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INTERNET OF THINGS ENABLED REAL TIME WATER QUALITY AND WEATHER MONITORING SYSTEM

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ABSTRACT:

In order to develop a new convenient online monitoring system for Internet of things, an online monitoring system based on cloud computing is designed. Aiming at the importance attached to the outdoor environment, design and development of the outdoor environment monitoring system based on NB-IOT and sensor technology. The real-time system by a plurality of sensor nodes collects outdoor environment parameters, send through efficient wireless communication technology. This paper presents an intelligent system which has highly efficient, low cost, low power consumption, air, sound and water quality real-time monitoring and quality parameters show on the webpage as well as on device LCD display and send to mobile android app through IOT technology. The system design by ARDUINO UNO R3 microcontroller based multisensory connected device and also connected a wireless modem to transmit the sensed data to the cloud server.

INTRODUCTION: The internet of Things (IoT) is viewedas an innovation and financial wave in the worldwide data industry after the Internet. The IoT is a wise system which associates all things to the Internet with the end goal of trading data and conveying through the data detecting gadgets as per concurred conventions. It accomplishes the objective of keen recognizing, finding, following, observing, and overseeing things [1]. It is an augmentation and extension of Internet-based system, which grows the correspondence from human and human to human and things or things and things. In the IoT worldview, many articles encompassing us will be associated into systems in some shape [4]. It is a current correspondence paradigm that envisions a near future, in which the objects of regular day to day existence will be outfitted with microcontrollers, handsets for computerized correspondence, and reasonable convention stacks that will make them ready to speak with each other and with the clients, turning into a vital piece of the Internet [5]. The IoT idea, consequently, goes for making the Internet much more immersive and unavoidable. Moreover, by empowering simple get to and association with a wide assortment of gadgets, for example, for example, home apparatuses, reconnaissance cameras, checking sensors, actuators, showcases, vehicles, et cetera, the IoT will encourage the advancement of various applications that make

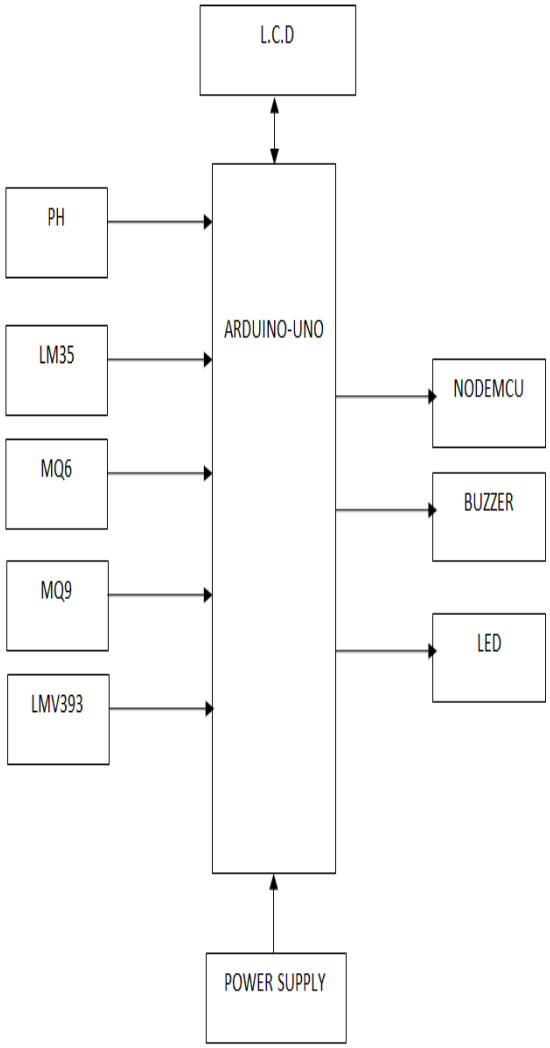
utilization of the possibly gigantic sum and assortment of information created by such questions give new administrations to subjects, organizations, and open organizations. This worldview in reality finds application in a wide range of areas, for example, home mechanization, modern robotization, therapeutic guides, versatile human services, elderly help, clever vitality administration and brilliant networks, car, traffic administration, and numerous others [6]. Now coming the main topic, Environmental issues like environmental change have gotten much consideration as of late, and natural checking make us ready to pick up an expansive comprehension of regular environmental forms. Environmental monitoring procedures is a basic assignment for both researchers and specialists. From past decade environmental data has gotten an extremely quick advancement and wide applications in checking environmental processes. Environmental informatics includes particular natural issues identified with the uses of software engineering and frameworks building methods, administration information framework, and ecological data framework, which were intended to gather, process and trade information since the 1980s. Automatic data acquisition has been quickly expanded by assortment of advancements, for example, remote detecting, land data framework, worldwide situating framework et cetera. From the 2000s, the multiplication of programmed information securing innovations, for example, radio recurrence recognizable proof and sensor advances, was acquainted with make choice emotionally supportive networks and coordinated ecological data systems and furthermore conveyed new essentialness to environmental monitoring. The fast advancement and wide utilization of natural informatics has huge enhanced environmental monitoring and viability. In the most recent decade, the internet of things (IoT), an idea depicting how the internet reaches out into people groups' regular daily existences through a remote system of particularly identifiable objects[1], is anticipated to have the capacity to advance the whole procedure of environmental monitoring[2]. Present developments in innovation principally concentrate on controlling and checking of various exercises. These are progressively rising to achieve the human needs. Most of this innovation is centered around proficient observing and controlling diverse exercises.

