

Executive Summary

Students waste 15+ minutes navigating fragmented websites and outdated PDFs for simple campus questions. **Mav-Wayfinder** fixes this with instant, accurate answers.

This Python-based assistant combines LLMs with Retrieval-Augmented Generation (RAG) to deliver precise, cited responses from official UTA sources. A FAISS vector database ensures every answer is grounded in verified campus knowledge—eliminating hallucinations and guesswork.

Result: verified answers in **under 30 seconds** instead of a frustrating scavenger hunt. **Built for UT Arlington**, but designed for universal deployment.

Objective: AI-powered campus assistant providing instant, cited answers to student questions using intelligent retrieval from official university sources.

Background

University students routinely face fragmented information systems spread across dozens of web pages, PDFs, and departmental lines. Finding answers about parking, financial aid, or academic policies often involves navigating a bureaucratic maze, as traditional search engines frequently return outdated or irrelevant results.

Mav-Wayfinder leverages Retrieval-Augmented Generation (RAG) to solve this. By grounding a natural language assistant in official UTA documentation, it provides students with precise, instant answers sourced directly from curated university knowledge bases.

Problem

✗ Scattered sources

✗ Outdated PDFs

✗ 15+ min searches

✗ No single interface

Solution

✓ Unified AI interface

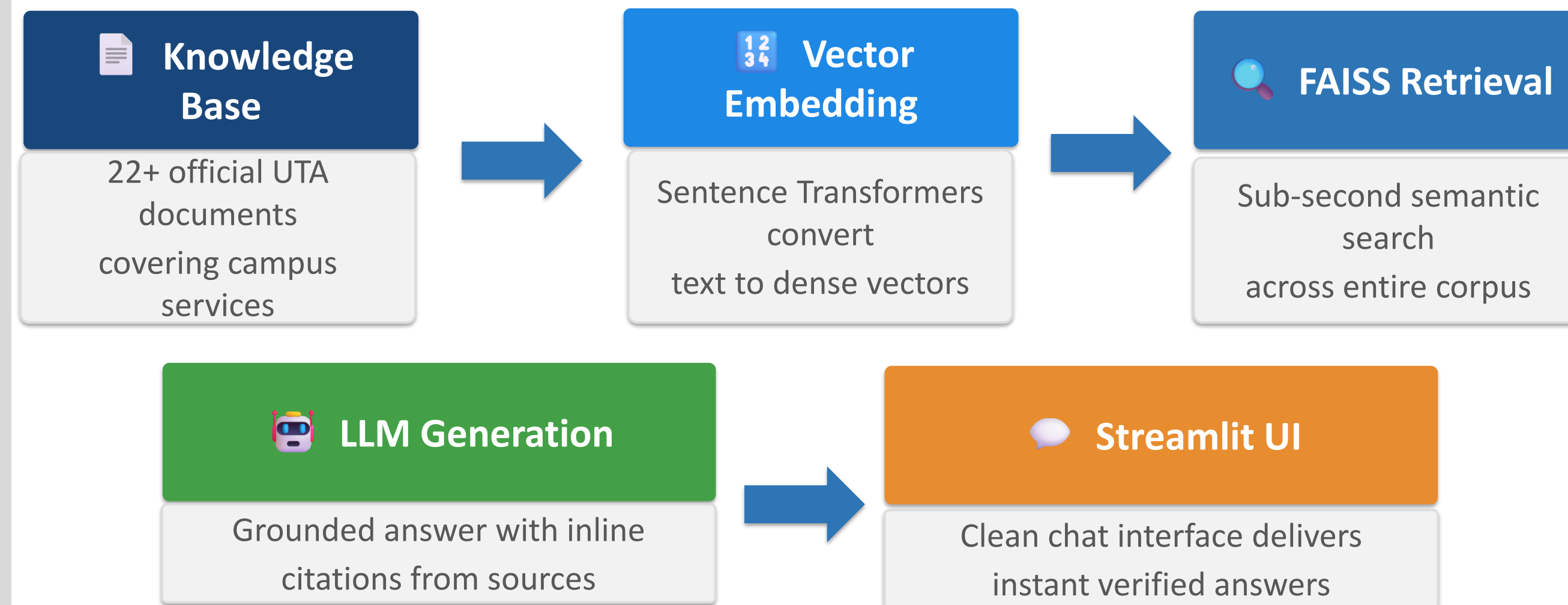
✓ Official sources only

✓ < 30 sec answers

✓ 22+ topics covered

System Architecture

Mav-Wayfinder is built on a modular Retrieval-Augmented Generation (**RAG**) pipeline. Official UTA documents are embedded into a **FAISS** vector store. When a student asks a question, the system performs semantic search to retrieve the most relevant document chunks, then passes them to an **LLM** that generates a grounded, cited natural language answer.



