

# Car Damage Categorisation

Artificial Intelligence  
Final Project

Team 4

AUTORENT

## Team Members

- Amos Lim
- Eugene Tay
- Kun Meng Soh
- George Chen
- Zuhairi Marican

## Outline

- EDT background
- AI design
- Chatbot design and integration
- MVP demo
- Project learnings

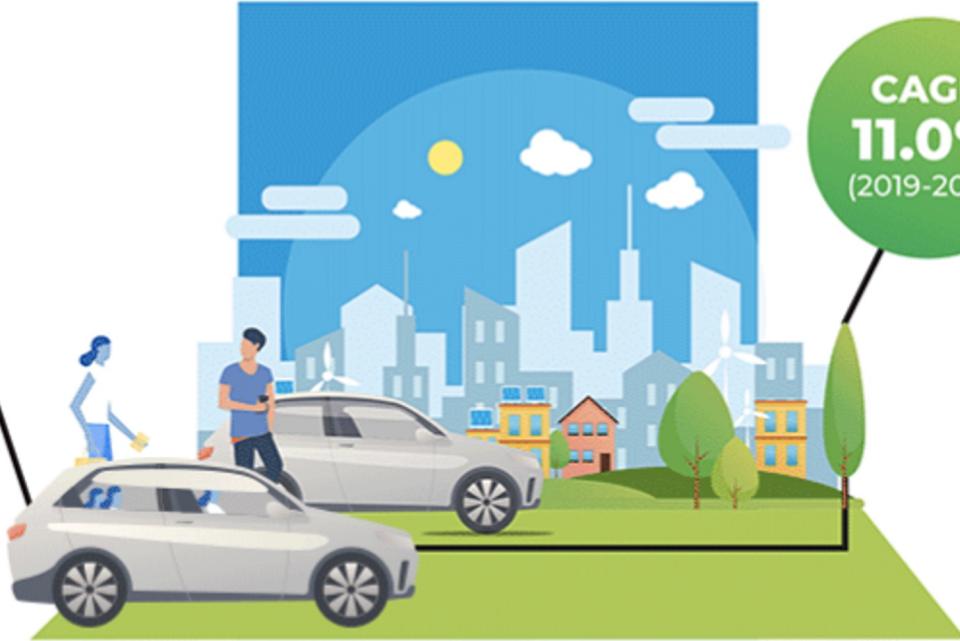
\$10,846.9  
million

\$5,571.2  
million

2018 2025

WITH OVER  
**40%**

# CARSHARING MARKET



## DRIVERS



Cost-effective and convenient mobility service



Growing concerns over greenhouse gas emissions



Government policies encouraging the adoption of carsharing programs

Market Players: Car2Go Ltd., cambio Mobilitätservice GmbH & Co. KG, Cityhop Ltd., Communauto inc., DriveNow GmbH & Co. KG, Getaround Inc., CarShare Australia Pty. Ltd., Ekar FZ LLC, HOURCAR, Locomute (Pty) Ltd., Peg City Car Co-op Ltd., Turo Inc., ORIX Auto Corporation, Mobility Cooperative, Modo Cooperative, Lyft Inc., Hertz Global Holdings Inc., and Zipcar Inc.

# The Disputes Over Rental Car Damages Liabilities



#CAR | #DAMAGE | #RENTAL

**Car renter gets slapped with \$2,200 fine but others say he should've checked condition from the GetGo**



SEPTEMBER 07, 2022  
PUBLISHED AT 12:30 PM  
By [MELISSA TEO](#)



Facebook/Dan Yeo

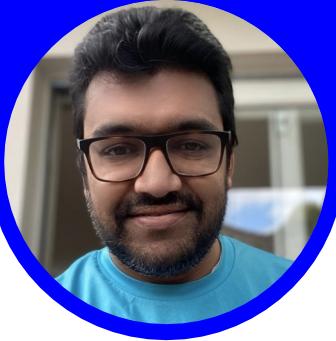
According to GetGo's terms and conditions, the hirer should unlock and inspect both the interior and exterior of the vehicle for evidence of physical damage to the vehicle before driving or moving off from the designated GetGo parking space.

