Environmental Monitoring For IoT Applications Based On Wireless Sensor Network

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ABSTRACT

This paper presents the functional design and integration of a complete WSN platform that can be used to remote environmental monitoring and target for IoT applications. The system of physical object devices, vehicles, buildings and other items embedded with sensors, electronics, software and network connectivity that enables these objects to collect and exchange data, this is called IoT. IoT is expected to generate large amounts of data from diverse locations. IoT is one of the platforms for today's smart city and smart energy management systems. Wireless Sensor Network (WSN) is used to monitor environmental conditions such as sound, pressure, temperature etc. The application requirements are long lifetime, low cost, fast deployment, low maintenance; high number of sensors and high quality of service are considered in the specification. Low-effort platform reuse is also considered for the specifications and design levels for a wide array of related monitoring applications.

Keywords- *ARM7, Internet of Things (IoT), Sensor data acquisition.*

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1. INTRODUCTION TO WIRELESS SENSOR NETWORK AND IoT:

For open nature fields, WSN for IoT environmental monitoring applications is challenging. High reliability, low cost, and long maintenance-free operation, is the some advantages of WSN. At the same time, the nodes can be exposed to variable and extreme climatic conditions. The Internet of thing (IoT) [1] has technological changes in information industry. Wireless Sensor Networks (WSN) [3] is based on advanced technologies in which we communicate with the environment by sensing the properties nature. The main application of WSN sensors are used to monitor physical or environmental conditions, such as temperature, pressure and sound etc. and pass their data through the network to a main location.[4] To effectively collect and process the data and information at IoT end nodes, a low-cost data acquisition system is necessary in IoT based information systems. For long-term industrial environmental data acquisition uses WSN (Wireless Sensor Network) [2].The network of node that cooperatively sense and may control the environment, enabling interaction between persons or computers and the surrounding environment were described as a WSN.

In this paper, a new method of environment monitoring system based on a WSN technology is proposed. A WSN can generally be described as a network of nodes that cooperatively sense and control the environment, enabling interaction between persons or computers and the surrounding environment. Today's WSNs includes sensor nodes, actuator nodes, gateways and clients. A large number of sensor nodes are implemented randomly inside or near the monitoring area (sensor field), with the help of self-organization. The collected data transmit along to other sensor nodes by hopping are done through sensor nodes. To get to the gateway node after multihop routing, and finally reach the management node through the internet or satellite, monitored data is handled by multiple nodes, all this process is done during transmission. The working of user is to configure and manages the WSN with the management node, publish monitoring missions and collection of the monitored data.

Figure1: Concept of Internet of Thing

Internet of Things is the future technology of connecting entire world in together. All objects, sensors connected to share the data obtained from various locations and process the data according to the applications. According to the Experts IoT will consist of 50 billion objects in 2020. IoT refer a wide variety of devices such as heart monitoring implants for environmental monitoring.

2. LITERAETURE SURVEY

Mihai T. Lazarescu their paper published "Design of a WSN Platform for Long-Term Environmental Monitoring for IoT Applications" This paper gives the information about constructing all phases of Environmental monitoring IoT applications based on WSN. It starts by analyzing the application requirements and defining a set of specifications for the platform. To guide most nodes and platform solution and the implementation decisions, a real-life, implementation is choosed. The purpose of this paper to guide the specification and development of WSN platforms for other IoT application domains. [1].

S. C. Panchalin their paper published "a long-term monitoring in lot environment for WSN industrial applications". The application of long-term environmental monitoring IoT applications is to design and implementation of a complete WSN platform. This is the purpose of this paper. The importance of WSN is low maintenance, low cost, fast deployment, high number of sensors, long lifetime. A WSN can sense, compute, and communicate with other devices for getting local information, also used to make global decisions about a physical environment. Today, there is evolution of WSNs over the Internet of Things (IoT). IoT is a set of technologies that enable a wide range of appliances; devices, and objects, things to interact and communicate among themselves .The active element that provides the information are included in the IoT. [2]. Kondamudi Siva Sai Ram, A.N.P.S. Guptain their paper published "IoT based Data Logger System for weather monitoring using Wireless sensor networks" the paper is based on solution for monitoring the environmental conditions at some place & makes the information visible anywhere in the world. The technology included in the Internet of Things (IoT), which is an advanced and efficient solution for connecting the things to the internet & to connect the entire world of things in a network. The things in this paper refer to automatic electronic equipment, sensors. The system perform monitoring & controlling the environmental conditions like temperature, humidity, light intensity, CO2 level sensors & send the information to the web page. The data collected from the implemented system is accessible through internet from anywhere in the world. [3].

