Iot-Enabled Home Environment Control for Next Generations

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Abstract
People have become more conscious of the environment in recent years. This awareness drives the need for a dependable environmental monitoring system. A system for monitoring the environment's air quality is also employed in industry. In heavy industrial or mining, Several harmful gases have the potential to contaminate the air. Users can monitor temperature and humidity levels as well as detect the presence of hazardous gases in both indoor and outdoor spaces with the help of the suggested module. The information is accessible to the user from anywhere in the globe with an internet connection thanks to the web server's storage of it. The suggested work develops a web application that provides users with access to essential data. The user also has the option of configuring a notification for significant changes in sensor data. The proposed system is accurate, user-friendly, and less expensive than other systems that are closely linked. Additionally cloud-based, it has modules for data monitoring and visualisation. In stages, the system has been assessed. After evaluating all features under various circumstances, it exhibits a high level of accuracy and dependability.

1. INTRODUCTION

The Internet of Things is presently the hottest IT topic. Through a wired or wireless internet connection, all terminal devices can transfer data using the Internet of Things (IOT). All terminal devices' ability to collect more data and information for more application services is enabled by sensor control. The small terminal consumes little power and is inexpensive. A wireless system with low power consumption is necessary because manganese is necessary for a network. An X-Bee network is used to transfer the data. It is a data-carrying wireless communication module collecting capabilities that may be used with X-Bee items of several types, each with a particular antenna type function. The Zigbee communication protocol is supported by the X-Bee.The main characteristics are inexpensive, quick, and power-efficient network technology support. The sensor is linked to the end device, which controls, transmits, and receives data. As a high quality of life is continued, so do the requirements for the living environment, which are becoming safer, cosier, automated, and intelligent. The first category of environmental monitoring system research includes a distributed temperature and humidity environment monitoring system based on CAN bus and RS-485 bus. The second category of environmental monitoring systems research is wireless and includes wearable intelligent environment parameter acquisition systems using IOT technology. By utilising cutting-edge computer technology, network communications technology, intelligent control technology, wireless sensor network technology, and naturally combining a variety of home appliances, a functional home environment can be created.

The term "Internet of Things" (IoT) has been in use for over fifteen years. Despite the efforts of research organisations and forward-thinking corporations, The Internet of Things has not yet fully arrived, it must be said. This is primarily caused by the absence of a uniform IoT architecture and a lack of agreement on defining protocols and standards for all IoT components. An exciting new technology called the Internet of Things (IoT) has the potential to revolutionise communication and internet technologies. The "Internet of Things," to put it simply, is the network of "things" that connects living and nonliving "things" together. The object oriented paradigm has historically viewed everything in the world as an object, whereas the internet of things paradigm views everything as an object. It is regarded as a smart object that enables them to interact both physically and virtually via internet technology. The Internet of Things (IoT) facilitates connections between people and things at anytime, anywhere, with anything, and with anybody through the usage of any path/network and service.

2. LITERATURE SURVEY

In this article [1], we demonstrate how the Internet of Things may be used to monitor typical residential conditions with a low-cost ubiquitous sensing device. Integrated network architecture and connecting procedures are provided for precise parameter measurement by smart sensors and data transfer via the internet. A self-control mechanism for better device operation was made available by the longitudinal learning system during the monitoring stage. The monitoring system's structure consists of widely dispersed sensing devices as well as a data-gathering, context-aware information system. It is promising that the proposed integrated network architecture has a 97% transmission reliability for sensing data. The prototype was evaluated by creating real-time graphical data instead of using a test bed scenario.

In this article [2], the goal of a smart home is for information processing to be completely incorporated into everyday items. This introduces the requirement to monitor commonplace items and the state alterations brought on by user engagement. Recognizing the user's activities, circumstances, and other details is made possible by this information. In this research, we use 42 everyday things to show off wireless sensor networking using the ZigBee protocol (embedded with 81 basic state change sensors of 8 sensor categories). The technology was tested in a real-world setting with ambient noise. With a system precision of 91.2% overall and a recall of 98.8% for typical objects, the sensing module has demonstrated promising results. When the signal strength at 8 distinct locations in a home environment was assessed, it was found to be 97.5% higher than the allowed level of >10 dB to achieve reliable data transfer. The transmission-reception range in an indoor environment was found to be 33 m for a single wall obstruction and 19 m for multiple wall impediments.

