

TECHAUTO: EMBRACING ARTIFICIAL INTELLIGENCE IN WEB BASED AUTOMOBILE SERVICE MANAGEMENT SYSTEM

CHAPTER 1

INTRODUCTION

1.1 GENERAL INTRODUCTION

As the global automotive industry is progressing towards the future of mobility, Garage Chains are due for a major overhauling. With the advent of digitisation, customer expectations have shot up and now they demand a seamless experience even in the aftersales automotive ecosystem. The Online Management System for Automobile Services is a progressive step in the field of service centres and garages. Any car user can make use of this website to locate and communicate with the service centres or garages in their vicinity. This website uses innovative technology that connects you with a Mechanic at the tap of a button.

Our system offers a host of ground breaking innovations in garage management software and garage management systems that are instrumental in redefining the entire digital journey of the customer when it comes to the maintenance and garage chains landscape.

1.2 GOAL OF THE PROJECT

Tech Auto: embracing Artificial Intelligence in web-based Automobile Service Management system is an online management system for Automobile services, a progressive step in the field of service centres and garage. Any car user can make use of this website to locate and communicate with the service centres or garages in their vicinity.

CHAPTER 2

LITERATURE SURVEY

2.1 STUDY OF SIMILAR WORK

Fully automated Garage Management System (GMS) is a cloud-based mobile and responsive web application for garage management with CMS. You can manage your whole garage system through this system and manage your website also. This is the best software for managing your garage job work, estimate, invoice, income, expenses, inventory sell and buys parts and customer interactions.

Quick Job Card

A record card is related to a specific job. It gives details of the time taken to do a piece of work and the parts used in the process

Easy Estimate

Share estimate to potential customers they may need to know the services and parts to be used

Book Service Appointment

Book and manage appointments using this app is Free and get reminders at a specific time

E-Invoicing

As business advance into the digital era, more and more are switching to electronic invoicing services to automate their accounts payable

Garage Expenses

An expense is the cost of operations that a company incurs to generate revenue. This app provides feasibility to manage your expense for Free.

Service Reminder

Easily know which vehicles are due or overdue for service. Easily send reminders to your customers via SMS.

2.1 EXISTING SYSTEM

The Garage Management System till now was not able to record the service details of vehicles. It was done manually. The inventory of spares is done manually. There was no maintenance history of all the vehicles that were serviced in the garage. The service dates had to be tracked manually and that was a difficult task.

Nowadays, having a car has become a common aspect of Indians; thus, sales have increased. It needs regular services and maintenance with an appropriately trained mechanic as it's an automobile or vehicle. And today, we all are on a busy schedule, and time to visit the service station has become a significant problem. This application of automobiles, i.e., vehicle services request, is one of the unique concepts. Here customers send a request for his car maintenance and pick up. The business owner sends his field engineer to pick up the car and note down all the customers' vehicle issues. Thus, details of the problem he faces are registered, and its budget is given to him. The well-trained staff does at his location, and an expert automobile engineer does its test drive. Extra associates can be provided, a garage mechanic. He gives regular reminders of the maintenance to a garage owner or works hope owner at regular intervals.

2.1.2 DRAWBACKS OF EXISTING SYSTEM

- Personal should be available for all seasons regardless of the customer flow.
- Efficiency and productivity of the workers cannot be scientifically tested.
- Availability of spare parts is uncertain.

CHAPTER 3

OVERALL DESCRIPTION

3.1 PROPOSED SYSTEM

Proposed system is Tech Auto. It is an Online Management System for Automobile Services is a progressive step in the field of service centres and garages. Any car user can make use of this website to locate and communicate with the service centres or garages in their vicinity.

- Enhance customer relations
- Simplify stock control
- Improve mechanic efficiencies
- Monitor performances

The system includes

❖ Garage Management Solutions: help garage chains to utilize their services for high efficiency with a larger objective of providing a delightful customer experience. It facilitates almost everything right from extensive searches, appointment booking, parts ordering to even report generation.

❖ Time Registration is a kiosk-based application used for optimizing operational efficiency by tracking mechanic's workload. It manages work hours spent on each task that is allocated centrally in the garages.

❖ Online Workshop Planner (OLP) is an extensively integrated centralized platform for managing all the garages bookings and other services It synchronizes with garage planners for better management.

❖ A mobile and tablet application that helps mechanics to access information at their workplace and execute work orders. It provides information related to maintenance and repairs to the mechanics and facilitates them to set their availability, schedule repairs, track or order spare parts.

❖ Emergency App A one of a kind mobile app specifically created for roadside assistance, automatic emergency alerts and response. It instantly sets emergency management plans, location reporting & personalized message directed to emergency response centres.

❖ Mechanic training platform A training platform to enable technical, sales and management training for garage personnel

Application Of AI in Tech Auto

- Categorization and prediction of demand of spare parts

A modern automobile is composed of around about 30,000 parts . Components that bust over time, need to be replaced during the maintenance process. Therefore, spare parts are needed at the right place, in the right quality and quantity, for replacement of broken parts to keep the automobile working.

- Manage and find efficiency of workers: Using artificial intelligence to transform employee productivity.
- Auto service reminders based on user statistics, Customer segmentation and Auto Marketing campaign

3.2 FEATURES OF PROPOSED SYSTEM

- Auto service reminders
- Auto marketing campaigns
- Employee productivity assessment
- Spare part demand prediction
- Auto status information alerts
 - Auto purchase order generation
- Employee work scheduling
- Sales prediction
 - Forecast Workload
- Auto service registration
- Emergency one click assistance
- Monitor quality of work
 - Auto Feedback system
 - Employee rating system

3.3 FUNCTIONS OF PROPOSED SYSTEM

- Categorization and prediction of demand of spare parts
A modern automobile is composed of around about 30,000 parts. Components that burst over time need to be replaced during the maintenance process there for spare parts are need at the right place, in the right quality and quantity. For replacement of broken parts to keep the automobile working.
- Manage and find efficiency of workers: Using artificial intelligence to transform employee productivity
Using artificial intelligence, system is able to learn and manage efficiency of workers as well as increase their productivity. able to predict the required personnel according to each season.
- Auto service reminders based on user statistics, Customer segmentation and Auto Marketing campaign.
- Customers will map to different groups using machine learning models based on the customer behaviour.

3.4 REQUIREMENTS SPECIFICATION

System analyst tasks to a variety of persons to gather details about the business process and their opinions of why things happen as they do and their ideas for changing the process. These can be done through questionnaires, details investigation, observation, collection of samples etc. As the details are collected, the analyst study the requirements data to identify the features the new system should have, including both the information the system produce and operational features such as processing controls, response times, and input output methods. Requirement specification simply means, “Figuring out what to make before you make it”. It determines what people need before you start developing a product for them. Requirement definition is the activity of translating the information gathered in to a document that defines a set of requirements. These should accurately reflect what consumer wants. It is an abstract description of the services that the system should provide and the constraints under the system must operate. This document must be written for that the end user and the stake holder can understand it.

The notations used for requirements definition should be based on natural languages, forms and simple intuitive diagrams. The requirements fall into two categories: functional requirements and non-functional requirements.

The requirements of specification of the proposed system are as follows:

- Minimum time needed for various processing
- Better service
- Faster response time

3.5 FEASIBILITY ANALYSIS

An initial investigation culminates in a proposal that determine whether an ultimate system is feasible. When a proposed system is made and approved it initiates a feasibility study. The purpose of the feasibility study is to identify various candidate systems and evaluates whether they are feasible by considering technical, economical and operational feasibility and to recommend to best candidate system. The feasibility of such a program is listed in a simulated environment. Once all features are working property in a simulated environment, we can implement in a real platform. During product engineering, we consider following types of feasibility:

3.5.1 Technical feasibility

Technical feasibility identifies whether the proposed system can be developed with the existing technologies and available hardware and software resources. As part of the technical feasibility of the system, the following points are to be emphasized. Technical feasibility is frequently the most difficult area to assess at the stage of the product engineering process. It is essential that the process of analysis and definition be conducted in parallel with an assessment of technical feasibility. The considerations that are normally associated with technical feasibility are development risk, resource availability and technology.

