

Asha AI Chatbot Technical Documentation

Overview

The **Asha AI Chatbot** is designed to provide personalized career guidance for women on the **JobsForHer** platform. This chatbot leverages **AI** to provide real-time job suggestions, mentorship guidance, and event recommendations. It's built using cutting-edge technologies for accessibility, security, and scalability.

1. Frontend (Web Interface)

Technologies Used:

- **React.js:** A JavaScript library for building user interfaces. It provides a dynamic, component-based architecture for creating reusable UI elements.
- **Tailwind CSS:** A utility-first CSS framework used for styling. It allows for easy customization and responsiveness across devices.
- **Web Speech API:** A browser API that enables speech input, allowing users to interact with the chatbot via voice. This supports **hands-free** interaction, making the chatbot more accessible.
- **ARIA Roles and Screen Reader Compatibility:** Ensures that the chatbot interface is accessible to users with disabilities. ARIA roles improve interaction with screen readers, enhancing accessibility for users with visual impairments.

Key Features:

- **Chatbot UI:** Displays the conversation between the user and the chatbot.
 - **Voice Input:** Allows users to interact with the chatbot using their voice through the **Web Speech API**.
 - **Accessibility:** ARIA roles are used for better compatibility with screen readers.
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2. Backend (Application Layer)

Technologies Used:

- **Node.js:** A JavaScript runtime that enables the backend to handle multiple simultaneous requests asynchronously, ensuring high performance and scalability.
- **Express.js:** A web application framework for Node.js that simplifies routing, request handling, and middleware integration.
- **REST API:** The communication protocol used between the frontend and backend, allowing users to interact with the chatbot and retrieve data (job listings, events, mentorship programs).
- **JWT (JSON Web Tokens):** Used for authentication and session management. JWT tokens are issued during login and used to authenticate subsequent API requests.
- **Integration with JobsForHer Internal APIs:** The backend is integrated with **JobsForHer's** internal APIs to fetch job listings, mentorship programs, and event data in real-time.

Key Features:

- **User Authentication:** Handled via JWT tokens for secure login sessions.
 - **API Routes:** Provides access to data on job listings, events, and mentorship programs.
 - **Secure Data Handling:** Ensures that all interactions between the frontend and backend are secure, using HTTPS and JWT for session management.
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3. AI & NLP Layer

Technologies Used:

- **OpenAI GPT-4:** A state-of-the-art conversational AI model used for generating human-like responses. It powers the chatbot's ability to answer user queries and provide career advice.
- **LangChain:** A framework used to manage **Retrieval-Augmented Generation (RAG)** pipelines. It helps the chatbot to retrieve relevant information from external knowledge sources before generating responses.
- **Pinecone:** A vector database used for storing and retrieving semantic vectors, which help the chatbot understand the context of user queries and provide accurate job suggestions.

- **Hugging Face Transformers:** Used for intent detection and natural language understanding (NLU). This helps the chatbot identify user intents (e.g., job search, mentorship) and extract relevant entities.
- **OpenAI Embeddings:** A method for converting textual data into semantic vectors, used for **semantic search** to find the most relevant job listings, events, and mentors based on user input.

Key Features:

- **Natural Language Understanding (NLU):** Detects the intent of the user and extracts meaningful entities (e.g., job titles, locations).
 - **Semantic Search:** Uses Pinecone and OpenAI Embeddings to find the most relevant information by comparing vector embeddings of user queries to stored knowledge.
 - **Conversational AI:** Powered by GPT-4 to provide responses in a human-like manner, engaging the user in an informative conversation.
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4. Infrastructure & DevOps

Technologies Used:

- **Google Cloud Platform (GCP):** Provides scalable infrastructure for hosting the application, ensuring high availability and reliable performance.
- **Kubernetes:** Used for container orchestration, allowing the chatbot to scale automatically based on traffic demands.
- **Prometheus:** A monitoring tool used for tracking system performance, such as response times, server health, and error rates.
- **GitHub Actions:** Automates CI/CD pipelines, enabling seamless deployment and version control.
- **HTTPS:** Ensures secure communication between the client (user) and the server, protecting sensitive data.

Key Features:

- **Scalable Infrastructure:** Hosted on GCP and managed with Kubernetes, ensuring that the chatbot can scale as user traffic increases.

- **Continuous Deployment:** With GitHub Actions, new features, bug fixes, and updates are deployed automatically to production with minimal downtime.
 - **Performance Monitoring:** Prometheus helps monitor the health of the system, identifying performance bottlenecks and ensuring a smooth user experience.
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5. Ethical AI & Privacy

Key Principles:

- **Bias Mitigation:** The AI models are trained using curated datasets to minimize bias. Specific efforts are made to ensure the chatbot provides gender-neutral, inclusive, and equitable responses.
- **GDPR-Compliant Data Handling:** The chatbot adheres to GDPR standards, ensuring that personal data is handled, stored, and processed in a secure and privacy-conscious manner. User consent is obtained before collecting any personal data.
- **Human-in-the-Loop:** For sensitive or ambiguous queries, the system will escalate to human moderators or experts. This ensures that the chatbot doesn't provide harmful or inappropriate advice.
- **Consent Management:** The chatbot includes a consent management mechanism, allowing users to control which data is stored or processed. Additionally, cookie compliance is ensured according to privacy regulations.

Key Features:

- **Data Anonymization:** Personal data is anonymized or encrypted to protect user privacy.
 - **User Control:** Users can manage their data preferences, including data deletion requests, through the user interface.
 - **Transparency:** Users are informed about the chatbot's data collection practices, with clear explanations of how their data will be used.
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Conclusion

The **Asha AI Chatbot** represents a powerful tool for empowering women with career resources and guidance. The solution leverages modern web technologies, robust AI

models, and a secure infrastructure to provide real-time job opportunities, mentorship, and event recommendations.

This technical documentation serves as a guide for developers and stakeholders involved in building, deploying, and maintaining the chatbot, while also emphasizing the importance of ethical AI practices and privacy compliance.