



VIGNAN's INSTITUTE OF INFORMATION TECHNOLOGY
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(Approved by AICTE-New Delhi & Affiliated to JNTUGV, Vizianagaram)
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Department of Computer Science and Engineering

(2023-24)

Bluetooth Chat Box

Mini Project Report

Submitted in partial fulfillment for the award of degree of

BACHELOR OF TECHNOLOGY

in

COMPUTER SCIENCE AND ENGINEERING

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CERTIFICATE

This is to certify that the project report entitled as “**Bluetooth Chat Box**” is the bonafide record of project work carried out under my supervision by Y.TarunSai (22L31A05O3), DhirajShah (22L31A05O6), S.Krupakar (22L31A05J7), T.Jananya Kavya Samhita (22L31A05L6), T.Mounika (23L35A0543) during the academic year 2023-2024, in partial fulfillment of the requirements for the award of the degree of Bachelor of Technology in Computer Science and Engineering of Jawaharlal Nehru Technological University-Gurajada,Vizianagaram. The results embodied in this project report have not been submitted to any other University or Institute for the award of any Degree or Diploma.

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DECLARATION

We here by declare that this Mini project report entitled “**Bluetooth Chat Box**” has undertaken by us for the fulfillment of Bachelor of Technology in COMPUTER SCIENCE AND ENGINEERING. We declare that this Mini project report has not been submitted anywhere in the part of fulfillment for any degree of any other University.

Date:22-08-2024

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Department of Computer Science and Engineering

VISION:

To be a center of excellence for High Quality Education and Research in the field of Computer Science and Engineering, generating highly competent professionals with ethical and human values human values serving the society.

MISSION:

- To impart high quality education with the strong foundation of Computer Science and Engineering principles that enable students to meet the challenges in profession/career.
- To nurture research activities among faculty and students by providing necessary facilities and environment.
- To mould students into effective professionals with necessary communication skills, team spirit, leadership qualities, managerial skills, integrity, social & environmental responsibility, lifelong learning ability with professional ethics and human values.

ABSTRACT

The objective of the Bluetooth Chat Box project is to develop a simple yet effective communication tool that allows users to exchange messages wirelessly using Bluetooth technology. This application aims to provide a convenient means of communication in situations where internet connectivity may be limited or unavailable, such as in remote areas or during emergencies. The development process involves designing and implementing a user-friendly interface that enables users to discover nearby devices, establish Bluetooth connections, and exchange text messages in real-time. The application is built using technologies compatible with various platforms, ensuring cross-device compatibility.

Key features include automatic device discovery, secure message transmission, and support for both one-to-one and group conversations. Technologically, the application leverages Bluetooth APIs provided by mobile operating systems like Android or iOS to establish communication channels between devices. The frontend is developed using platform-specific languages and frameworks, optimizing performance and ensuring a seamless user experience. Backend functionalities, if required, are kept minimal, focusing primarily on message routing and encryption. The Bluetooth Chat Box project offers a practical solution for communication in scenarios where traditional internet-based messaging services are not feasible. As connectivity becomes increasingly vital in various aspects of daily life, particularly in remote or disaster-stricken areas, the ability to communicate via Bluetooth can prove invaluable. By providing a simple and reliable means of exchanging message wirelessly, this application contributes to enhancing communication accessibility and resilience in diverse contexts.

KEYWORDS: Bluetooth, Wireless communication, User-friendly interface, Real-time messaging, Device discovery, Secure transmission, Cross-device compatibility, Mobile application.

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CHAPTER 1 INTRODUCTION

Bluetooth is a network technology that connects mobile devices wirelessly over a short-range to form a personal area network (PAN). They use short-wavelength, ultra-high frequency (UHF) radio waves within the range 2.400 to 2.485 GHz, for wireless communications.

Bluetooth Usage:

Usage of Bluetooth can be broadly categorized into three areas —

Access Points for Data and Voice — Real-time voice and data transmissions are provided by Bluetooth by connecting portable and stationary network devices wirelessly.