3.5.2 Operational feasibility

Proposed projects are beneficial only if they can be turned into information systems that will meet the operating requirements of the organization. This test of feasibility asks if the system will work when it is developed and installed. This project satisfies all the operational conditions. The project is found to work well on installation, all types of users can operate the system without any difficulty. User interfaces are designed in such a way that even ordinary users without having much knowledge in computer technology can easily operate the system. The access time of data is considerably low and the operation is less time consuming.

3.5.3 Economical Feasibility

An evaluation of development cost weighted against the ultimate income or the benefit derived from the developed system or product. Economic feasibility of a system means that the cost incurred in developing and implementing a system should not be higher than the financial benefits obtained by the users. During the economic feasibility study the following points were investigated.

- The cost to conduct a full system investigation
- The cost of hardware and software for the application being developed.
- The benefits derived by the users in terms of time, effort, accuracy of information, better decision making. Etc. are quantified and compared.

3.5.4 Behavioural Feasibility

Behavioural Feasibility evaluates and estimates the user attitude or behaviour towards the development of new system. It helps in determining if the system requires special effort to educate, retrain, transfer, and changes in employee's job status on new ways of conducting business.

CHAPTER 4

OPERATIONAL ENVIRONMENT

4.1 HARDWARE REQUIREMENTS

Processor	:	Intel i5 6th Gen
RAM	:	8GB ddr4
Hard Disk	:	256 GB SSD
Drives	:	CD ROM , C-type Port , USB 3.1*2 Port
Display Size	:	15” LED Monitor
Screen Resolution	:	1920*1080 Pixels
Keyboard	:	Wireless Enabled Logitech Keyboard
Mouse	:	Wireless Enabled Logitech Mouse
Monitor	:	Touch Capacity LED Monito
Dedicated Graphics Card	:	Nvidia Geforce 920m 2GB DDR4

4.2 SOFTWARE REQUIREMENTS

OPERATING SYSTEM	:	WINDOWS 10
PROGRAMMING LANGUAGE	:	PYTHON
IDE	:	PYCHARM
SCRIPTING LANGUAGES	:	HTML,CSS,JAVASCRIPT
WEB BROWSER	:	GOOGLE CHROME
FRONT END	:	PYTHON,DJANGO
BACK END	:	POSTGRESL
FRAMEWORK/LIBRARY	:	DJANGO,SCIKIT-LEARN,TENSORFLOW

4.3 TOOLS AND REQUIREMENTS

4.3.1 PYTHON

Python is an interpreted, object-oriented, high-level programming language with dynamic semantics. Its high-level built in data structures, combined with dynamic typing and dynamic binding, make it very attractive for Rapid Application Development, as well as for use as a scripting or glue language to connect existing components together. Python's simple, easy to learn syntax emphasizes readability and therefore reduces the cost of program maintenance. Python supports modules and packages, which encourages program modularity and code reuse. The Python interpreter and the extensive standard library are available in source or binary form without charge for all major platforms, and can be freely distributed.

Often, programmers fall in love with Python because of the increased productivity it provides. Since there is no compilation step, the edit-test-debug cycle is incredibly fast. Debugging Python programs is easy: a bug or bad input will never cause a segmentation fault. Instead, when the interpreter discovers an error, it raises an exception. When the program doesn't catch the exception, the interpreter prints a stack trace. A source level debugger allows inspection of local and global variables, evaluation of arbitrary expressions, setting breakpoints, stepping through the code a line at a time, and so on. The debugger is written in Python itself, testifying to Python's introspective power. On the other hand, often the quickest way to debug a program is to add a few print statements to the source: the fast edit-test-debug cycle makes this simple approach very effective.

4.3.2 Django

Django is a high-level Python Web framework that encourages rapid development and clean, pragmatic design. Built by experienced developers, it takes care of much of the hassle of Web development, so you can focus on writing your app without needing to reinvent the wheel. It's free and open source.

Ridiculously fast.

Django was designed to help developers take applications from concept to completion as quickly as possible.

Reassuringly secure.

Django takes security seriously and helps developers avoid many common security mistakes.

Exceedingly scalable

4.3.3 PostgreSQL

PostgreSQL is a powerful, open source object-relational database system with over 30 years of active development that has earned it a strong reputation for reliability, feature robustness, and performance.

A robust database in the LAPP stack

LAPP stands for **L**inux, **A**pache, **P**ostgreSQL, and **P**HP (or Python and Perl). PostgreSQL is primarily used as a robust back-end database that powers many dynamic websites and web applications.

General purpose transaction database

Large corporations and startups alike use PostgreSQL as primary databases to support their applications and products.

Geospatial database

PostgreSQL with the PostGIS extension supports geospatial databases for geographic information systems (GIS).

4.3.4 Pycharm

Pycharm is an integrated development environment (IDE) used in computer programming. specifically for the python language.it is developed by the Czech company jetBrains.it provides code analysis ,a graphical debugger an integrated unit tester etc.

4.3.5 Tensor Flow

TensorFlow is an end-to-end open source platform for machine learning. It has a comprehensive, flexible ecosystem of tools, libraries and community resources that lets researchers push the state-of-the-art in ML and developers easily build and deploy ML powered applications.

Easy model building

Build and train ML models easily using intuitive high level API's like Keras with eager execution ,which makes for immediate modeliteration and easy debugging.

Robust ML production anywhere

Easily train and deploy models in the cloud, on-prem, in the browser, or on-device no matter what language you use.

Powerful experimentation for research

A simple and flexible architecture to take new ideas from concept to code, to state-of-the-art models, and to publication faster.

5.1 System Design

System design is the process of defining the architecture, modules, and data for a system to satisfy specified requirements. It is the phase where the SRS document is converted into a format that can be implemented and decides how the system will operate. The purpose of design phase is to plan a solution for problem specified by the requirements. System design aims to identify the modules that should be in the system, the specification of those modules and how they interact with each other to produce the result. The goal of the design process is to produce a model for or representation of a system can be used later to build that system. The produced model is called design of the system.

- System design covers the following:
- Reviews the current physical system.
- Prepares output specifications.
- Prepares input specifications.
- Prepares edit, security and control specifications.
- Specifies the implementation plan.
- Prepares a logical design walk through of the information flow, output, input, control, and implementation plan.

MODULE DESCRIPTION

prediction of demand of spare parts

Manager Can see the report of predicted spare parts needed with needed quantity and available quantity. From here managers can generate auto purchase order. Spare Parts demand prediction is done using artificial neural networks model. In classification problems, the purpose of the network is to assign each case to one of a number of classes. Nominal output variables are used to indicate a classification problem. The nominal values correspond to the various classes. Very often used technique is the one where there is only a two-state variable. following variables were defined as an input

- number of days between two last demands in the time immediately preceding target period
- number of days between the target period and first nonzero demand immediately preceding target period

- mean demand for six days immediately preceding target period
- total demand in the last week immediately preceding target period
- number of days in the week immediately preceding target period when there was no demand
- mean demand for two weeks immediately preceding target period

A multi-layered perceptron (MLP) neural network has been used for forecasting occurrence of demand. If result coming from the ANN equals zero, it means that the predicted quantity of demand equals zero. However, if the result coming from the ANN equals one, it means that the quantity of the demand is nonzero and its value needs to be calculated.

