AI Tools for Engineering Entrepreneurship: Survey and Simulation Framework

Faculty Supervisor: Irving Barron

Project Overview

This project aims to develop the foundations of an AI-powered simulation framework that prepares engineering students for the entrepreneurial challenges of commercializing their technical projects. The work is structured in two phases over the 10-week period, combining a survey of the current landscape with the design and prototyping of an original tool. This project can be carried out by a single student, but there is sufficient scope and depth for two students to work on it collaboratively, particularly during Phase 2 where parallel workstreams in multimodal content generation become available.

Phase 1: Literature Survey and Technology Assessment (Weeks 1–4)

AI for Engineering Entrepreneurship. The student(s) will conduct a focused survey of state-of-the-art AI-based applications designed to guide, assist, or augment engineers in entrepreneurial endeavors. This includes tools for market analysis, business model generation, pitch development, IP strategy, and product-market fit evaluation. The goal is to identify capabilities, gaps, and design patterns in existing solutions.

Locally Deployable AI Solutions. In parallel, the student(s) will investigate AI models and frameworks that can run effectively on commodity hardware. With RAM and VRAM costs remaining prohibitively high, there is strong motivation to identify lightweight, quantized, or otherwise optimized models (e.g., small language models) that can be deployed locally without requiring expensive GPU infrastructure. This exploration will inform the technical feasibility of the simulation framework.

Phase 2: Framework Design and Prototyping (Weeks 5–10)

Building on the findings from Phase 1, the student(s) will design and begin implementing the foundational architecture of an AI-based entrepreneurial simulation. The framework will present engineering students with realistic scenarios and decision points they would encounter when commercializing a personal technical project. These scenarios may include customer discovery, funding decisions, regulatory navigation, team building, go-to-market strategy, strategic pivoting, industry and competitive analysis. The simulation will leverage locally deployable AI to generate dynamic, context-aware scenarios and provide formative feedback to the users. Importantly, the framework is envisioned as a multimodal experience: beyond traditional text-based interactions, the simulation will benefit from visual content generation via diffusion models (e.g., generating product mockups) and auditory content via text-to-speech solutions to create more human-like conversational situations. If two students are involved, one can focus on the core text-based simulation logic while the other explores integration of these visual and auditory modalities.

Expected Outcomes

By the end of the summer, the student(s) will deliver: (1) a written survey report covering the current landscape of AI-based entrepreneurship tools and locally deployable AI solutions, including a comparative analysis of model capabilities, hardware requirements, and suitability for the proposed framework; and (2) an architectural design document for the simulation framework, specifying the types of entrepreneurial scenarios to be supported, the interaction model between the user and the AI agents, the multimodal content pipeline, and the system requirements for local deployment. These two deliverables are the primary expected outcomes of the project.

A third desired outcome is (3) a proof-of-concept prototype demonstrating at least one complete simulation scenario running on commodity hardware; however, this goal is aspirational and may be constrained by different factors such as integration complexity encountered during Phase 2.

Desired Student Profile

This project is well-suited for one or two undergraduates with interest in both AI/machine learning and entrepreneurship. Ideally, candidates will have programming experience (Python preferred), familiarity with machine learning concepts, business or entrepreneurship experience, though these are not required.