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A REVIEW OF THE IOT-BASED SYSTEM FOR ENVIRONMENT MONITORING

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ABSTRACT

The IOT-based environment monitoring system is reviewed in this study. The primary goal of the suggested system is to use the internet to supply environmental characteristics at a remote location. For environmental and ambient monitoring applications, the suggested system offers a practical and simple solution. Using low-power wireless sensors that are connected to the Internet and transmit their readings to a central server, the system simulates the monitoring of environmental and ambient parameters. Lastly, any Internet-connected device can remotely view data saved on the base station from anywhere in the world. the creation of a cyber-physical system that keeps an eye on the ambient or environmental conditions in distant places. The resulting system makes it possible to record measurements from anywhere in the world and to view and analyze the collected data from any Internet-connected device. From the physical level, which consists of sensors and the communication protocol, to the cyber level, which includes data management and storage, this study covers the entire solution, a cyber-physical system. By offering a clearly defined architecture that streamlines data transfer from sensors with varying measurement capabilities and boosts supervisory efficiency, it solves the issues of system integration and interoperability.

Key words: Internet of Things, Internet, distant location, wireless sensors, and cyber-physical system.

INTRODUCTION

1. There are numerous reasons why weather monitoring is important. Monitoring the weather is necessary to keep crops growing healthily and to guarantee a safe working environment in industries, etc. The advancement of technology has made it easier than in the past to read environmental characteristics. Miniaturized electrical devices called sensors are used to measure environmental and physical characteristics. The system will be quicker and use less power if the sensors are used to monitor the weather. The results will be accurate. There is no denying the significance of environmental monitoring in the modern day. Wireless sensor networks (WSNs), whose main function is to observe the physical environment and record physical quantities that characterize it, were initially applied in this field. WSNs are vast networks of processing-capable, wirelessly communicative, resource-constrained sensors that carry out various application goals inside a particular sensing domain. In terms of connectivity, the IEEE 802.11 standard has become one of the most widely used wireless technologies. The internet of things (IoT) is becoming a ubiquitous platform and service for consumer electronics as current devices and sensors continue to increase in power, functionality, and cost. IoT makes it possible to connect to almost any number of devices online. As a result, it offers a lot of possibilities for connecting and communicating with people. One of the main uses for wireless sensor networks is environment monitoring. To monitor various environmental characteristics such as temperature, humidity, gasses, pressure, wind speed, and so on, WSNs are made up of a variety of widely dispersed sensors. Buildings that use wireless ambient sensors may become more energy-

efficient. Sensor nodes, which are inexpensive, low-power devices, make up WSN. The main issue in using these sensors for extensive environmental monitoring is energy efficiency.

2. LITERATURE SURVEY

3. With an effective range of 10 to 100 meters and a typical communication rate of less than 1 Mbps, Bluetooth wireless technology is a low-cost, short-range radio technology that does away with the need for proprietary cable connecting devices like laptop PCs, mobile PCs, PDAs, cameras, and printers. Bluetooth makes use of IEEE 802.15.1 specifications. One of the protocols created to improve the capabilities of wireless sensor networks is ZigBee. Low cost, low data rate, comparatively short transmission range, scalability, dependability, and adaptable protocol architecture are some of ZigBee's features. The IEEE 802.15.4 standard serves as the foundation for this low power wireless network technology. ZigBee has a bandwidth of 250 kbps and a range of about 100 meters. Because of their energy-efficient design, ZigBee and other IEEE 802.15.4-based protocols have historically been taken into consideration for sensor network applications. On the other hand, newly created power-efficient Wi-Fi components have emerged as a promising contender in this field with suitable system design and usage model. The transmission range of other technologies, such as Bluetooth, Zigbee, and RFID, is limited. A technique called Radio Frequency Identification (RFID) uses radio waves to wirelessly transmit a serial number that identifies a person or object. In the Internet of Things, RFID technology is crucial for economically resolving problems with object identification. Other communication technologies, such as ZigBee and RF Link, can communicate almost as well as Wi-Fi, but they are limited to peer-to-peer connection and cannot broadcast information.

Table 1 Comparison between different technologies

Specifications	NFC	RFID	Bluetooth	wifi
Maximum coverage range	10 cm	3 meter	10-100 meter	100 meter
Frequency of operation	13.56 MHz	Varies	2.4 GHz	2.4 GHz,5GHz
Communication	2-way	1-way	2-way	2-way
Data rate	106,212,424kbps	varies	22 Mbps	144 Mbps
Applications	Credit card related payments-ticket booking	EZ-Pass tracking items	Communication between phone and peripherals	Wireless internet

Low-power Wi-Fi promises multiple years of battery lifetime while providing easy integration to existing infrastructure with built-in IP-network compatibility. Wireless Fidelity (Wi-Fi) is a networking technology that allows computers and other devices to communicate over a wireless signal.