Inventory management and billing

- Create new product ,edit details of existing product
- block/unblock a product
- register/edit/delete vendor details
- Stock update - enter stock update details based on new supply
- Mark Damage product/stock adjustment
- Create purchase order based on demand prediction/view status of purchase order
- Mark vendor payments ,view vendor payment details, view balance statement
- Create/view/edit category

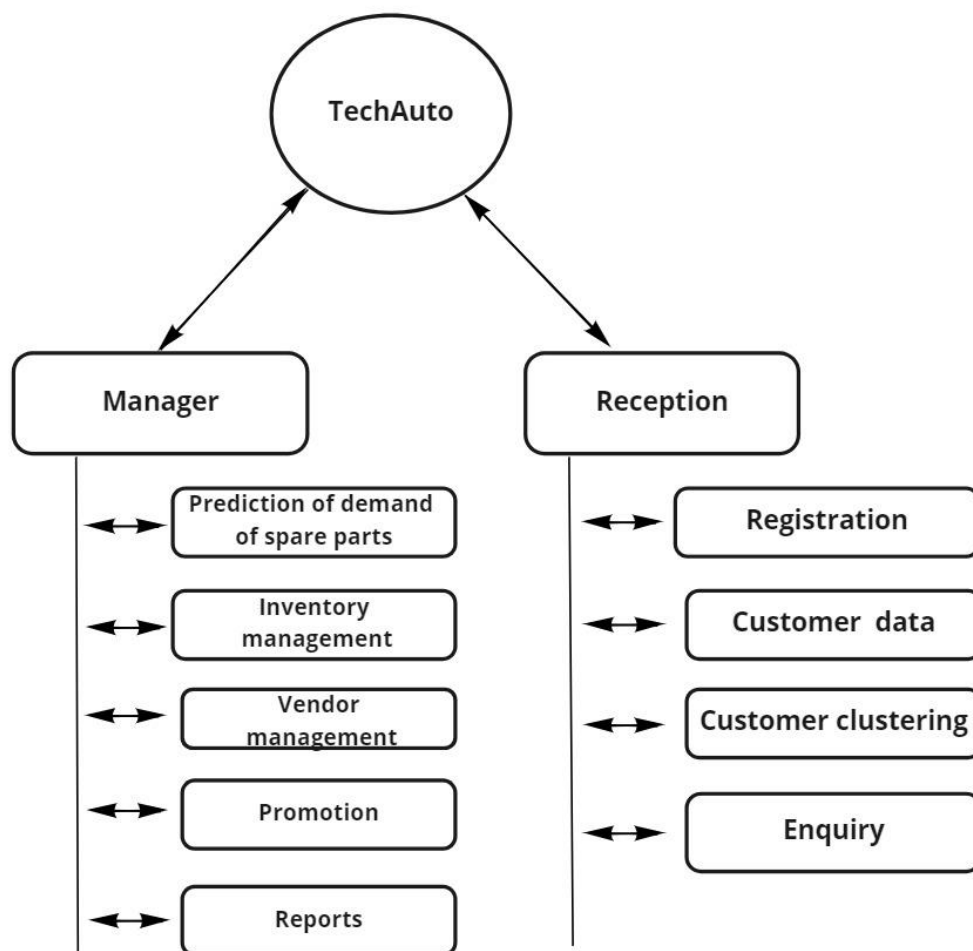
Customer management

- add/edit customer details
- Customer enquiry details update
- Customer segmentation: Common characteristics in customer segments can guide how a company markets to individual segments and what products or services it promotes to them. K-means clustering is a popular unsupervised machine learning algorithm method, used for segmentation. after perform customer segmentation, algorithm find similar characteristics in each customer's behaviour and needs. Then, those are generalized into groups to

satisfy demands with various strategies. Moreover, those strategies can be an input of the

- Targeted marketing activities to specific groups
- Launch of features aligning with the customer demand
- Development of the product roadmap
- Auto Marketing campaign based on customer group

System diagram

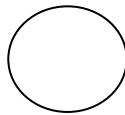


5.2 Data Flow Diagram

A data flow diagram (DFD) is a graphical representation of the “flow” of data through an information system, modeling its process aspects. A DFD is often used as a preliminary step to create an overview of the system, which can later be elaborated. DFDs can also be used for the visualization of data processing. A DFD shows what kind of information will be input to and output from the system, where the data will come from and go, and where the data will be stored. It does not show information about the timing of process or information about whether processes will operate in sequence or in parallel.

Data Flow Diagrams Notations

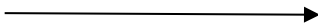
Process:



Input/Output:



Flow of direction:

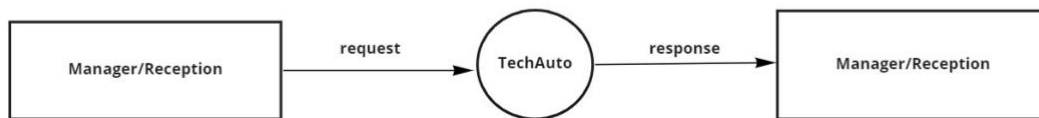


Data store:

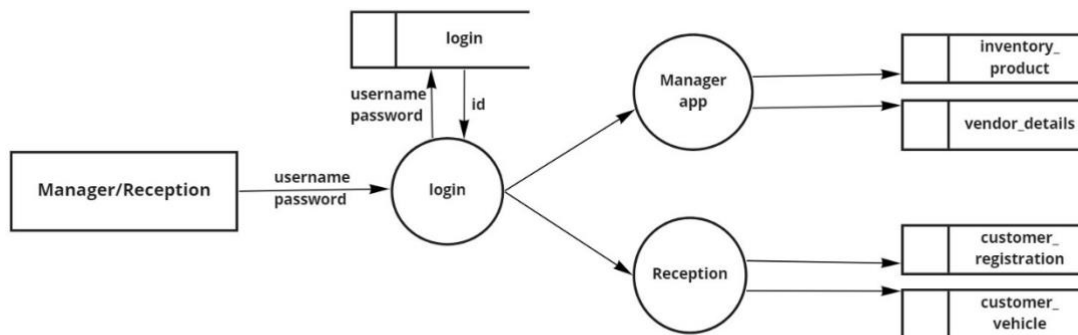


5.2.2ProjectDFD

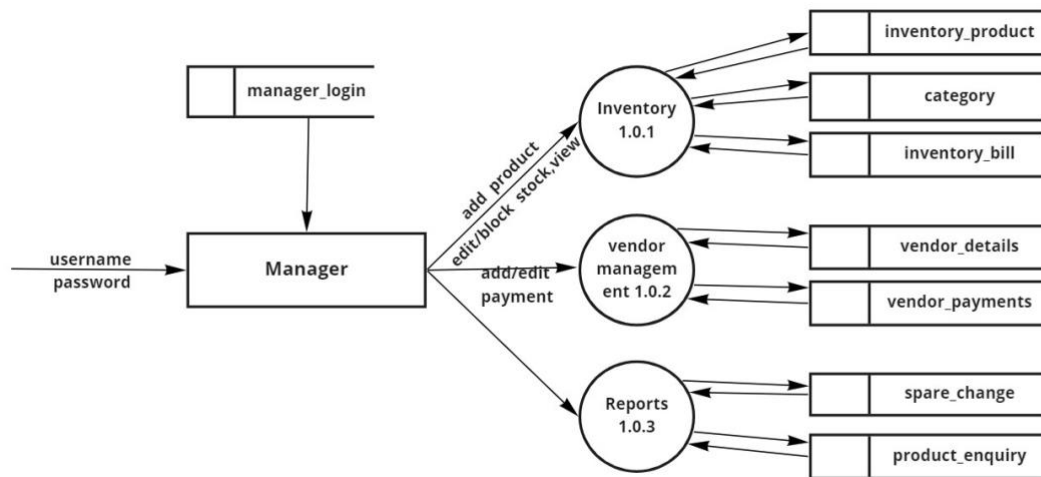
Level 0



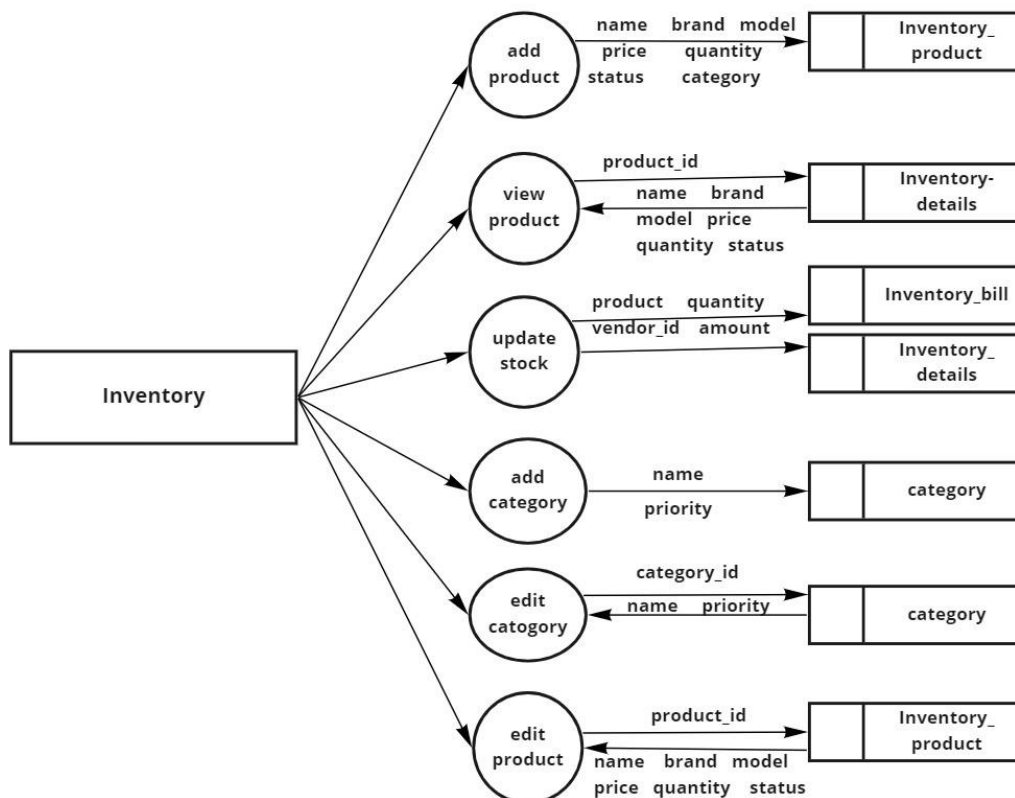
Level 1



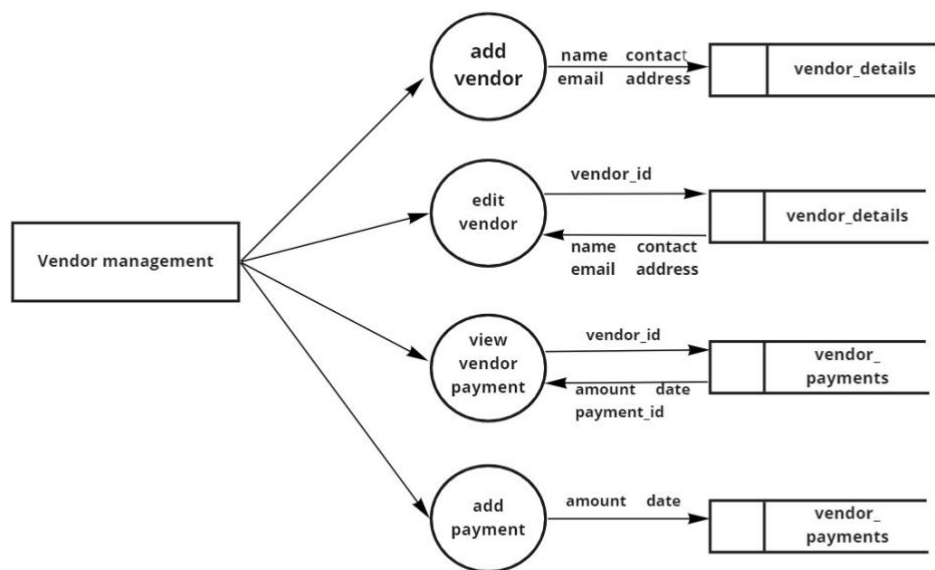
Level 1.0



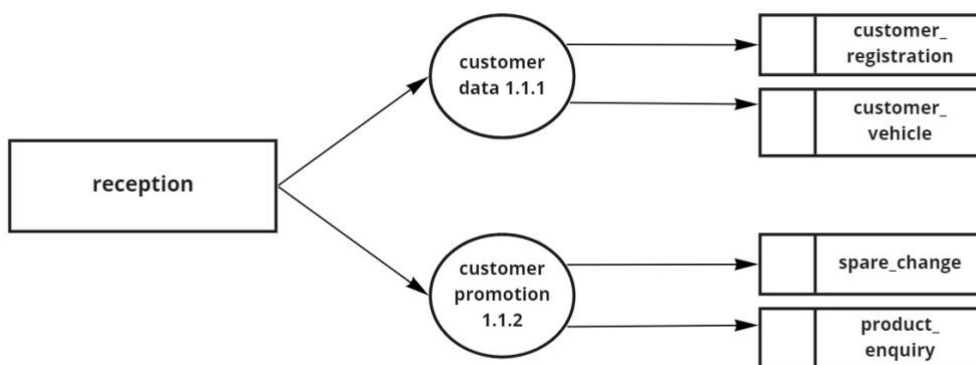
Inventory (Level 1.0.1)



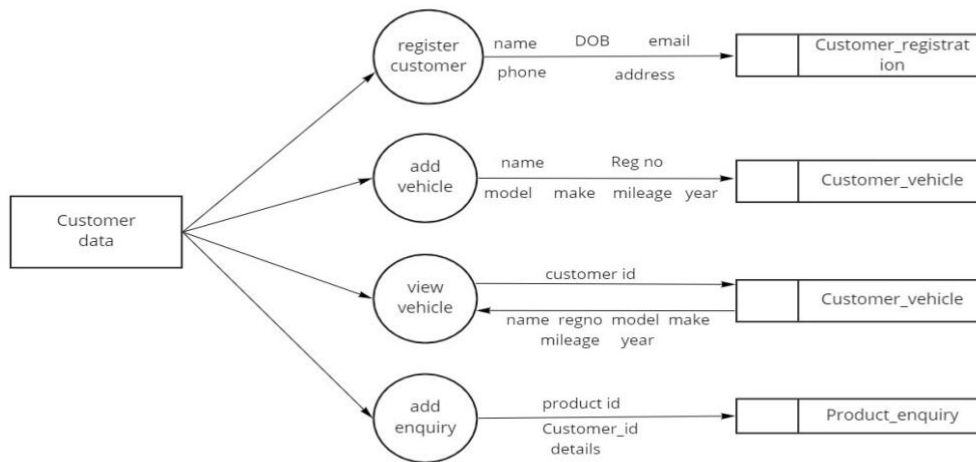
Vendor Management (Level 1.0.2)



