

# A IOT BASED SMART SYSTEM TO CONTROL AIR & WATER QUALITY IN URBAN AREAS

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**Abstract**— This paper represents an IoT (Internet of things) based water quality and air pollution monitoring system. This system measures water condition based on two physical parameters (pH, and turbidity properties) & also measures concentrations of gases such as CO, CO<sub>2</sub>, H and methane using sensors. All sensors are connected with Arduino UNO in discrete way to detect the water parameters and concentration of gases. The output of all sensors values are compared with WHO (world health organization) water & air parameters and then the data is send to server. If sensor values are matched with standard values then water is supply to urban area otherwise water is not supply.

**Index Terms**— Internet of things Arduino UNO, turbidity.

## I. INTRODUCTION

The pollution has become a major problem around the world, air pollution and water pollution is the most dangerous, shocking and severe pollution among other pollutions e.g. water pollution, soil pollution, noise pollution, light pollution, thermal pollution etc. Water pollution is the major cause of diseases like typhoid fever, Cholera, Diarrhea etc. Air pollution is the major cause of diseases like asthma, cancer, bronchitis, birth defects and immune system like diseases. The impact of water on any living beings is beyond description. With the rapid increase of world population, water management becomes an important issue specially in industrial, agricultural and other sectors. Most of the people around the world lack behind drinkable water. Every year many people are suffering from various fatal diseases caused by water pollution. Research has found that around 5 million death is caused only because of drinking unsafe water. Research by WHO (World Health Organization) shows that almost

1.4 million of child death can be prevented by providing drinkable water to them. Considering the daily newspapers and any other electronic or print media, a devastating news which is spreading day by day is people is becoming sick and the climate is changing such a way that it has become miserable for living of people. From the aspect from top to bottom, every people are suffering the curse of climate change. The main reason for the climate change and people health is air pollution. It has brought changes in climate like global warming, global dimming, over raining, drought, storms, acid rain, foggy

weather etc. The living things on earth and under water are suffering many problems like change in life due to lack of proper facilities of life.

## II LITERATURE REVIEW

	AUTHORS	TITLE OF THE PAPER	TECHNOLOGY USED
1	N. Vijay Kumar, Ramya	Real time monitoring of the water quality parameters	Raspberry pi
2	Brinda D and Jain P.C	Real-Time Water Quality Monitoring System using Internet of Things	Microcontroller(LP C2148) Zigbee module
3	Ms.Sarika Deshmukh, Mr. Saurabh Surendran, Prof. M.P. Sardey	Air and Sound Pollution Monitoring System using IoT	Microcontroller PIC16F877A
4	Dr.A.Sumithra and Dr. S. Gavaskar	smart environment monitoring system using Internet Of Things	ATMEGA 328

1. N. Vijay Kumer, R Ramya developed a system for real time monitoring of the water quality parameters. In their research they measure the water parameter such as turbidity, conductivity, temperature, pH and dissolved oxygen. Instead of Arduino they used the raspberry pi b+ model as core controller and send the sensor data on cloud platform.

2. Brinda D and Jain P.C. in their paper designed a wireless sensor network using zigbee module. This module transfers the sensor data wirelessly to the microcontroller. Then a GSM module sends that data to the smart phone. Additionally they used.

### 3. Air and Sound Pollution Monitoring System using IoT.

- Ms.Sarika Deshmukh, Mr. Saurabh Surendran, Prof.

M.P. Sardey. Is a real-time monitoring system for the monitoring of concentration of air pollution and sound pollution in the environment. For this purpose, a hardware system is designed to detect the carbon monoxide, carbon dioxide and smoke concentration. The output of the system obtained from the sensor and processor collaboration is in digital form. A network using Wi-Fi technology can transmit the information of sensor modules to the another location. The proposed system is supposed to measure the pollution levels of various places or sites.

4. A smart environment monitoring system using Internet Of Things. Dr.A.Sumithra,J.Jane Ida, K. Karthika , Dr. S. Gavaskar.(March 2016). This is a community-led air quality sensing network that allows anyone to collect very high resolution readings of NO<sub>2</sub> and CO concentrations outside of their home. IT Sensor networks are also being deployed in tunnels to monitor air flow, visibility, and a range of gases (CO, CO<sub>2</sub>, NO<sub>2</sub>, O<sub>2</sub>, SH<sub>2</sub> and PM-10). IT Other sensor networks measure temperature, humidity and similar parameters on highways to qualify them as 'smart roads'. Due to the vast technological developments in the field of wireless communication technology it has led to the emergence of many Pollution monitoring sensors and wireless networks for monitoring and reporting pollution.

