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EXPERT SYSTEM FOR DIAGNOSING DAMAGE TO AUTOMATIC MOTORCYCLE ENGINES USING THE FORWARD CHAINING METHOD

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ABSTRACT

Damage to the matic engine due to negligence in treatment. The new vehicle owners aware of the damage after the vehicle can not operate properly. Therefore, the use of vehicles likely to require regular maintenance. By way of detecting damage to what is happening on the vehicle. For example, if the vehicle sound noisy and have no idea why this happens, it is this which encourages the development of an expert system to identify / diagnose matic damage to the engine. Submission of information was carried out using visual basic applications that have been made. By running the application diagnosis expert system engine matic damage to the computer, it will be processed in the system then the results will be displayed on the computer screen. This system is expected to provide optimal information from the user and the system of reciprocity.This study is expected to provide all information related to the engine damage problem quickly and efficiently on a reciprocal basis between the user and the system.

Keywords*: expert system, damage to the engine, forward chaining, visual basic 6.0.*

INTRODUCTION

A. Background of the problem

In computer science, many experts concentrate on the development of artificial intelligence (AI). AI is a special study where the goal is to make computers think and act like humans. There are many implementations of AI in the computer field, for example Decision Support Systems, Robotics, Natural Language, Neural Networks, and others. Another example of an area of artificial intelligence development is expert systems that combine knowledge and data exploration to solve problems that normally require human expertise. The goal of developing an expert system is not actually to replace the role of humans, but to substitute human knowledge into a system form, so that it can be used by many people.

Damage to components on automatic motorbikes occurs due to negligence on the part of automatic motorbike users, so it is necessary to carry out routine checks on automatic motorbikes in order to prevent more serious damage as early as possible. Because of these problems, a system is needed that can overcome these problems. Where later the results of this expert system will be of great help to mechanics. Only certain experts can access this system because it is to maintain the security of the data held by these experts. This expert system uses an Access database from Ms. Office and Visual Basic 6.0 programming.

An expert system is an artificial intelligence program that combines a knowledge base with an inference engine. Based on the existing knowledge base, an inference engine is used to produce solutions to the problem domain to be solved. The expert system application in this final project can diagnose or search for the type of damage that has occurred and try to provide a repair solution.

In the expert system there is one part which is the brain of the expert system, namely the inference engine which is used to produce solutions. The inference technique used in this expert system is the forward chaining method, where this technique starts its reasoning from existing facts leading to conclusions.

B. Identification of problems

Problems often faced include:

1. Many visitors want to know about problems with their motorbike engine

damage and must consult a mechanic first.
2. Lack of public knowledge, especially automatic motorbike riders, regarding maintenance of their motorbike engines.
3. Sometimes mechanics forget about damage problems they have already handled, because too many visitors come.

C. Formulation of the problem

After making observations, the author provides a solution for motorbike users who want to maintain their engines properly and can use an expert system for diagnosing damage to motorbike engines. So that mechanics at least know the basics of minor damage and how to maintain or repair it.

If there are ongoing or more serious complaints, you can immediately visit an expert, namely an engine mechanic. In this application, the mechanic can find out all types of damage that have been analyzed and how to repair them, so it will be easier to find out what damage has occurred to the vehicle's engine. customer.

D. Purpose and objectives

The aims and objectives that can be obtained by developing an expert system to overcome automatic motorbike engine damage are as follows:

1. Non-expert lay people (mechanics) can utilize the expertise of this expert system in the field of maintenance and solutions to motorbike engine damage without the direct presence of an expert.
2. Increasing work productivity, namely increasing work efficiency because with this expert system, motorbike engine damage will be easier to find out the results and solutions for.
3. Time savings in solving complex motorbike engine damage problems which usually take a long time to find a solution.
4. Provides easy solutions for complex and repetitive cases of motorbike engine damage.
5. The knowledge of a motorcycle engine expert can be documented indefinitely in this expert system.

2. Literature Review

Computers have developed as data processing tools, producing information. Even computers also play a role in decision making. Not satisfied with just this function, computer experts are still continuing to develop the sophistication of computers so that they can have human-like abilities. Artificial intelligence is making computers act like humans and have intelligence like humans. The fields included in artificial intelligence are computer vision, natural language processing, robotics, artificial nervous systems and expert systems.

