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Industrial Mains Power Monitoring and Alert System Over LAN Network

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Abstract: *To keep the server running properly, the temperature and humidity in the server room need to be considered because if the temperature or humidity in the server room is not suitable with standards it will disturb or damage the existing sever. For this reason, the condition of the server room must be monitored and the temperature and humidity in the room are maintained. Also considering the mains power supply status, it is also important to read the status on mains power supply, the device will read the status and if mains power supply get down then device will switch on inverter power supply and send alert to user Email.*

Keywords: Arduino UNO, ESP01 Wi-Fi module, DHT11 Temperture and Humidity sensor, LCD16x2 , Ethernet.

1 Introduction

The proliferation of wireless devices has given rise to the internet of things (IoT), which allows systems to be linked and data to be shared between them. The capacity of IoT to be used for real-time monitoring is one of the reasons for its recent growth and popularity.

This is the foundation for the proposed IoT-based system for monitoring specific environmental parameters such as temperature, humidity, air pollution, sunlight intensity, and rain, which has been found to be accurate and effective. Traditional methods, which take longer, cost more, and are often unreliable, are used to analyze temperature, humidity, air pollution, sunlight intensity, and rain. Furthermore, such regulation isn't always possible to implement on a single platform. As mobile communication networks have reached remote areas, IoT- based real-time monitoring of environmental parameters such as temperature, humidity, air pollution, sunlight intensity, and rains has proved to be an efficient and cost- effective solution. If the above-mentioned environmental criteria are properly controlled using an integrated framework, it would have a wide range of application, including agriculture for observing healthy crop growth, industry for ensuring a clean working atmosphere, and city life for maintaining a healthy lifestyle.

The Internet of Things (IoT) has been increasingly emerging in order to build smart ecosystem, smart cyber realms, and smart apps. IoT and Big Data among other technologies will perform a major role in education because many learners have expectations to have personalized curriculum delivered to their desks. Pollution monitoring, waste management, water quality, protection, and other IoT-based applications have been documented. The most affordable real-time monitoring device on the market today is very costly, and even if it is, it has poor features. Most devices are vendor-specific, with extra payments for features such as alarm notices, reminders, and additional sensors. IoT is an enhancer of system effectiveness, greater flexibility and further creation business opportunities and revenue stream.

2 Literature Survey

We collected literature study articles on Raspberry Pi and DHT11 sensors and we also collected research journals relating to temperature and humidity monitoring systems. The information obtained from this literature study will be used as a reference in system design.

A. Design: In this process we will design our proposedwork in designing hardware.

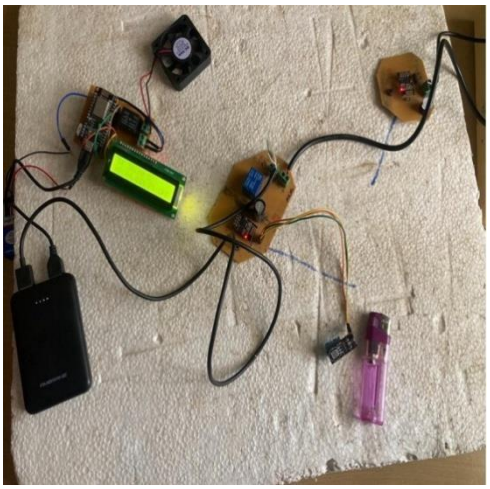
B. Assembly and Installation: In this part we have wireless LAN mesh network establishment and communication with cloud.

C. Wireless LAN mesh network establishment. The data will be shared wirelessly over the mesh network.

D. Communication with cloud: All gathered data willbe shared over the cloud and generate alert usingGmail.

E. Testing and Modification: Testing and modification will be done by using proteus software and logical hardware testing of prototype.

Hardware Snap



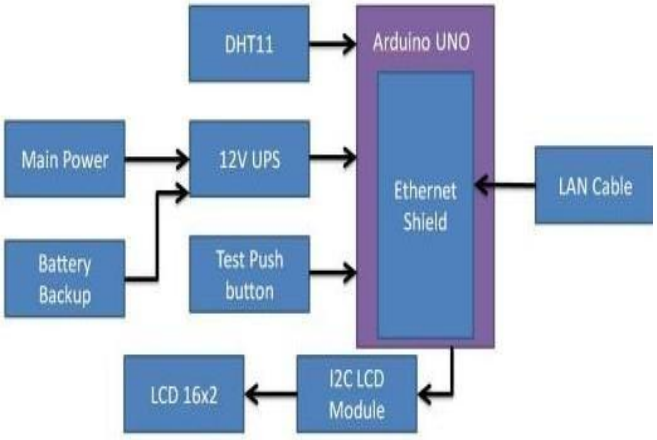


Fig.1 Block diagram of transmitter device

Transmitter device is a device which monitor mains power supply and environmental status such as temperature and humidity. Whenever mains power is ON the device is working on 12v adapter power supply but when power cut OFF then device get switched on battery and ESPO1 sense the cut off then generate alert on wireless LAN network, Receiver device is a device which continue monitors the signal of transmitter device on wireless LAN network. Whenever we detect power cut off notifications then buzzer will turn ON.

