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IOT BASED ENVIRONMENTAL MONITORING AND INSTANT RESPONSE ALERT SYSTEM

1. BURRA RAMA DEVI, 2. B.V.V.S.SRAVANTHI
1. M.Tech, Dept. of ECE, V S Lakshmi Engineering College for Women, Kakinada, A.P
2. ASSISTANT PROFESSOR, Dept. of ECE, V S Lakshmi Engineering College for Women, Kakinada, A.P

ABSTRACT: Climatic change and environmental monitoring have received much attention recently. Man wants to stay updated about the latest of latest weather conditions of any place like a college campus or any other particular building. Since the world is changing so fast so should the weather stations. Here in this paper we present a weather station that is very helpful for smart city challenges. This weather station is based on IoT (internet of things). It is equipped with environmental sensors used to capture distributed meteorological measurements at any particular place and report them in real time on cloud. This paper proposes a novel wireless prototype of a live weather monitoring station that uploads weather information received from the array of sensors to cloud database from a remote location which can be monitored from anywhere. The weather data is recorded, monitored and processed to forecast the different weather events and predict the upcoming disasters. The proposed battery powered cost-effective system can be installed anywhere within a locality or building to serve the maximum people. Further this project is enhanced by inserting voice alerting system using AVR voice IC.

INTRODUCTION: The internet of Things (IoT) is viewed as 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.

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 Thing speak cloud with a wireless framework is explained in automotive monitoring systems [10] where the data collected from an array of sensors are updated over Thing speak cloud using Beagle Bone Black board. There has been an excellent tutorial type material [3] which clearly explains how to get started with Thing speak flowed by Arduino IDE (Integrated Development Environment) and Thing speak integration. An online tutorial on live weather station [11] enriches how to integrate Arduino UNO with Thing speak 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. This paper also proposed a system that tries to implement uniformity in sensor network for handling of the observed data [4]. Limitation- The paper discussed the data handling in sensor networks with pattern mining. The real hardware development and implementation is not discussed. Alippi, Cesare, et al. in this paper the author presents a detailed analysis of the major problems in the wireless sensor networks in terms of energy. The author also discusses that lifetime of a battery is limited and it is the only source of power for sensor nodes. Hence it infers that the major requirement for sustenance of the wireless sensor network will depend upon how efficiently energy is managed in the network [5]. Limitation- Paper focuses on the management of energy in the sensor network. It discusses the policies to use energy efficiently. No hardware complexities are discussed. 25 Lee et al. the author has implemented wearable device based electrocardiogram measurement system for monitoring of health in real time.

PROPOSED TECHNIQUE

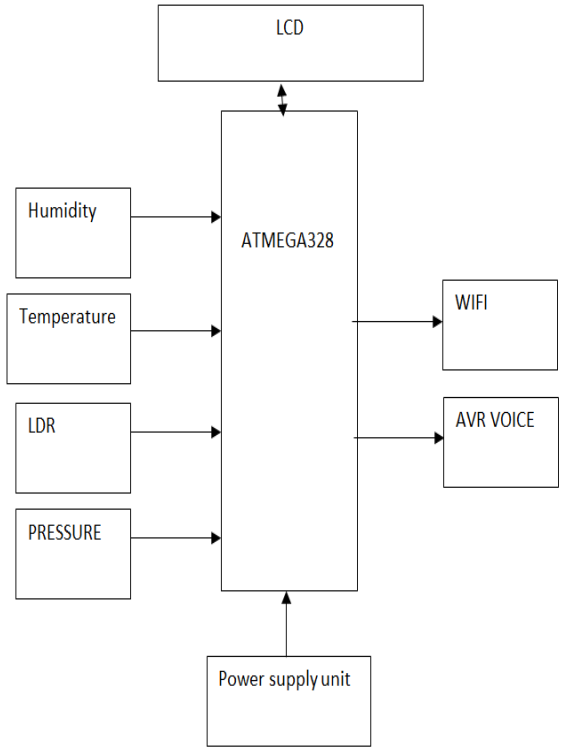


Fig Proposed novel wireless framework of a live weather
monitoring station and disaster alert system

This circuit is designed to record the voice signal. The microphone is used to pick up the voice signal. Then the signal is given to APR 600 multi section sound record and replay IC. APR 9600 is a low cost high performance sound record/reply IC incorporating flash analogue storage technique. Record sound is retained even after power supply is removed from the module. The replayed sound exhibits high quality with low noise level. Total sound recording time can be

varied from 32 seconds to 60 seconds by changing the value of a single resistor. The IC can operate in two mode such as serial mode and parallel mode.

