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LoRa Based Emergency Communication System

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***Abstract*— The location and human activity are usually used as one of the important parameters to monitor the health status in healthcare devices. However, nearly all existing location and monitoring systems have the limitation of short-range communication and high power consumption. In this project, we propose a new mechanism to collect and transmit monitoring information based on LoRa technology. The monitoring device with sensors can collect the real-time activity and location information and transmit them to the cloud server through IOT. The user can check all his history and current information through the specific designed mobile applications. Experiment was carried out to verify the communication, power consumption and monitoring performance of the entire system. This system can collect monitoring and activity information accurately and provide the long rang coverage with low power consumption.**

***Index Terms*—Lora, Forest, temperature, humidity, soil moisture**

I. INTRODUCTION

The main objective of this project is to communicate from remote forest area to city using LoRa technology. Various parameters are noted/tracked, and this information is transmitted using LoRa. The transmitted information is received in the city through a LoRa module and thereby the received data is stored in Google Firebase Deforestation is a very crucial thing which is happening in large scale caused by various parameters like forest fire, landslide, floods etc. The cause of forest fires is not easy to track and to detect early with the help of this technology it can become easy, and water can be sprinkled to avoid further damage. Along with this soil moisture and rain can be detected for further advancement of this technology. It is very difficult to monitor these activities happening in the forest area as it is a remote place with less technological support. Using LoRa as a communication act like a bridge of communication between a remote place and city by using LoRa technology it becomes easy to monitor such activities going on in a remote forest.

II. LITERATURE REVIEW

Ritesh Rastogi et a1.[1] "LoRa and Edge Computing based System Architecture for Sustainable Forest Monitoring" The combination of LoRa, and edge computing can provide an efficient system architecture for sustainable forest monitoring. LoRa sensors can collect environmental data over a long-range wireless network, and edge computing can be used to process the data closer to where it is generated, reducing latency and bandwidth usage. This system architecture can help predict the occurrence of wildfires and the spread of diseases, helping ensure the health and preservation of our natural ecosystems.

Hammad Aamer et a1.[2] "A Very Low Cost, Open, Wireless, Internet of Things (IoT) Air Quality Monitoring Platform" The increasing levels of air pollution pose a significant threat to the environment and human health. Air quality monitoring has become an essential aspect of modern urban life, with many people relying on air quality data to make decisions about their daily activities. In recent years, the Internet of Things (IoT) has emerged as a promising technology to address this issue. It is low cost, making it accessible to a wider range of users. It is open, allowing for customization and modification of the system to suit specific needs. It is wireless, eliminating the need for complex wiring and infrastructure. Additionally, it is IoT-based, providing real-time data and remote access to the system.

A. Kumar et fa1.[3]"Air Quality Monitoring System Based on ISO/IEC/IEEE 21451 Standards" Air pollution has become a major concern due to its harmful effects on human health and the environment.

ISO/IEC/IEEE 21451 standards provide a common framework for sensor communication protocols and data formats. The proposed air quality monitoring system based on ISO/IEC/IEEE 21451 standards provides an

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effective solution for monitoring air quality parameters. The use of these standards ensures interoperability, flexibility, and cost-effectiveness, making the system suitable for various applications.

Genwei Guo et a1.[4] "A Model with Leaf Area Index and Trunk Diameter for LoRaWAN Radio Propagation in Eastern China Mixed Forest" Every node in LoRaWAN is connected by radio transmission. The radio signal may be attenuated when it is deployed in a forest due to diffraction, reflection, scattering, and absorption effects produced by different obstacles like trees and bushes. To design effective wireless systems that can function in mixed forests, it is necessary to better understand the propagation characteristics of these difficult radio propagation environments. However, due to the potential for significant impacts from various environmental factors (such as vegetation type, density, tree height, and weather), modeling forest radio propagation is comparatively challenging.

