1.4 Problem Definition and Scope

Problem Definition

Despite the rapid evolution of AI and LLMs in recent years, the practical application of these models in software engineering has remained fragmented and limited in scope. Existing code generation tools, while capable of producing syntactically correct functions or modules, often suffer from a lack of coherence, integration, and completeness. Developers are still required to spend significant effort in debugging, testing, and restructuring the output to match real-world project expectations.

The core issue lies in the inability of current tools to understand the **entirety of a software development task**—from project initialization and modular decomposition to inter-component integration and validation. There is also no standardized framework that coordinates multiple AI agents (LLMs) for specialized roles such as frontend development, backend logic, testing, and documentation, which are all integral parts of a functioning software system.

Furthermore, most tools operate in a single-turn interaction mode where context is not maintained effectively across prompts. This results in inconsistencies across generated files, breaking the modular integrity and increasing maintenance overhead for human developers.

Therefore, there is a clear need for an intelligent, scalable, and modular framework that goes beyond mere code generation to **create complete, structured, and testable software projects**—automatically and with minimal manual intervention. The proposed solution, **CodeCodez**, addresses this need by combining multi-agent LLMs with graph-based task decomposition and orchestration mechanisms to deliver end-to-end project generation from high-level specifications.

Scope of the Project

The scope of this project is defined by the following capabilities and constraints:

Included in Scope:

- **Automated Project Scaffolding:** Generating the complete directory structure, entry points, environment files (e.g., requirements.txt, .env, Dockerfile), and base logic for backend and frontend components.