LITERATURE SURVEY:

There are several WSN design schemes available to log the sensor data. An example of WSN systems is illustrated in automation in construction [9] where the authors explain a web-based building environmental monitoring system using WSN. A substantial example of integrating Thingspeak cloud with a wireless framework is explained in automotive monitoring systems [10] where the data collected from an array of sensors are updated over Thingspeak cloud using Beagle Bone Black board. There has been an excellent tutorial type material [3] which clearly explains how to get started with Thingspeak flowed by Arduino IDE (Integrated Development Environment) and Thingspeak integration. An online tutorial on live weather station [11] enriches how to integrate Arduino UNO with Thingspeak cloud without using any internet shield through a C# client application. In another example of WSN [12], authors describes weather cum disaster alert system using Zigbee/IEEE802.15.4 standard that sends the sensor data to a local SQL (Structured Query Language) based server to intimate the status. A robust example of flood forecasting model using WSN is described [13]. A similar flood early warning system, based on

SMS and web is proposed [14] that uses WSN and java programming module. However, very few of them have been successful in updating the collected data over cloud and letting the other client nodes access those data as and when required. Secondly, none of them allow the user access the system to immediately know the current status when he is away from his locality or home. Thirdly, it's convenient to make system computer independent and let the user access the system from mobile phone sitting from anywhere. A good example of instant alert generation scheme of natural disaster is available [15] which uses Arduino GSM (Global System for Mobile Communications) shield to send the alert notification to the users. ZHANG Xiaoshuan et. al suggests a system for precision irrigation for vine's growth by developing a PVIDSS system and provides an efficient way to improve the irrigation efficiency [17]. Limitation-Paper suggests improving the irrigation efficiency, but doesn't discuss any procedure to monitor the values of parameters required to make it more efficient. Aggarwal, Rajan, et al. discusses about one of the major problems for irrigation in an agriculture field is the shortage of water. WSN based weather forecast information using GSM is developed, which is on the bases of data collected from sensors [18]. Limitation-Paper discusses the GSM based WSN system which is licensed network and hence user needs to pay for using the network. Present requirement is license free network where end user need not pay for the use of network. Kuang-Yow Lian et al. proposes a system which monitors the environmental parameters like temperatures, humidity , quality of air and the electric load. The system is implemented using smart phones. The developed system will also be able to measure the vibrations of operating machinery. For intelligent monitoring, ZigBee and Wi-Fi protocols are used.

PROPOSED TECHNIQUE:



Ph sensor is used to measure the acidity quantity of a water , LM35 is used to temperature value of the present atmosphere, MQ6 is sued to measure the of LPG type gases in air, MQ9 is sued to measure the carbon monoxide in air, LMV393 sensor is used to sound pollution in present situation. All the acquired and calibrated values are sent to arduino uno to compare with predefined threshold values in order to find the quality of environment. If any one of the sensor crosses its limits, automatically, a warning buzzer, indication LED will on. Along with that a

continuous monitoring is done through mobile android app. Here, node MCU is used to send the data to android app(Blynk app).