3. EXISTING METHOD

The development of technology is an ongoing process in the existing system. It is a huge contribution to society to be able to create a product employing modern technology that will make the lives of others better. In this study, a cell phone-based, low-cost, flexible, and secure home automation system is created and put into use. The home appliances are wired through relays to the input/output ports of the standalone arduino BT board, which serves as the design's foundation.

The arduino BT board and the phone can communicate wirelessly. With just a few small changes to its core, this system's low cost and scalability make it possible to control a wide range of gadgets. Only authorised users are allowed access to the home appliances thanks to password protection.

DISADVANTAGES OF THE EXISTING SYSTEM

• High cost

• Inability to access data

• We did not receive notification Alerts

4. PROPOSEDMETHOD

In the industrial sector, an air quality monitoring system is also used. There is a chance that the air in heavy industrial or mining settings could be contaminated by a variety of harmful gases. In such dangerous conditions, an environmental monitoring system might be able to save the workers' lives. There are issues with data collection, data management, connection, and power consumption with such a massive sensor deployment. IoT technology is perfect for this kind of need.

In order to effectively monitor environmental changes, the IoT-based system described in this study uses sensors, microcontrollers, and IoT technology. Users of the suggested module can monitor temperature and humidity levels as well as detect the presence of hazardous gases in both indoor and outdoor environments. The information is accessible to the user from anywhere in the globe with an internet connection thanks to the web server's storage of it. The suggested work develops a web application that provides the user with crucial information.

It is possible for the user to configure a notification for significant changes in sensor data. Comparing the proposed system to other systems that are similarly linked, it is more reasonably priced, accurate, and simple to use. It also uses the cloud and has modules for data visualisation and monitoring. The system was assessed in stages. After putting all functions to the test under various circumstances, it exhibits a high level of accuracy and dependability.

A system for tracking ambient air quality can also be used in industry. There is a chance that many hazardous gases could pollute the air in heavy industry or mining. In such hazardous conditions, an environmental monitoring system may be able to save the lives of employees. Data collection, data management, connectivity, and power consumption issues arise with such large-scale sensor deployments. IoT technology is ideal for this type of need. This article suggests an IoT-based framework for tracking environmental change that uses sensors, microcontrollers, and IoT-based technology. Users can monitor temperature, humidity, and the presence of hazardous gases both inside and outdoors using the proposed module. The user can access the data via an internet connection from any location in the world because it is saved on the web server. The proposed work creates a Web-based programme to give the user essential information. Alerts for significant changes in sensor data can also be configured by the user. The suggested system is more affordable, accurate, and user-friendly when compared to other systems in the same field. Along with being cloud-based, it has modules for simple monitoring and data visualisation. At various points, the system has been assessed. After being tested for all of the functions in numerous settings, it demonstrates a high level of accuracy and dependability.

