

## STUDY ON A BLUETOOTH BASED SMART SENSOR NETWORKS

Mahesh Mahindalekar<sup>1\*</sup>, Dr. Priya Chandran<sup>2</sup>

<sup>1,2</sup>Bharati Vidyapeeth's Institute of Management and Information Technology,  
Navi Mumbai, India

**Abstract -** Wireless sensor networks are computer networks with sensors, microprocessors, and wireless interfaces. This technology has recently received a lot of attention. A wide range of modern and exciting uses, ranging from personal health care to environmental monitoring and military applications, are suggested for these networks. Different To communicate between sensors, wireless methods such as basic RF, Bluetooth, UWB, or infrared can be employed. This document explains the fundamental principles, features, and issues of Bluetooth-based wireless sensor networks, as well as the challenges they face.

A simple Bluetooth-based sensor network is implemented. The presentation of the key issues encountered during the Implementation and solutions are also carried out. Bluetooth is used to specify this on smart sensor networks Topology. How smart sensor networks are used and how Bluetooth technology can be used to implement them. The goal of communication in the industrial field, how they are built, how they work, and the concept are all discussed. The architecture, network, applications, and working have all been examined primarily for the purposes of communication and study.

**Keywords:** Wireless sensor networks, media access control, and wide-area networks are some of the terms used.

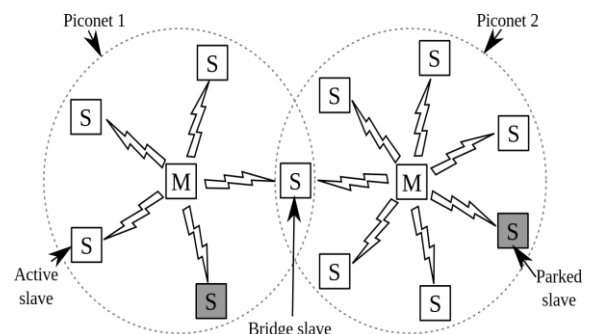
### 1 INTRODUCTION

Sensor networks including sensors, microprocessors, and wireless communication interfaces are known as wireless sensor networks. This technology has recently gained popularity. WSN technology is frequently employed in the industrial sphere for communication. Sensors are employed in industry for communication. In this Signals are sent over wires from each field equipment and monitored on a central control system room. The field device has been utilised since the inception of the wire concept to reduce wiring costs. Wireless Wires are expensive, large, and easily damaged, thus technology is used to eliminate them. In 1994, Ericsson Mobile Communications began research to determine the use of a low-power, low-cost, low-ratio interface and to develop a method to eliminate wires between devices. Dr. Jaap Haartsen, an electrical engineer, devised Bluetooth technology and named it after him. Bluetooth is named after

Denmark's 10th-century king Harald "Blue tooth." Bluetooth's goal is to unity and harmony. It also allows the various devices to converse via wireless networking. Bluetooth uses a

frequency hopping spread spectrum technology and operates at 2.4 GHz in the illegal ISM band. A good Bluetooth gadget has a range of roughly 10 meters and can be expanded to 100 meters. The communication channel supports a total bandwidth of 1 Mb/sec. A record-breaking data transfer rate a single channel can accommodate a maximum of three channels at 721 KBPS.

#### 1.1. TECHNOLOGY OVERVIEW



Bluetooth is a low-cost, short-range wireless technology with low power consumption that is appropriate for a wide range of small battery-powered devices such as cell phones, cameras, laptops, and other devices [2]. Piconet and Scatternet are the two topologies utilised in Bluetooth architecture.

### 1.2. A PICONET –

A Piconet is an improvised network that uses Bluetooth technology to connect wireless devices. It's a collection of up to eight devices that use the same frequencies. The notion of master and slave is used. Each piconet has a master, while the remainder of the device serves as a slave. The device that initiates the piconet is usually the master [8]. To create a piconet, the device first looks for other Bluetooth devices in the vicinity. When the two meet, when devices have the same frequency, the necessary information is sent, and paging is used to establish the link. It's possible to use the procedure. There are two options if more than seven units need to exchange data: The first is to place one or more gadgets in the park state. Sniff, hold, and park are Bluetooth modes that are used for low power usage [7]. When a device enters park mode, it disconnects from Piconet, but the schedule adjustment is preserved. Continuously, the master of piconet sends out signals to the slaves inviting them to keep the piconet. If the piconet has fewer than seven slave devices, only the slave returns. If not, the master will park one of the active slave devices. Due to There will be a delay as a result of these actions, which may be undesirable for some applications such as procedure control. Applications requiring an immediate response from the command center.