Anita Gehlot et a1.[5] "Digitalization of forest using the Internet of Things (IoT)" Digitalization of forests using the Internet of Things (IoT) is an emerging trend that has gained significant attention in recent years. This approach involves the integration of IoT devices with forest management systems to improve forest management, conservation, and sustainability. In this survey paper, we will provide an overview of the current state of the art in the digitalization of forests using IoT and discuss the challenges and opportunities of this technology in the forestry sector.

Gagan Parmar et a1.[6] "An IoT Based Low-Cost Air Pollution Monitoring System" Air pollution has become a major global concern as it poses a serious threat to human health, natural resources, and the environment. Due to the increase in urbanization, industrialization, and the use of fossil fuels, air pollution has risen dramatically in recent years. The continuous monitoring of air quality is necessary to mitigate the effects of air pollution on human health and the environment. In recent years, the Internet of Things (IoT) has emerged as a promising technology for monitoring air quality in a cost-effective and efficient manner.

Swapnil Bagwari et a1.[7] "Disaster Monitoring based on IoT and Long Range Assisted Framework" Disaster monitoring is an important area of research and development, and the use of the Internet of Things (IoT) and Long Range Assisted Framework (LRAF) has emerged as a promising approach to improve the effectiveness and efficiency of disaster monitoring systems. In this survey paper, we will review the current state of the art in disaster monitoring based on IoT and LRAF.

Roberto Vega-Rodríguez et a1.[8] "Low Cost LoRa based Network for Forest Fire Detection" The survey paper also discusses the different components of a LoRaWAN-based WSN for forest fire detection, including the sensors, gateways, and cloud platforms. It also highlights some of the challenges associated with deploying and maintaining LoRaWAN-based WSNs, such as the need for line-of-sight communication and interference from other wireless networks. Overall, the survey paper concludes that LoRaWAN-based WSNs are a promising solution for forest fire detection due to their low cost, long-range communication capabilities, and low power consumption.

Khaled A. Ghamry et a1.[9] "Unmanned Aerial Vehicle Based Forest Fire Monitoring and Detection Using Image Processing Technique" Forest fires are a significant environmental issue that causes significant damage to the environment and wildlife. Traditional forest fire monitoring and detection methods such as satellite-based monitoring, ground-based monitoring, and aerial surveillance using manned aircraft have limitations such as cost, time-consuming, and safety concerns. Unmanned Aerial Vehicles (UAVs) equipped with cameras and sensors have emerged as a promising technology for forest fire monitoring and detection. UAVs can fly at low altitudes, capture high- resolution images and videos, and quickly cover large areas of forests.

Matthias Budde et a1.[10] "Enabling low-cost particulate matter measurement for participatory sensing scenarios" This paper proposes a low-cost solution for measuring particulate matter (PM) in participatory sensing scenarios. To test the effectiveness of the sensor, the authors conducted experiments in both laboratory and real-world settings. In the laboratory, they exposed the sensor to different levels of PM and compared its readings to those of a reference instrument. In the real- world setting, they distributed the sensors to community members in a low-income neighborhood and compared the results to those of a reference instrument located at a nearby air quality monitoring station.

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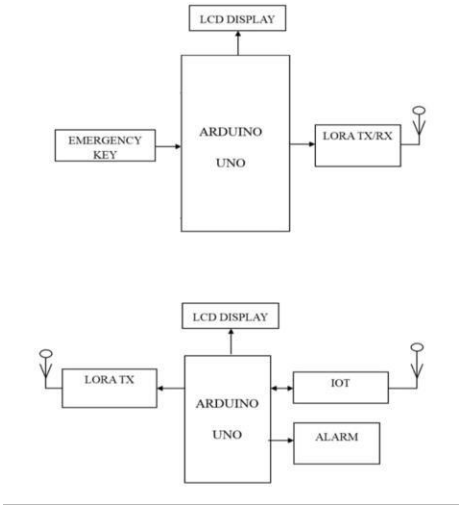
III. BLOCK DIAGRAM



IV. CONCLUSION

By using LoRa technology, it played a vital role in connecting the remote forest with city and provide various alerts and notifications generated from a remote forest area to the user located in city and the information shared using LoRa was later stored in Google Firebase where it became easy to keep track of these data.

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