

FORESTRY MONITORING SYSTEM USING LORA

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Abstract

The prosperity of a nation is determined by the welfare of their forests. Besides providing wood, fuel and other biological products, forests serve as a home to many living beings. Hence it becomes our

inevitable duty to protect them. Recently, forests around the world are affected by forest fires. Therefore, in order to protect the forests from forest fires, we have developed a system called “Forestry monitoring system using LoRa”. The purpose of this system is to avoid the forest fires and also to protect the wildlife by monitoring them using a wireless technology called LoRa(Long Range). This device can also prevent smuggling of trees. On the other hand, the current system is a GSM/GPS based system which requires data connectivity to function. Hence, we have designed a system which is more reliable than the currently used system.

Keywords: *Lora, Arduino uno, sensors.*

1.INTRODUCTION

In order to conserve the ecosystem in the forests, it is relevant to protect the wildlife and the precious trees in the forests from forest fires and from other misfortunes. Technological developments can bring a solution to this issue. With the help of progress in technologies around the world, it is possible to protect the flora and fauna of the forests. Today, mankind has a bunch of innovative ideas that has the ability to change the future. ARDUINO which is considered as a key device connects all the other devices in the system. The inputs to the ARDUINO are given by a fire sensor and an ultrasonic sensor through amplifiers. The LoRa transmitter gets the signal from the Arduino and sends it to the LoRa receiver. The information can be monitored on the PC which is connected to the LoRa receiver through RS232. By this way, we can monitor the entire forest using wireless technology called LoRa. Lora transmits and receives continuously monitoring forest area using PC.

2.EXISTING SYSTEM

The existing system is based on manmade techniques and its methods are used in various kind of products, which are used in widely used in all over the world. It helps for living beings in the earth , but even it cause some problems . other than this the obstacle may occur naturally. Such one is forest wild fire. If the forest fires, the plants and the animals living in that region may suffer a lot without having a proper food and shelter. Every year lot of flora and fauna are died due to this wild fire in forest area. The sensor connected along with the arduino board collects the data and send it by wireless technology. It gives warning by using the GPS/GSM Module.

Drawbacks:

- GSM based method only monitor less distance.
- They are not monitoring in real time.
- It will only give the emergency message.

3.PROPOSED SYSTEM

The proposed method of this project works on the technology called LORA. It is used to examine the fire and accidents caused by it with the help of fire sensor. The output of this is given to arduino board with the help of amplifier. An another sensor is used to detect the animals or an object which are crossing within the forest limit by the help of ultrasonic sensor. Ultrasonic sensor finds the animal or human crossing in the forest area. when fire is detected in forest area, the emergency alarm is activated and the information regarding the fire accident is transmitted via Lora transmitter to Lora receiver. Similar process takes place for the animal crossing. We can monitor the received information on the PC through RS232. This process doesn't require the need of network. This system is very helpful in safeguarding the forest from fire accidents. Ultrasonic sensor finds the animal or human crossing in the forest area. When fire is detected in forest area, the emergency alarm is activated and the information regarding the fire accident is transmitted via Lora Transmitter to Lora Receiver. Similar process takes place for the animal crossing. We can monitor the Received information on the PC through RS232 .This process doesn't require the need of the network. This system is very helpful in safeguarding the forest from fire accidents.

