Car Damage Analysis

User Manual - David Weir (Student No. 15432642)





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Project Name: Car Damage Analysis

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Abstract:

Car Damage analysis is a project which aims to streamline the returns process in car rental companies at the moment.

Images of cars are captured by an enclosure surrounding the car, these images are then analysed using machine learning algorithms in order for a prediction to be made as to whether the car is damaged or not. Damaged cars are displayed to employees through a web application.

This project aids in increasing the productivity of employees in car rentals companies by reducing the amount of time taken to analyse a car for damages.

1 Introduction	2
2 Concept of Operations	2
3 Glossary	2
4 Procedures	3
4.1 Performing an Appraisal	3
4.2 Flagging an Appraisal	4
4.3 Searching for a Previous Appraisals of a Car	5
4.4 Adding a New Car	6
4.5 Entering a Car to be Analysed	7
5 Error Messages and Problem Resolutions	8
5.1 Invalid Car Registration Input	8
5.2 Empty Input	8
5.3 No cars found for registration	9
5.4 Registration not found in video stream	9
6 Page Walkthroughs	10
6.1 Navigation Bar	10
6.2 Appraisal Page	10
6.3 Report Page	11
6.4 Search Page	12
6.5 History Page	12
6.6 New Car Page	13
7 Navigational Features	14

1 Introduction

The content of this manual will guide users through the varying functionalities available to them through both the web application and the hardware enclosure. Walkthroughs will also be available outlining each of the major pages of the web application.

This manual uses the IEEE standard for Software User Documentation as a foundation and guide. Some sections from the standard are not applicable due to the scope of this project however.

NOTE: As this system is primarily a web application, the installation guide for users is not necessary in this document. Users will interact through a browser. A more detailed installation guide is available in the technical manual.

2 Concept of Operations

The functionalities / procedures outlined in this report make use of both the software web application and the hardware enclosure aspects of the system. The procedures to be outlined below:

- 1. Performing an appraisal
- 2. Flagging an appraisal
- 3. Searching for a previous appraisals of a car
- 4. Adding a new car
- 5. Entering a car to be analysed

3 Glossary

- Appraisal: The action taken by an employee of a rental car company in which they
 appraise the damage of a car in order to generate a bill for a customer. More
 specifically in this system, an appraisal contains images which can be used by an
 employee while appraising damages.
- **Enclosure:** The hardware portion of this project is comprised of two cameras and a Raspberry Pi computer, which detect car registrations and capture images of the car in order for them to be analysed for damage.

4 Procedures

4.1 Performing an Appraisal

- From the appraisals page, click on the appraisal which you wish to complete. The damage report page will be displayed containing the relevant information.
- A green status box will be displayed, informing you that the appraisal is currently open.



• In the damage report page, you can view images of the damage in order to assess the severity.



- At the bottom of the damage report page, click the *Appraisal Complete* button.
- The status box will now appear red, informing you that the appraisal has been closed.



4.2 Flagging an Appraisal

- From the appraisals page, click on the relevant appraisal. The damage report page will be displayed, containing relevant information.
- A green status box will be displayed, informing you that the appraisal is currently open.



- At the bottom of the damage report page, click the *Flag as No Damage* button.
- The status box at the top of the page will remain green. A new yellow status box will appear, informing you that the appraisal has been flagged.



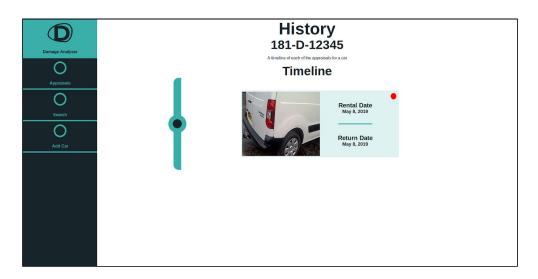
This flagged appraisal will then be used to improve the system over time.

4.3 Searching for a Previous Appraisals of a Car

- Navigate to the search page through the navigation bar on the left side of the screen by clicking *Search*.
- The search page will be displayed containing a search input box.
- Enter the registration plate of the car which you would like to search for. Car registrations must match the Irish registration standard of YYY-CC-SSSSS.