INTERNET OF THINGS:

IoT (Internet of Things) is an advanced automation and analytics system which exploits networking, sensing, big data, and artificial intelligence technology to deliver complete systems for a product or service. These systems allow greater transparency, control, and performance when applied to any industry or system. IoT systems have applications across industries through their unique flexibility and ability to be suitable in any environment. They enhance data collection, automation, operations, and much more through smart devices and powerful enabling technology.

ARDUINO UNO:

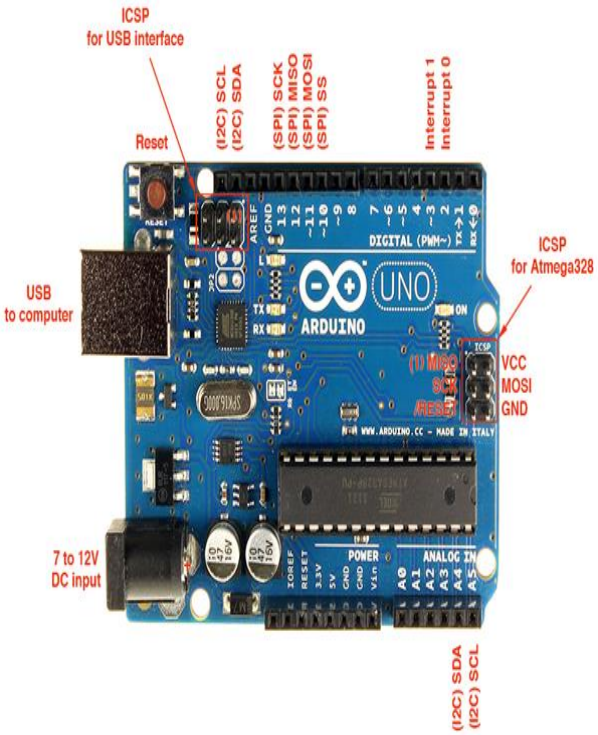
The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter. The Uno board has a resistor pulling the 8U2 HWB line to ground, making it easier to put into DFU mode.

The board has the following new features:

- 1.0 pinout: added SDA and SCL pins that are near to the AREF pin and two other new pins placed near to the RESET pin, the IOREF that allow the shields to adapt to the voltage provided from the board. In future, shields will be compatible with both the board that uses the AVR, which operates with 5V and with the Arduino Due that operates with 3.3V. The second one is a not connected pin, that is reserved for future purposes.
- Stronger RESET circuit.
- Atmega 16U2 replace the 8U2.

"Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduino, moving forward. The Uno is the latest in a series of USB Arduino boards.

ARDUINO PIN DIAGRAM:



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.

INTRODUCTION

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

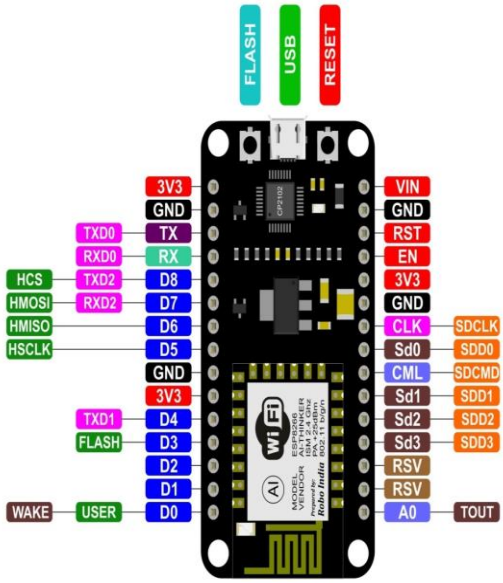
can be programmed to generate any desired character that can be formed using a dot matrix. To distinguish between these two data areas, the hex command byte 80 will be used to signify that the display RAM address 00h will be chosen Port1 is used to furnish the command or data type, and ports 3.2 to 3.4 furnish register select and read/write levels.