Cable replacement — Bluetooth replaces the need for a large number of wires and cables of wired networks. The connections can be made instantly and are retained even when the devices "are not within range. The range of the devices is typically 10m. However, the range can be extended by using amplifiers.

Ad hoc networking — Ad hoc networks are formed impromptu by the network devices by passing the need for a central access point like a router. Bluetooth networks are ad hoc in nature since a Bluetooth enabled device can form an instant connection with another Bluetooth enabled device as soon as it comes into range.

Bluetooth Applications:

Some of the common applications of Bluetooth are —

- In laptops, notebooks and wireless PCs.
- In mobile phones and PDAs (personal digital assistant).
- In printers.
- In wireless headsets.
- In wireless PANs (personal area networks) and even LANs (local area networks) to transfer data files, videos, and images and MP3 or MP4.
- In wireless peripheral devices like mouse and keyboard.

CHAPTER 2 EXISTING SYSTEM

In existing Bluetooth chat systems for Android devices, the initial setup requires a physical connection and configuration to establish a link between devices. This cumbersome process involves exchanging user IDs and other setup details manually, which can be time-consuming and prone to errors. Once the connection is established, users can share information, but the initial setup itself can be a barrier to ease of use. The need to handle and input multiple user details adds complexity, and sometimes the connection is unstable, causing interruptions in data sharing. This lack of seamless connectivity and the requirement for manual configuration detract from the user experience.

Moreover, Bluetooth technology, while convenient for short-range communication, has several inherent drawbacks. Data security remains a significant concern, as Bluetooth connections are vulnerable to various types of attacks and unauthorized access. Additionally, the short range of Bluetooth limits the practical distance over which devices can communicate effectively. This range constraint, coupled with the tendency for connections to drop unexpectedly, further diminishes the reliability and efficiency of Bluetooth-based communication systems. Overall, these limitations contribute to a less secure and less stable user experience, highlighting the need for more robust and user-friendly solutions.

DISADVANTAGES:

- Low data security.
- Short range communication.
- Can lose connection very easily.

CHAPTER 3 PROPOSED SYSTEM

The proposed Bluetooth Chat Android system represents a significant advancement by removing the need for an internet connection to send texts and documents. This upgrade simplifies the file transfer process, allowing users to exchange information directly via loss or corruption that can arise from unreliable internet connections. By ensuring that all communications are managed over a stable Bluetooth connection, the system provides a more dependable means of exchanging important files and messages without being subject to the fluctuations of network availability.

Additionally, the proposed system enhances user convenience by streamlining the connection process. Users can establish a Bluetooth connection quickly and effortlessly, bypassing the often complex and time-consuming setup associated with internet-based communication. This ease of pairing eliminates the need for intricate network configurations and reduces the risk of connectivity issues. Overall, this simplified approach not only saves time and effort but also ensures a more reliable and efficient method for sharing information, making the system more accessible and user-friendly.

ADVANTAGES:

- No internet connection required.
- Less chance of losing data.
- High transfer rate.

CHAPTER 4 REQUIREMENTS

SOFTWARE REQUIREMENTS:

1. Python Environment

- **Requirement:** Python 3.x
- **Explanation:** Ensure Python 3.x is installed on both the server and client devices. The code uses Python's standard libraries and Tkinter, which is included with Python 3.x.

2. Bluetooth Adapter

- **Requirement:** A working Bluetooth adapter
- **Explanation:** Both the server and client devices need to have Bluetooth capabilities. The adapter should be properly installed and configured for Bluetooth communication.

3. Bluetooth Pairing

- **Requirement:** Devices must be paired
- **Explanation:** The server and client devices need to be paired with each other before they can establish a connection. This involves going through the Bluetooth settings and pairing the devices.