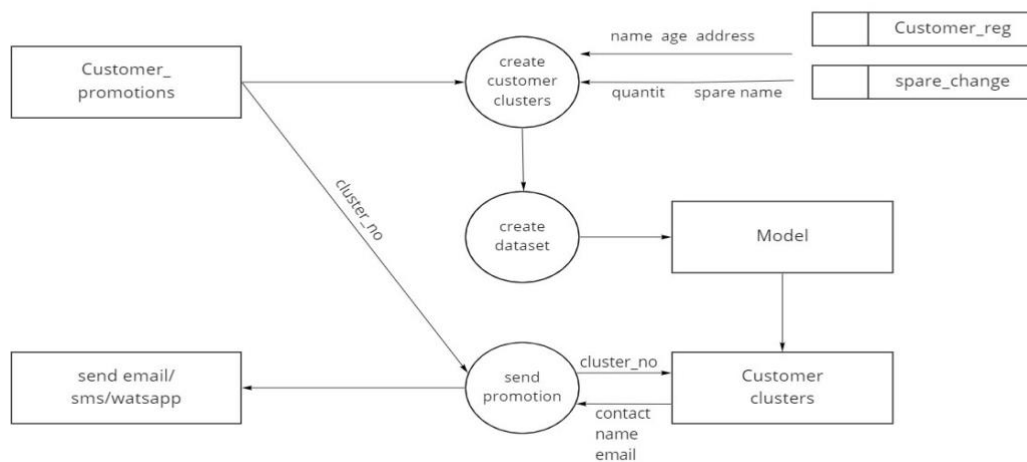
Reception (Level 1.1)



Customer Data (Level 1.1.1)



Customer Promotion (Level 1.1.2)



5.3 Database Design

The overall objective in the development of database technology has been to treat data as an organizational resources and as an integrated whole. DBMS allow data to be protected and organized separately from other resources. Database is an integrated collection of data. The most significant form of data as seen by the programmers is data as stored on the direct access storage devices. This is the difference between logical and physical data.

Database files are the key source of information into the system. It is the process of designing database files, which are the key source of information to the system. The files should be property designed and planned for collection, accumulation, editing and retrieving the required information.

The proposed system stores the information relevant for processing in the SQL database. This database contains tables, where each corresponds to one particular type of information. Each piece of information in table is called a filed or column. A table also contain records, which is a set of fields. All records in a have the same set of fields with different information. There are primary key fields that uniquely identify a record in a table. There are also fields that contain primary key from other another table called foreign keys. Normalization is the process of minimizing redundancy from a relation or set of relations. Redundancy in relation may cause insertion, deletion and updation anomalies. So, it helps to minimize the redundancy in relations.

Table number: 1

Table name: Inventory product		primary key: product id	
Description: details of inventory product			
Field	datatype	constraint	size
Product id	int	Primary key	
Name	varchar		50
Brand	varchar		50
Price	double		
Quantity	int		
Description	varchar		50
Status	varchar		20
Category id	int	Foreign key	

Table number: 2

Table name: Category		primary key: Category id	
Description: details of Category			
Field	Datatype	constraint	size
Category id	Int	Primary key	
Name	Varchar		50
Priority	Varchar		50

Table number: 3

Table name: vendor details		primary key: vendor id	
Description: details of vendor			
Field	datatype	constraint	size
Vendor id	int	Primary key	
Name	varchar		30
Contact	varchar		15
Email	varchar		40
Address	varchar		40

Table number: 4

Table name: Inventory bill		primary key: Inventory id	
Description: details of inventory bill			
field	datatype	constraint	size
Inventory id	int	Primary key	
Vendor id	int	Foreign key	
Total	double		
date	date		
Amount given	double		

Table number: 5

Table name: Inventory details		primary key: Inventory details id	
Description: details of inventory details			
field	Datatype	constraint	size
Inventory details id	Int	Primary key	
Inventory id	int	Foreign key	
Product id	int	Foreign key	
quantity	int		
Amount	double		

Table number: 6

Table name: vendor payments		primary key: payment id	
Description: details of vendor payment details			
field	datatype	constraint	size
Payment id	int	Primary key	
Vendor id	int	Foreign key	
Amount	double		
date	date		

Table number:7

Table name: spare change		primary key: spare change id	
Description: details of spare change details			
field	datatype	constraint	size
Spare change id	int	Primary key	
Vehicle id	int	Foreign key	
Product id	int	Foreign key	
date	date		
Quantity	int		
Reason	varchar		100

Table number:8

Table name: product enquiry		primary key: Enquiry id	
Description: details of product enquiry details			
field	datatype	constraint	size
Enquiry id	int	Primary key	
Details	text		
Product id	int	Foreign key	
Customer id	int	Foreign key	
date	date		

Table number:9 Customer

Table name: Customer		primary key: customer id	
Description: details of customer			
field	datatype	constraint	size
Customer id	int	Primary key	
Name	varchar		30
DOB	date		
Email	varchar		30
Address	text		
Phone	varchar		15

Table number:10

Table name: Customer vehicle		primary key: vehicle id	
Description: details of Customer vehicle			
field	datatype	constraint	size
Vehicle id	int	Primary key	
Customer id	int	Foreign key	
Name	varchar		30
Reg number	varchar		30
Model	varchar		30
Make	varchar		30
Manufacturing year	varchar		10
Mileage	double		

5.4 Input Design

Input design is the process of converting user inputs into computer-based format. The goal of designing input data is to make the data entry, logical and error free. Input data are collected and organized into groups of similar data. The project requires a set of information from the

user for processing. The various factors to be considered during input designs are input data to the system, methods for performing input validation and steps to follow when error occurs, medium to use, arrangement of data etc. For providing a good input design for the application easy data input and selection features are adopted. The input design requirements such as user friendliness, consistent format and interactive dialogue for the right message and help for the user at the right time are also considered for the development of this project.

In this project all the fields are validated. If any field then error message will be displayed, so as to help the user while giving inputs. The drop down lists are used to reduce the user inputs and to select a preferred item from the list easily. Check boxes are used for user's category selection. User just needs to click the preferred category from the checkbox list. User will select one of the items in list boxes. The following design guidelines will result in a friendly and deficient interface. Minimize the number of input actions required from user. This can be accomplished by using the mouse to select from the predefined set of inputs. In application user can select the options.

In the project “**TECH AUTO**” the input design is done in such a way that the users of the system will never get confused or enter wrong data. The simplicity and ease of use lies in the act that the desired objectives can be accomplished with a few mouse clicks.

The input design of the system identifies the following data:-

Ø Login forms

This is a design in admin, officer and user module to login into the home page.

Ø Add officer

This is a design in the admin module to add the details of officer.

Ø Edit officer.

This is a design in the admin module to updates the details of officer.

Ø Add Crime

This is a design in the officer module to add the crime details .

Ø Add Wanted Details

5.5 Output Design

Output design generally refers to the result generated by system. Output is the most important and direst source of information to the user.

Efficient output design should improve the system relationship with user and help in decision-making. Output can take different forms that are screen displays, printed forms, graphical layouts etc. Efficient and well defined output design improves the relationship of the system and the user, thus, facilitating design making.

When designing output, system analyst must accomplish following:

Ø Determine what information to be present.

Ø Decide whether to display, print the information and select the output medium.

Ø Arrange the presentation in acceptable format.

Ø Decide how to distribute the output to intended recipient.

Efficient output design will improve the system relationship with the user. Output forms are the forms where the respective module. We may also see the outputs in reports. The reports often refresh for every change in the database.

We can create reports by using SQL queries. Outputs from the system are required to communicate the results of processing to users. Formats of outputs are defined during output design. The success of the system depends on how well the output reports are generated.

The output design includes the following:

Ø Home page : This acts as the home page for the admin and officer.

Ø View officer: This is a design in the admin module to view the details of officer.

Ø View Crime: This is a design in the officer module and registered user module to view the crime details .

Ø View Wanted Details: This is a design in the officer and user module to view the most wanted person details.

Table Number: 5.5.1

Process	Input design	Output design
Login page for Manager and Reception	Enter user name, password	Show home page
Customer Registration	Enter Customer details	If valid user Registration is successful
Spare Demand Prediction	Previous spare details/history	Future demand and prediction
Add customer	Enter customer Details	Customer data added successfully
Add Category	Enter category details name and priority	Categories created successfully
Add vehicle	Enter vehicle details	Vehicle details created successfully
Add vendor	Enter vendor details	Vendor details created successfully
Add enquiry	Enter customer name, product and description	Enquiry created successfully
Product list	Enter product details	View the status of list
Vendor payments	Enter details of payments	Payments created successfully
Update stock	Update the details of stock	Stocks updated successfully

Program Design

i. Manager

Step 1: Start

Step 2: Once logged in the manager has the privilege to inventory management, vendor management, customer promotion, and view reports.

