

Design Document ChatBox

Video Streaming Component

Purpose: To capture, transmit, and display real-time video between clients.

Implementation:

- Capture video frames from the webcam using OpenCV.
- Compress and send the frames over a TCP socket to the server.
- The server then broadcasts these frames to connected clients.
- Clients receive, decompress, and display the video frames.

Integration:

- Runs on a thread to ensure smooth video capture and display.
- Integrated with the main application loop to work alongside audio and text messaging components.

Audio Streaming Component

Purpose: To enable real-time audio communication.

Implementation:

- Capture audio using PyAudio.
- Stream audio data to the server, which then redistributes it to other clients.
- Clients play the received audio stream.

Integration:

- Operates on a separate thread to handle continuous audio capture and playback.
- Synchronized with video and text components to provide a cohesive communication experience.

Text Messaging Component

Purpose: To allow clients to send and receive text messages.

Implementation:

- Implement text-sending and receiving functionalities using TCP sockets.

- The server handles the distribution of text messages to all connected clients.

Integration:

- Runs in the main application loop or on a separate thread, depending on implementation.
- Designed to seamlessly function alongside the video and audio streams.

Network Communication

- Utilizes TCP sockets for reliable data transmission.
- The server acts as a central hub for all communications for video, audio, and text.
- Each component uses a separate port and socket for data transmission to avoid interference and data mix-up.