4. Bluetooth MAC Address

- **Requirement:** Correct Bluetooth MAC address
- **Explanation:** The MAC address used in the server_gui.py and client_gui.py scripts must match the Bluetooth address of the server device. Update "10:68:38:c2:43:e5" with the correct MAC address for your server device.

5. Port Number

- **Requirement:** Consistent port number
- **Explanation:** Both the server and client scripts use port 4. This port number should be consistent between the server and client for communication.

6. Dependencies

- **Requirement:** Python standard libraries
- **Explanation:** The code relies on Python's standard libraries: socket, threading, and tkinter. No additional installation is required for these libraries as they are part of Python's standard library.

7. GUI Library

- **Requirement:** tkinter library
- **Explanation:** The tkinter library is used for the graphical user interface (GUI). It is included with Python, so no separate installation is required. Ensure that tkinter is

properly installed with your Python distribution.

8. Basic Networking Permissions

- **Requirement:** Network permissions.
- **Explanation:** The script requires permission to create network sockets and listen for connections. Depending on the operating system, you might need to grant network access permissions.

9. Running the Scripts

- **Requirement:** Execute Python scripts
- **Explanation:** You need to execute the server_gui.py script on the server device and the client_gui.py script on the client device. This can be done via the command line:
 - On the server device: python server_gui.py
 - On the client device: python client_gui.py

10. Operating System Compatibility

- **Requirement:** Compatible operating system
- **Explanation:** Ensure that the operating system on both devices supports Bluetooth and Python. Linux, macOS, and Windows are generally compatible, but specific Bluetooth support might vary.

HARDWARE REQUIREMENT:

- **Computer:**

A Standard Computer Capable of Running Python and OpenCV: The system needs a standard computer with sufficient processing power to run Python and the OpenCV library efficiently. While the requirements are not overly demanding, the computer should be capable of handling real-time video processing and gesture recognition without significant latency, ensuring a smooth and responsive user experience.

CHAPTER 5 SCOPE OF THE PROJECT

The Bluetooth Chat Box project is designed to provide a versatile and reliable communication tool that operates over Bluetooth, addressing scenarios where internet connectivity is either limited or unavailable.

The project scope includes:

1. **Offline Communication:** The application will facilitate text messaging between devices using Bluetooth, without requiring an active internet connection, making it suitable for remote areas or emergencies.
2. **User Interface Development:** Creation of intuitive graphical user interfaces (GUIs) for both server and client applications. The interfaces will allow users to send and receive messages effortlessly.
3. **Bluetooth Integration:** Implementing Bluetooth functionalities to handle device discovery, pairing, and communication. This includes ensuring secure and stable connections between paired devices.
4. **Cross-Platform Compatibility:** Ensuring that the application can operate across different platforms (e.g., Android and iOS) with minimal adjustments.
5. **Real-Time Messaging:** Developing a system capable of real-time text communication, with features to handle multiple messages simultaneously.
6. **Security Considerations:** Basic encryption of messages to prevent unauthorized access and ensure secure communication between devices.
7. **Performance Optimization:** Ensuring that the application performs efficiently under various conditions, including different hardware configurations and Bluetooth versions.
8. **Future Enhancements:** Laying the groundwork for future enhancements such as voice chat, user authorization, and web support.

CHAPTER 6 LITERATURE SURVEY

REVIEW ON LITERATURE WORK

TITLE 1: Bluetooth Smart Support for 6LoBTLE

YEAR: 2015

AUTHOR: Joseph Decuir

ABSTRACT:

The Bluetooth Low-Energy transport, trademarked Bluetooth Smart, is now a market fact [1]. Worldwide sales of Bluetooth Smart devices and Bluetooth Ready mobile devices are measured in several billion units per year. The two most exciting new markets are wearable devices [2h] [3] and home networking [4].

