SFBU Customer Support System
With Speech Integration

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Project Design

- An **enhanced** version of [SFBU Customer Support System](#).

- Support **text & speech I/O**, **conversation management**, **chat history management**, **dynamic document uploading**.

- API Used:

  - **GPT-4o-mini** for text generation.

  - **Whisper API** for speech-to-text transcription.
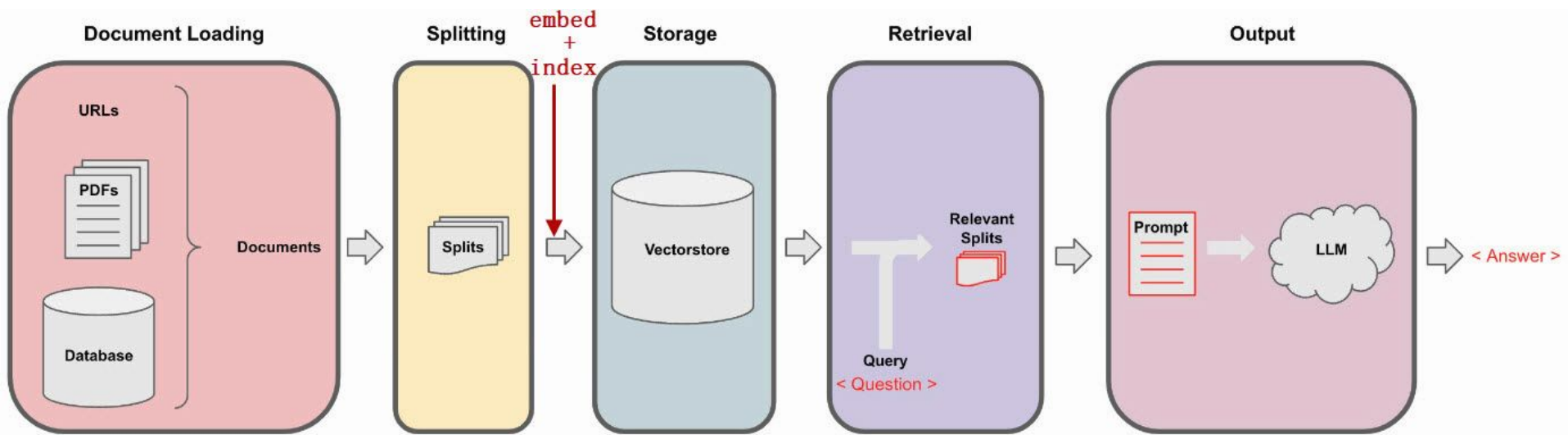
  - **OpenAI TTS** for text-to-speech.

Key Features

- **Multimodal Interaction**: Text and speech.

- **Advanced Conversational Memory**: History-aware retriever.

- **Document Retrieval with RAG**: Dynamically load PDFs, web links, and YouTube videos.

- **User-Friendly Web Interface**: Built using Panel.

Workflow Overview

- **RAG and VectorDB Creation**: Document loading, vector storage.

- **Conversational QA Chain**: Contextual retriever, concise answers.

- **Speech I/O Integration**: Whisper API for input, TTS for output.

- **Web Interface**: Upload, interact, and manage conversations.

RAG Workflow

Conversational QA Chain

- Create a **Contextual Retriever**: create_history_aware_retriever

- Define **System Prompt**: ChatPromptTemplate

- Build the **Conversational QA Chain**:
  create_stuff_documents_chain, create_retrieval_chain

- **Memory Management**: MemorySaver

- **State Management**: StateGraph

Speech Integration

- `initialize_flags()`: Define shutdown and pause events for threads.

- `record_audio()`: Captures and queues audio input.

- `transcribe_forever()`: Converts audio to text using **Whisper API**.

- `play_speech_response()`: Generates GPT responses and outputs speech using **OpenAI TTS**.

Web Interface Design

- **Conversation Tab**: Asking questions, start new conversation, speech toggle.

- **Chat History Tab**: Viewing and clearing history.

- **Document Upload Tab**: Upload PDFs, URLs, YouTube.