Step 3: In inventory management manager can add, view, edit product, add, edit category, update stock.

Step 4: In vendor management manager can add, edit vendor, view vendor payments, and add payments.

Step 5: In customer promotion manager can send promotions to customers.

Step 6 : Manager can view reports.

Step 7 : Stop

ii. RECEPTION

Step 1: Start

Step 2: Reception can register customer data using name, dob, email, phone and address.

Step 3: Reception can add customer vehicle details using name, register number, model, make, milage and year.

Step 4: customer can view vehicle details.

Step 5: Add enquiry.

Step 6: Stop

CHAPTER 6

FUNCTIONAL AND NON-FUNCTIONAL REQUIREMENTS

6.1 FUNCTIONAL REQUIREMENTS

- Manager should login with his credentials provided by the system for doing any activity
- Reception should login with his credentials provided by the system for doing any activity
- Reception add customer data and customer vehicle.
- Manager update stock, vendor payments, add products.
- Spare demand prediction is made by using the previous sales data.
- Customer promotions are send according to customer cluster.

6.2 NON- FUNCTIONAL REQUIREMENTS

A non-functional requirement is a requirement that specifies criteria that can be used to judge the operation of a system, rather than specific behaviors. Some of the non-functional requirement are mentioned below

- **Usability:** The system shall have a clean interface with only needed features, clear terminology and tools tips wherever necessary. Warnings or alerts shall be specified in clear way.
- **Efficiency:** The system shall respond to different searches being conducted like searching particular product, search quantity, etc. in a very fast way.
- **Interoperability:** The system shall be able to interact with other systems. The system should able to be supported at least one software which has a relationship with payment process
- **Portability:** The system shall be independent of the specific technological platform used to implement it.
- **Reliability:** Reliability defined as a measure of the time between failures occurring in a system, so that the system shall operate without any failures for a particular period of time.
- **Availability:** Availability measures the percentage of time the system is in its operational state so that the system be available for use 24 hours per day and 365days per year.

CHAPTER 7

TESTING

7.1 Testing Strategies

An engineered product can be tested in one of these two ways. These testing strategies include:

- Black box testing
- White box testing

Blackbox Testing

Black box testing is not a type of testing; it instead is a testing strategy, which does not need any knowledge of internal design or code etc. As the name “black box” suggests, no knowledge of internal logic or code structure is required. The types of testing under this strategy are totally based/focused on the testing for requirements and functionality of the work product/software application. Black box testing is sometimes also called as “Opaque Testing”, “Functional/Behavioural Testing” and “Closed Box Testing”. The base of the black box testing strategy lies in the selection of appropriate data as per functionality and testing it against the functional specifications in order to check for normal and abnormal behaviour of the system. Now a day, it is becoming common to route the testing work to a third party as the developer of the system knows too much of the internal logic and coding of the system, which makes it unfit to test the application by the developer. In order to implement Black Box Testing strategy, the tester is needed to be thorough with the requirement specifications of the system and as a user, should know, how the system should behave in response to the particular action. In our project white box as well as black box testing is done.

White box Testing

White-box testing is a method of testing the application at the level of the source code. Whitebox testing (also known as clear box testing, glass box testing, and transparent box testing, and structural testing) is a method of testing [software](#) that tests internal structures or workings of an application, as opposed to its functionality. In white-box testing an internal perspective of the system, as well

as programming skills, are chooses inputs to exercise paths through the code and determine the expected outputs.

7.2 Unit Testing

In this testing, each module is tested individually and integrated the overall system. Unit testing focuses verification efforts on the smallest unit of software design in the module. This is also known as 'module' testing.

The modules of the system are testing separately. This testing is carried out during programming stages itself. In this testing step each module is found to be validation checks for verifying the data input given the user which both the formal and validity of the entered. It is very easy to find error and debug the system.

In the project "**TECH AUTO**" each module is tested individually and is found to be an error free one.

7.3 Integration Testing

Data can be lost across an interface; one module can have an adverse effort on the other sub functions, when combined may not produces the desired major functions. Integrated testing is the systematic testing for constructing the uncover errors within the interface. This testing was done with sample data. The developed system has run successful for this sample data. The need for integrated test is to find the overall system performance.

In the project "**TECH AUTO**" each module is tested individually and all the modules are integrated together and the integration testing is carried out for the whole system. The whole system is working accurately without any errors.

7.4 System Testing

Software Testing is a critical element of software quality assurance and represents the ultimate review of specification, design and code generation. System testing is the stage of implementation, which is aimed at ensuring that the system works accurately and efficiently before live operation commences. Testing is the major quality measure employed during the software development. After the coding phase, computer programs available are

executed for testing purpose. Testing not only has to uncover errors introduced during coding, but also locates errors committed during the previous phase. Thus, the aim of testing is to uncover requirements, design or coding errors in the program. Testing is a process of executing a program with the intension of finding an error. A good test case is one that has a highest probability of finding an as yet undiscovered error. A Successful test is one that uncovers an as yet undiscovered error.

Our objective is to design tests that systematically uncover different classes of errors and to do so with minimum amount of time and effort. Testing demonstrate that software functions appear to be working according to specification, that performance requirements appear to have been met. Data collected as testing is conducted provide a good indication of software reliability and some indication of software quality as a whole.

But there is one thing that testing cannot do:

Testing cannot show the absence of defects it can only shoe that software defects as present.

7.5 Testing Results

The application was tested at the level of the source code. The test went through the internal perspective of the system, as well as programming skills, are chooses inputs to exercise paths through the code and determine the expected outputs. The functionality of the application was tested. Unit testing, integration testing and system testing was performed.

Unit testing is a method by which individual units of source code are tested. The testing resulted in some errors and they were corrected accordingly.

Integration testing is the final step in testing. In this case all the modules were combined and given the test data. The data produced the expected results after a number of corrections.

Manager Login

Table Number:7.4.1

Test case ID	Test Scenario	Test step	Test data	Expected Result	Actual Result	Pass/Fail
1	Check manager login with valid data	Go to site enter user id and password click submit	Username, password	Manager should login to application	As expected	pass
2	Check manager login with invalid data	Go to site enter user id and password click submit	Username, password	Manager login should fail	As expected	pass

Reception Login

Table number:7.4.2

Test case ID	Test Scenario	Test step	Test data	Expected Result	Actual Result	Pass/Fail
1	Check reception login with valid data	Go to site enter user id and password click submit	Username, password	Reception should login to application	As expected	pass
2	Check reception login with invalid data	Go to site enter user id and password click submit	Username, password	reception login should fail	As expected	pass

Inventory Management

Table Number:7.4.3

Test Case Id	Test Scenario	Test Step	Test Data	Expected Results	Actual Results	Pass/Fail
1	Check add product by entering valid name, brand, model, price, quantity, status, category	Go to site add product by entering name, brand, model, price, quantity, status, category	Name, brand, model, price, quantity, status, category	Product added successfully	As expected	pass
2	Check add product by entering invalid name, brand, model, price, quantity, status, category	Go to site add product by entering name, brand, model, price, quantity, status, category	Name, brand, model, price, quantity, status, category	Product adding failed	As expected	pass
3	Update stock with valid product, quantity, vendor id, amount	go to site add row update stock with product, quantity, vendor id, amount and click submit	Product, quantity, Vendor id, amount	Stock updated successfully	As expected	pass
4	Update stock with invalid product,	Go to site, add row update stock with	Product, quantity,	Stock up dation failed	As expected	pass

	quantity, vendor id, amount	product, quantity, vendor id, amount and click submit	Vendor id, amount			
5	Add category with valid details	Go to site, add category with name, priority	Name, priority	Successfully added	As expected	pass
6	Add category with invalid details	Go to site, add category with name, priority	Name, priority	Add Category failed	As expected	pass