TITLE 2: A Bluetooth radio in 0.18 μm CMOS

YEAR: 2003

AUTHOR: P. van Zeijl; J.-W.T. Eikenbroek; P.-P. Vervoort; S. Setty; J. Tangenherg; G. Shipton; E. Kooistra; I.C. Keekstra; D. Belot; K. Visser; E. Bosma; S.C. Blaakmeer

ABSTRACT:

This paper describes the results of an implementation of a Bluetooth radio in a 0.18 μm CMOS process. A low-IF image-reject conversion architecture is used for the receiver. The transmitter uses direct 1Q-upconversion. The VCO runs at 4.8-5.0 GHz, thus facilitating the generation of 0 $^\circ$ and 90 $^\circ$ signals for both the receiver and transmitter. By using an inductor-less LNA and the extensive use of mismatch simulations, the smallest silicon area for a Bluetooth radio implementation so far can be reached: 5.5 mm². The transceiver consumes 30 mA in receive mode and 35 mA in transmit mode from a 2.5 to 3.0-V power supply.

TITLE 3: Security for Bluetooth enabled devices using BlipTrack Bluetooth detector

YEAR: 2015

AUTHOR: MonuKumar; B. K. Gupta

ABSTRACT:

As the Bluetooth technology is growing there is a need of secure communication and to keep there data secret where Bluetooth is used as primary option. There are many attacks possible on ' Bluetooth technology and associated devices such as denial of service attack, passive eavesdropping and active eavesdropping, man-in-the-middle attacks, message modification, and resource misappropriation. So it is a challenge to detect the attacker. This paper proposed an idea for those Bluetooth enabled devices which uses Secure Simple Pairing (SSP) association models not having Strong security against passive eavesdropping.

TITLE 4: Bluetooth Performance Analysis in Personal Area Network (PAN)

YEAR: 2006

AUTHOR: Rozeha A. Rashid; RohaizaYusoff

ABSTRACT:

Bluetooth is a telecommunications industry specification operating in an unlicensed frequency band of 2.4 GHz that describes how mobile phones, computers, and personal digital assistants - (PDAs) can be easily interconnected using a short-range wireless connection. In this study, a personal area network (PAN) was set up using three personal computers, two Bluetooth universal serial bus dongles, one serial Bluetooth module and also a Bluetooth mobile phone. A graphical user interface (GUI) using Visual Basic 6.0 was built to display the system accessibility such as file and system properties, transferring text files, chatting program and network detection by Bluetooth's service discovery protocol (SDP).

CHAPTER 7 MODULES

The project can be divided into the following key modules:

1. **Bluetooth Communication Module:**

- **Function:** Manages Bluetooth connectivity, device discovery, and data transmission.
- **Components:** Bluetooth adapter, Bluetooth APIs, socket programming for communication.

2. **User Interface (UI) Module:**

- **Function:** Provides the graphical interface for interaction, including message input and display.
- **Components:** Tkinter for GUI development, text areas for displaying messages, and input fields for user communication.

3. **Message Handling Module:**

- **Function:** Processes incoming and outgoing messages, ensuring proper display and routing.
- **Components:** Message encoding/decoding, threading for real-time communication, and GUI updates.

4. **Device Management Module:**

- **Function:** Handles device pairing, connection setup, and status monitoring.
- **Components:** Bluetooth device discovery, pairing algorithms, connection status indicators.