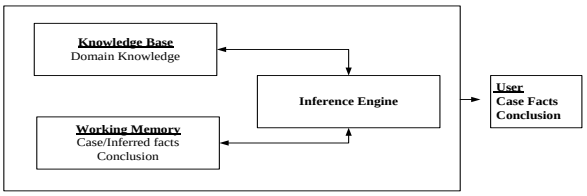
Basically expert systems are applied to support problem solving activities, some of the solving activities in question include: decision making, knowledge fusing, design making, planning, forecasting, setting (regulating), relying (controlling), diagnosis (diagnosing), formulation (prescribing), explanation (explaining), giving advice (advising) and training (tutoring).

Expert systems are created in a particular area of knowledge for a particular expertise that approaches human abilities in one area. Expert systems try to find satisfactory solutions as an expert would. Apart from that, the expert system can also provide an explanation of the steps taken and provide reasons for the suggestions and conclusions it finds. Usually expert systems are only used to solve problems that are difficult to solve with ordinary programming, considering that the costs required to create an expert system are much greater than creating an ordinary system.

A. Expert System Structure

The main components in the expert system structure include the Knowledge Base, Inference Engine, Working Memory, and User Interface. The structure of the

expert system can be shown in the picture below:



An expert system is composed of two main parts, namely:

1. Development Environment (development environment)
   The expert system development environment is used to incorporate expert knowledge into the expert system environment.
2. Consultation Environment
   Consulting environments are used by non-expert users to gain knowledge.

B. Knowledge Representation Techniques

Knowledge representation is a technique for representing the knowledge base obtained into a particular scheme or diagram so that the relationship or connection between one data and other data can be known. This technique helps knowledge engineers understand the knowledge structure that the expert system will create. There are several knowledge representation techniques that are commonly used in developing an expert, namely:

1. Rule-Based Knowledge.
   Knowledge is represented in the form of facts and rules. This form of representation consists of a premise and a conclusion.
2. Frame-Based Knowledge.
   Knowledge is represented in a hierarchical form or network of frames.
3. Object-Based Knowledge.
   Knowledge is represented as objects. Objects are data elements consisting of data and methods or processes.

C. Expert System Components

Flowcharts are symbols used to describe the sequence of processes in a computer program or a tool used to create algorithms. Flowchart is a flow of thought. There are many ways to complete a train of thought, both written and verbal. In writing, it can be stated in the form of a written sentence, or in the form of a table, or in the form of a chart or picture. Specifically to express the flow of thought in the form of images, America made a standard which he called ANSI (American National Standard Institute). One that is standardized in ANSI is a Flowchart image. The flow of thought can be expressed by the image of an arrow that points to the flow of an activity.

When drawing a flow chart, programmers can follow the following guidelines:

a. Flowchart programs should be top to bottom and start from the left of a page.
b. The activities in the flow chart must be clearly indicated.
c. It must be indicated where the activity will start and where it will end.
d. Each activity in the flow chart should use a word that represents a job (eg: “calculate” salary).
e. Each activity in the flowchart must be in the proper order.
f. Activities that are cut off and will be connected elsewhere must be clearly indicated using a connecting symbol.
g. Use standard flow chart symbols.

D. Inference Engine

The inference engine has two functions, namely inference and control. Inference is a reasoning process, while control functions to control execution. Inference involves the processes of watching (matching) and unifaction (merging). This process is based on a database containing facts, usually stored in special files and can also be obtained from consultation and used in the process of testing the rules implied by the knowledge base. Two inference techniques are: backward tracking (backward chaining) and forward tracking (forward chaining)

E. UML *(Unifield Modelling Language)*

Experts in the field of software design around 1980-1990 began working with the object-oriented programming language OOP (Object Oriented Programming). Thus, a more appropriate methodology is needed in this case, namely UML which is a collaborative methodology between Booch methods developed by Graddy Booch, OMT (Object Modeling Technique) developed by DR. James Rumbaugh, as well as OOSE (Object Oriented Software Engineering) developed by Ivar Jacobson, and several other methods. This is the most frequently or most appropriate methodology used today to adapt the use of programming languages with an object-based programming paradigm.

UML itself consists of grouping system diagrams according to certain aspects or points of view. Diagrams are those that describe problems and solutions to problems in a model.