Siyuan Chen, Yu Wang in their paper published "Capacity of Data Collection in Arbitrary Wireless Sensor Networks" this paper gives information about the theoretical limitations of data collection in terms of possible & achievable Capacity. The sensor network is not implemented uniformly, in most of practical sensor applications. In this paper we deliver the upper & constructive lower bounds for data collection capacity in arbitrary networks. The proposed data collection method can lead to order performance for any arbitrary sensor networks. [4].

3. METHDOLOGY

In this proposed architecture to reduce standby power consumption and to make the room easily controllable with Temperature & Other sensors to monitor the environmental parameters. To realize the proposed architecture, we

proposed and designed the wireless communication. Wireless is a low-cost, low-power. The low cost technology allows, WSN's can be implemented in wireless control and monitoring applications. The low power facility allows longer life with smaller batteries, Sensors continuously monitors the parameters. Microcontroller continuously monitors the Sensors input signal. The proposed system consists of sensors and wireless sensor network. The sensor performs the sensing functions that are collecting data from different sensors. Such as temperature, light, humidity, gas, rain etc. The processor performs multiplexing i.e. multiplexing the data obtained from different type of sensors and send this data on the display in symbolic and mathematical form.

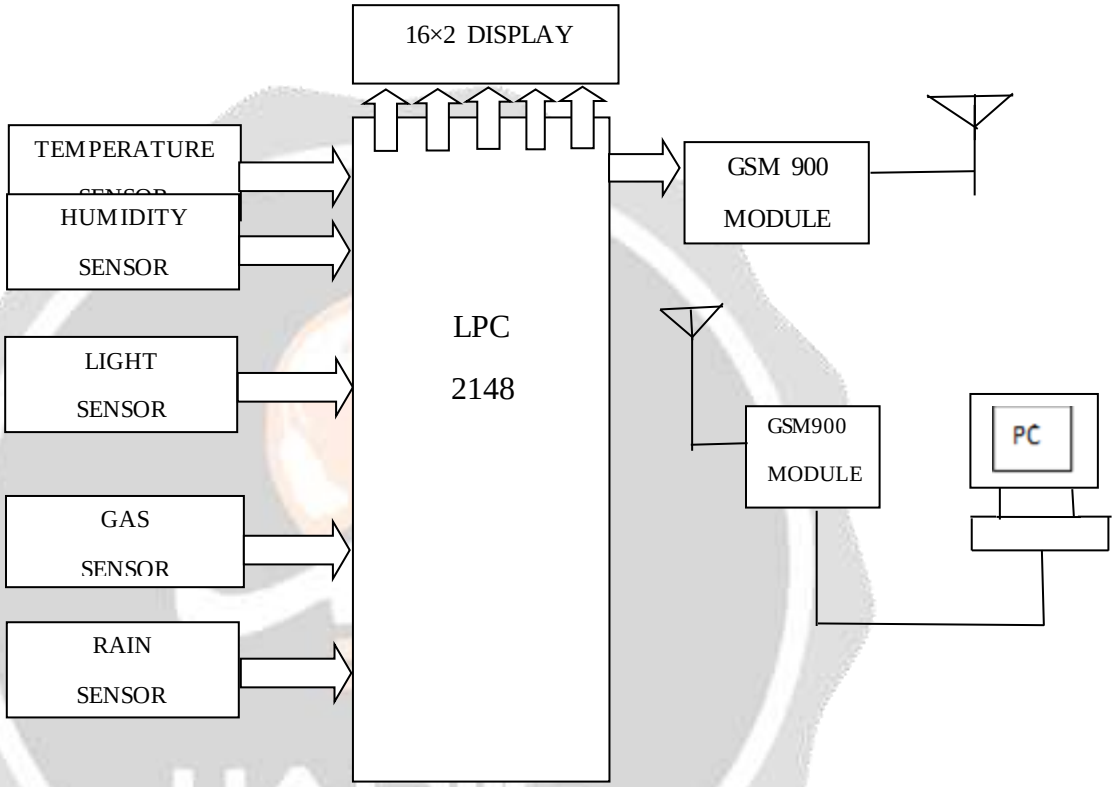

Figure 2: Block Diagram of System