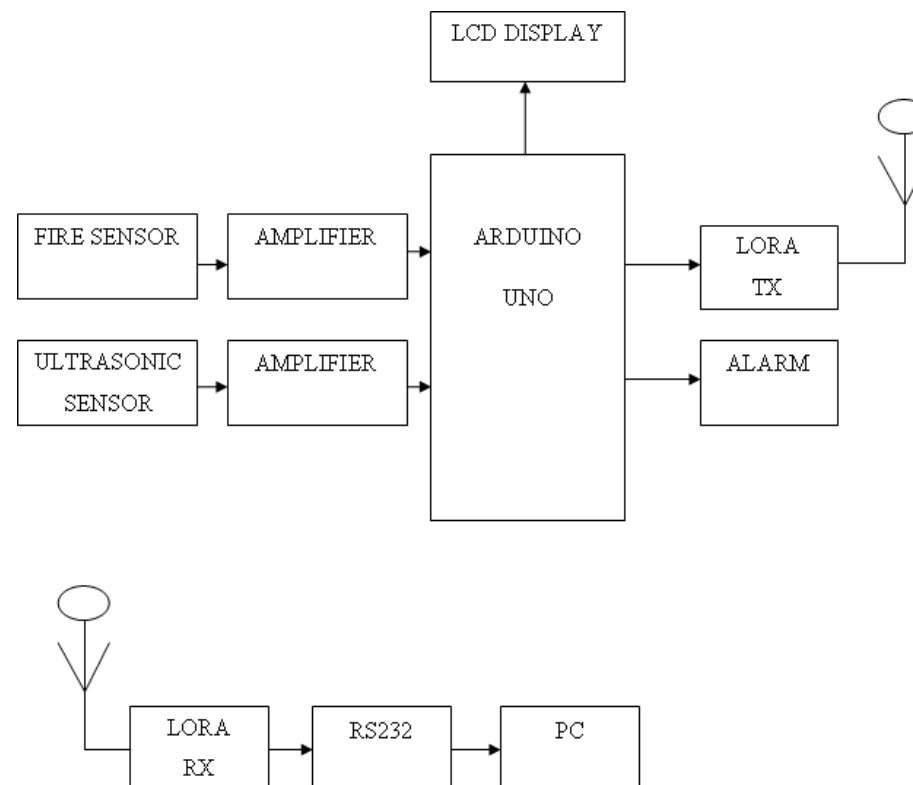


Fig1 block diagram

3.1 SOFTWARE REQUIREMENT

SOFTWARE SPECIFICATION

Language : **PROTEUS 8.1**

Operating System : **Windows 7_10**

Proteus software: it is used to design the automation in electronics prints. It gives the exact way of schematic diagram which helps us to understand easily.

3.2 HARDWARE REQUIREMENT

3.2.1 Arduino Uno:

The Arduino Uno is generally an open-source microcontroller board which is mainly based on the ATmega328P. This board has about 14 digital input/output pins where 6 pins can be used as PWM outputs, 6 as analog inputs, a 16 MHz quartz crystal, a power jack, an ICSP header and a reset button. This board is much capable to support the microcontroller. It also has a type B USB cable through which the board can be powered by an external 9-volt battery. This board accepts voltages between 7 and 20 volts. The operating voltage of the UNO board is about 5 volts. The length, width and height of the board is generally about 68.6mm, 53.4mm and 25g.



Fig.2 Arduino UNO Board

3.2.2 LORA:

LoRa is a low-power wide-area network protocol. This technology is developed by Semtech. LoRa is based on the spread spectrum modulation technique which is obtained from the Chirp Spread Spectrum (CSS). LoRa uses various frequency bands. It enables long range transmissions with low power consumption. LoRa devices also have geolocation capabilities which can be used to identify the geographic location of an object in the real world. The performance of the physical and the data link layer is evaluated by various field test and simulations. Based on these analysis and evaluations, some of the possible solutions for the enhancement of the performance are proposed. Some of the basic radio frequency bands that LoRa uses are 433 MHz, 868 MHz for Europe, 915 MHz for Australia and North America and 923 MHz for Asia. LoRa also offers a secure data transmission for IoT applications.

