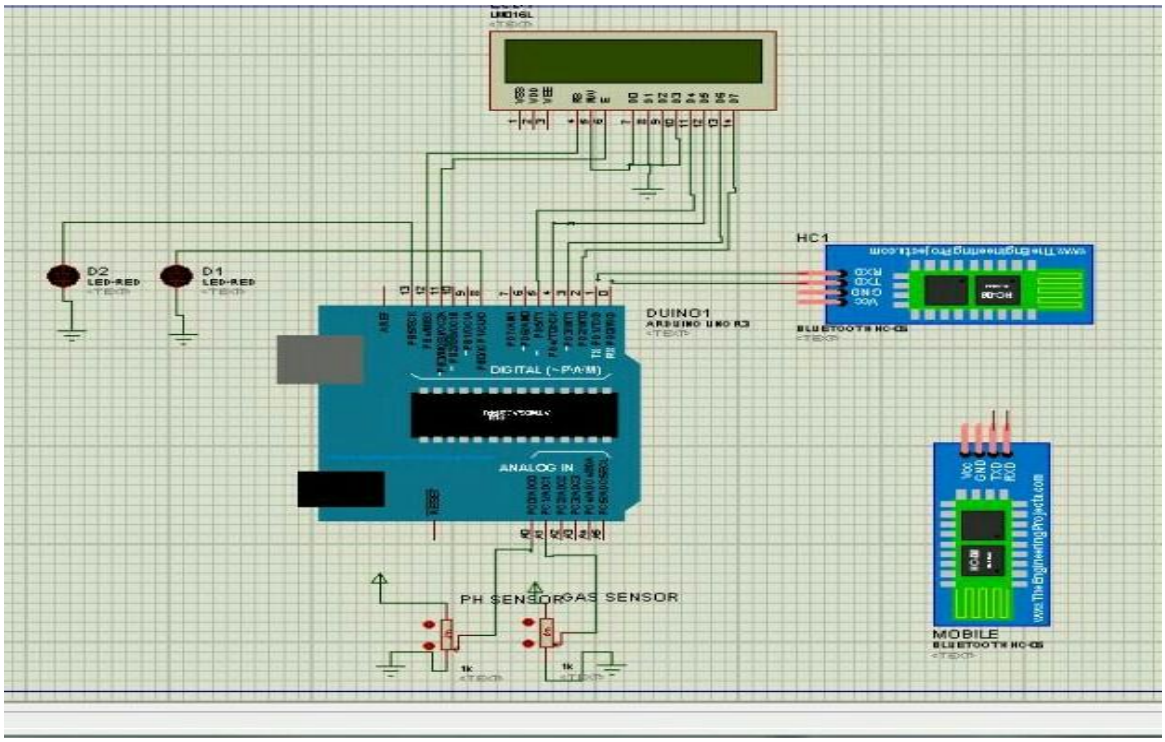


Fig. 8: Simulation Result

The above simulation represents industry works usually, when the value of acidic medium and gas range does not exceeds the setup values.

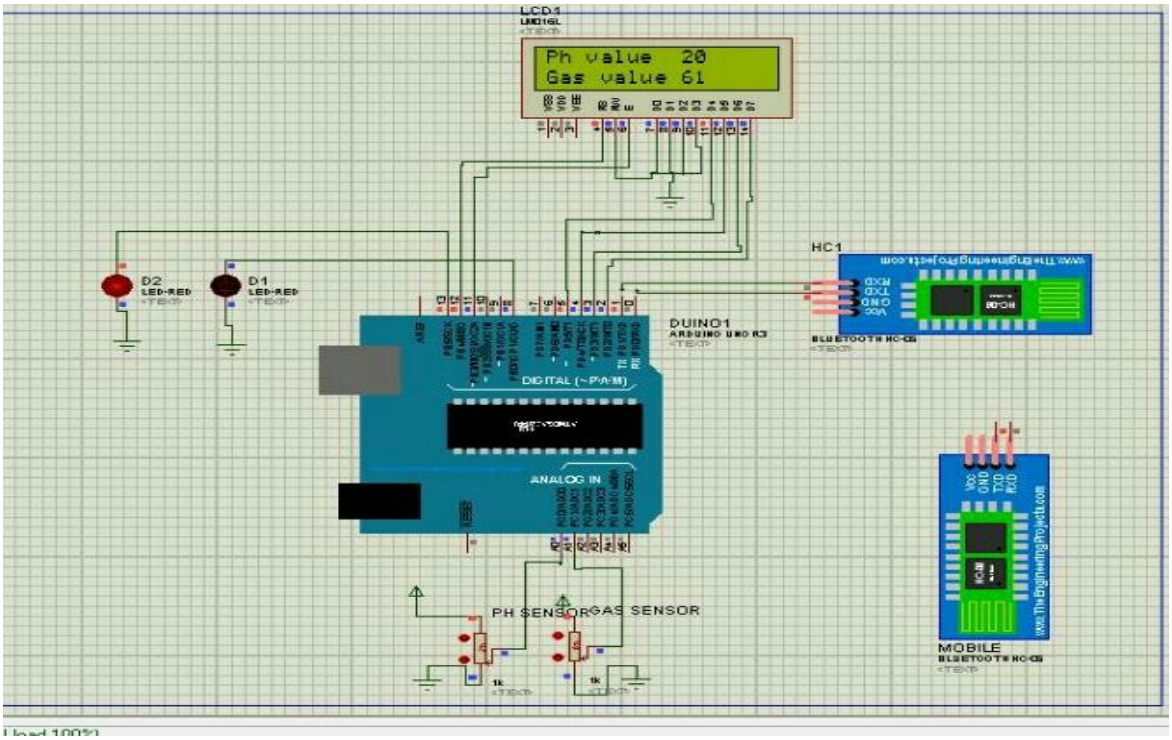


Fig. 9: Simulation Result

The above simulation shows industry power shut down when Ph values and gas range exceeds the setup values. that is Ph value is less than 7 and gas range is greater than 10%.The result can be displayed in IOT also

