Faculties of Engineering & Technology

Dumka Engineering College

Software Requirements Specification (SRS)

DEC Chatbot — Voice & Text Assistant for Dumka Engineering College

Submitted by

Neelesh Ranjan

Under the guidance of

Mrs. Sunidhi Priyadarshini
(Asst. Prof., Department of Computer Science & Engineering)

Polytechnic Compound Road, Dumka, Jharkhand 814101

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Introduction

1.1. Purpose

This document provides detailed information about the Software Requirements Specification of the DEC Chatbot. The SRS follows IEEE-style organization and will guide supervisors, developers, testers, QA and maintenance personnel.

1.1.1. Scope

The DEC Chatbot is a web-based and voice-enabled assistant for Dumka Engineering College. Users can ask questions about admissions, academics, exams, timetables, faculty contacts, events, and campus services. The system supports both text and voice I/O and can escalate to a human when confidence is low.

Overall Description

2.1. Product Perspective

The chatbot integrates into the DEC website as an embeddable widget and exposes Flask-based REST APIs. It uses Python libraries for NLU and information retrieval from a curated Knowledge Base and official college resources.

2.2. Product Function

1. Accept user queries (text and voice).
2. Perform speech-to-text (ASR) and text-to-speech (TTS).
3. Detect intents and extract entities using NLU.
4. Retrieve answers from the Knowledge Base, calendars, and directories.
5. Provide suggested follow-ups and links to official pages.
6. Escalate to staff on low confidence or on request.
7. Log conversations for analytics and improvement.

2.3. User Characteristics

Administrator, Faculty/Staff, and Student/Visitor users with general web proficiency.

2.4. Assumptions and Dependencies

Stable internet access; access to official college data sources; periodic KB updates by admins; browser support for microphone access.

2.5. Tools and Technologies

Python 3.x, Flask, Rasa or Transformers+spaCy, SentenceTransformers/FAISS, PostgreSQL, SQLAlchemy, Web Speech API, pyttsx3/gTTS, Docker, Gunicorn+Nginx.

General Requirements

3.1. Specific Requirements

Requirement 1: The system must support both text and voice conversations.

Requirement 2: The chatbot must return accurate answers from an Admin-maintained Knowledge Base.

Requirement 3: Intent confidence threshold (e.g., 0.75) shall be used to decide clarification or escalation.

Requirement 4: Conversation logs must be stored with PII masking as per policy.

Requirement 5: Admins can manage KB entries, thresholds, and escalation recipients via a secure dashboard.

3.2. Tools and Technologies

Backend: Python (Flask), NLU: Rasa/Transformers, Database: PostgreSQL, Vector Search: FAISS, Frontend: HTML/CSS/JS, Deployment: Docker.

External Interfaces

4.1. User Interfaces

Three modules: Client (web chat), Admin (dashboard), and optional mobile webview. Login/role-based access for administrators.

4.2. Hardware Interfaces

Client devices with microphone/speaker; server with sufficient CPU/RAM (optional GPU).

Functional Requirements

1. Description: The system shall allow users to chat without registration.

• Input: Message or voice.

• Output: Bot reply and suggestions.

2. Description: The system shall allow admins to update Knowledge Base entries.

• Input: Authenticated admin edits.

• Output: Updated KB and index refreshed.

3. Description: The system shall convert speech to text and back to audio.

• Input: Microphone audio.

• Output: Transcribed text and synthesized speech.

4. Description: The system shall retrieve answers from KB and official sources.

• Input: Detected intent + entities.

• Output: Answer with confidence score.

5. Description: The system shall escalate to staff on low confidence.

• Input: Low score or user request.

• Output: Email/portal notification to staff and acknowledgement to user.

5.1. Constraints

5.1.1. Operational and Environmental

Usable on modern browsers; microphone permission needed; secure access for admin endpoints.

5.1.2. Legal Constraints

Display privacy policy and obtain consent for audio recording; comply with college data policies.

5.1.3. Design Constraint

Lightweight widget; containerized backend; compatibility with hosting environment.