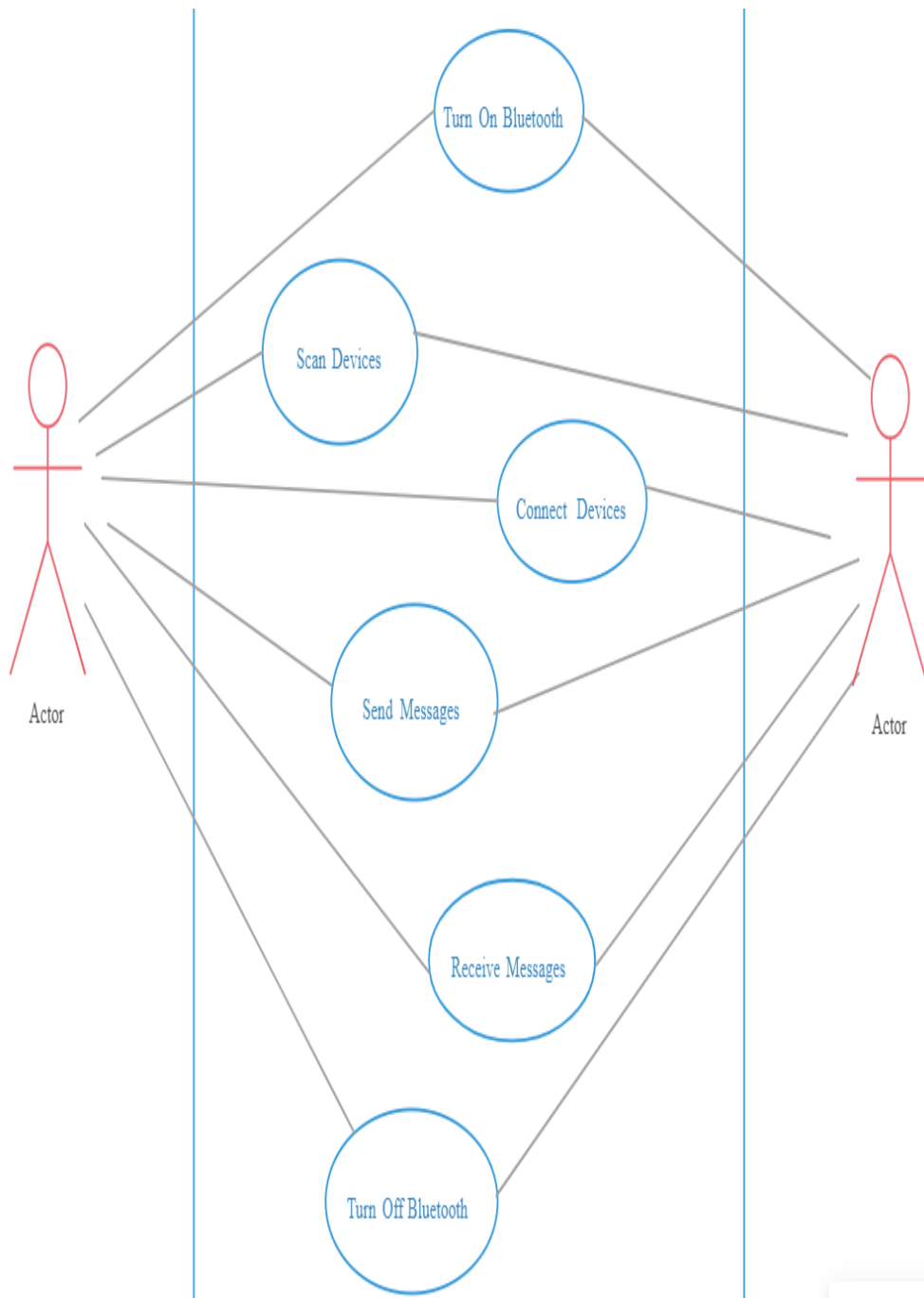
5. **Security Module:**

- **Function:** Provides basic encryption and security features to safeguard message content.
- **Components:** Encryption algorithms, secure pairing methods.

6. **Configuration Module:**

- **Function:** Manages system settings, such as Bluetooth MAC addresses and port numbers.
- **Components:** Configuration files or settings within the application.

CHAPTER 8 SYSTEM DESIGN



8.1 Architecture Overview:

The system design of the Bluetooth Chat Box consists of two primary components: the server and the client. Both components interact with each other over Bluetooth to facilitate communication.

- **Server:**
 - **Role:** Acts as the central communication hub, waiting for client connections and handling incoming messages.
 - **Components:**
 - **Bluetooth Server Socket:** Listens for incoming connections.
 - **Message Handling:** Receives and displays messages from clients.
 - **GUI:** Provides the interface for server-side operations.
- **Client:**
 - **Role:** Connects to the server and exchanges messages.
 - **Components:**
 - **Bluetooth Client Socket:** Connects to the server.
 - **Message Handling:** Sends and receives messages.
 - **GUI:** Provides the interface for client-side operations.

