# Vels University

MTECH – CSE

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Project Guide :

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# Design and Implementation of a Low-Code Conversational AI Assistant using Retrieval-Augmented Generation and Large Language Models

**Abstract:**

Conversational AI has evolved rapidly with the advent of Large Language Models (LLMs), enabling intelligent and context-aware interactions between users and systems. However, integrating these models into enterprise applications typically requires extensive coding and AI expertise. This project presents a low-code framework to build a Conversational AI Assistant using **Retrieval-Augmented Generation (RAG)** and **LLMs**, integrated with platforms like **Oracle APEX**. The assistant enables natural, domain-specific communication while retrieving accurate responses from enterprise knowledge sources. This approach reduces development time, lowers technical barriers, and makes AI accessible in business workflows like ERP or CRM systems.

## 1. Introduction:

- Natural language interfaces have become essential in modern applications due to their ability to improve usability and accessibility. Traditional chatbot systems, however, are often rule-based, lacking contextual awareness or dynamic knowledge access. The emergence of LLMs such as OpenAI's GPT and Google's T5 has enabled significant advancements in generative responses and semantic understanding.
- Combining these capabilities with **Retrieval-Augmented Generation (RAG** which augments LLMs with external document or database knowledge has opened up a new path for building smart assistants. Still, technical challenges hinder widespread adoption. By leveraging **low-code platforms** like Oracle APEX, this project proposes a solution that allows even non-developers to configure and deploy intelligent conversational systems within enterprise settings.

## 2. Problem Statement:

Despite the capabilities of LLMs and RAG, enterprise adoption remains slow due to:

- High complexity in integrating AI with existing systems.
- Lack of context-awareness in traditional chatbots.
- Time-consuming and skill-intensive development cycles.
- Difficulty accessing proprietary or internal knowledge sources through AI.
- No-code/low-code environments lacking AI-native components.

Thus, there is a need for a **low-code, intelligent, and enterprise-ready conversational AI assistant** that leverages **RAG and LLMs** for smarter, real-time, and domain-specific interactions.

**3. Objectives:**

To design a low-code architecture for a conversational AI assistant. To integrate LLMs with enterprise data using RAG. To allow contextual question-answering from internal sources (e.g., documents, databases). To deploy the assistant via Oracle APEX or similar low-code tools. To reduce AI integration complexity in enterprise applications.

**4. Literature Survey:**

Several studies highlight the potential of conversational agents in enterprise settings. Research in NLP has led to the development of powerful LLMs capable of understanding and generating human-like text. Tools like Oracle APEX and Microsoft Power Platform provide low-code solutions for building enterprise applications. However, limited work has been done on combining these technologies to create ERP-specific assistants.