Vendor Management

Table Number: 7.4.4

Test Case Id	Test Scenario	Test Step	Test Data	Expected Results	Actual Result	Pass/fail
1	Add vendor with valid name, contact, email, address	Go to add vendor with name, contact, email, address	Name, contact, email, address	Vendor added successfully	As expected	pass
2	Add vendor with invalid name, contact, email, address	Go to add vendor with name, contact, email, address	Name, contact, email, address	Add Vendor failed	As expected	pass

3	Add payment with valid details amount, date	Go to add payments with amount, vendor id and enter submit	Vendor id, amount	Payment added successfully	As expected	pass
4	Add payment with invalid details amount, date	Go to add payments with amount, vendor id and enter submit	Vendor id, amount	Add payment failed	As expected	pass

Customer Data

Table Number: 7.4.5

Test Case Id	Test scenario	Test Step	Test Data	Expected Results	Actual Results	Pass/Fail
1	Customer registration with valid details name, dob, email, phone, address	Go to site register customer using details such as name, dob, email, phone, address	Name, dob, email, phone, address	Registered successfully	As expected	pass
2	Customer registration with invalid details name, dob, email,	Go to site register customer using details such as name, dob,	Name, dob, email, phone, address	Registration failed	As expected	pass

	phone, address	email, phone, address				
3	Customer vehicle adding with valid details name, regno, model, make, mileage	Go to site add vehicle with name regno, model, make, mileage	Name, regno, model, make, mileage	Vehicle added successfully	As expected	pass
4	Customer vehicle adding with invalid details name, regno, model, make, mileage	Go to site add vehicle with name regno, model, make, mileage	Name, regno, model, make, mileage	Add vehicle failed	As expected	pass

Chapter 8
RESULTS AND DISCUSSION

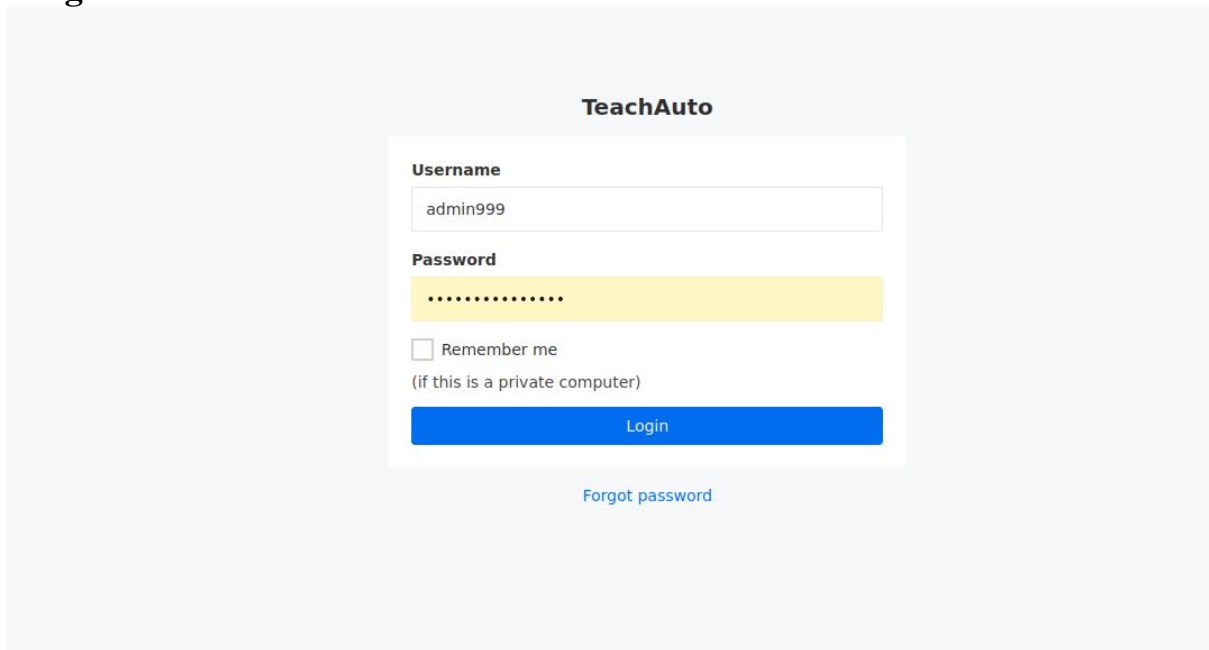
8.1 RESULTS (Salient Features)

The main motivation and objective of this system is to provide a solution to reduce the inconvenience in finding a unique diet for the user. Enabling the user experiencing a friendly user interface. Systematic handling of the schedules in such a way is a key to increasing its manageability and its competence. The proposed system incorporated with the following features.

- Human effort can be reduced
- Improved efficiency
- Easy access to the machine related descriptive/static data
- Easy access to the machine related documents
- Efficient management of the relation between the main asset and its sub-components, modules and parts
- Dynamic tracing of the status of maintenance, depending on whether the maintenance action is planned or performed.
- The system predicts the date of the next required mileage/working hours reading for the machine.
- The user can easily extract the list of the machines included in an inspection.

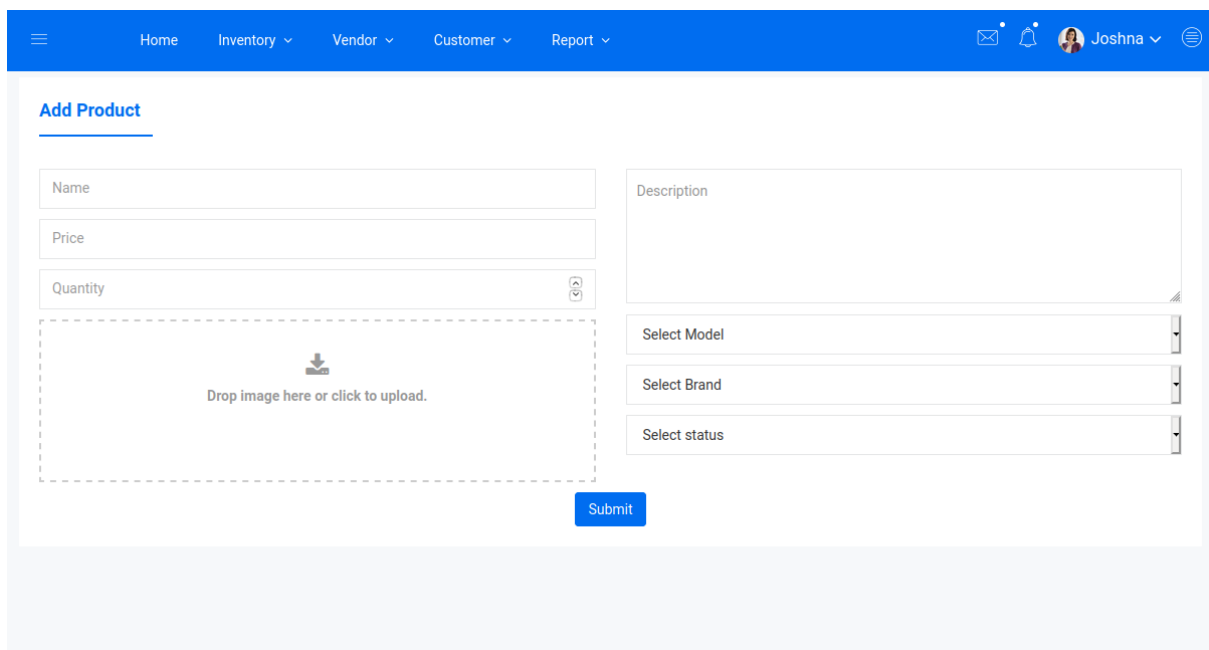
8.2 SCREEN SHOTS

1.login



The screenshot shows a login page for 'TeachAuto'. The page has a light gray background. In the center, there is a white box containing the login form. The form has a title 'TeachAuto' in bold. Below the title, there are two input fields: 'Username' with the value 'admin999' and 'Password' with a masked password '.....'. Below the password field, there is a checkbox labeled 'Remember me' with the text '(if this is a private computer)' underneath it. At the bottom of the form is a blue 'Login' button. Below the form, there is a link 'Forgot password' in blue text.