8.2 System Flow

1. **Initialization:**
 - Server starts and listens for incoming Bluetooth connections.
 - Client connects to the server and initiates communication.
2. **Pairing and Connection:**
 - Devices pair via Bluetooth and establish a secure connection.
3. **Messaging:**
 - Messages are sent from the client to the server and vice versa.
 - Messages are displayed in real-time on the respective GUIs.
4. **Termination:**
 - Connection is closed when the session ends or if either device disconnects.

8.3 Design Considerations

- **Error Handling:** Implement mechanisms to handle disconnections and errors gracefully.
- **Scalability:** Design to support multiple connections if necessary.
- **Usability:** Ensure the GUI is intuitive and easy to use.

CHAPTER 9 APPLICATIONS

Emergency Communication

- **Use Case:** In disaster-stricken areas or during emergencies where traditional communication networks may be down, Bluetooth Chat Box can facilitate crucial communication between first responders, emergency teams, and affected individuals.
- **Benefit:** Provides a reliable means of communication without dependence on cellular networks or the internet, helping coordinate rescue operations and relay vital information.

Collaborative Work in Areas with Poor Connectivity

- **Use Case:** In locations with unstable internet connections, such as construction sites or field research locations, the Bluetooth Chat Box can be used for real-time communication and data sharing.
- **Benefit:** Enhances collaboration and information exchange without relying on internet connectivity, improving efficiency and coordination.

Testing and Debugging in Development

- **Use Case:** For developers working on Bluetooth-enabled applications, the Bluetooth Chat Box provides a practical tool for testing and debugging Bluetooth connectivity and messaging functionalities.
- **Benefit:** Offers a controlled environment to test Bluetooth communication features and troubleshoot issues during the development phase.

Private and Secure Messaging

- **Use Case:** For users who require secure and private communication, the Bluetooth Chat Box offers a local communication channel that is less susceptible to interception compared to internet-based messaging platforms.
- **Benefit:** Enhances privacy and security by limiting communication to within a defined range and avoiding exposure over public networks.

CHAPTER 10 SOURCE CODE

SERVER.PY

```
import socket

import threading

import tkinter as tk

from tkinter import scrolledtext

# Function to handle receiving messages from the client

def handle_client(client_socket, text_area):

    while True:

        try:

            data = client_socket.recv(1024)

            if not data:

                break

            text_area.insert(tk.END, f"Client: {data.decode('utf-8')}\n", 'client')

        except OSError:

            break

    client_socket.close()

# Function to start the server

def start_server(text_area):

    server = socket.socket(socket.AF_BLUETOOTH, socket.SOCK_STREAM,
socket.BTPROTO_RFCOMM)

    server.bind(("10:68:38:c2:43:e5", 4))

    server.listen(2)

    text_area.insert(tk.END, "Waiting for connection...\n", 'info')

    client_socket, addr = server.accept()

    text_area.insert(tk.END, f"Connected to {addr}\n", 'info')
```

```

# Start a new thread to handle incoming messages

threading.Thread(target=handle_client, args=(client_socket, text_area)).start()

def send_message():

    message = entry.get()

    entry.delete(0, tk.END)

    client_socket.send(message.encode("utf-8"))

    text_area.insert(tk.END, f"You: {message}\n", 'user')


# Configure send button action

send_button.config(command=send_message)


# Create the server interface

root = tk.Tk()

root.title("Bluetooth Server Chatbox")


# Set the main window background color

root.configure(bg="#2e3f4f")


# Create a text area with scroll functionality

text_area = scrolledtext.ScrolledText(root, wrap=tk.WORD, bg="#1f2a35", fg="white", font=("Arial",
12),height=15)

text_area.pack(padx=10, pady=10, fill=tk.BOTH)


# Configure tags for colored text

text_area.tag_config('client', foreground='#f28b82')

text_area.tag_config('user', foreground='#a7ffeb')