3. Design Process

Block diagram

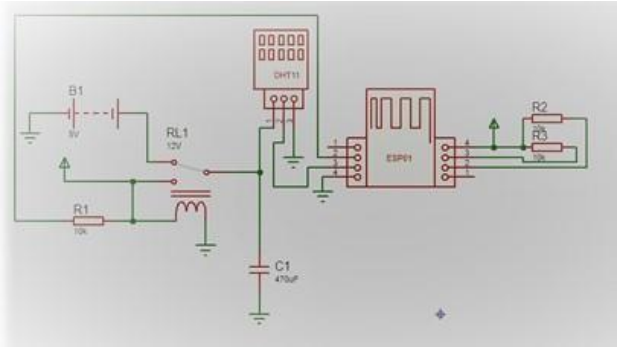


Figure 1. Operational diagram of server Room monitor

a) Mains power monitoring : At input side just like showed in circuit diagram we added relay, at open terminal of relay input from mains power supply is given and same power supply is given to the coil of relay. Whenever mains power supply cuts off then relay trims to normally connected terminal and at that terminal we added battery of 5V, this battery will work as UPS. At pin 2 the resistor is connected and that resistor is also connected to the mains power supply 5v adapter so if mains power cuts off then pin 2 will go Low else pin 2 will be high.

b) Temperature and humidity monitoring : At pin 3 the DHT11 is connected. DHT11 is temperature and humidity sensor which transfer data over a single wire protocol.

c) ESPO1 : ESPO1 is a smallest WIFI module which allow us to communicate over the internet. It has 2GPIO pins and one serial port.

Software Implementation

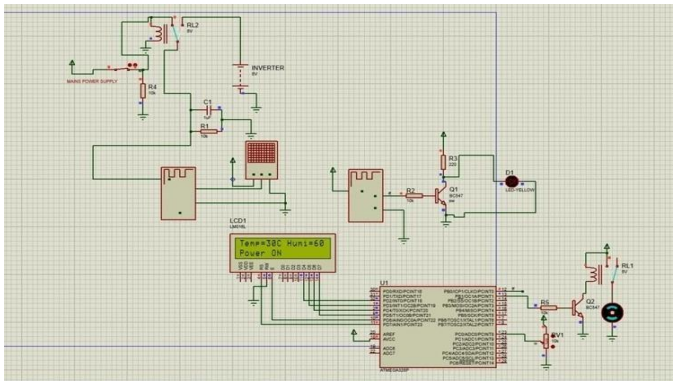


Fig. 3.1 Proteus Design

Hardware Implementation

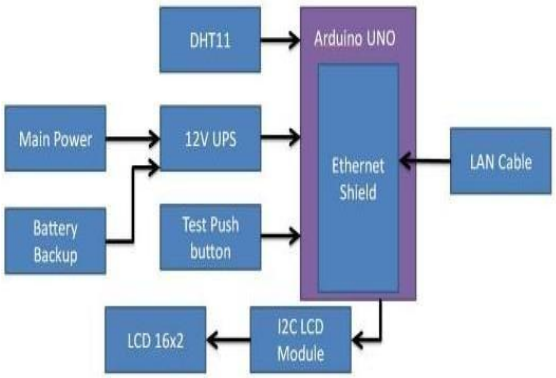


Fig 3.2 Reciever device block diagram

1] DHT11 :

DHT11 is a 3 pin sensor which senses the humidity and temperature in the environment. It is digital sensor uses capacitive humidity sensor and a thermistor to measure a surrounding air. Good for 20-80% humidity reading with 5% accuracy and good for reading 0-50°C temperature readings
±2°C accuracy.

2] 12V UPS :

The 12V UPS is used to provide battery backup and to detect the cut off of main power supply so the controller could send the mail to monitioring station.

3] Test Push Button :

The test push button is used to test or check the status of 3 server room at that instant only. The monitoring station will get notify by all three server room and if any station fails to acknowledge the push button signal then the respected device is offline.

4] LCD16x2 :

LCD16x2 is used to display status of all connected devices so user can get information easily rather than getting mail.

5] Arduino UNO :

Arduino UNO is well known controller in market, available very easily and quick programmable controller. Various library available so to reduce programming time.

6] Ethernet Shield :

Ethernet shield provide a path to Arduino UNO to send data over the LAN network. So that the device will get totally on network and communicate with other 3 devices andalso with mail server.