F. ERD (*Entity Relationship Diagram*)

ERD is a model used to explain relationships between data in a database based on basic data objects that have relationships between relationships. ERD is used to model data structures and relationships between data, to describe them several notations and symbols are used. Basically there are three symbols used, namely:

a. Entity
   An entity is an object that represents something real and can be distinguished from something else. The symbol for this entity is usually depicted as a rectangle.
b. Attribute
   Each entity must have elements called attributes which function to describe the characteristics of the entity. The contents of an attribute have something that can identify the contents of one element from another. The attribute image is represented by an ellipse symbol.
c. Relationships/Relationships
   Relationship is a relationship between a set of entities and another set of entities. Relations are represented by parallelograms

RESEARCH METHODS

To analyze and design the system, the author conducted research using the following methods:

A. Data collection techniques

This method is a method that is carried out by conducting research using the following method:

1. Direct Observation Method at the motorbike repair shop (observation).
   Observation is a method of collecting data through direct observation of the object under study. In this case the author collected data related to the material through observations in several existing motorbike repair shops which the author used as research material.
2. Library Research Methods (Library Research).
   Literature study is a way of obtaining data or information sourced from data collection, studying reading books, notes and other relevant lecture materials. In this case the author collected data related to writing material through manual reading which was related to damage to automatic motorbike engines.

B. System Development Model

A program will not succeed without someone controlling it. In this case it depends on the user (brainware) so that a program has value. With brainware, the computer will be able to read machine language commands, then translated by humans to produce useful information. The need for an application program that is easy to use and has an attractive and quite good graphic display is felt to be an important thing considering the guidance from various other fields. The ease of use of the application program will be very

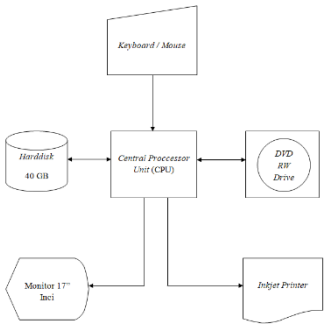
helpful in solving work problems and in accordance with what has been planned. So a good application program will produce good performance, optimal work results and provide satisfaction for all parties.

1. Hardware
   The definition used in hardware (hardware) is to describe all the electronic and mechanical elements of computers and equipment used by programmers. Hardware is all components and equipment that make up a system and other equipment that allows computers to carry out tasks or processes.Broadly speaking, hardware is a computer that can be divided into two parts, namely:
   a. Central Processing Unit
   Central Processing Unit (CPU) is the brain of a computer or data processing media, the CPU is divided into three parts, namely:
   1. Memory, which is a place or container used to store program data to be processed by the CPU.
   2. ROM (Random Only Memory), which is memory whose contents have been created and determined by the factory and cannot be changed or deleted by the computer user (user).
   3. RAM (Random Access Memory), namely memory that can be read or written.

   b. Input and Output Devices
   That is an input and output from the computer. The hardware needed by the author so that the application can run are as follows:
   1. Processor: Pentium Dual Core
   2. RAM: 4 GB (2.74 GB usable)
   3. Hard Disk : 250 Giga Bytes
   4. CD-RW : CD Room
   5. Keyboard : Standard Keyboard
   6. Monitor: 17 inches
   7. Printers: Inkjet Printers

2. Software (Software)
   Software is a series or arrangement of instructions that must be in the correct order. Software is often referred to as a program. The function of the software is to prepare application programs so that the performance of all equipment on the computer is controlled.
   a. Operating System (Operating System)
   An operating system device (operating system) is a set of software tools designed to facilitate the use of computers in running programs. In this final project the author uses the Microsoft Windows Seven information system.
   b. Programming Language
   The application program used for designing this program is Microsoft Visual Basic 6.0, Microsoft Office Access 2007.

3. Computer System Configuration
   Computer system configuration is a form of model that describes or interprets the components of a computer in a simple way. A computer configuration can be described as follows



C. Related research

With the computer, the company's performance and operations can be improved. For example, in a sales system where the recording system is manually (the writing is still using notes), processing and calculating large-scale data is often difficult for users and this manual system can also cause long queues for buyers, as well as reporting sales results which are often late. and not accurate. For this reason, a computer program is needed to be able to calculate sales transactions and process sales data, so that precise,

accurate, efficient, timely information can be generated and do not experience duplicate data.

As of this writing, the author proposes a reliable solution by using a significant helper program to the problems that exist in the handphone shop and the author uses the Microsoft Visual Basic 6.0 programming language. The title of the final project that the author wrote is "Mobile Sales Program at Mobile Stores".