Use Case: Speech I/O

SFBU Customer Support System

Conversation   Chat History   Document Upload

User: whats the school address

ChatBot: The school address is 161 Mission Falls Lane, Fremont, CA 94539.

User: when are the campus closed

ChatBot: The campus is closed on the following dates: Labor Day (September 2, 2024), Thanksgiving
Holiday (November 28 - 30, 2024), and Winter Break (December 25 - 31, 2024).
Additionally, it is closed on New Year Holiday (January 1, 2025).

```
Listening...
[2024-11-26 16:38:49.251194] Transcription result: 'Hey computer, what's the sch
ool address?'
[2024-11-26 16:38:49.251339] Wake word detected. Starting conversation mode.
[2024-11-26 16:38:49.251429] Processing input: ' whats the school address'
[2024-11-26 16:38:59.334720] Playback completed.
[2024-11-26 16:38:59.335004] Temporary audio file 'reply.mp3' removed.
[2024-11-26 16:39:02.356410] Transcription result: 'Thank you, stop.'
[2024-11-26 16:39:02.356449] Stop word detected. Ending conversation.
[2024-11-26 16:39:11.141438] Transcription result: 'When are the campus closed?'
[2024-11-26 16:39:11.141479] Ignoring input (not in conversation mode).
[2024-11-26 16:39:20.378403] Transcription result: 'Hey computer, when are the c
ampus closed?'
[2024-11-26 16:39:20.378482] Wake word detected. Starting conversation mode.
[2024-11-26 16:39:20.378515] Processing input: ' when are the campus closed'
[2024-11-26 16:39:45.526699] Playback completed.
[2024-11-26 16:39:45.526954] Temporary audio file 'reply.mp3' removed.
[2024-11-26 16:39:48.742239] Transcription result: 'Thank you, stop.'
[2024-11-26 16:39:48.742272] Stop word detected. Ending conversation.
```

Ask me a question...   **Send**

Use Speech Input/Output   Start New Conversation

Use Case: Follow-up Q&A

Use Case: Chat History

User: what's the school address

ChatBot: The school address is 161 Mission Falls Lane, Fremont, CA 94539.

User: when are the campus closed

ChatBot: The campus is closed on the following dates: September 2, 2024 (Labor Day), November 28 - 30, 2024 (Thanksgiving Holiday), December 25 - 31, 2024 (Winter Break), January 1, 2025 (New Year Holiday), and during Spring Break from March 31 - April 5, 2025.

User: What are the scholarship options?

ChatBot: Scholarship options include undergraduate scholarships based on GPA, ranging from 25% to 100% (e.g., SFBU for 2.0-2.49 GPA to Presidential for 4.0). Graduate scholarships also range from 0% to 100% based on GPA, with specific percentages for different GPA bands (e.g., 50% for 3.0-3.24 GPA to Presidential for 4.0+). Additionally, need-based scholarships are available for students who submit a FAFSA Submission Summary.

User: Tell me more about one of them.

ChatBot: The Presidential Scholarship is awarded to undergraduate students with a perfect GPA of 4.0, covering 100% of tuition costs. To maintain this scholarship, students must uphold Satisfactory Academic Progress, maintain a minimum cumulative GPA of 2.00, and enroll in at least twelve credits per semester. The scholarship is valid for tuition payments only and does not cover additional student fees.

Clear History

No chat history yet.

Clear History

Use Case: Document Q&A

SFBU Customer Support System

Conversation   Chat History   Document Upload

| Choose File | 📄 sfbu-2024-2025-unive…atalog-8-20-2024.pdf | **Process PDF** |

| Enter URL... | **Process URL** |

| Enter YouTube link... | **Process YouTube** |

✅ PDF uploaded and processed successfully.

Conversation   Chat History   Document Upload

User: Tell me about the MSDS program.

ChatBot: The MSDS program requires a minimum of 30 semester credit hours of graduate study, including three foundation courses, four specialization courses, a capstone course, and electives. Students must have a bachelor's degree in a relevant field and meet specific background preparation requirements in mathematics, programming, and data structures. To graduate, students must maintain a GPA of 3.0 or better and complete all coursework with a grade of C or higher.

| Ask me a question... | **Send** |

Use Speech Input/Output   Start New Conversation

Thanks.

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