### 1.3. SCATTERNET –

It is made up of interconnected piconets that allow more than 8 units to communicate. Scatter nets are generated when a master or slave device in one piconet chooses to act as a slave in another piconet [7]. Scatter nets provide for greater throughput. Multiple-hop is also possible in different piconets. It is possible to route between devices. This means that in a single piconet, only one component can interact at a time. As a result, they jump from one channel to the next, relying on the channel limit [8].

### 2. BLUETOOTH BASE SENSOR NETWORK

Developers are demonstrating operability between various gadgets in order to create several applications.

Such applications include wireless sensor networks. It includes a sensing unit, microcontroller, power supply, and wireless communication connection, among other small gadgets.

Important characteristics of wireless sensor networks:

1. Network nodes combine throughout the task in progress.
2. It pays special attention to data.

Because the position of junctions is not decided in the field and the construction of smart sensor nodes is not planned, it is possible that certain sensor nodes will close in such a way that they can either complete the required measurement or the error probability will be increased [2] [4]. A small node of repetitious code was created to solve these difficulties. The number is discarded. These nodes also combine and share data. As a result, greater results are guaranteed. The collected data is sent to users through a "gateway" that uses multiple hop pathways in the Smart sensor nodes. Strawn about the field.

### 2.2. BLUETOOTH HARDWARE ARCHITECTURE

There are three main function modules in Bluetooth hardware:

- i) Bluetooth radio frequency Trans receiver unit (2.4 GHz)
- ii) Link regulating unit
- iii) Interface for the Host controller

A digital signal processing portion with a link controller and a central processor make up the host controller. Link For base band processing and physical processing, a controller with both hardware and software components is used protocol layers The CPU core assists the Bluetooth module in filtering page requests and responding to inquiries [4]. Link The manager is a piece of software that runs on the CPU and communicates with them via link manager protocols.

### 3. A WIRELESS SENSOR NETWORK

The querying and tasking functions of a wireless sensor network are critical.

**Querying:** Queries are employed when the current value of an observed event is required.

**Tasking:** This is a more complex procedure that comes in handy when an event must be remembered for a long period. The system is assigned these two functions, querying and tasking, through a "gateway," which also relays the data gathered user responses [2].

The main functions of a gateway are:

- Interaction with sensor networks is one of a gateway's key functions.
- It is utilised a short wireless communication.
- It helps with things like finding smart sensor nodes.
- Provides routing and sending and receiving data from sensors techniques.
- It regulates gateway connection and dataflow to and from the sensor network.
- It establishes a standard for dealing with concepts by providing information on the present sensors that are involved.
- their peculiarities
- It assigns functions for a uniform approach to sensors, regardless of their type, location, or other factors.
- topology of the network, introduction of questions and tasks, and response
- User communication is important.
- Communication with users and other sensor networks via the internet, WAN, satellite, or other means different types of short-range communication technologies.

### 3.1. SENSOR NETWORK IMPLEMENTATION

The major goal of the sensor network implementation was to create a hardware plan and standard software solutions that could be used as support and for the purpose of wireless sensor network research.

Smart sensor nodes and a gateway are used in sensor networks. Every node has a large number of sensors [5] [7] is coupled to a microprocessor and a Bluetooth element.

Piconet gateways and smart nodes behave like Piconet nodes. For instance: Pressure sensor with Bluetooth.

The Bluetooth node has the sensor attached to it. The pressure

sensing element, smart signal processing circuitry with density and temperature reception, and the Transducer Electronic Data Sheet are all included (TEDS). These are built-in features of sensor microcontrollers that are used to govern node connectivity as well as other functions. TED's arrangement [5] should be remembered.

### 3.2. SMART SENSOR NODE DISCOVERY

The first step in completing the gateway installation is to locate the smart sensor nodes. All smart nodes are found via the gateway, and a list of sensor attributes and network topologies is created. Then, to make the procedure of removing the old sensor and installing the new one as simple as possible, executed simultaneously [2] [3] [5].

### ALGORITHM

Bluetooth performs the inquiry method when the gateway has been initialised. Following the discovery of Bluetooth devices, the major and minor device classes are examined. The sensor nodes define the type of device and attached sensor by setting some parameters. To provide a more detailed explanation of the duty class field is utilised when offering service[7]. If the discovered device is not a smart node, it is discarded. Because no specific sensor profile exists at this time, the database searches for a serial port outline link. Once After acquiring the associated string, the Bluetooth link is approved, and data transfer begins.

### 4. CONCLUSION

Wireless sensor networks are an exciting area of research with numerous applications and solutions. They are a collection of several little gadgets that can interact with and process data. Bluetooth is a simple and effective way to communicate data in sensor networks. Routing and application planning We neglect several issues connected to the MAC layer, physical layer, application layer, and system level operations. 1st routing layer Bluetooth devices must be able to automatically connect and exchange information within range of a different gadget.

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