RESULTS AND DISCUSSIONS

A. Design an Expert Algorithm

1. Main Menu Form Algorithm Design

The following is the main menu form algorithm used in expert systems, namely the user is allowed to select the menus that are available, and then will continue to the next process. For more details, pay attention to the following algorithm:

```
Buka tampilan menu utama
Pilih menu yang ada
if Pilih = Info then
    Membuka tampilan info kerusakan
elseif Pilih = Diagnosis then
    Membuka tampilan form konsultasi
elseif Pilih = Menu Update then
    Membuka tampilan form login
elseif Pilih = Menu antuan then
    Membuka tampilan form bantuan
elseif Pilih = Keluar then
    Mengeluarkan program
Endif
```

2. Info Form Algorithm Design

The following is the component info form algorithm used in the expert system, namely the user is allowed to view information on several machine components. For more details, pay attention to the following algorithm:

```
Buka tampilan form info, Pilih menu yang ada
if Pilih = kepala silinder then
    Membuka info fungsi kepala silinder
elseif Pilih = Blok Silinder then
    Membuka info fungsi blok silinder
elseif Pilih = piston then
    Membuka info fungsi piston
elseif Pilih = ring piston then
    Membuka info fungsi ring piston
elseif Pilih = poros engkol then
    Membuka info fungsi poros engkol/crank shaft
elseif Pilih = roller then
    Membuka info fungsi roller
elseif Pilih = rumah kopling then
    Membuka info fungsi rumah kopling
elseif Pilih = v belt then
    Membuka info fungsi v belt
elseif Pilih = Keluar then
    Mengeluarkan form info komponen
end if
```

3. Diagnosis Form Algorithm Design

The following is a consultation algorithm used in expert systems. This consultation form contains questions about the symptoms of automatic machine damage and the user must answer these questions to produce a diagnosis. For more details, pay attention to the following algorithm :

```
Buka tampilan form Konsultasi kerusakan
if pilih diagnosis then
  if pilih = Ya then
    if kerusakan = ditemukan then
      tampil hasil analisa konsultasi
    else
      tampil gejala yang berhubungan
    end if
  else pilih = Tidak then
    if kerusakan = ditemukan then
      tampil hasil analisa konsultasi
    else
      hasil analisa tidak terdeteksi
    end if
  end if
endif
```

4. Expert Table

Table IV.1. Symptom table

Kode Gejala	Gejala
G01	Saat pengapian tidak tepat
G02	Baut stasioner rusak
G03	Platina tidak berfungsi
G04	Ring piston aus
G05	Koil tidak berfungsi
G06	Kopling selip
G07	Mesin sangat panas
G08	Rantai mesin kendor
G09	Sentrifugal rusak
G10	Katup bocor
G11	Bensin habis
G12	Baut platina kendor
G13	Karburator kotor
G14	Baut penyetel katup aus
G15	Oli mesi kurang
G16	Rantai kendor
G17	Knalpot berasap
G18	Bensin tidak baik mutunya
G19	Piston macet
G20	Busi kotor
G21	Aliran bensin tidak lancer

T able IV.2. Damage Rule Table

Kode Kerusakan	Nama Kerusakan
P01	Mesin tidak stasioner
P02	Bensin boros
P03	Mesin berisik
P04	Mesin sulit dihidupkan
P05	Mesin tersendat-sendat
P06	Mesin tiba-tiba mati

5. Rules for experts

***Rule* 1 : Jika** Saat pengapian tidak tepat **Dan** Platina tidak berfungsi **Dan** Koil tidak berfungsi **Dan** Bensin habis **Dan** Karburator kotor **Dan**

Busi kotor **Maka** Kerusakan = Mesin sulit dihidupkan.

***Rule* 2 : Jika** Ring piston aus **Dan** Kopling selip **Dan** Rantai mesin kendor **Dan** Sentrifugal rusak **Dan** Baut platina kendor **Dan** Baut penyetel katup aus **Dan** Oli mesin kurang **Maka** Kerusakan = Mesin brisik.

***Rule* 3 : Jika** Karburator kotor **Dan** Busi kotor **Dan** Aliran bensin tidak lancar **Maka** Kerusakan = Mesin tersendat-sendat.