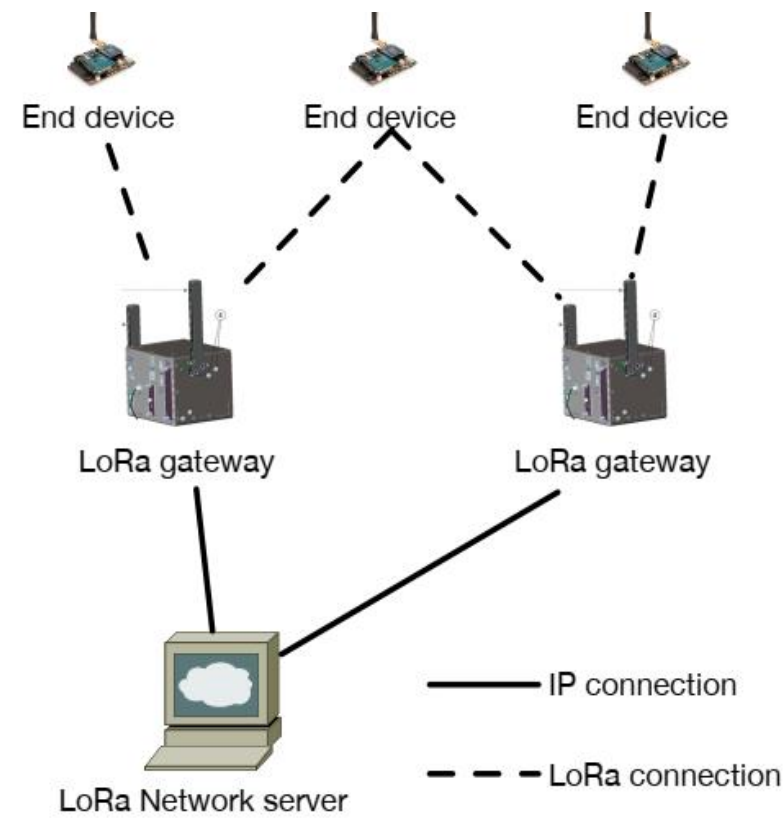


Fig.3 Lora network architecture

3.2.3 FIRE SENSOR:

A fire sensor works by detecting smoke and/or heat. These devices respond to the presence of smoke or extremely high temperatures that are present with a fire. after the device has been activated,it will send a signal to the alarm system to perform the programmed response for that zone.

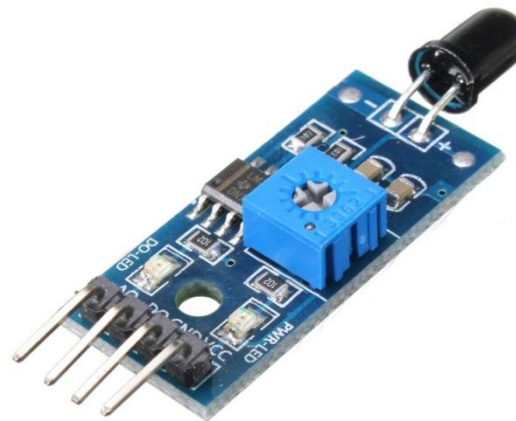


Fig 4 Fire sensor

3.2.4 ULTRASONIC SENSOR:

The Ultrasonic sensors works on the principle of SONAR and RADAR system which is used to determine the distance to an object. An ultrasonic sensor generates the high frequency sound waves. when this ultrasound hits the object ,it reflects as echo which is sensed by the receiver.



Fig.5 Ultrasonic sensor

4.RESULTS AND DISCUSSION

This system can also be implemented in places where rare wild lives are living and precious trees are planted and to prevent forest fires. The LoRa transmitter and receiver units are placed at particular places for proper results. The LCD displays the message and the alarm indicates the situation to the control station where the receiver unit is placed. This message received at the receiver unit helps the forest officials to take preventive actions. With the help of progress in science and technology, this system can be implemented in a large scale that will help the forest officials.

ADVANTAGES:

- Low power consumption
- Reduces the time
- Low cost to design the circuit and maintenance
- Reliability & compatibility

5.CONCLUSION

A LoRa based Forest and Wildlife monitoring system is designed and developed. Here, multi-sensors are deployed to cover the forest area. This system can also be implemented in places where rare wild lives are living and precious trees are planted to prevent forest fires.with the help of progress in science and technology,the system can be implemented in a large scale that will help the forest officials.

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