7] Buzzer :

Buzzer is just a sound making component used to make alert by beeping. In this device there are two types of alert. Light and buzzer. There are 3 server rooms for each room there is respected bulb used for light indicator and a common buzzer for all server rooms used for sound alert.

8] Channel Relay :

channel relay is used to switch 4 bulb that is 3 bulb for 3 server rooms and 1 extra for future purpose. This relay channels can handle 230v AC upto 10A and operates on 5V dc. Performs on/off switching mechanism as same as normal switch but controlled by digital controller not manually.

4 Algorithm :

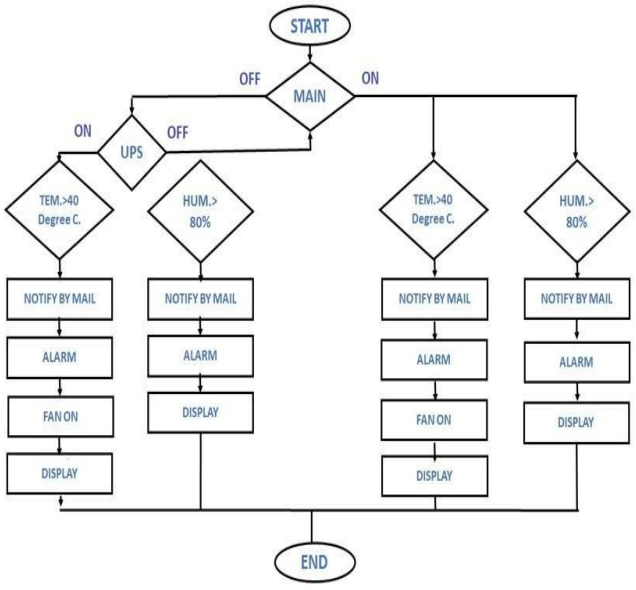


Fig 4 Algorithm

Looking to above algorithm first of all there is a two ways to provide power supply for run the circuit first is main power supply and second is uninterrupted power supply (UPS).if main power supply gets cut due to some reason's that time Circuit switch to the UPS and if main power supply run continuously without any disturbance then there is no need to switch the powermode.

In both power modes if system gets unbalanced such as temperature increases, switching the power mode or increases the humidity that time system send us a mail.and notify us that In server room run under unbalance situation and over all operation get complete.

5 Results:

Results on hardware after the operation of mains power monitoring.

Fig 1 First Reading on hardware when mains power goes down

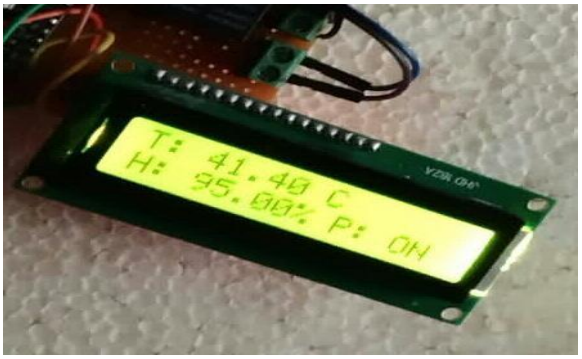


Fig 2 Second Reading on hardware when mains power supply

Fig 3 Server room alert reading via Gmail

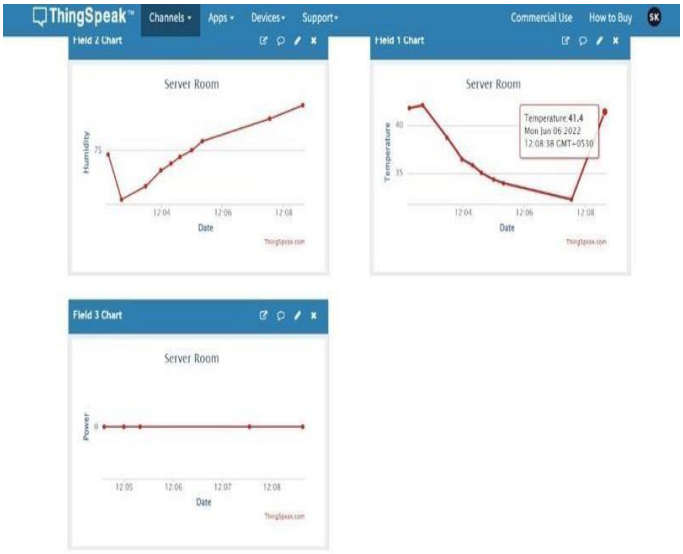


Fig 4 Software Flowchart

Sr. No	Main Supply	UPS Supply	Temp	Fan	Humidity	Alarm
1	OFF	ON	34.90	OFF	72.00%	ON
2	ON	OFF	41.40	ON	95.00%	ON

6 Conclusion

Server room monitoring need 24x7 internet connectivity to perform operations like sending alert, notification and mails. It made easy to display all critical parameter on users smart phone and over Gmail.

7 Acknowledgements

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