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To cite this article: C Malarvizhi *et al* 2021 *J. Phys.: Conf. Ser.* **1964** 062069

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RF Based Lo-Ra Transceiver Patient Health Detection System

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Abstract. In the last century, remote treatment surveillance grew rapidly, along with the increasing number of internet users with things (IoT). Health management, especially because early disease diagnosis can minimize distress and treatment costs, is very important for prevention. The diagnosis and timely care of multiple conditions will dramatically boost patient treatment alternatives: Wireless Clinical Management and Monitoring Device for Patients. Wireless health surveillance system or patient surveillance system requires remotely tracking the critical patients through computers, which transmit patient data wirelessly to distant locations. Health networks based on IoT seek to increase the quality of healthcare services via data collection and analysis in real-time. Nonetheless, conventional IoT systems have several drawbacks. In areas with a weak or unreliable Internet, for example, they cannot operate effectively. Low power large area network (LPWAN) technologies such as long-range network components like LoRa are a viable solution for showing the issue of Internet services. In diagnostic techniques and therapies, monitoring system plays an essential part.

Keywords: LoRa, Heartbeat sensor, IoT, Safety.

1. Introduction

In disease diagnosis and therapies, condition monitoring plays a key role. Electrocardiogram (ECG) tracking or fall tracking systems, for example, can help diagnose irregularities and send clinicians notifications about the irregularities. [2] Recently, applications of fall detection using wearable devices. Due to many advantages, such as compact, reduced, sustainable energy and non-intrusiveness [1], The usual use of portable sensors is. Often such wearable instruments receive 3-D or 3-D angular speed (or both) from a human physician. The computers then transfer the gathered information to a portal to the cloud.[4] However, the drawbacks of these systems are. [3] For starters, they cannot function efficiently in certain circumstances, such as places with instable or lack of Internet connectivity. LoRa is one of the most common technologies for the wide-area low-energy network (LPWANs) [5]. The LoRa channel model is characterized to allow long and low-power transmissions [6].

LoRa is widely used in many IoT systems from irrigation, agricultural monitoring, and flood warnings to intelligent urban calculation. [7]. LoRa's ability to minimize the number of sensor nodes and power usage can be useful, especially in areas with poor access or lack of infrastructure and urban



areas. [8] With the latest cloud-based remote healthcare networks relying on traditional WAN technologies such as Bluetooth and Wi-Fi, LoRa seems to be a good candidate for solving these problems, taking into account the above factors. In this paper, we introduce a revolutionary LoRa architecture and IoT technology. LoRa will, however, [9] help with high data rate (i.e., theory, 250 kbps). LoRa is one of the most populated low-energy places to enhance the standard of operation, so the networks' architecture will attain the benefits [10].

The system design would help to address the shortcomings of current IoT-based systems for health management. The rest of the article is formulated as follows: In. The suggested proposed framework is introduced in Section II; the applied model is defined in Section III, and analytical data are evaluated. The work ends with Section IV [11].

2. Lora Architecture and Framework

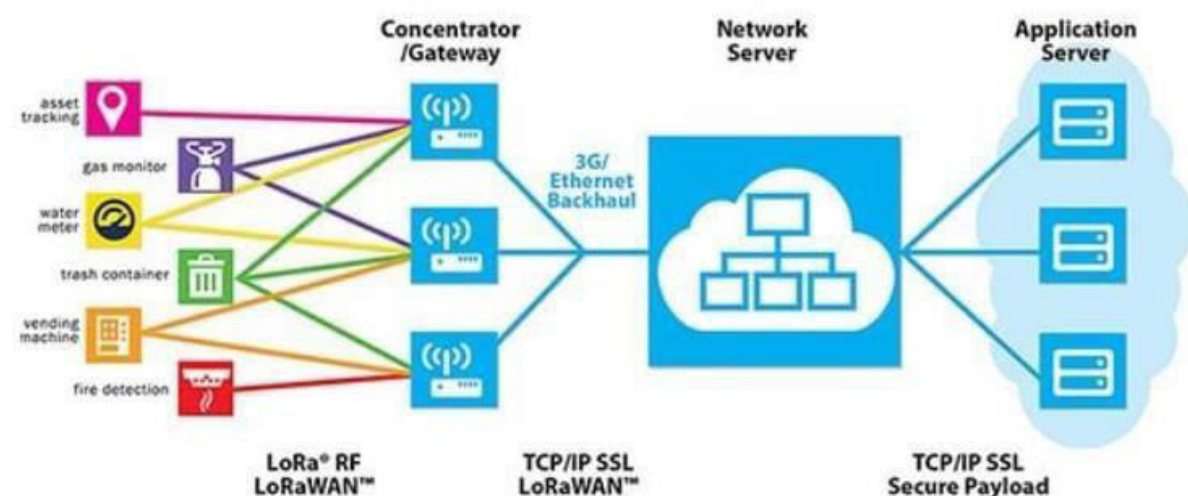


Figure 1: Autonomous vehicle in the closed environment map
proposed system architecture and framework are shown in figure1.

