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Smart Environment Data Monitoring System

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ABSTRACT: Air pollution is a growing issue these days. It is necessary to monitor environment and keep it under control for a better future and healthy living for all. Here we propose an environment monitoring system that allows us to monitor and check live environment in particular areas through IOT. System uses air sensors to sense presence of harmful gases/compounds in the air and constantly transmit this data to microcontroller and reports it to the online server over IOT. The sensors interact with microcontroller which processes this data and transmits it over internet. Keywords: dust detection; temperature monitoring ; humidity monitoring.

I. INTRODUCTION

Recently, with the increasing interest in the Internet of Things (IoT), the interest in cellular IoT is growing such that the LTE Advanced Release-13 standard of 3GPP (the 3rd Generation Partnership Project) introduced a Narrowband IoT technology to provide services over wide. Meanwhile, as the damage from air pollution due to fine dust and ozone increases continuously, interest in the atmospheric environment is increasing rapidly around the world. According to the recent study [3], fine dust is mainly caused by combustion of fossil fuel, and it is known to act as a main factor causing or exacerbating various lung diseases in the human body [3]. Ozone is caused by the photochemical reaction of NO2 and volatile organic compounds (VOCs) emitted from automobile exhaust gas and the like due to strong sunlight, which causes respiratory system diseases [4]. Hence, there is a growing need for an atmospheric environment monitoring system capable of effectively measuring and analysing contaminants in the air as the hazard of air pollution becomes serious.

For this purpose, a government-led air monitoring system in most countries is installed to provide information on air pollution to users by observing the atmospheric environment, and air pollution information observed through the National Ambient air quality Monitoring Information System (NAMIS) of Korea Environment Corporation is also provided to the public. However, the NAMIS consists of high-cost atmospheric environment measurement equipment, and thus, it is very expensive to build a new atmospheric environment measurement station. Therefore, there is a desperate need for an atmospheric environment monitoring system that can effectively provide atmospheric environmental observation results to public facilities such as kindergartens and schools, or homes and commercial facilities in the area where the NAMIS' atmospheric environment measurement station is not operated. In this paper, we propose an IoT-based atmospheric monitoring system using LTE mobile communication network (Long Term Evolution) in order to solve the problems such as cost and the restrictions in the installation place and space of existing atmospheric environment measuring equipment. The proposed system has been developed as a prototype that measures various air environment information including fine dusts and ozone in the atmospheric environment measuring device and transmits the packet including the measured information as well as the location and operation status of the measuring device to the LTE network and analyses them on the server.

II. SYSTEM DESIGN AND IMPLEMENTATION

The following requirements are considered for the proposed IoT-based atmospheric monitoring system. 1) It is necessary to be able to access the mobile communication network that provides wide coverage in order to measure the atmospheric environment information without restriction on the place or location and to transmit it to the server. 2) In addition, it is capable of measuring various types of air environment information including fine dusts, and also provides a visualized result form so that users can conveniently use the results through web or smart phone application.

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III. EXISTING SYSTEM

There are many existing works on evaluating and comparing physical activity monitors. Some of them evaluated a set of monitors on their accuracy of step counts, and the others on their accuracy of energy expenditure. Most of the existing works evaluated accuracy by testing the monitor's performance during pollution, and there were also a small part of these works can be improved by using IOT technology in proposed system.

Disadvantages

- Low communication
- Not efficient

IV. PROPOSED SYSTEM

The goal of building a smart city is to Improve quality of life by using technology to improve the efficiency of services and meet residents needs. Information and Communication Technology allows city officials to interact directly with the public to tell what is happening in the city, how the city is evolving, and how to enable a better quality of life. We are going to monitor the environment by using IOT technology. Consider an area that is being surveyed for estimating how much the area is affected by pollution. The constituents of air along with its proportion are calculated and if it is higher than normal then the officials are intimated about it.

Advantages

- User friendly
- High reliability
- Low power consumption

V. SYSTEM CONFIGURATION

Hardware used:

- Microcontroller
- Temperature Sensor
- Power supply
- WIFI

Software used:

- Embedded C
- Arduino compiler
- Proteus VI

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BLOCK DIAGRAM

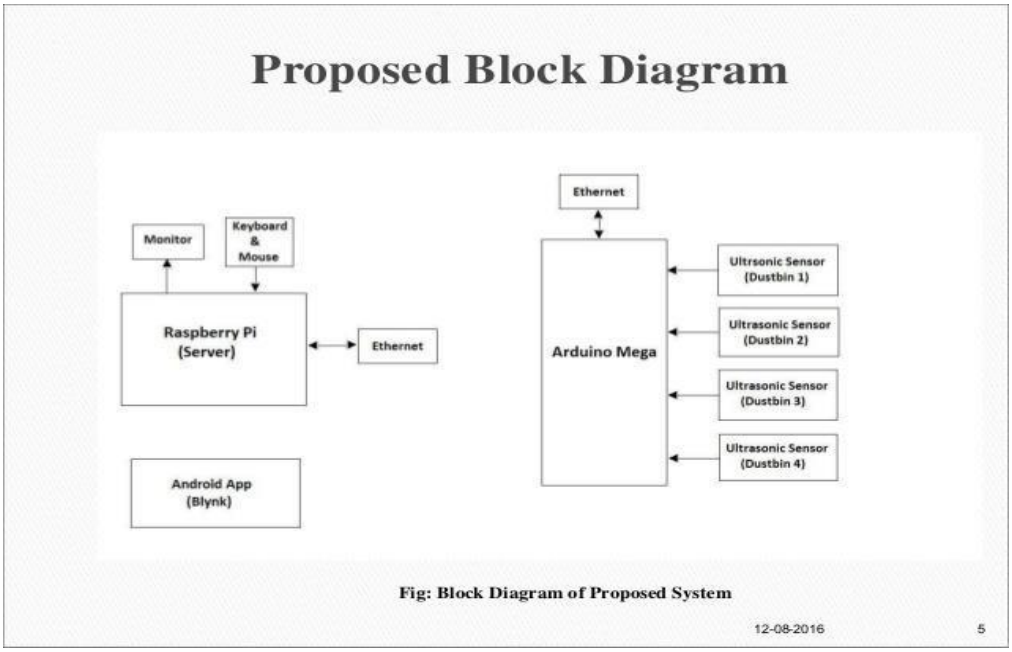

Fig: Block Diagram of Proposed System

VI. CONCLUSION

In this paper, we have proposed an IoT-based atmospheric dust monitoring system, which is developed by a prototype with a small size low cost and eco-friendly air environment measurement device connected by the LTE network, and the atmospheric environment analyser. The development system has no restriction on installation location or installation space. The development system observes the atmospheric environment elements similarly, even though it is difficult to directly compare the observation results of the two systems due to the different locations in the measurement sites of the two systems. The development system can easily change measuring sensors, and compatible with various communication systems such as the WIFI communication network for the transmission of the measurement results. It is expected that the development system will be effectively utilized in atmospheric environment based services by installing the developed measurement devices at public facilities such as schools and homes.

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