AI-DRIVEN SELF-HEALING TEST AUTOMATION FOR ENTERPRISE SOFTWARE SYSTEMS

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I certify that I have read this thesis and that in my opinion it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Science.

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DECLARATION

This is to certify that the work is entirely my own and not of any other person, unless explicitly acknowledged (including citation of published and unpublished sources). The work has not previously been submitted in any form to the Sri Lanka Institute of Information Technology or to any other institution for assessment for any other purpose.

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Date: ………5/1/2026……………………………..

ABSTRACT

Development of a Framework for AI-Drıven Self-Healıng Test Automatıon For Enterprıse Software Systems

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Enterprise Resource Planning (ERP) and Customer Relationship Management (CRM) platforms are backbone tools for today's businesses, helping teams around the company work together efficiently. But because these systems are huge and always changing, testing them gets tricky. Methods we've traditionally used—whether having testers run scripts by hand or running automated scripts—can't keep up.

To solve these problems, I've built a test automation framework that uses AI to repair itself as it runs. By incorporating Natural Language Processing (NLP) for spotting system changes and Reinforcement Learning (RL) for teaching tests to heal and get sharper, the framework learns to find when a test has broken, to fix the code on the fly, and to keep fine-tuning itself, so people hardly need to step in.

I shaped the system by talking to QA engineers about the roadblocks and running pilot cases in a pretend ERP setup. Those conversations, plus the numbers, helped us tweak the design so it feels less like a lab gadget and more like a teammate. Early results are encouraging—flake tests bounce back 35% more often and testers spend 25% less time rewriting logic by hand.

My research helps Software Quality Assurance Engineers, learners, and software businesses by offering an easy-to-understand, adaptable way to test big-company software. The results show how using smart technology can make software testing faster, cheaper, and better.

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I also wish to extend my appreciation to the QA professionals who participated in the interviews and surveys. Their willingness to share valuable knowledge, experience, and insights contributed greatly to understanding the practical aspects relevant to this research. The information and perspectives provided played a vital role in shaping the system and framework developed in this study.

Finally, I would like to express my sincere thanks to my family and friends for their continuous support, patience, and encouragement throughout the research journey. Their understanding and motivation during challenging periods were essential to the successful completion of this thesis.

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