ADVANTAGES OF THE PROPOSED SYSTEM

1) Simple installation

2) Direct cellular phone updates

3) Accurate pollution surveillance

4) Distance-based surveillance

CONCEPTION OF A SYSTEM

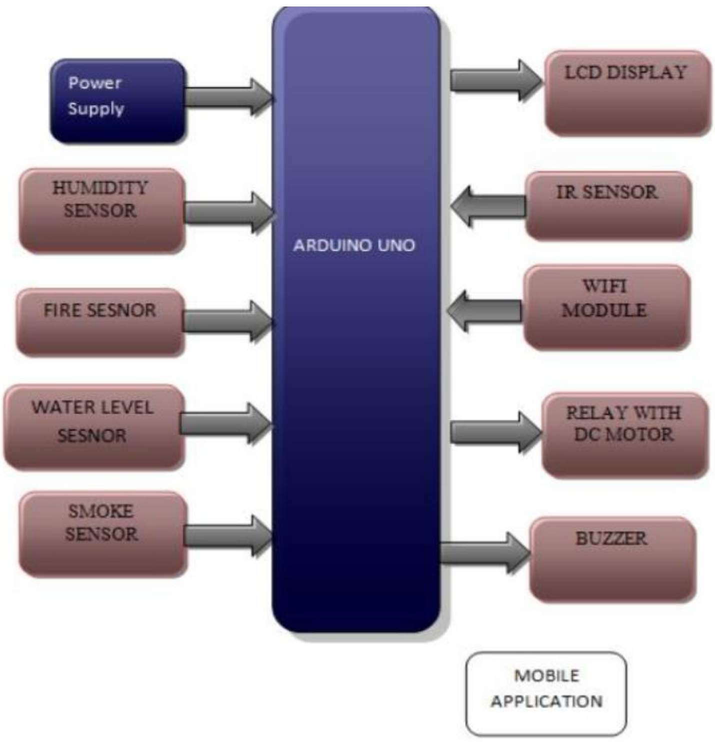

Fig: 5.1 Block Diagram

RESULTS

A device's various parts are connected by these links. Numerous different input options are available for configuring the power supply. If several sources of power are available at once, the power manager will switch between them to keep a constant supply. The battery will be charged by the solar cell or the main AC supply, which will also power the remaining components. The power manager will switch to the battery for continued operation in the event of a mains AC power failure or if there is no electricity in the solar cell at night. The power management system's solar cell connection is connected to a buck-boost converter. The buck-boost converter converts any voltage from 3 to 18 volts to a fixed 15 volts because the voltage generated by the solar cell is not constant. This 15V is sent to the system that charges the batteries. A lithium-ion 1500 mAh 12.5 volt rechargeable battery powers the gadget.

A battery charge protection circuit has been incorporated into the system to stop overcharging or total battery discharge. It effectively lowers the voltage by using two buck modules. The sensors require 5 volts and 12 volts, while the ESP8266 and arduino boards need 3.3 volts. The ESP8266 is the device's central processing unit (CPU). It is in charge of collecting sensor data, formatting it, and transmitting it to the sensor gateway. It is possible to chain the IOT mux if more sensors are needed. Because different sensors require different voltage levels, the power controller for the sensor power supply is diverse. The power controller can also turn off the power to any sensors that are not in use, helping to conserve as much electricity as possible.

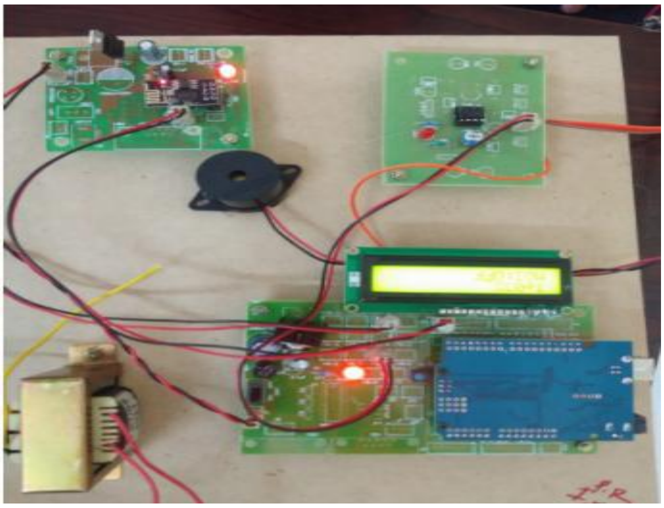

Fig.8.1 Hardware kit image.

