

Expert System for Auto Repair

Contributor: Prasad Gavankar
Affiliation address: Mechanical and Industrial Engineering
Texas A&M University-Kingsville
Kingsville, TX 78363
Telephone: (512) 595-2292
Fax: (512) 595-2371
E-mail: P-Gavankar@taiu.edu

Type: Design problem
Student time: Four weeks
Location: Computer laboratory and take home

Summary

This project is intended to be used with first year engineering students in the last six weeks of classes as an introduction to the field of engineering and cooperative learning. Students will work in a group of two to design and develop an expert system for diagnosing a simple automotive malfunction. The design procedure can serve as an important evaluation criterion.

The primary purpose of this project is to enable the students to understand the role of computer programming in an engineering application. The project will also help in demonstrating the concepts of mechanical troubleshooting and its logical representation.

ABET Descriptors

Engr Sci Content: First Year Engineering
Type: System and process
Elements: Analysis, construction, testing and evaluation
Features: Design methodology, creativity, open-ended
Constraints: Limited time and programming capabilities
Effort: Team.

Expert System for Auto Repair

Problem Statement:

This project is designed to familiarize you with mechanical and electrical troubleshooting and its automation using a conventional programming language. Each group will consist of three students.

Study how one can detect the cause of mal-function when a car does not start. Develop an expert system to help a freshman engineering student with no prior auto repair experience in repairing the car.

You will have to demonstrate your expert system to a group of reviewers in twenty minutes.

Resources:

- A personal computer
- A "C" language compiler

Evaluation Criteria:

- Design procedure
- Use of advanced programming language features
- User friendliness
- Oral presentation
- Project Report
 - Style
 - Use of flow charts
 - Use of correct English

Expert System for Auto Repair

Engineering Notes:

The primary objective of this project is to familiarize the students with the role of programming in real life applications. Students will explore more information on troubleshooting their cars.

Expected outcome:

The professor should observe the solution procedure followed by the students. The students can be asked how the expert system could be expanded to troubleshoot the entire electrical system ignition system and the fuel supply system. Their input can be sought on the role of a mechanic vis-à-vis an expert system.

Students that are more familiar with cars have an advantage in this project. Those students with little or no car repairing background should be paired with more knowledgeable students.

Discussion/follow-on activities:

Diagnostic flowcharts for auto repairs are available in topical textbooks.

Discuss the advantages and limitations of an expert system.

Explore how graphical information can be inserted as a part of the feedback from the expert system.

Students can also be asked to design an expert system for selecting a restaurant in a given city. The expert system may provide detailed driving instructions, area map and estimated cost for selected options.