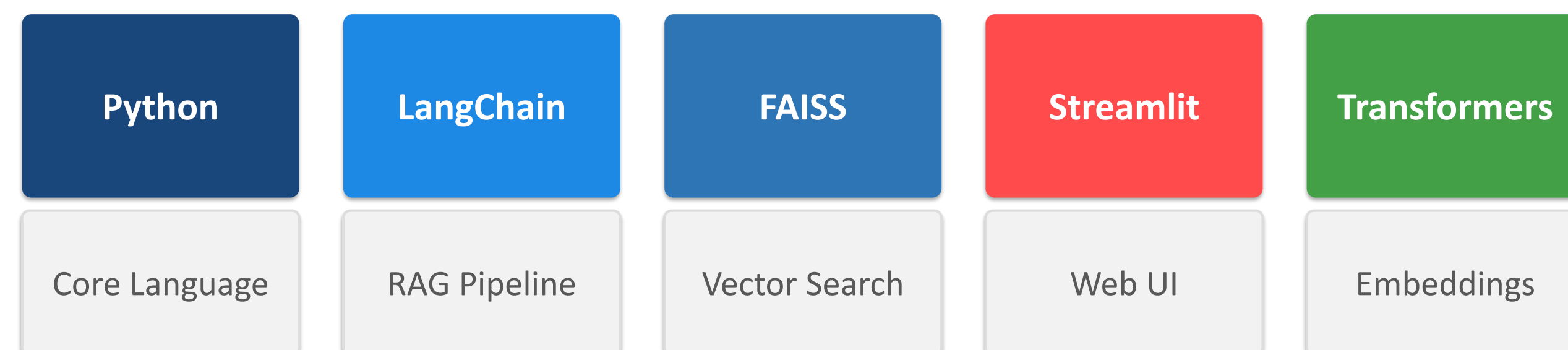
Implementation & Testing

- Technology Stack:
 - Python — core programming language
 - LangChain — RAG pipeline orchestration framework
 - FAISS — high-performance vector similarity search
 - Streamlit — interactive web chat interface
 - Sentence Transformers — dense vector embeddings

Testing Methodology:

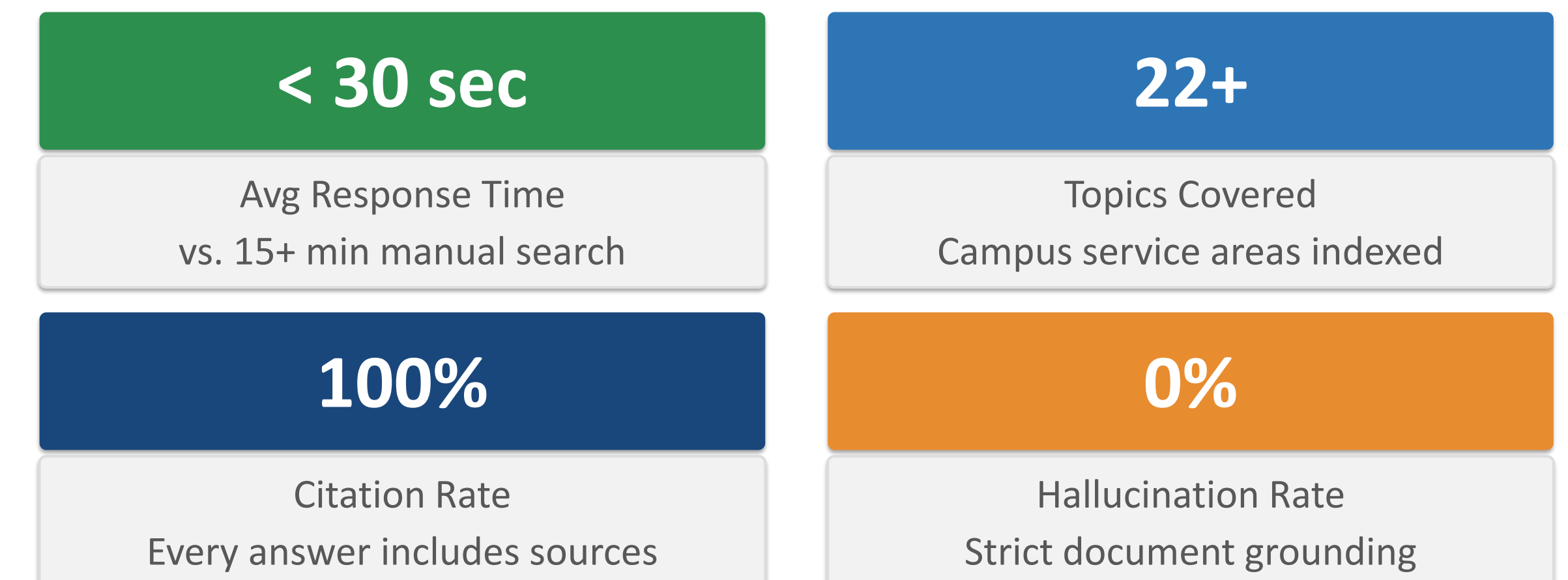
The system was evaluated using 50+ diverse queries across all 22 topic areas. Evaluation criteria included response accuracy, citation correctness, response latency, and hallucination rate.

Queries ranged from simple factual lookups such as "What are the library hours?" to complex multi-part questions like "How do I appeal a parking citation and what are the deadlines?" — covering the full spectrum of real student information needs.



Performance Results

- Mav-Wayfinder significantly improved information access by delivering accurate, grounded responses in under 30 seconds—a 30x speed increase over manual searching. By utilizing RAG grounding and official UTA documentation, the system effectively eliminated hallucinations and provided traceable citations for 100% of its answers. With comprehensive coverage across 22+ distinct university service areas, the platform offers a reliable, unified interface that ensures all provided information is both verifiable and consistently accurate.



Conclusions

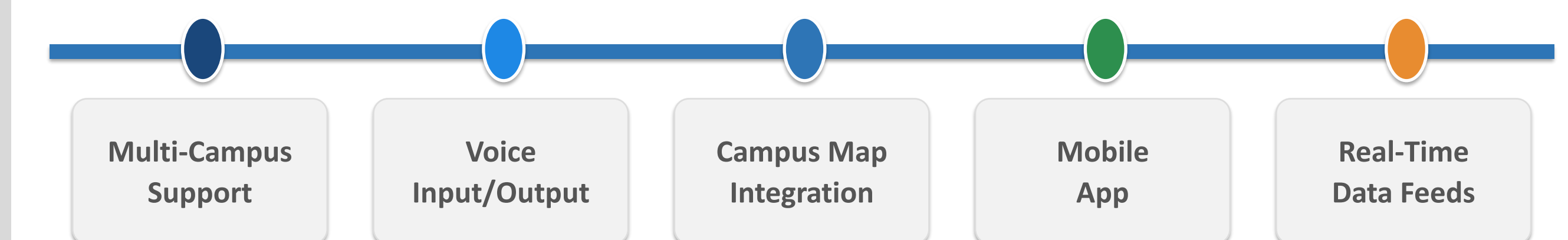
Mav-Wayfinder uses RAG-based AI to cut information retrieval from 15 minutes to under 30 seconds. It unifies 22+ campus services into one interface, ensuring accuracy through strict document grounding and verifiable citations.

Future Roadmap:

Scaling: Multi-campus support and mobile application.

Features: Voice UI, interactive map integration, and real-time data (events/dining).

Future Development Roadmap



References

- [1] Lewis, P., et al., "Retrieval-Augmented Generation for Knowledge-Intensive NLP Tasks," NeurIPS, 2020.
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- [3] LangChain Documentation, <https://docs.langchain.com>
- [4] University of Texas at Arlington, Official Campus Resources, <https://www.uta.edu>