***Rule* 4 : Jika** Saat pengapian tidak tepat **Dan** Baut stasioner rusak **Maka** Saringan udara kotor **Dan** Knalpot berasap **Dan** Bensin tidak baik mutunya **Maka** Kerusakan = Mesin tidak stasioner.

***Rule* 5 : Jika** Saat pengapian tidak tepat **Dan** Katup bocor **Dan** Baut penyetel katup aus **Maka** Kerusakan = Bensin boros.

***Rule* 6 : Jika** Koil tidak berfungsi **Dan** Mesin sangat panas **Dan** Piston macet **Maka** Kerusakan = Mesin tiba-tiba mati.

Table IV.3 Expert Relationship Table

Kode	P01	P02	P03	P04	P05	P06
G01	X	X		X		
G02	X					
G03				X		
G04			X			
G05				X		X
G06			X			
G07						X
G08			X			
G09			X			
G10		X				
G11				X		
G12			X			
G13				X	X	
G14		X	X			
G15			X			
G16	X					
G17	X					
G18	X					
G19						X
G20				X	X	
G21					X	

6. Expert Decision Tree

A tree is a hierarchical structure consisting of nodes that store information or knowledge and branches that connect the nodes. A decision tree is created to facilitate decision making. A decision diagram is a simple depiction of a problem and its solution.

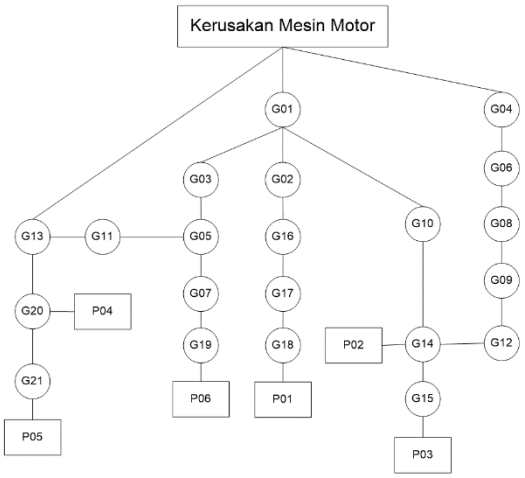


Figure V.1 Tree Diagram Representing Solutions to Motor Engine Damage Problems

Information :

1. P01 = Mesin tidak stasioner

Gejala :

- G01= Saat pengapian tidak tepat
- G02 = Baut stasioner rusak
- G16 = Saringan udara kotor
- G17 = Knalpot berasap
- G18 = Bensin tidak baik mutunya

2. P02 = Bensin boros

Gejala :

- G01 = Saat pengapian tidak tepat
- G10 = Katup bocor
- G14 = Baut penyetel katup aus

3. P03 = Mesin brisik

Gejala :

- G04= Ring piston aus
- G06 = Kopling selip
- G08 = Rantai mesin kendor
- G09 = Sentrifugal rusak
- G12 = Baut platina kendor
- G14 = Baut penyetel katup aus
- G15 = Oli mesin kurang

4. P04 = Mesin sulit dihidupkan

Gejala :

- G01= Saat pengapian tidak tepat
- G03 = Platina tidak berfungsi
- G05 = Koil tidak berfungsi

- G11 = Bensin habis
- G13 = Karburator kotor
- G20 = Busi kotor

5. P05 = Mesin tersendat-sendat

Gejala :

- G01 = Saat pengapian tidak tepat
- G02 = Baut stasioner rusak
- G16 = Saringan udara kotor

6. P06 = Mesin tiba-tiba mati

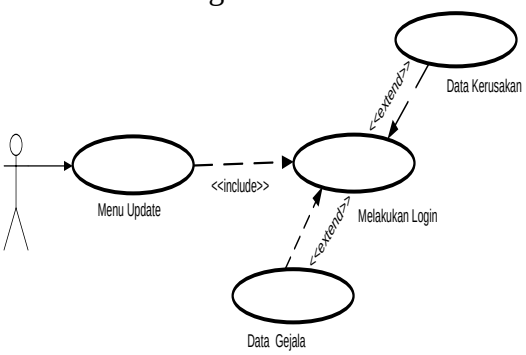
Gejala :

- G05 = Koil tidak berfungsi
- G07 = Mesin sangat panas
- G19 = Piston macet

The process of operating the knowledge or information base is first converted into the form of a decision tree (tree diagram) and rules. This is done to make the problem solving process easier. This expert system uses the forward tracking method (Forward chaining) and uses the best first search method. This method is used to reach the best conclusions in a relatively short time without compromising the goals to be achieved.