3.1. Internet of Things (IOT)

4. The ability to connect sensors, actuators, or any other device to the Internet is referred to as the "Internet of Things" (IoT). It has the potential to drastically alter how we live our daily lives and engage with gadgets like smart meters, HVAC systems, security sensors, and home appliances. The Internet of Things' ambition calls for connectivity to small, non-rechargeable battery-powered devices in addition to consumer gadgets and household appliances. These tiny devices, which are frequently different kinds of sensors and actuators, must be able to run dependably on batteries for years even when there is a lot of interference. The Internet of Things is a

technological revolution that symbolizes how communications and computing will develop in the future.

5. PROPOSED SYSTEM

6. All of the sensors and equipment in the suggested system can be connected to the microcontroller, which serves as the system's primary processing unit. The microcontroller may control the sensors to extract data from them and process the All of the sensors and equipment in the suggested system can be connected to the microcontroller, which serves as the system's primary processing unit. The microcontroller may control the sensors to extract data from them and process the

1. analysis with the sensor data and updates it to the internet through Wi-Fi module connected to it.

1.1. LPC1768

2. The LPC1768 microcontroller is a good fit for the system that has been put into place. The microcontroller should use less power because our suggested system is a low-power consumable solution. The ARM Cortex-M3-based LPC1768 microcontroller is designed for embedded applications that need low power dissipation and a high degree of integration. In addition to using Harvard architecture with distinct local instruction and data buses and a third bus for peripherals, the ARM Cortex-M3 CPU has a three-stage pipeline.

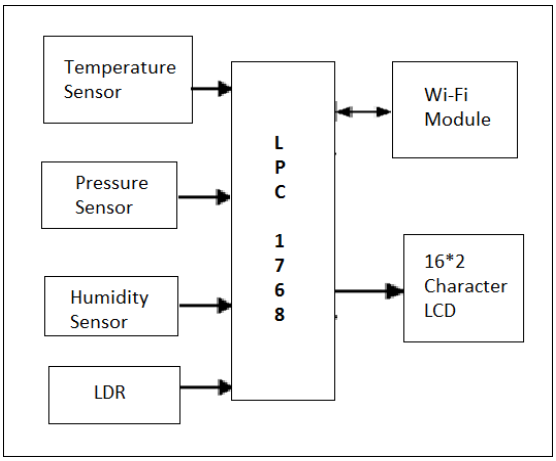

Figure 1 Block diagram

2.1. Wi-Fi Module

3. The ESP8266 Wi-Fi module has an integrated TCP/IP protocol stack. in order for any microcontroller to be able to connect to a Wi-Fi network. Any microcontroller must use the UART interface to communicate with the ESP8266, which is a preprogrammed SOC. It requires a 3.3v supply voltage to function. In order to configure the module in client mode, the microcontroller must be programmed to transmit the AT commands in the necessary order. Both client and server modes are compatible with the module. We will receive a single IP address that is reachable within its local network whenever it connects to a Wi-Fi network. In addition to UART ports, the module has two GPIO pins. By using the two UART pins as data lines and setting up the two GPIO pins as control lines and clock signals, it also has an integrated SPI protocol. Additionally, it has 1MB of on-chip flash memory. It has an internal power management unit with all PLLs and regulators.

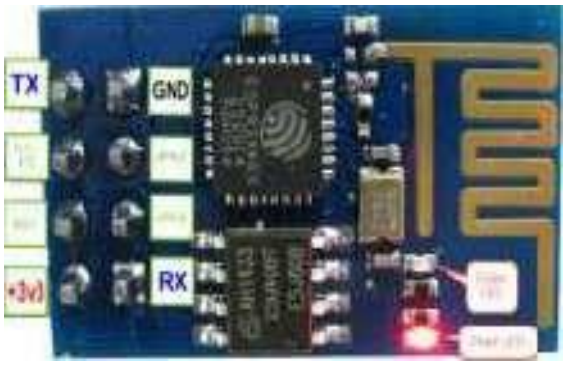

Figure 2 ESP8266 Pin details

3.1. Sensors

4. The LDR, pressure, temperature, and humidity sensors make up the system. The main environmental parameters, such as temperature, pressure, relative humidity, and light intensity, will be measured by these four sensors. Each of these sensors will provide an analog voltage that corresponds to a specific weather factor. These analog voltages will be transformed into digital data by the microcontroller.

5. CONCLUSION

6. The system may be utilized in a variety of monitoring applications, does away with cumbersome solutions, and has the ability to log data in areas with Wi-Fi network connectivity. It makes use of sensors that measure the surroundings and transmit data to an Internet of Things platform. It was demonstrated how to create a CPS that uses the current IEEE 802.11 infrastructure to monitor environmental factors. By attaining low power consumption and providing battery lifetimes of several years, the communication protocol and node design aim to improve the security and dependability of the suggested system.

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