TABLE OF CONTENTS

Page

LIST OF ABBREVIATIONS

AI	Artificial Intelligence
LLM	Large-Language Model
CI/CD	Continuous Integration/Continuous Deployment
PEFT	Parameter-Efficient Fine-Tuning
PEP	Python Enhancement Proposal
UI	User Interface
API	Application Programming Interface
GPT	Generative Pre-Trained Transformer
Llama	Large Language Model Meta AI

LIST OF FIGURES

LIST OF TABLES

ABSTRACT

The increasing complexity of modern software development demands efficient and highquality code reviews. Traditional manual reviews, while effective in certain scenarios, are often time-consuming, error-prone, and inconsistent, leading to delayed deployments and heightened risks of bugs in production. While static analysis tools address some challenges, they lack the semantic depth required to evaluate functional requirements or suggest nuanced improvements. This project introduces an intelligent Large Language Model (LLM)-based Code Review Assistant designed to automate and enhance the code review process. Powered by advanced LLMs, the assistant performs contextual analysis of code, identifies bugs, detects code smells, suggests optimizations, and enforces adherence to coding standards. Unlike traditional tools, this system bridges the gap between static analysis and human intuition, offering detailed, natural language feedback tailored to developers' needs. The assistant targets two primary audiences: students and educators in academia, where it provides instructional feedback to foster a deeper understanding of coding best practices, and professional developers, where it integrates seamlessly into Continuous Integration /Continuous Deployment (CI/CD) pipelines for real-time, automated feedback. Initially tailored for Java, the system is designed to adapt to other programming languages and workflows, ensuring scalability and versatility. In addition to enhancing software quality, the assistant promotes energy-efficient development cycles by reducing the computational cost of prolonged manual reviews and error-prone builds. Socially, it democratizes access to cutting-edge AI tools, benefiting students and startups in resource-constrained regions. By fostering innovation and technological equity, this project contributes to the broader goals of skill development and sustainable software engineering. This report details the methodology, architecture, and implementation strategies employed to develop this transformative tool, underscoring its potential to revolutionize code review practices in both academia and industry.