Non-Functional Requirements

6.1. Software Application Attributes

6.1.1. Reliability – >95% response success for KB-backed queries.

6.1.2. Maintainability – Modular design; documented admin operations.

6.1.3. Availability – Target 99% during working hours.

6.1.4. Security – HTTPS; RBAC; encryption at rest where applicable.

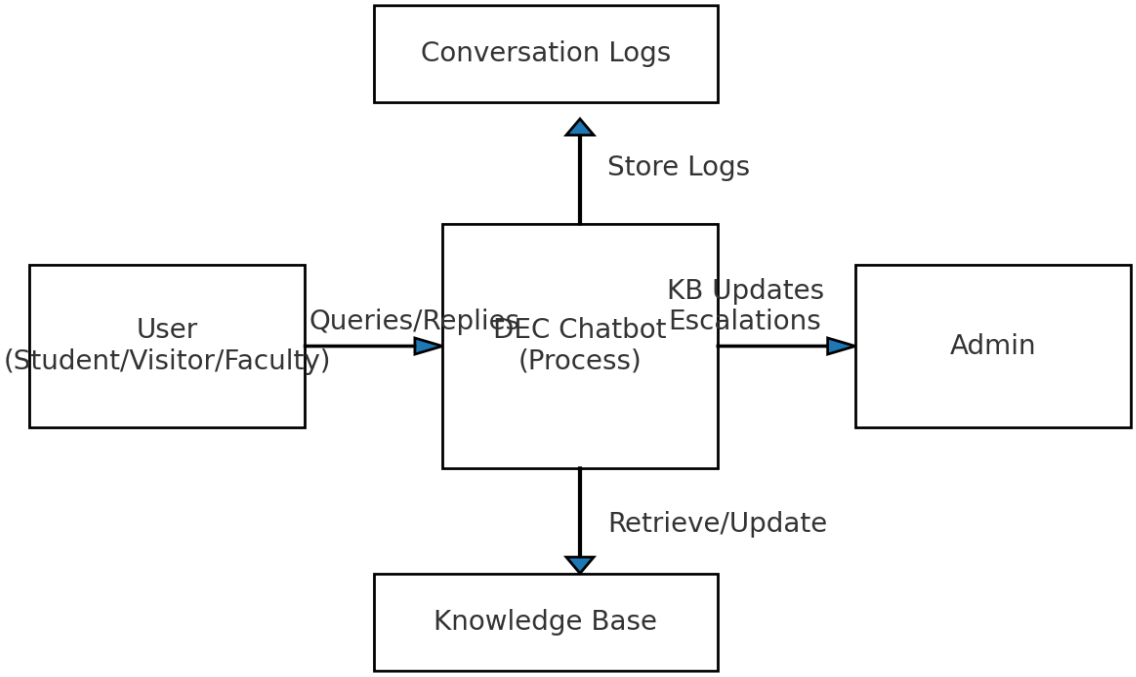
6.1.5. Portability – Works across major browsers; containerized backend.

6.1.6. Usability – Clear prompts; quick replies; accessible controls.

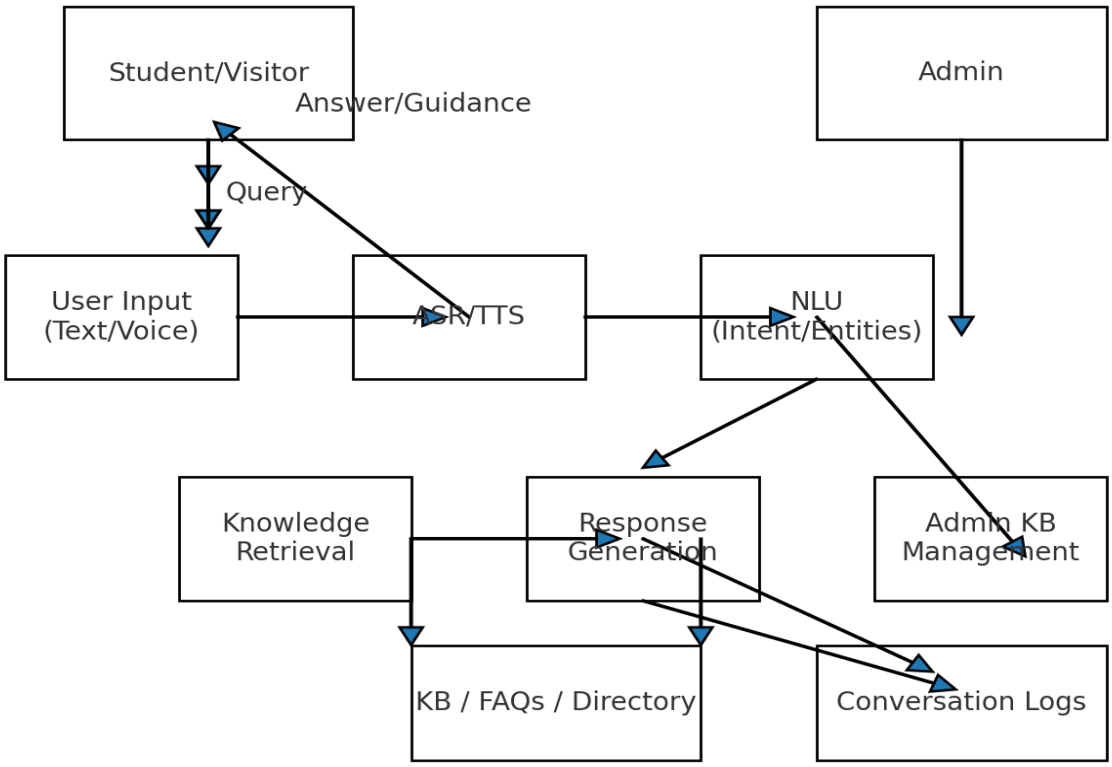
6.2. Look and Feel – College branding; consistent fonts; minimal color palette.

