# Final Year Project

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Computing with Games Development

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# "**AI-Driven CI/CD Pipeline: Automating Code Quality and Unit Testing with GitHub Actions"**

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# Introduction

In the constant growing field of software development, automation and continuous improvement are critical to maintain efficiency, code quality, and rapid delivery. As modern development teams shift towards Agile and DevOps methodologies, Continuous Integration and Continuous Delivery (CI/CD) pipelines have become foundational elements in software development processes. These pipelines allow for the automatic integration and testing of code, ensuring that new features and updates are integrated to our software without manual work. However, maintaining high code quality and comprehensive test coverage remains a challenge, especially as the complexity of codebases increase.

The integration of AI into CI/CD pipelines presents a promising solution to these challenges. AI can enhance the process by automating code quality analysis, detecting code smells, and even suggesting or generating unit tests. This is particularly useful in environments where junior developers are making contributions, as AI can assist by identifying potential issues early in the development cycle, providing solutions, and facilitating faster feedback.

This project focuses on the development of an AI-Driven CI/CD Pipeline, leveraging GitHub Actions as the core automation tool for pipeline orchestration. The pipeline will incorporate AI capabilities to automate key quality assurance tasks such as code scanning, detecting code smells, generating unit tests, and ensuring high code coverage. The AI will be triggered during the pull request process, reviewing the code submitted by developers, offering improvements, etc.

The primary objective of this project is to explore the integration of AI with GitHub workflows to create an automated system that enhances code quality in real-time. By embedding AI-driven automation within the CI/CD process, the project seeks to provide innovative solutions for improving code reliability and developer productivity, thus establishing a modern approach to DevOps. Through tools like SonarQube for code quality scanning and GitHub Actions for workflow automation, this project will provide practical insights into how AI can help streamline the CI/CD lifecycle.

# Chapter 1: Literature Review

## 1.1

# Chapter 2: Methodology

## 2.1 Research Question

How can AI-driven automation enhance the code review process in CI/CD pipelines, specifically through the integration of GitHub Actions and SonarQube for improving code quality and developer efficiency?

## **References:**

[The Role of AI in DevOps | GitLab](https://about.gitlab.com/topics/devops/the-role-of-ai-in-devops/)