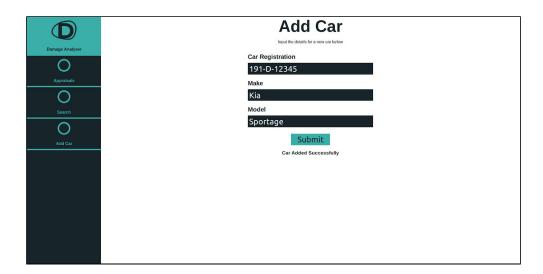
- A search result box will be displayed, containing the car information and the number of appraisals present in the system for that car.
- Click on the search result box. The history of the car will be displayed as a timeline.



 From this page, you can choose a relevant appraisal based on the dates of the rental.

4.4 Adding a New Car

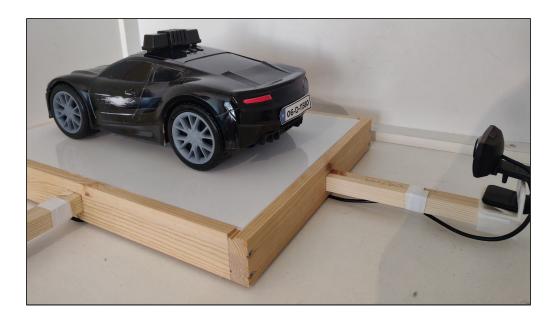
- Navigate to the new car page through the navigation bar on the left side of the screen by clicking *New Car*.
- The new car page will be displayed, containing a number of input boxes for the cars information.
- Input the relevant information for the new car and click the *Submit* button at the bottom of the form.
- A success message will be displayed, informing you of the successful addition of the new car to the system.



The new car can now be used in the creation of appraisals.

4.5 Entering a Car to be Analysed

- Place the car in the enclosure, ensuring that the rear registration plate is visible and readable by the cameras of the enclosure.
- The registration plate of the car will be read by the camera at the rear of the car and validated as shown in the model enclosure below.

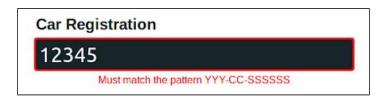


- Once validated, images will be captured of all sides of the car and sent to be analysed.
- If damage is detected on the car, an appraisal will be created for an employee to assess.

5 Error Messages and Problem Resolutions

5.1 Invalid Car Registration Input

- A number of procedures require the user to input a valid Irish car registration.
- If a user inputs an invalid registration, a message is displayed informing them of the correct format for the registration.



The user can then re-enter the registration, matching the format.

5.2 Empty Input

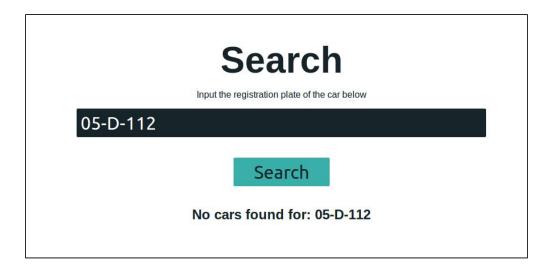
If a user does not input any text for an input box and clicks submit, error messages are displayed.

• The user must then input text and re-submit the form which they are completing.



5.3 No cars found for registration

• If a user searches for a car which does not exist, a message is displayed informing them as such.



 Following this, the user can either re-enter the registration to ensure it is valid or create a new car in the system to match this registration.

5.4 Registration not found in video stream

If a car has entered the enclosure and the registration plate cannot be found, a number of steps can be taken:

- The registration plate may not be visible, so the customer may be required to move the car.
- The registration plate may not be readable; it may be necessary for the customer to clean the registration plate or move any obstruction between the camera and the registration plate.

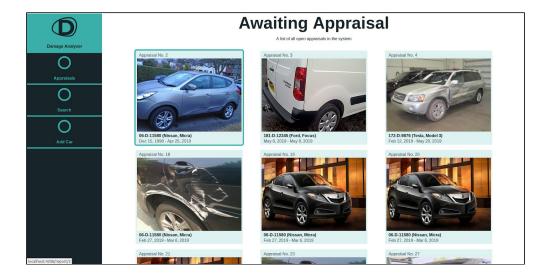
6 Page Walkthroughs

6.1 Navigation Bar

- The logo will return the user to the appraisal page.
- Clicking Appraisals will also take users to the appraisal page.
- Clicking Search will take the user to the search page.
- Clicking New Car will take the user to the new car page.