Data Flow Diagrams

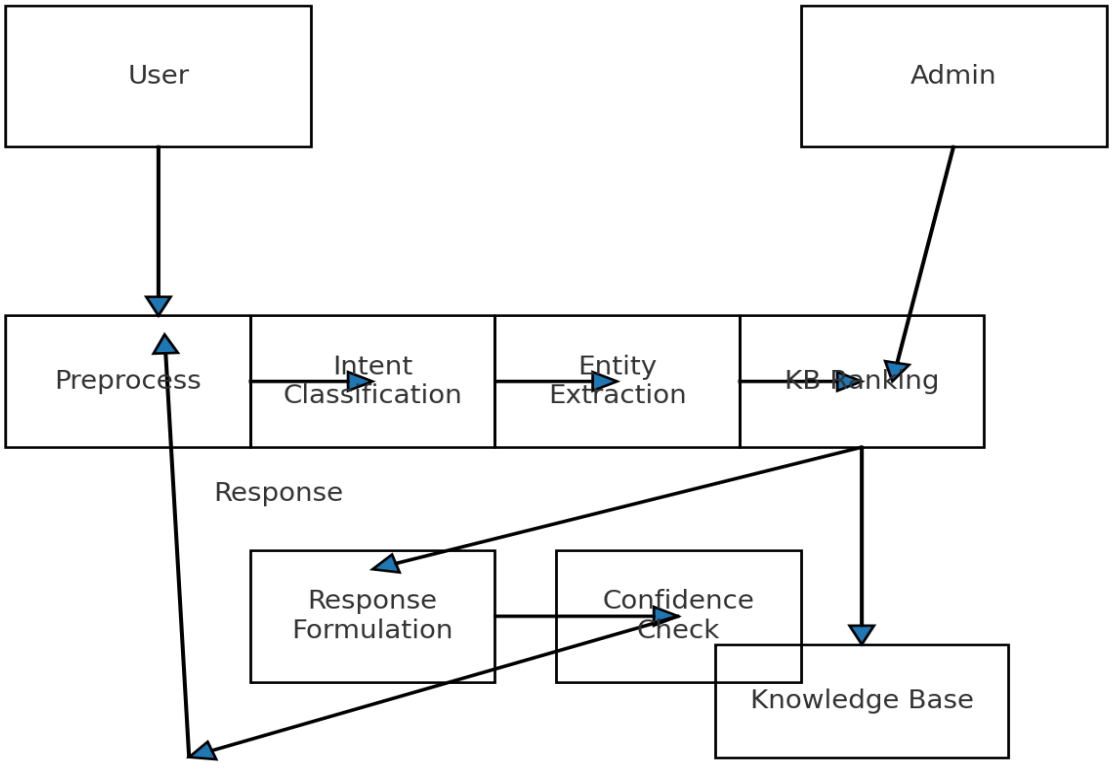
7.1. Data Flow Diagram (DFD Level-0)



7.2. Data Flow Diagram (DFD Level-1)



7.3. Data Flow Diagram (DFD Level-2)



References

[1] Python Documentation – https://www.python.org/

[2] Flask Documentation – https://flask.palletsprojects.com/

[3] Rasa – https://rasa.com/

[4] spaCy – https://spacy.io/

[5] SentenceTransformers – https://www.sbert.net/

[6] Web Speech API – MDN Docs