ARDUINO: The Arduino Software (IDE) allows you to write programs and upload them to your board. In the Arduino Software page you will find two options:
1. If you have a reliable Internet connection, you should use the online IDE (Arduino Web Editor). It will allow you to save your sketches in the cloud, having them available from any device and backed up. You will always have the most up-to-date version of the IDE without the need to install updates or community generated libraries.
2. If you would rather work offline, you should use the latest version of the desktop IDE.
Code online on the Arduino Web Edito To use the online IDE simply follow these instructions. Remember that boards work out-of-the-box on the Web Editor, no need to install anything.
Install the Arduino Desktop IDE

LIQUID CRYSTAL DISPLAY: The LCD is used for the purpose of displaying the words which we are given in the program code. This code will be executed on microcontroller chip. By following the instructions in code the LCD display the related words. Fig shows the LCD display.

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Fig. : LCD Display

The LCD display consists of two lines, 20 characters per line that is interfaced with the PIC16F73.The protocol (handshaking) for the display is as shown in Fig. The display contains two internal byte-wide registers, one for commands (RS=0) and the second for characters to be displayed (RS=1). It also contains a user-programmed RAM area (the character RAM) that can be programmed to generate any desired character that can be formed using a dot matrix. To distinguish between these two data areas, the hex command byte 80 will be used to signify that the display RAM address 00h will be chosen Port1 is used to furnish the command or data type, and ports 3.2 to 3.4 furnish register select and read/write levels.

NODEMCU ESP8266:

The ESP8266 series, or family, of Wi-Fi chips is produced by Espressif Systems, a fabless semiconductor company operating out of Shanghai, China. The ESP8266 series presently includes the ESP8266EX and ESP8285 chips. **ESP8266EX** (simply referred to as ESP8266) is a system-on-chip (SoC) which integrates a 32-bit Tensilica microcontroller, standard digital peripheral interfaces, antenna switches, RF balun, power amplifier, low noise receive amplifier, filters and power management modules into a small package. It provides capabilities for 2.4 GHz Wi-Fi (802.11 b/g/n, supporting WPA/WPA2), general-purpose input/output (16 GPIO), Inter-Integrated Circuit (I^2C), analog-to-digital conversion (10-bit ADC), Serial Peripheral Interface (SPI), I^2S interfaces with DMA (sharing pins with GPIO), UART (on dedicated pins, plus a transmit-only UART can be enabled on GPIO2), and pulse-width modulation (PWM). The

processor core, called "L106" by Espressif, is based on Tensilica's Diamond Standard 106Micro 32-bit processor controller core and runs at 80 MHz (or overclocked to 160 MHz). It has a 64 KiB boot ROM, 32 KiB instruction RAM, and 80 KiB user data RAM. (Also, 32 KiB instruction cache RAM and 16 KiB ETS system data RAM.) External flash memory can be accessed through SPI. The silicon chip itself is housed within a 5 mm × 5 mm Quad Flat No-Leads package with 33 connection pads — 8 pads along each side and one large thermal/ground pad in the center. The ESP8266 is a System on a Chip (SoC), manufactured by the Chinese company Espressif. It consists of a Tensilica L106 32-bit **micro controller** unit (MCU) and a **Wi-Fi transceiver**. It has **11 GPIO pins*** (General Purpose Input/Output pins), and an **analog input** as well. This means that you can program it like any normal Arduino or other microcontroller. And on top of that, you get Wi-Fi communication, so you can use it to connect to your Wi-Fi network, connect to the Internet, host a web server with real web pages, let your smartphone connect to it, etc ... The possibilities are endless! It's no wonder that this chip has become the most popular IOT device available. The ESP8266 WiFi Module is a self contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your WiFi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. Each ESP8266 module comes pre-programmed with an AT command set firmware, meaning, you can simply hook this up to your Arduino device and get about as much WiFi-ability as a WiFi Shield offers (and that's just out of the box)! The ESP8266 module is an extremely cost effective board with a huge, and ever growing, community.

CONCLUSION:

In order to realize the remote monitoring of outdoor environmental information, a monitoring system is built based on NB-IOT network. Real time remote monitoring of indoor environment is realized through advanced NB-IOT technology. A real-time display on the phone shows that when the air, water quality is abnormal, the mobile phone will remind the user. Experiments show that the system meets the design requirements, realizes real-time remote monitoring of light intensity, air environment data, historical data query, warning output and other functions.

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