**Project 1: End-to-End AI Agent for Recruiter Q&A on Students**

**Description:**  
This capstone project runs through the entire semester and integrates every key topic from the course—Data Engineering, foundational LLM concepts, Retrieval-Augmented Generation (RAG), LLM fine-tuning, and model alignment. Students will collaboratively design, build, and refine an intelligent agent that enables recruiters to ask natural language questions about students and get detailed, accurate answers.

The agent will leverage all the components learned in class:

* **Data Engineering:** Collect, preprocess, and structure student data and related materials.
* **LLM Fundamentals:** Apply prompt engineering and interact with language models.
* **RAG:** Integrate a retrieval system so the agent can ground its responses in real student records, portfolios, and resumes.
* **Fine-Tuning:** Personalize the LLM with supervised fine-tuning using real Q&A pairs.
* **Alignment:** Apply modern alignment techniques to ensure the agent’s answers are safe, accurate, and relevant.

**Deliverable:**  
By the end of the semester, each student or team will have a working, deployable AI-powered agent. This agent can be demonstrated live to recruiters or employers, and students are encouraged to include a link to their deployed agent or a project showcase in their resume, LinkedIn, or personal portfolio for job applications. This is a tangible, job-ready AI project that can significantly boost your career profile.

**Project 2: Voice Research Assistant Agent (Homework Project)**

**Description:**  
As a hands-on extension of the course material, students will individually build a voice-driven research assistant agent. The project involves:

* Developing a voice agent that accepts spoken questions and provides synthesized spoken answers.
* Integrating Automatic Speech Recognition (ASR), Large Language Models (LLMs), and Text-to-Speech (TTS).
* Building and debugging a chained audio-AI pipeline.

**Purpose & Resume Value:**  
Completing this project provides a strong, demonstrable example of applied AI engineering with multi-modal systems. Students can create a short demo video or share their code/project link as a concrete portfolio piece for job applications, showcasing real-world experience with modern voice AI technologies.

**Project 3: Independent Interest-Driven AI Agent (Optional, Self-Directed)**

**Description:**  
This optional project empowers students to design and implement an AI agent that is closely aligned with their own research interests or future career field. Students can select any topic or application—such as music, art, home automation, business analytics, biomedical research, legal tech, education, etc.—ensuring their project is directly relevant to the industry or academic path they want to pursue. Students are responsible for all phases: data collection, model development, system integration, and final deployment.

**Showcase & Recognition:**  
At the end of the semester, all completed projects will be presented in a public showcase event. This provides a unique platform for students to demonstrate their domain-specific skills to peers, instructors, and invited guests from industry and academia. A panel of judges will evaluate the projects, with prizes awarded to the top three outstanding projects.

**Career Impact:**  
Because the project is directly connected to each student’s own field of study or intended industry, it serves as a highly relevant, portfolio-ready demonstration of applied AI skills. Participation in the showcase—and especially recognition as a top project winner—can be highlighted on resumes, LinkedIn, and personal websites. Students are encouraged to publish their work as public demos, GitHub repositories, or portfolio pages, providing strong, field-specific evidence of their expertise for job applications and professional networking.