```

```

text_area.tag_config('info', foreground='#fbbc05', font=("Arial", 12, "italic"))

# Entry box for user input
entry = tk.Entry(root, bg="#394a5b", fg="white", font=("Arial", 12))
entry.pack(padx=10, pady=5, fill=tk.X)

# Send button
send_button = tk.Button(root, text="Send", bg="#5c6bc0", fg="white", font=("Arial", 12))
send_button.pack(padx=10, pady=5)

# Start the server when the GUI is loaded
threading.Thread(target=start_server, args=(text_area,)).start()

root.mainloop()

```

CLIENT.PY

```

import socket

import threading

import tkinter as tk

from tkinter import scrolledtext

# Function to handle receiving messages from the server
def receive_messages(client_socket, text_area):

    while True:

        try:

            data = client_socket.recv(1024)

            if not data:

                break

```

```

        text_area.insert(tk.END, f"Server: {data.decode('utf-8')}\n", 'server')

    except OSError:

        break

client_socket.close()

# Function to start the client

def start_client(text_area):

    client_socket = socket.socket(socket.AF_BLUETOOTH, socket.SOCK_STREAM,
socket.BTPROTO_RFCOMM)

    client_socket.connect(("10:68:38:c2:43:e5", 4))

    text_area.insert(tk.END, "Connected to the server.\n", 'info')

# Start a new thread to receive messages from the server

threading.Thread(target=receive_messages, args=(client_socket, text_area)).start()

def send_message():

    message = entry.get()

    entry.delete(0, tk.END)

    client_socket.send(message.encode("utf-8"))

    text_area.insert(tk.END, f"You: {message}\n", 'user')

# Configure send button action

send_button.config(command=send_message)

# Create the client interface

root = tk.Tk()

root.title("Bluetooth Client Chatbox")

```

```

# Set the main window background color

root.configure(bg="#2e3f4f")


# Create a text area with scroll functionality

text_area = scrolledtext.ScrolledText(root, wrap=tk.WORD, bg="#1f2a35", fg="white",
font=("Arial", 12), height=15)

text_area.pack(padx=10, pady=10, fill=tk.BOTH)


# Configure tags for colored text

text_area.tag_config('server', foreground='#f28b82')

text_area.tag_config('user', foreground='#a7ffeb')

text_area.tag_config('info', foreground='#fbbc05', font=("Arial", 12, "italic"))


# Entry box for user input

entry = tk.Entry(root, bg="#394a5b", fg="white", font=("Arial", 12))

entry.pack(padx=10, pady=5, fill=tk.X)


# Send button

send_button = tk.Button(root, text="Send", bg="#5c6bc0", fg="white", font=("Arial", 12))

send_button.pack(padx=10, pady=5)


# Start the client when the GUI is loaded

threading.Thread(target=start_client, args=(text_area,)).start()


root.mainloop()

```


CHAPTER 11 CONCLUSION

This application provides all the features that are required when there is no internet connection, can prove helpful in collaborate learning, Easy to communicate, Sending and receiving messages in real time, help to save your internet data, Engaging messaging features. Messaging has become a part of our everyday lives in part due to its convenience for real-time chat communication and simple-to-use functionality. These messaging and real-time chat applications play an important role in how the world interacts today, due to their immediacy and vast capabilities. Hence, after going through the design and architecture of android as well as Bluetooth we can conclude that the implementation of Bluetooth chat application can be done easily which can be prove to be very useful to the android users.

FUTURE WORK:

With the knowledge I have gained by developing this application, I am confident that in the future I can make the application more effectively by adding these services.

- Extending this application by providing Authorization service.
- Creating Database and maintaining users.
- Increasing the effectiveness of the application by providing Voice Chat.
- Extending it to Web Support.

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