Geolocation: Allows an application for GPS-free, reduced detection.

Low Cost: Reduces expenditures in three different ways: development in technology, operating expenses and finished sensors.

Standardised: Enhanced national integration speeds for LoRa WAN-based infrastructure and IoT apps deployment and roll-out.

Low Power: A procedure explicitly optimised for small energy usage that extends battery life up to 20 years.

Long Range: In dense urban/indoor regions, single base stations provide penetration and also link rural areas up to 30 miles away.

LoRa is a "long-range" short. It is the physical layer (PHY) that allows contact with incredibly long distances with optimised energy consumption and a clear signal possible.

Low-power, [12] the wide-scale network is known as LoRa WAN, also known as LPWAN. For the Internet of Things, it is a global de-factor norm (IoT) [15]. We introduced a computational system for health surveillance with LoRa Architecture. [13] We emphasised the use of LPWAN technologies to make it easier to install such systems in rural areas. In the edge layer, efficient data treatment and compression algorithms are added to lower data transfer rate, thereby improving the latency of the system in these cases, taking into account network bandwidth. Block diagram of the system is shown in Figure 2.

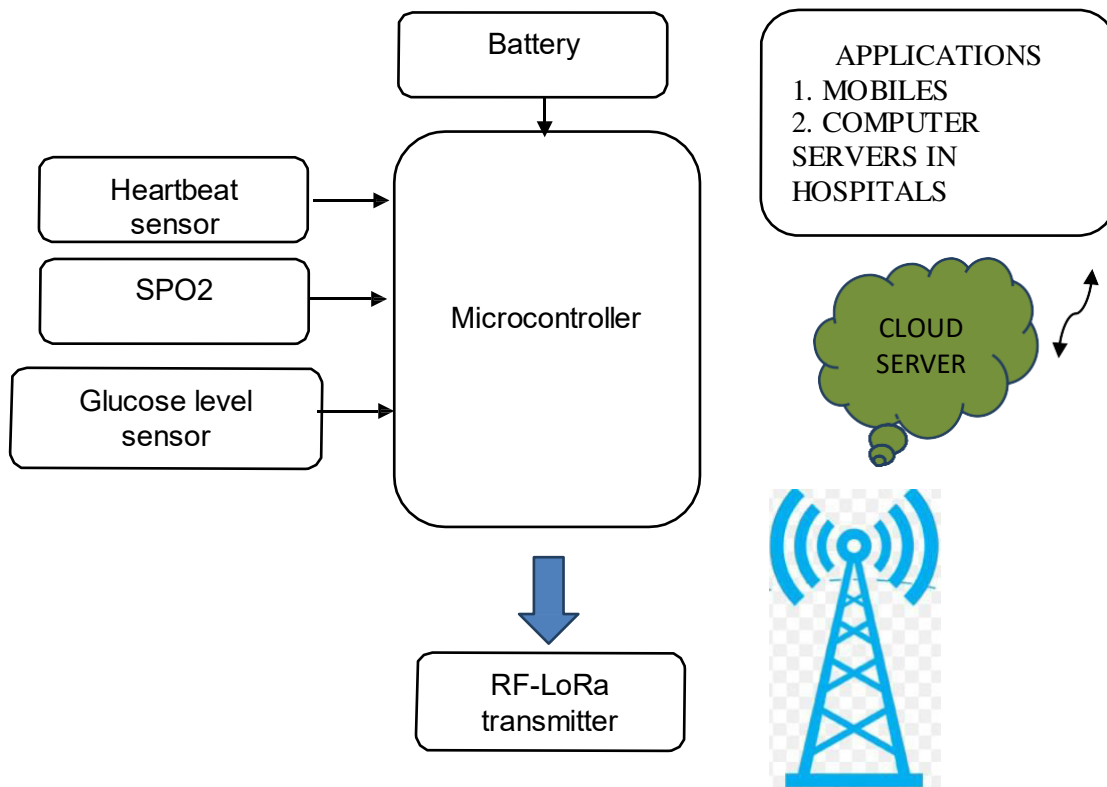


Figure 2: Block diagram

3. Proposed System & Working

In this proposed work we have provided a LoRa based transmitter over a long-range at a shorter period. [14] We fixed the modules such as heartbeat sensor, Spo2 sensor, and glucose level monitoring sensor from the patient input. Specifically, a glucose level of each patient can be monitored over a long-range. And we can add the sensor input drastically without any intervention and output of each node of the sensor can be viewed. This proposed work can be fixed to different nodes and transmitted over such distance building over a Km without any data loss. The existing methods have BLE 5.0 module, zig bee, etc., and the data loss of the system is large to rectify this LoRa based system is implemented.

