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VEHICLE PROBLEM DIAGNOSIS EXPERT SYSTEM

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A dissertation submitted to the Faculty of Information Technology, University of Moratuwa, Sri Lanka for the partial fulfillment of the requirements of the Degree of MSc in Information Technology.

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Declaration

I declare that this dissertation does not incorporate, without acknowledgement, any material previously submitted for a Degree or a Diploma in any University and to the best of my knowledge and belief, it does not contain any material previously published or written by another person or myself except where due reference is made in the text. I also hereby give consent for my dissertation, if accepted, to be made available for photocopying and for interlibrary loans, and for the title and summary to be made available to outside organizations.

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Dedication

I dedicate this dissertation to my parents who gave me support when I'm studying for the Master of Science. My parents accompanied me with their love, unlimited patience, understanding and encouraging me throughout the time period. Without their support, I would never be able to accomplish this work.

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Abstract

The vehicle is a complex system which requires a variety of parts for appropriate functioning. Because of this complexity there are numerous things which can malfunction in a vehicle. Diagnosing malfunctioning parts and fixing those issues in vehicles are very complex and time consuming due to the varying technologies used in vehicles. According to literature, since 1980s, expert systems have been the ideal technology for the diagnosing task in physical and biological systems. However, the use of expert systems in Sri Lanka is very limited. This project presents the development of an expert system to diagnose problems in vehicles. The research mainly focused on mechanical problems which might occur in vehicles. There are variety of users that might find the system beneficial. Users of the developed system include expert mechanics, novice mechanics, drivers and vehicle owners. Managers of garages can also be benefited by this system when doing preliminary investigations.

Requirements that were needed to develop the expert system were gathered by interviewing the staff of the project sponsor. Some requirements were taken through manuals and from the Internet. Expert system has been developed by using the client server architecture. Apache Tomcat was used as the web server. To develop the expert system e2gRuleEngine shell had been used. The shell contains the knowledge base as well as the inference engine. The rules requiring for inference making are stored in the knowledge base. New rules for the knowledge base could be added by using the e2gRuleWriter. Inference engine uses forward chaining technique to infer. According to the selection by the user rules were matched and matching rules were fired and a solution was given. Working with incomplete information, provision of reasons/explanations for answers and uncertainty handling are also built into the inference engine. The developed expert system was first evaluated by the expert mechanics. By expert evaluation it could be tested whether the correct rules have been added to the system. A questionnaire was designed and it was used to check the user-friendliness and the usability of the developed expert system. A questionnaire was distributed among a sample which has taken from simple random sampling. According to the statistical analysis it can be concluded that expert system works on par with human expert with the 84% confidence.

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