6.2 Appraisal Page

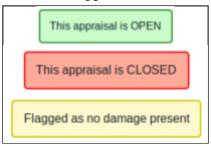


- The appraisal page displays all of the open appraisals which are present in the system.
- The appraisal contains information such as the make and model of the car, as well as the rental and return dates.
- Each appraisal links to the damage report page for that appraisal.

6.3 Report Page



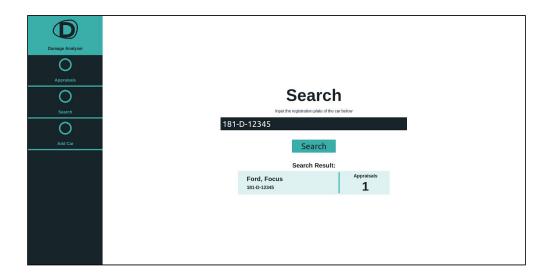
- The damage report page contains all information relating to an appraisal and the associated car.
- The status indicator informs the user of the current status of the appraisal, this indicator can be open, closed, or flagged.



- The table contains all relevant information for the appraisal such as make and model of the car.
- Clicking on the images of the car will display the gallery. The user can view all
 images of the car by clicking on the next and previous arrow indicators along the side
 of the image or by using the arrow keys on the keyboard. The gallery can be closed
 by clicking on the X indicator or by using the escape key on the keyboard.

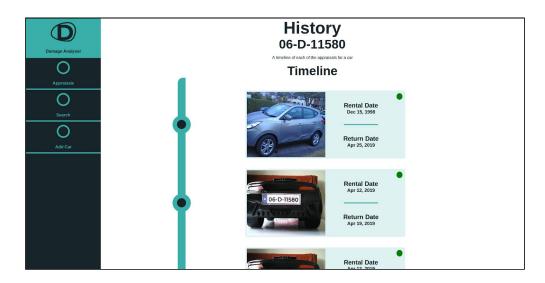


6.4 Search Page



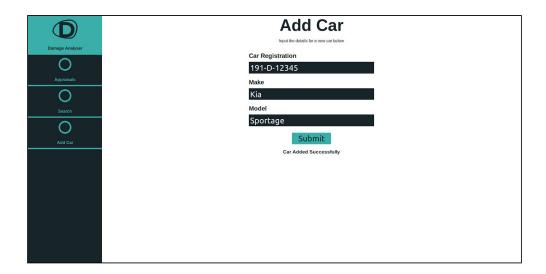
- The search page allows users to search for all previous appraisals made for a car using the cars registration plate.
- Users can input a search registration plate in the input box. The search results page will be displayed containing the make, model and number of appraisals for a car.
- Clicking on the search results will display the history page for the car.

6.5 History Page



- The history page displays a timeline of all appraisals created for a car.
- Each history entry in the timeline contains the rental and return date for an appraisal, as well as a colour coded indicator for the status of the appraisal. A red indicator for a closed appraisal and a green indicator for an open appraisal.
- Clicking on a history entry will display the damage report page for that appraisal.

6.6 New Car Page



- The new car page allows car rental employees to enter new cars into the damage analysis system.
- The input form allows employees to enter the registration, make and model for a car.
- A success message is displayed to inform employees of the successful addition of a car to the damage analysis system.

7 Navigational Features

Application Section	Operation	Icon
Navigation Bar	Enter Appraisal Page	Appraisals
	Enter Search Page	Search
	Enter New Car Page	Add Car
Appraisal Page	Enter Damage Report Page	Appraisal No. 2 06-D-11580 (Nissan, Micra) Dec 15, 1998 - Apr 25, 2019
	Next Image	\bigcirc
Image Gallery	Previous Image	
	Close Gallery	×
Search Result	Enter History Page	Search Result: Ford, Focus Appraisals 181-D-12345 1