4. Results and Discussion

The below picture depicts the sample prototype model of LoRa transmitter using heart rate sensor, spo2 and level monitor of glucose. This will transmit the data over a long range of distance. This will be proved by a strong method. A prototype model of the system is shown in figure 3.

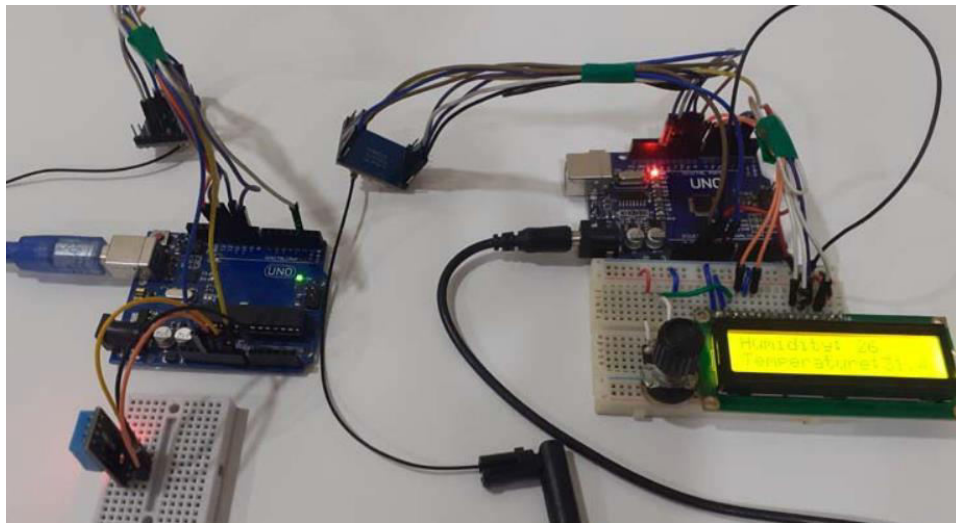


Figure 3: Sample prototype output

Below Figure 4 graph shows the heart rate of the patients which we randomly picked and monitored the health conditions and plotted the data. This data can be used for future references.

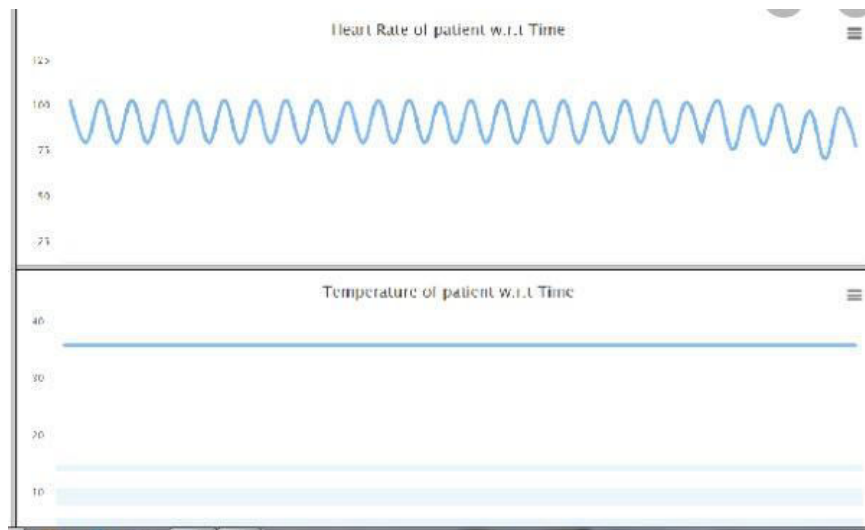


Figure 4: Heart rate monitoring in dashboards

5. Conclusion

With LoRa Architecture, we have suggested a conceptual framework for health monitoring. We emphasized the use of LPWAN technologies to make it easier to install such systems in rural areas. In the edge layer, efficient data treatment and compression algorithms are added to lower data transfer rate, thereby improving the latency of the system in these cases, taking into account network bandwidth. The collected health care provider is sent to a predictive analytics module through a LoRa WAN network. The findings are graphically illustrated via Web dashboards. For future studies, there are many fields. First, we plan to introduce IoT4HC's specific atmosphere using machine learning methods to make a smart diagnosis of a person's condition. Second, if emergency conditions have been identified, we want to establish a warning system to warn health professionals.

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