Theory:

A liquid crystal is a material (normally organic for LCDs) that will flow like a liquid but whose molecular structure has some properties normally associated with solids. The Liquid Crystal Display (LCD) is a low power device. The power requirement is typically in the order of microwatts for the LCD. However, an LCD requires an external or internal light source. It is limited to a temperature range of about 0°C to 60°C and lifetime is an area of concern, because LCDs can chemically degrade.

NODE MCU:

The Node MCU is an open source firmware and development kit that helps you to prototype your IoT product with ArduinoIDE or in few Lau script lines. It includes firmware which runs on the ESP8266 Wi-Fi SoC. And hardware which is based on the ESP-12 module. In this tutorial we explain how to use NodeMCU with Arduino IDE.

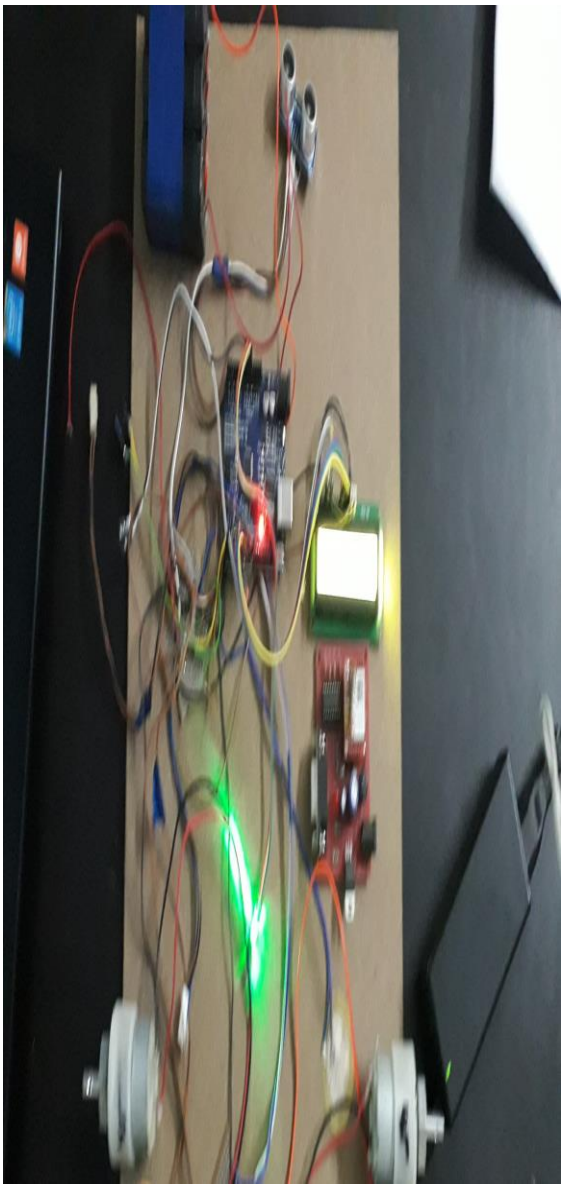


POWER SUPPLY

Block diagram

The ac voltage, typically 220V rms, is connected to a transformer, which steps that ac voltage down to the level of the desired dc output. A diode rectifier then provides a full-wave rectified voltage that is initially filtered by a simple capacitor filter to produce a dc voltage. This resulting dc voltage usually has some ripple or ac voltage variation. A regulator circuit removes the ripples and also remains the same dc value even if the input dc voltage varies, or the load connected to the output dc voltage changes. This voltage regulation is usually obtained using one of the popular voltage regulator IC units. The potential transformer will step down the power supply voltage (0-230V) to (0-6V) level. Then the secondary of the potential transformer will be connected to the precision rectifier, which is constructed with the help of op–amp. The advantages of using precision rectifier are it will give peak voltage output as DC, rest of the circuits will give only RMS output.

RESULTS



CONCLUSION

Framework of live weather station is proposed based on easyto- use Arduino architecture with wired and wireless connectivity. This researches focuses on developing innovative ways and modules hooked up with array of sensors to manage, monitor, display and alert the weather forecast and warnings as and when required using the advantage of cloud service to utilize the state of the art sensing and communication technologies. The proposed system utilizes temperature, humidity, light intensity and atmospheric pressure sensors to determine the conditions of environmental changes and updates those measured values from an exposed arena in a cloud database. As an extension of this project, voice alerting is implemented for more quick accurate results.

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