### BlockDiagram

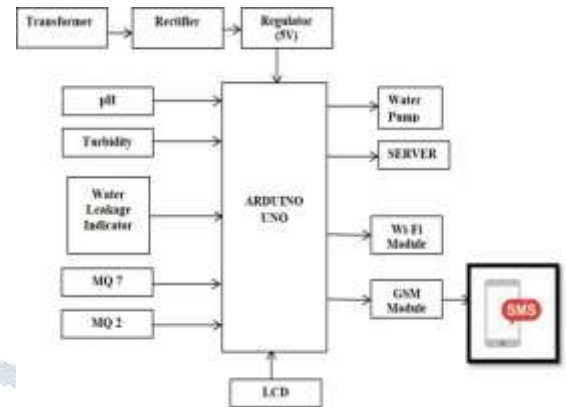


Fig : BLOCK DIAGRAM OF PROPOSED SYSTEM

### III PROPOSEDWORK

The model is designed using an Arduino Uno microcontroller, GSM module, pH sensor, Turbidity sensor, MQ 2, MQ 7 Gas Sensor, pump, transformer, rectifier, regulator and a 16x2 liquid crystal display (LCD) Screen. The functional block diagram is shown in figure 1. This project represents an IoT (Internet of things) based village water quality and air pollution monitoring system. This system measures water condition based on two physical parameters (pH, and turbidity properties) & also measures concentrations of gases such as CO, CO<sub>2</sub>, and methane using sensors. All sensors are connected with Arduino UNO in discrete way to detect the water parameters and concentration of gases. The output of all sensors values are compared with WHO (world health organization) water & air parameters and then the data is sent to server. If sensor values are matched with standard values then water is supplied to village otherwise water is not supplied to village.

### III HARDWARE DESIGN



Fig: Hardware Design of Proposed System.

### POWERSUPPLY:-

The electric power is almost exclusively generated, transmitted and distributed in the form of alternating current as an economical proposition. However for many applications we require dc supply. Batteries cannot be used for the purpose as they are costly and require frequent replacement. Therefore, it is

necessary to convert available ac supply into the required dc supply. This is achieved by an electronic device known as rectifier.

average value. It may be seen that very little ripple is still present in the output which may be eliminated by using voltage regulator. The above reasons necessitate using regulated dc power supply

### RECTIFIER:-

An electronic device which converts Alternating current into Direct current is called as rectifier. A rectifier changes ac into dc by eliminating the negative half-cycles of the alternating voltage. It may be thought of as a switch that closes a load circuit during the positive half-cycle of ac supply and opens the circuit during the negative half-cycle. Therefore rectifier provides one-way path for electric current i.e. conduction takes place in one direction only. It is in this way that a rectifier converts an alternating current into unidirectional current. For reasons associated with economics of generation and transmission, the electric power available is usually an ac supply. The supply voltage varies sinusoidal and has a frequency of 50 Hz. It is used for lighting, heating and electric motors. But there are many applications (e.g. electronic circuits) where dc supply is needed. When such a dc supply is required, the mains ac supply is rectified by using crystal diodes.

IV

### RESULTS



### FILTERCIRCUIT:-

The output of the rectifier has pulsating character i.e. it contains ac and dc components. The ac component is undesirable and must keep away from the load. To do so a filter circuit is used. The most commonly used are capacitor filter; choke input filter and pi filter.

### CAPACITORFILTER:-

It is extremely popular because of its low cost, small size, little weight and good characteristics. It consists of a capacitor connected across rectifier output in parallel with load. The pulsating dc voltage of the rectifier output is applied across the capacitor. As the rectifier voltage increases it charge the capacitor and also supplies current to the load. Once the capacitor charged to the peak value of output voltage, it starts discharging through load. The voltage across the load will decrease slightly because immediately the next voltage peak comes and recharges the capacitor.

This process is repeated again and again and the voltage waveform becomes

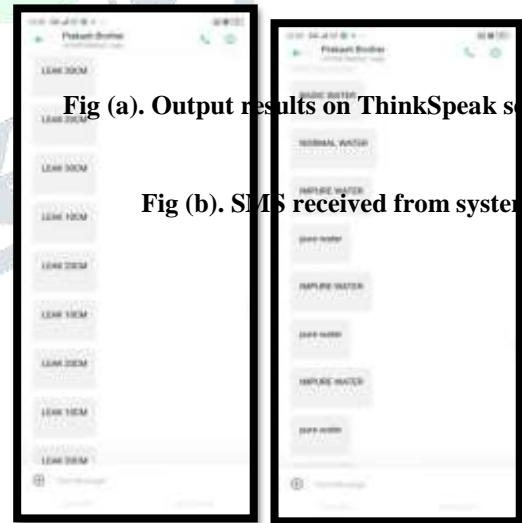


Fig (a). Output results on ThinkSpeak server

Fig (b). SMS received from system



Fig (c). output results on display

#### V CONCLUSION

The design and development of the village water quality and air pollution monitoring system. The proposed system consists of several water quality and air pollution parameter sensors. The system can be easily installed, with the base station kept close to the target area, and the task of monitoring can be done by less-tried individuals. The system can monitor water & air quality automatically, and it is low in cost and does not require people on duty.

#### REFERENCES

- [1] N.Vijay Kumer, R Ramya, "The Real Time Monitoring of Water Quality in IOT Environment",
- [2] Brinda and P. C. Jain. "Realtime water quality monitoring system using Internet of Things." 2017 International Conference on Computer, Communications and Electronics (Co mptelix)
- [3] Ms.Sarika Deshmukh, Mr. Saurabh Surendran, Prof. M.P. Sardey, "Air and Sound Pollution Monitoring System using IoT " in International Journal on Recent and Innovation Trends in Computing and Communication, Volume: 5 Issue: 6, June2017.
- [4] Dr. A. Sumithra, J.Jane Ida, K. Karthika , Dr. S. Gavaskar, "A Smart Environmental Monitoring System Using Internet Of Things" in International Journal of Scientific Engineering and Applied Science (IJSEAS), Volume2, Issue-3,March2016.