International Journal of Research in Engineering and Science (IJRES)
ISSN (Online): 2320-9364, ISSN (Print): 2320-9356
www.ijres.org Volume 11 Issue 9 ǁ September 2023 ǁ PP. 189-191

Development of Industrial Process Monitoring System Using A Lora Mesh Network

Dr. T. PARITHIMAR KALAIGNAN[1], E. SHOBANA[2]
Professor[1], PG Student[2]
Annai Mathammal Sheela Engineering College,Namakkal

ABSTRACT: *The usage of Wireless Sensor Networks has become essentially important in recent years because of their ability to manage real-time data for various novel services. In this paper a novel LoRa based energy efficient environmental monitoring, alerting and controlling system for agriculture is designed and implemented. This system utilizes an Atmega 328 processor, various sensors likes temperature, Humidity, air quality are connected with microcontroller and LoRa communication module. Sensors gather various physical data from the field in real time and transmit it to the processor and to the end user via LoRa communication. Then necessary actions are initiated to perform action on behalf of people to reduce or eliminate the need of human labor. The sensors is connected to the processor to monitor the activities in real time. The proposed system will be implemented and tested.*

Keywords: *WSN,SHHS, RFID .*

Date of Submission: 11-09.2023 Date of acceptance: 25-09-2023

I. INTRODUCTION:

Spectrum modulation, based on the chirp spread spectrum (CSS) technology, is the method employed by LoRa. In addition to LoRa, various portable radio wave technologies may be used in IoT applications to track vast distances and require little power. A software layer called LoRaWAN® specifies how devices must use the LoRa, such as when they send or receive messages. This study identifies significant socio-technical, cognitive, affective, and contextual elements that influence the adoption of WSN-SHHS and discusses their facilitators and inhibitors [1]. In this research, a low cost method for creating a system that can track a patient's real-time parameters utilizing an Active UHF RFID system and the appropriate parameter monitoring sensor is proposed [2]. The application specificities of WSNs are examined in order to create a design framework for an adaptive routing algorithm that can meet all WSN requirements. A.MO.R can meet QoS and congestion requirements while achieving the WSN's goals with little communication and energy overhead, according to simulation tests [2]. This paper describes a robust healthcare monitoring system that integrates wireless sensor network (WSN) technology and code division multiple assess (CDMA) with extended feature of locally standalone diagnosis algorithms that implemented in cell phone. The system possesses multiple physiological signals measurements on real time that applicable to various environments [3]. The implementation of the monitoring system without any watchdog nodes is what makes this work special. Furthermore, to the best of the authors' knowledge, the Contiki OS has not yet adopted this method [4]. Sensing data is sent to a control center, where an advanced monitoring application (MA) uses a REST web service to make it simple for local and remote users to access it. A number of critical capabilities and innovative properties of the proposed SHS have been emphasized by the straightforward proof of concept that was used to validate it. These features mark a considerable advancement above the current state of the art [5].

II. HARDWARE DESIGN

- **Power supply unit:**

A Power supply unit supplies Direct Current (DC) power to the other components in a circuit. It converts general-purpose Alternating Current (AC) electric power from the mains (to low-voltage.

- **Step down transformer:**

When AC is applied to the primary winding of the transformer it can either be stepped down or stepped up depending on the value of DC needed. In our circuit the transformer of 230v/15v is used to perform the step down operation where a 230V AC appears as 5V AC across the secondary winding.

- **Arduino controller:**

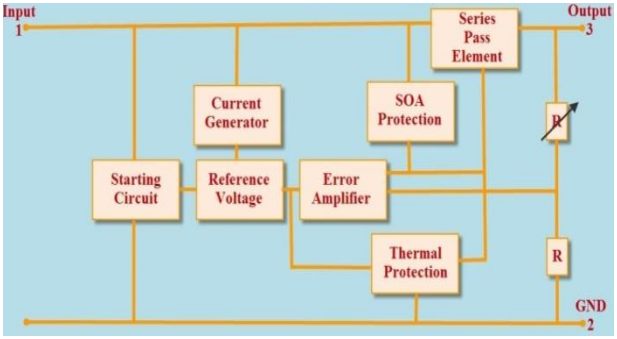
Arduino is a free and open-source electronics platform with simple hardware and software. Arduino boards can read inputs such as a light on a sensor, a finger on a button, or a Twitter tweet and convert them into outputs such as operating a motor, turning on an LED, or publishing anything online.

➢ **Communication:**

The Arduino Uno includes a number of communication ports for connecting to a computer, another Arduino, or other microcontrollers. The ATmega328 supports UART TTL (5V) serial communication via digital pins 0 (RX) and 1 (TX). An ATmega16U2 on the board channels serial communication over USB and appears to software on the PC as a virtual com port.

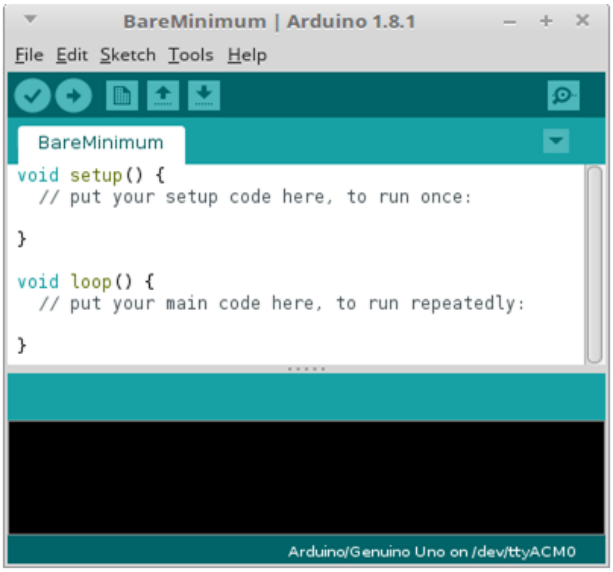
➢ **Voltage Regulator:**

15V DC voltage can be stepped down to 5V DC voltage using a DC step-down converter called as voltage regulator IC7805. The first two digits '78' of IC7805 voltage regulator represent positive series voltage regulators and the last two digits '05' represents the output voltage of the voltage regulator.



➢ **Programming:**

The Arduino Uno can be programmed with the Arduino freeware software. Select "Arduino Uno from the Tools > Board menu (according to the microcontroller on your board). For details, see the reference and tutorials.



III.CONCLUSION

In this project, it is suggested to build and execute an energy-efficient environmental monitoring, alerting, and regulating system. In addition to requiring less human labor, wireless field monitoring enables users to properly track changes that occur promptly at the field. Temperature, humidity, air quality, light intensity, and other critical elements for plant growth can all be monitored by the suggested system. Additionally, this proposed system is quite robust and user-friendly. The system also includes Internet of Things (IoT) components for global monitoring.

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BIOGRAPH

Dr.T.PARITHIMAR KALAIGNAN Received the B.Engineering Degree EEE from Dr.MGR Engg college, Chennai in 1998. The M.E Degree PED from Anna university, Chennai in 2004.The Ph.D Degree Anna University , Chennai in 2015. He has been working as Principal in Annai Mathammal Sheela Engineering College, Erumapatty, Tamilnadu, India. His research interest in Biomedical Engg.
Email: parithi_t@Yahoo.co.in

Mrs. E.SHOBANA
She is doing her ME degree of EST at Annai mathammal sheela Engg college, Erumapatty in 2023. . She obtained her B.E degree From Annai Mathammal Sheela Engg college, Namakkal in 2021. Her research interest include "Embedded system".
Email: shobanalakshmi66@gmail.comf