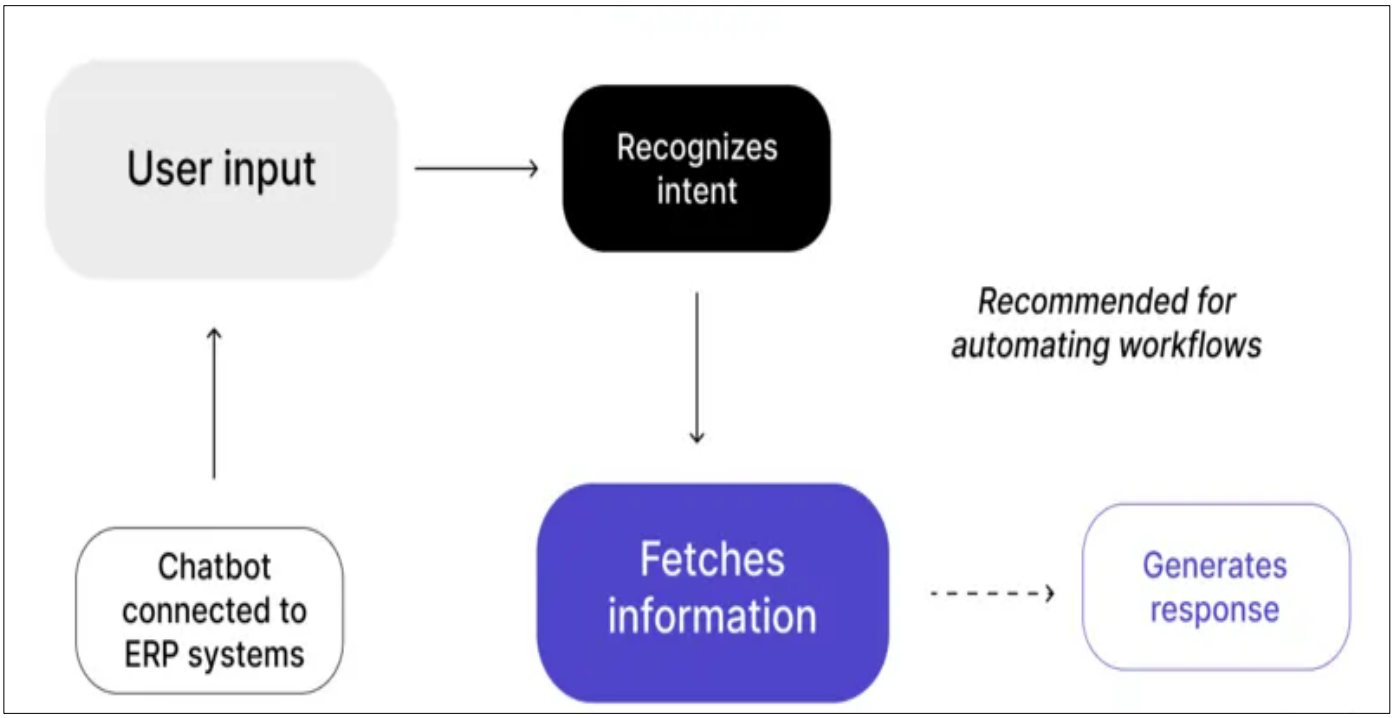
**5. System Architecture:**

**Components:** -

- **User Interface:** Web or mobile-based chat interface built using low-code tools.
- **Middleware Layer:** Handles prompt formatting, user session management, and logging.
- **ERP Connector:** Integrates with ERP backend using APIs or direct SQL access.

**Data Flow:**

- User inputs query in natural language.
- Middleware formats input and sends it to the LLM.
- LLM processes input and returns structured commands.
- Middleware translates command into ERP-compatible actions.
- Results are fetched from ERP and displayed to the user.




**6. Methodology:**

- **User Query Handling:** Accept user input via a frontend chat interface (Oracle APEX page or web component).
- **Embedding Generation:** Convert user queries and documents into vector representations using models like OpenAI embeddings or Sentence-BERT.
- **Knowledge Retrieval:** Search internal databases or document stores using similarity search (e.g., FAISS or pgvector).
- **Augmented Prompting:** Combine retrieved documents with the original query in a prompt.
- **LLM Response Generation:** Use LLMs (like GPT-4) to generate context-aware responses.
- **Display & Feedback:** Show results in the frontend. Log feedback for improvements or training.

**7. Features:**

Conversational AI Interface (chat-style). Natural language understanding and query resolution. Integration with enterprise databases/documents. Retrieval-augmented context injection. Low-code deployment via Oracle APEX. Scalable vector-based document search. Modular and reusable architecture.

**8. Tools and Technologies:**

- Oracle APEX (Low Code Platform)
- GPT-4 API
- FAISS Vector
- LangChain
- Python Rest API
- Oracle DB

**10. Expected Outcomes:**

A working conversational assistant with RAG integration. Seamless integration with structured databases and unstructured documents. Reduction in development time for AI-based features. Improved user satisfaction through context-rich responses. Demonstration of low-code AI orchestration in an enterprise use case.

**11. Conclusion:**

This project bridges the gap between AI capabilities and business usability by implementing a low-code conversational AI assistant. Through Retrieval-Augmented Generation, the assistant is able to provide accurate and domain-relevant responses, outperforming traditional chatbots. The low-code approach ensures rapid development, ease of customization, and accessibility for enterprises lacking deep AI expertise. This solution serves as a template for future enterprise-grade AI implementations.

**12. Future Work:** -

Integrate voice input and output for hands-free interaction. Expand to multi-agent systems for task automation (e.g., scheduling, data updates). Support real-time multilingual conversations. Use reinforcement learning from user feedback to improve response accuracy. Implement auto-summarization and document parsing for knowledge expansion. Deploy on cloud platforms for scalability and high availability.

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