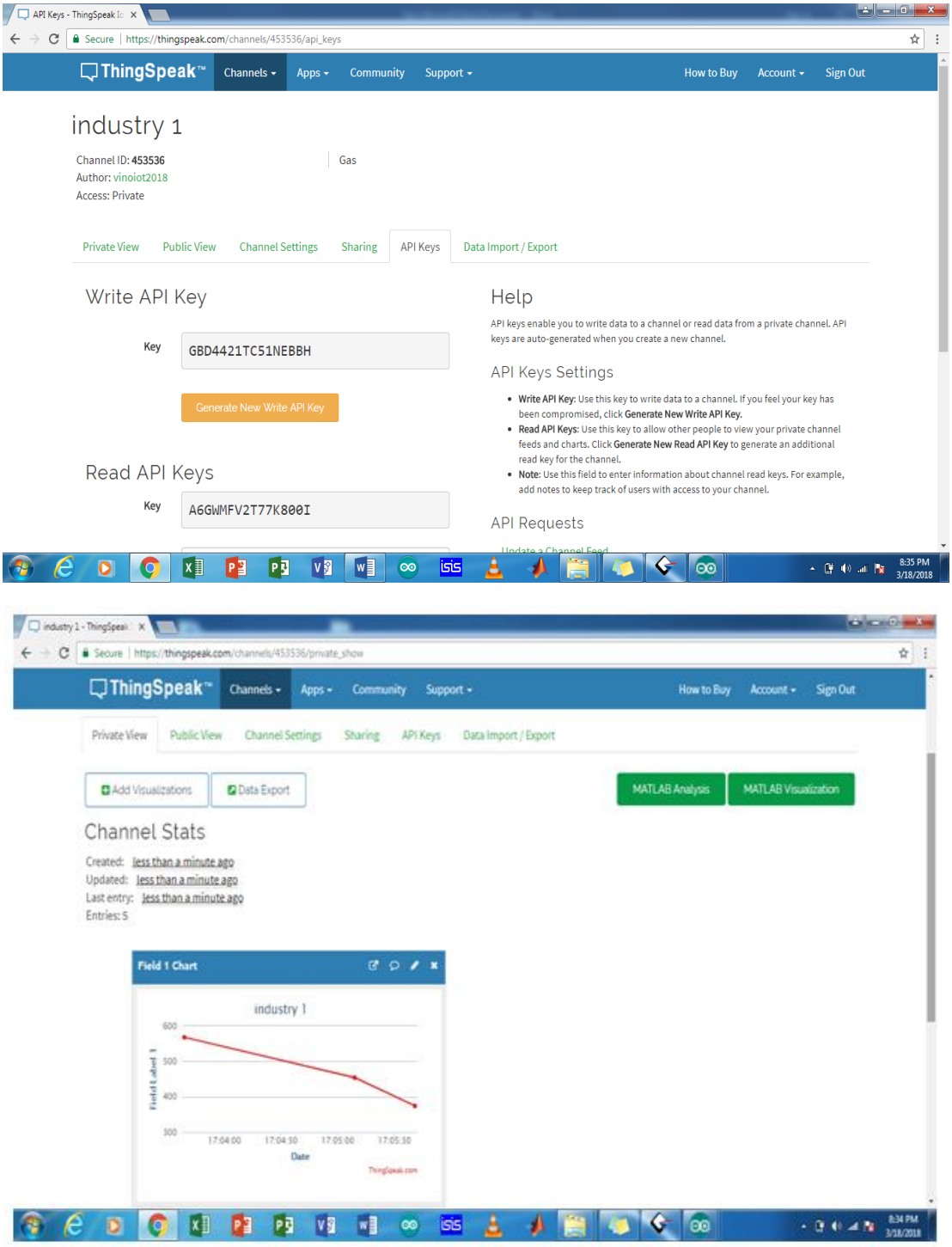


Fig. 10: Result in webpage

7. Result Comparison

PH<7	GAS> 20	LED1	LED2	INDUSTRY STATUS
7	20	GLOW	GLOW	RUN
7.5	10	GLOW	GLOW	RUN
3	10	NOTGLOW	GLOW	POWEROFF
8	50	GLOW	NOTGLOW	POWEROFF

8. Conclusion

The ultimate objective is to make our EARTH AS POLLUTION FREE. It can be proved by the design model. This design can tackle the problems present in previous work. By constantly monitoring and restrict the aquatic quality and air values in industries. Arduino controller is used to do the process properly. The model can accomplish the self-monitoring and controlling the pollution automatically. It can be established in real-time system. The simulation outcome can be proved in hardware also. It can alter efficiently and accurately.

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