1. To implement WSN interfaced with Processor using

1) Humidity Sensor.

2) Temp Sensor.

3) CO2 Sensor.

4) Light Sensor.

2. To implement IoT system to monitor sensor data.

4. SYSTEM SPECIFICATION

1. I/P Voltage (Battery):12V.

2.16×2 LCD Display.

3. GSM & LCD Voltage: 5V

4. Processor run at: 3.3V

5. Wireless Communication.

6. Compact Design.

7. IoT to assist in environmental protection.

8. Continuous availability of sensor data.

9. Low power consumption.

10. IoT supports the interaction between 'things'& allow more complex structures.

5. RESULT DISCUSSION:

5.1 Controlling and monitoring:

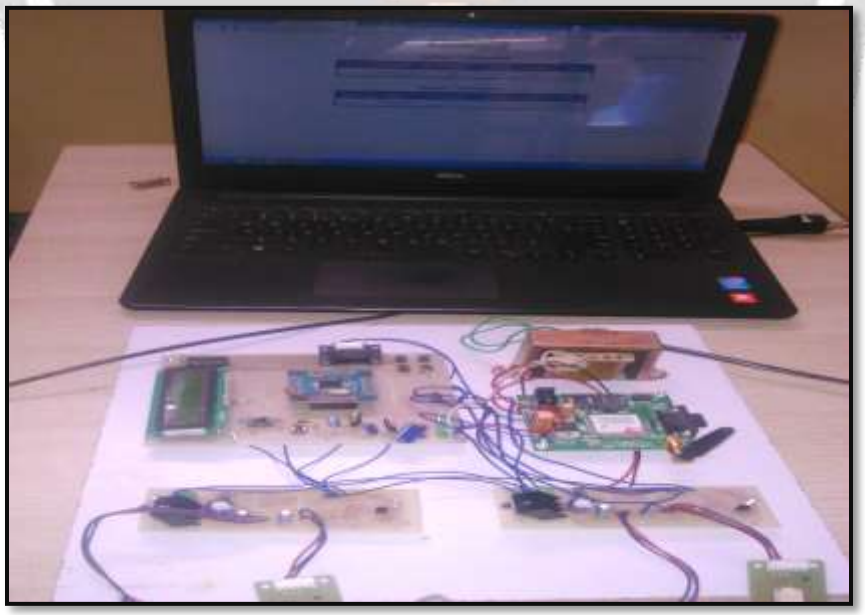

Figure 3: Web Page for monitoring and controlling

The 5 sensors perform the sensing function & after finishing sensing function the reading get from the sensors is displayed on the pc screen. The image of the setup is shown in above figure. The data collected from the sensors are continuously updates on the pc screen each 5 seconds. That means continues updates according to the environment changes we can get. The table below shows the observations:

Parameters	**Output**
Temperature sensor(LM35)	43.58 (high)
Humidity Sensor(SY-HS220)	30.25(medium)
Light Sensor(LDR)	25.30(sunny)
Gas Sensor(MQ 135)	32.58(low emission)
Rain Sensor	90.33(heavy rain)

Table 1: Theoretical observation table.

6. CONCLUSION

With the help of IoT we can get the status of all the sensors from anywhere in the world. Across this glow continuous Availability of sensors data can provide signals or alarm beforehand for any environment disasters.

7. REFERENCES

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