RMIT UNIVERSITY
School of Science, Engineering & Technology

GenAI-Power Software Testing Assist Platform

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SCAN FOR MORE INFORMATION

BACKGROUND INFORMATION

TMA Solutions Initiative: This project was initiated in collaboration with TMA Solutions to address inefficiencies in software testing workflows. It aligns with their goal of integrating AI into real-world QA processes to improve speed, accuracy, and scalability.

Data-Driven Insight: The platform uses Large Language Models (LLMs) and agentic AI to extract requirements and generate test cases from unstructured documents.

Practical Application & Global Impact: While developed for TMA, the solution is applicable across industries - healthcare, finance, HR—where structured QA and compliance testing are critical.
It sets a precedent for scalable, AI-driven testing frameworks.

Operational Benefit: The system reduces test case generation time by up to 50%, improves execution efficiency by 30%, and ensures ≥95% requirement coverage.
It minimizes manual effort, accelerates release cycles, and enhances software reliability.

OBJECTIVE

INSIGHTS

Enable AI-driven decision-making in software testing by extracting actionable insights from unstructured project documents and QA workflows.

SUSTAINABILITY

Promote sustainable QA practices by reducing resource usage, cutting test generation time by 80% and minimizing repetitive manual effort.

TRANSFORMATION

Redesign traditional QA operations through agentic AI workflows, replacing manual test case generation with intelligent automation.

ADAPTIVE

Build a system that can adapt to diverse project contexts, document formats, and evolving requirements using modular AI agents and human-in-the-loop validation.

Items	Duration (weeks)	Objective
Planning Phase	**2**	Plan the core function, risk assesment and achiveble goal.
AI Developement	**6**	Build agentic AI system using LangGraph and LLMs for requirement extraction and test generation
UI Developement	**4**	Design and implement user-friendly interfaces for test creation, results, and chatbot interaction.
Backend / API Setup	**3**	Develop FastAPI backend with secure authentication and CRUD operations.
Agent Integration	**2**	Connect AI agents to backend and enable dynamic prompt-based workflows.
Testing & Validation	**3**	Conduct unit, integration, and end-to-end testing with real QA testers.
Document & Presentation	**2**	-
Roadmap Execution	**20**	Follow sprint-based roadmap for phased delivery, feedback, and deployment.

METHODOLOGY

AI Development
The platform uses agentic AI architecture powered by LangGraph and Claude/Gemini models. These agents autonomously extract requirements, generate test matrices, and produce test cases. The agentic design was chosen for its modularity, allowing specialized agents to handle tasks like semantic evaluation, reflection, and prompt refinement—ensuring accuracy and adaptability.

UI Development
A responsive frontend was built using React + TailwindCSS + TypeScript, with a focus on usability and clarity. Key interfaces include login/signup, test creation, result dashboards, and a chatbot for interactive QA support. The admin panel is being developed using the Refine framework to streamline user and project management.

Roadmap Construction
The project followed a structured sprint-based roadmap:

CONCLUSION & FINDINGS

Scientific Advancement
The project contributes to academic research by demonstrating the effectiveness of agentic LLM architectures in software testing. It proposes a hybrid AI–human validation model that balances automation with expert oversight—setting a foundation for future AI-assisted testing methodologies.

Technical Achievement
Successfully developed a full-stack platform integrating FastAPI, React, and LangGraph, capable of automating requirement extraction and test case generation. Achieved measurable improvements, including ≥95% requirement coverage, ≥90% test matrix coverage, 50% reduction in test generation time, and 30% boost in execution efficiency—validated through comparative testing and real QA sessions.

EXPERIMENTS & RESULTS

AI-Driven QA Transformation
Successfully applied agentic AI and LLMs to automate requirement extraction and test case generation, significantly improving efficiency, coverage, and reliability in software testing workflows.

Scalable Impact & Future Integration
Developed a modular roadmap and architecture that not only meets TMA Solutions' needs but also sets a foundation for broader industry adoption—enabling future integration with platforms like JIRA, Azure DevOps, and expanding into other domains.