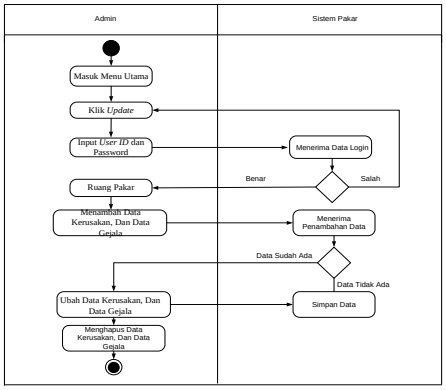
7. System Design (UML)

1. Use Case Diagrams

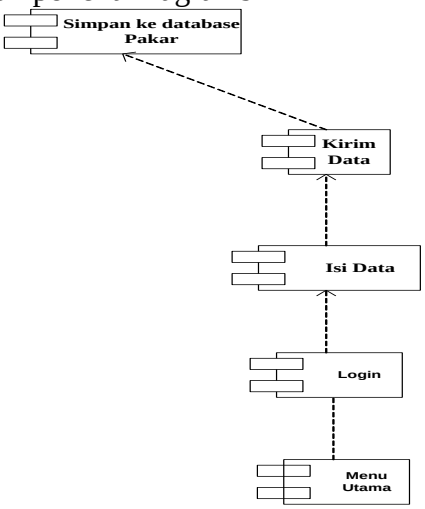


Use case	**Info**
Brief Description	*Use Case* Pakar bisa dilakukan oleh *Pakar* jika ingin mengolah Data Kerusakan dan Data Gejala
Actor	Pakar
Precondition	Sebelum masuk ke form Kerusakan dan Gejala, *Actor* masuk ke menu *update* terlebih dahulu untuk melakukan login
Main Flow	Setelah *Actor login,Actor* bisa memilih data yg akan di *update.*
Alternatif Flow	Jika *Actor* Mengklik Data Kerusakan maka sistem akan menampilkan Form Data Kerusakan dan *Actor* bisa mengolah Data Kerusakan
Postcondition	Apabila telah selesai maka *Actor* klik tombol keluar dan akan kembali ke menu utama.

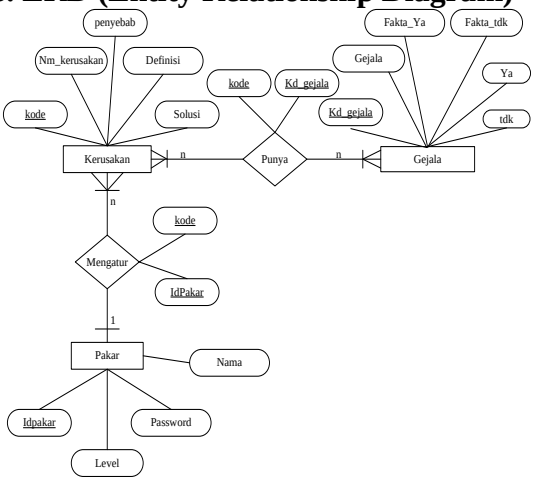
2. Activity Diagrams



3. Component Diagrams



8. ERD (Entity Relationship Diagram)



9. Program View

1. Main course

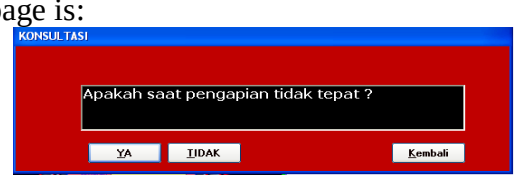
This page functions as the front page / main menu. This main menu consists of menu options that can be seen by visitors. The image of the main menu is

2.Form Login

This page is a login place for admins or experts to enter the admin room to change, delete and add disease data, knowledge data and admin data. The appearance of this page is:

3.Consultation Form

This page is a place for users to consult about whether pregnancy is present in the user or not. The appearance of this page is:

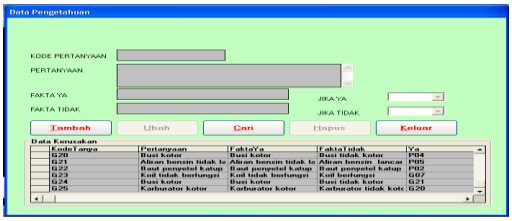


4.Damage Form

This page is a place for admins or experts to change, delete and add damage data. The appearance of this page is:

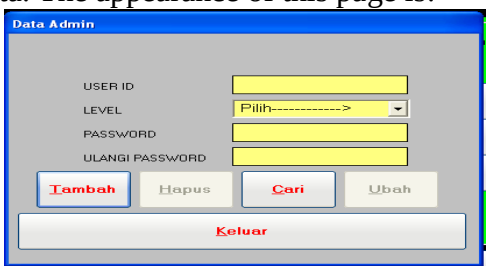
5. Symptom/Question Form

This page is a place for admins or experts to change, delete and add knowledge data. The appearance of this page is:



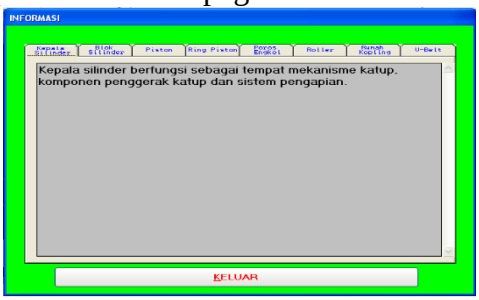
6.Admin Form

This page is a place for admins or experts to change, delete and add admin data. The appearance of this page is:



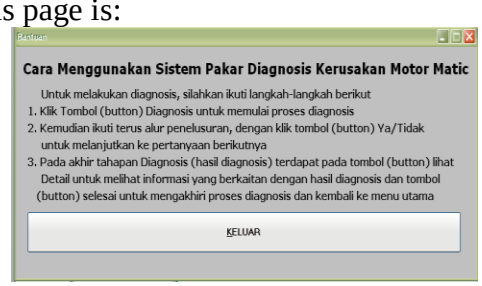
7.Information Form

This page is a place to find out information about pregnancy diseases. The appearance of this page is:



8.Help Form

This page is a place to find out information on how to use expert system application programs. The appearance of this page is:



7. System Testing Methods

System testing is carried out to check the cohesiveness between system components and sub-systems with the main aim being to ensure system elements function as expected. System testing also includes thorough program testing. A

collection of programs that have been integrated need to be tested or tested to see whether a program can receive well, process and provide good program output.

1. User Login Testing

Kasus dan Hasil Uji (data yang dimasukan benar)			
Data Masukan	**Yang diharapkan**	**Pengamatan**	**Kesimpulan**
Usenamer:ADMIN *Password:ADMIN*	Apabila login benar admin dapat menjalankan sistem	Pengguna dapat mengisi data login sesuai yang diharapkan	Diterima
Kasus dan Hasil Uji (data yang dimasukan salah)			
Data Masukan	**Yang diharapkan**	**Pengamatan**	**Kesimpulan**
Username:ADMIN *Password:123456*	Data login tidak dikenal dan menampilkan kesalahan	*Username* tidak dapat melakukan login. Sesuai yang diharapkan	Diterima

2. User Input Testing

Kasus dan Hasil Uji (data yang dimasukan benar)			
Data Masukan	**Yang diharapkan**	**Pengamatan**	**Kesimpulan**
Username:nyd *Password:nanang* Hak Akses : *user* admin	Apabila data tersimpan *username* nyd dapat login	Pengguna dapat mengisi data pengguna sesuai yang diharapkan	Diterima
Kasus dan Hasil Uji (data yang dimasukan salah)			
Data Masukan	**Yang diharapkan**	**Pengamatan**	**Kesimpulan**
Username: nyd *Password:123456* Hak Akses : *admin*	Data tidak bisa disimpan dan menampilkan pesan kesalahan	*Username* nyd tidak dapat disimpan. Sesuai yang diharapkan	Diterima

3. Input Testing for Malfunction Symptoms

Kasus dan Hasil Uji (data yang dimasukan benar)			
Data Masukan	**Yang diharapkan**	**Pengamatan**	**Kesimpulan**
Mengisi atribut data gejala yang telah disediakan dengan data yang benar	Klik simpan, data gejala akan masuk ke database, maka akan tampil di tabel gejala	Data berhasil disimpan kedalam database	Diterima
Kasus dan Hasil Uji (data yang dimasukan salah)			
Data Masukan	**Yang diharapkan**	**Pengamatan**	**Kesimpulan**
Mengisi atribut data gejala yang telah disediakan dengan data yang salah	Proses pemasukan data gagal, data ada yang belum terisi	Proses pemasukan data gagal dan menampilkan kesalahan	Diterima