2.Add product



The screenshot shows an 'Add Product' form. The form is titled 'Add Product' in blue text. It has a blue header bar with navigation links: Home, Inventory, Vendor, Customer, and Report. On the right side of the header bar, there are icons for email, notifications, and a user profile (Joshna). The form itself is white and contains several input fields: 'Name', 'Price', 'Quantity', 'Description', 'Select Model', 'Select Brand', and 'Select status'. There is also a large dashed box for uploading an image with the text 'Drop image here or click to upload.' and a blue 'Submit' button at the bottom right.

3.Product list

Product List								Add Product
No	Name of Product	Status	price	quantity	Model	Brand	Setting	
1	Hopkins 47345 4 Wire Flat Adapter	Active	\$12	10	67309	Hopkins		
2	Castrol 03128C Edge 5W-30 Full Synthetic Motor Oil, 5 Quart	Disabled	\$50	0	Castrol oil 33	Castrol		
3	Shell Spirax S6 AXRME SAE 75W-90 GL-5	Active	\$20	28	shell s6	shell		
4	Triax HD Gear Premium LS 80W-90, GL-5	Active	\$24	28	GL-5	Triax		

Previous 1 2 3 Next

4.Update stock

update stock					Add Row
Guta Agencies					
No	Name	amount	quantity	Total	
1	Castrol 03128C Edge High Mileag	\$25	100	\$2500	
2	Shell Spirax S6 AXRME SAE 75W-	\$10	100	\$1000	
Total:				\$3500	

Submit

5.Add category

Home

Inventory ▾

Vendor ▾

Customer ▾

Report ▾

Joshna ▾

Add Category

Name

Priority

Submit

6.Add vendor

Home

Inventory ▾

Vendor ▾

Customer ▾

Report ▾

Joshna ▾

Add Vendor

Vendor Name

Phone

email

Address

Submit

7.Edit vendor

Home

Inventory

Vendor

Customer

Report

Edit Vendor

Guta Agencies LLC

+17334455298

gutachicago01@gmail.com

guta tower , chicago

Submit

8. Vendor payment

Home

Inventory

Vendor

Customer

Report

Joshna

vendor payments

Add payment

June- 2021

No	Name	amount	date
1	seeko Tradelinks	\$1420	10-06-2021
2	seeko Tradelinks	\$1500	12-06-2021
3	Guta Agencies	\$1500	12-06-2021

Previous

Next

9. Add payment

Home

Inventory ▾

Vendor ▾

Customer ▾

Report ▾

Joshna ▾

Search...

Home / add Paym

Vendor Payment

Guta Agencies

amount

Submit

10.Add customer

Home

Customer ▾

Service ▾

spares ▾

Billing ▾

Settings ▾

Add Customer

Name

Date of Birth

email

phone

Address

Submit

11.Add vehicle

HomeCustomerService ♾spares ♾Billing ♾Settings ♾

+1962888309

Home / Add Vehicle

Add Vehicle

Name

Registration number


Select Brand

Select Model

Manufacturing year

kilometer

Register vehicle



Customer Name

Fly kin

Dob

08-10-1985

Email ID

fly@gmail.com

Phone

+1962888309

Address

Chicago.

12.View vehicle

HomeCustomerService ♾spares ♾Billing ♾Settings ♾

+1962888309


Home / view vehicle

View Vehicle

Registered vehicles of Fly kin

Add vehicle

No	Registration number	Brand	Model	year	km
1	NYC 5633	Chevrolet	BLAZER	2020	22132



Customer Name

Fly kin

Dob

08-10-1985

Email ID

fly@gmail.com

Phone

+1962888309

Address

Chicago.

13.Add enquiry

Home

Customer

Service

spares

Billing

Settings

+1962888309

Q

Home / Add Enquiry

Add Enquiry

customer Name

product

Description

Submit

14.Spare prediction


No	Product Name	predicted Demand	Available Quantity	PO Given	Need to Purchase
1	Shell Spirax S6 AXRME SAE 75W-90 GL-5	110	20	50	40
2	Triax HD Gear Premium LS 80W-90	50	5	0	45
3	Mann-Filter HU 816 X Metal-Free Oil Filter	150	80	70	0
4	Bosch Ignition Coil 6-PACK	30	0	0	50
5	EPAuto CP430 Premium Cabin Air Filter	10	13	0	0
6	Macrofiber Cabin Air Filter	50	30	30	0

15.Send promotion

Send Promotions

Select Customer Cluster

Select Media



Drop image here or click to upload.

Subject

Content

Submit

CHAPTER 9

CONCLUSION

9.1 System Implementation

The final and important phase in the system life cycle is the implementation of the new system. The term implementation has different meanings ranging from the conversion of a basic application to a complete replacement of a computer system. The procedure however, is virtually the same. Implementation includes all those activities that take place to convert from old system to new. The new system may be totally new replacing existing system, manual or automated, or it may be a major modification to an existing system. The method of implementation and time scale to be adopted is found out initially. Next the system is tested properly and at the same time users are trained in the new procedure.

Proper implementation is essential to provide a reliable system to meet organization requirements. Successful implementation may not guarantee improvement in the organization using the new system, but it will prevent improper installation.

The implementation involves following things:

- Careful planning.
- Investigation of the system considerations.
- Design the method to achieve the changeover.
- Evaluation of change over method.

Implementation of a new system requires the operating staff installing the software and creating computer files. There are many ways in which this can be achieved.

The most common methods are the following.

- Direct change over
- Parallel running
- Pilot running change over the creation of the designed system takes place in the implementation phase.

This phase activities do the following:

- Development of phase overview
- Preparing for implementation
- Computer program development
- Development phase report and overview It also performs activities like writing, testing, debugging and documenting the programs.

There are three types of implementations:

- Implementation of a computer system to replace a manual system. The problems encountered are converting files, training users, creating accurate files and verifying printouts for integrity.
- Implementation of a new computer system to replace an existing one. This is usually a difficult conversion. If not properly planned, there can be many problems. Some large computer systems have taken as long as a year to convert.
- Implementation of a modified application to replace the existing one, using the same computer. This type of conversion is relatively easy to handle, provided there are no major changes in the files. Every system requires periodic evaluation after implementation.

This is to review the performance of the system and to evaluate against established standard or criteria. A study is conducted for measuring the performance of the system against pre-defined requirements. This study results a post-implementation review that determines how well the system continues to meet the performance specification.

9.2 CONCLUSION

The online management system for automobile services is a progressive step in the field of service centres and garages. Any car user can make use of this website to locate and communicate with the service centres or garages in their vicinity. This website uses innovative technology that connects you with a mechanic at the tap of a button. garage management solution facilitates almost everything right from extensive searches, appointment booking, parts ordering to even report generation. In this website managers can add products, vendor details, payments and can demand spare parts which is done by predicting the spare part requirement, from the previously collected customer data. reception can enter the customer details and vehicles details . clusters are formed in the basis of vehicle and priority. manager can give promotions to each cluster of customers easily.

9.3 Future Enhancement

This project can be modified by adding any more features and develop the application to enhance the user experience. In future spare parts prediction can be enhanced using the data regarding number of services done in a day. A tablet based android /ios application for manager, admin and reception can be developed. An auto chat bot for customer enhancement can be easily integrated into the system.

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APPENDICES

List of tables

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