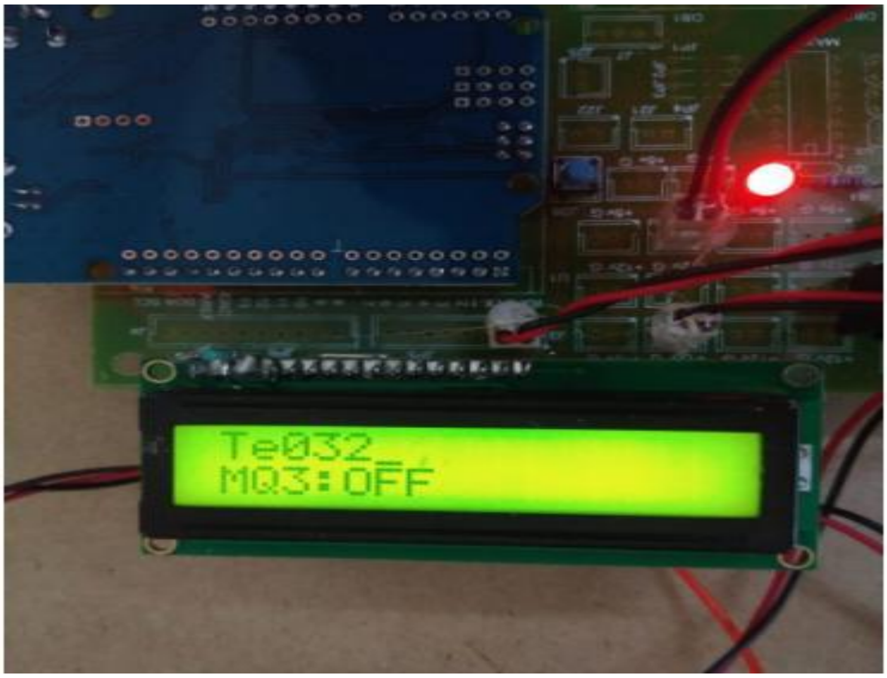

Fig.8.2. LCD display parameters.

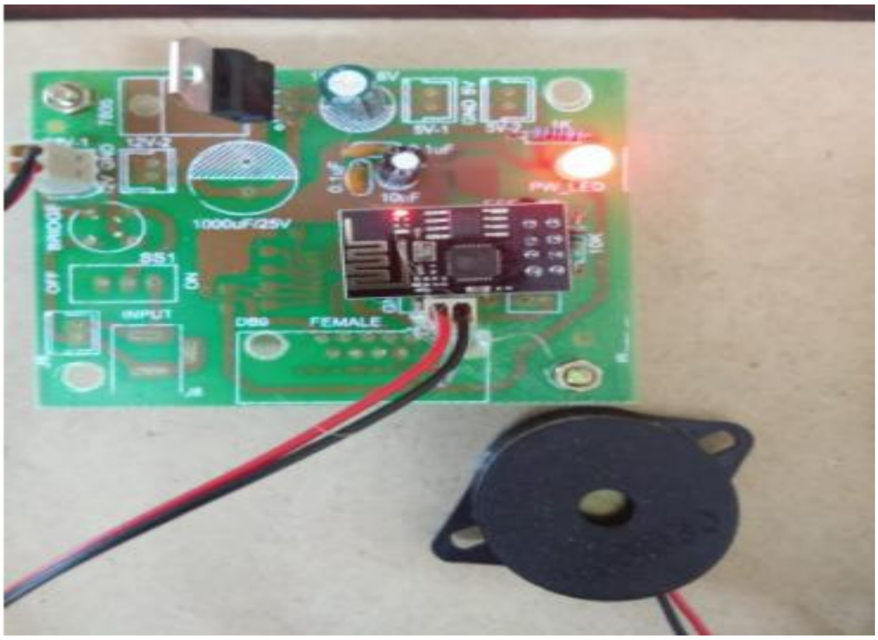

Fig.8.3: WIFI module.

CONCLUSION

This Environment Monitoring System can be used to monitor a range of environmental indicators because it is built using inexpensive, easily accessible components. It is simple to modify this system for usage either inside or outside. The suggested system has undergone numerous tests with various parameters, and each test has been successful. Furthermore, this device can connect to the gateway through Bluetooth, Infrared, or Wi-Fi without requiring significant design changes, making it suitable for a variety of situations. Because of this, the technology is adaptable and scalable. The study effort will introduce a number of machine learning techniques that will provide users with extra information in the future.

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