4.Crash Input Testing

Kasus dan Hasil Uji (data yang dimasukan benar)			
Data Masukan	**Yang diharapkan**	**Pengamatan**	**Kesimpulan**
Mengisi atribut data gejala yang telah disediakan dengan data yang benar	Klik simpan, data gejala akan masuk ke database, maka akan tampil di tabel kerusakan	Data berhasil disimpan kedalam database	Diterima
Kasus dan Hasil Uji (data yang dimasukan salah)			
Data Masukan	**Yang diharapkan**	**Pengamatan**	**Kesimpulan**
Mengisi atribut data gejala yang telah disediakan dengan data yang salah	Proses pemasukan data gagal, data ada yang belum terisi	Proses pemasukan data gagal dan menampilkan kesalahan	Diterima

5.Damage Diagnostic Testing

Kasus dan Hasil Uji	
Data yang dimasukan benar	
Pertanyaan	1. Apakah saat pengapian tidak tepat? 2. Apakah platina tidak berfungsi? 3. Apakah koil tidak berfungsi? 4. Apakah bensin habis? 5. Apakah karburator kotor? 6. Apakah Busi kotor?
Jawaban	1. Ya 2. Ya 3. Ya 4. Ya 5. Ya 6. Ya
Yang diharapkan	Menampilkan Keterangan kerusakan: Mesin sulitdihidupkan
Pengamatan	Sistem berhasil mengenali inputan jawaban
Kesimpulan	Diterima
Data yang dimasukan benar	
Pertanyaan	1. Apakah saat pengapian tidak tepat? 2. Apakah ring piston aus? 3. Apakah kopling selip? 4. Apakah rantai mesin kendor? 5. Apakah sentrifugal rusak? 6. Apakah baut platina kendor? 7. Apakah baut penyetel katub aus? 8. Apakah oli mesin kurang?
Jawaban	1. Tidak 2. Ya 3. Ya 4. Ya 5. Ya 6. Ya 7. Ya 8. Ya
Yang diharapkan	Menampilkan Keterangan kerusakan: Mesin berisik
Pengamatan	Sistem berhasil menampilkan hasil diagnosis
Kesimpulan	Diterima
Data yang dimasukan salah	
Pertanyaan	1. Apakah pengapian tidak tepat? 2. Apakah ring piston aus

	3. Apakah karburator kotor? 4. Apakah koil tidak berfungsi?
Jawaban	1. Tidak 2. Tidak 3. Tidak 4. Tidak
Yang diharapkan	Menampilkan keterangan kerusakan tidak terdeteksi, karena jawaban tidak sesuai
Pengamatan	Proses berhasil sistem menampilkan keterangan kerusakan tidak terdeteksi
Kesimpulan	Diterima
Data yang dimasukan salah	
Pertanyaan	1. Apakah saat pengapian tidak tepat? 2. Apakah baut stasioner rusak? 3. Apakah katup bocor?
Jawaban	1. Ya 2. Tidak 3. Tidak
Yang diharapkan	Menampilkan keterangan kerusakan tidak terdeteksi, karena jawaban tidak sesuai
Pengamatan	Proses berhasil sistem menampilkan keterangan kerusakan tidak terdeteksi
Kesimpulan	Diterima

CONCLUSION

After discussing the previous chapters, the author can draw the following conclusions:

1. The design of this program is an alternative to reduce and facilitate the problems that have occurred so far in analyzing damage to automatic motorbike engines.
2. By designing this program, the damage analysis system for automatic motorbike engines can be carried out more quickly and accurately.
3. Using computer applications requires precision and discipline from the user, especially in terms of storing data that is truly in accordance with existing regulations, so that it can be said that if the data entered is correct then output will automatically be produced in accordance with what is expected. For this reason, it is necessary to provide training for employees who are directly involved in data processing.
4. When making a program, it is necessary to have complete program facilities to understand data processing work and provide the desired information, as well as users so that the program can be utilized properly.
5. With an application system for analyzing damage to automatic motorbike engines, errors or deficiencies can be minimized and can even be accurate so that they are easy to overcom

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