They are also expected to inform the company of damages and malfunctions via the submission of relevant photographs via the app, and if there is none submitted, the hirer is "deemed to be satisfied with the vehicle's condition".

Customer Experience

Company Bottomline

# Persona



Pritesh Chakravarthi Adi

Job Title	CTO
Salary	\$200k/year
Tech proficiency	High
Age	35
Location	Singapore



## Motivations

- Deliver stable and workable solutions for customers
- Satisfy the business needs from other stakeholders such as product management, business development and customer support.

## Pain Points

- Unable to find cost-effective and reliable solution quickly
- Significant time and investment required for turnkey solutions built inhouse

# HMW Statement

How might we help car rental companies to verify the car conditions during the rental processes so that there are minimal disputes over car damages liabilities?

# AI Design Essentials

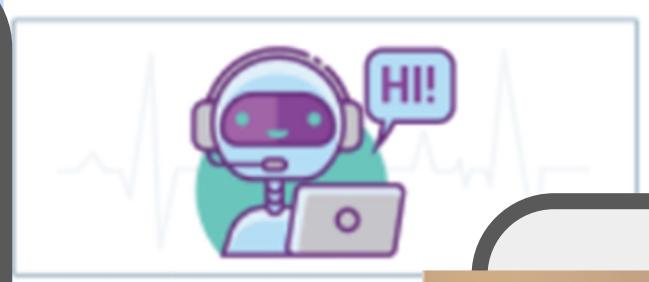
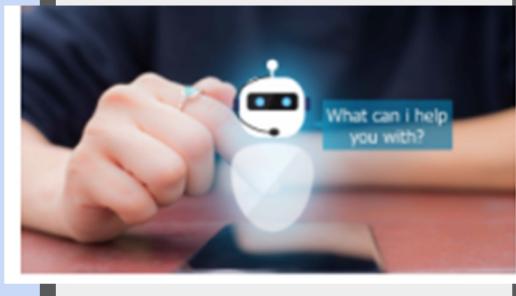
# AI Intent

**To achieve instant ability to determine whether the car exteriors have been damaged after the user used the car.**

# Big Idea



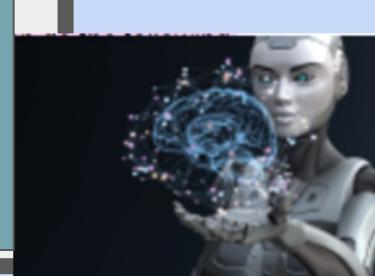
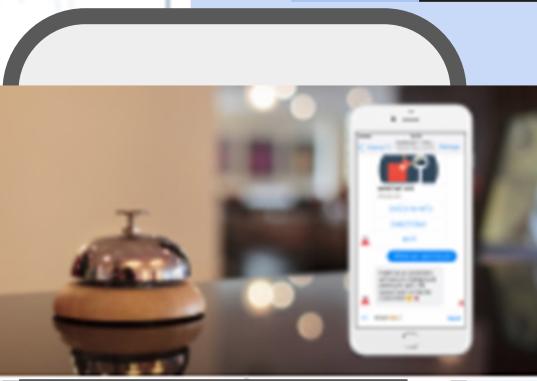
Reliable “Helper”  
“ to identify damaged  
/Good conditioned  
cars



Personal advisor on  
Car rental rates, insurance  
and  
workshop  
matters



24/7 instant  
Car booking  
Concierge  
(Before and After  
Rental)



# DATA

HAVE

Public	Private	User
	<ol style="list-style-type: none"><li>1. Blacklisted namelists</li><li>2. Driving records(i,e LTA Certificate of Merit status/demerit point)</li></ol>	<ol style="list-style-type: none"><li>1. Profession</li><li>1. Valid driving licence (3/3A)</li></ol>

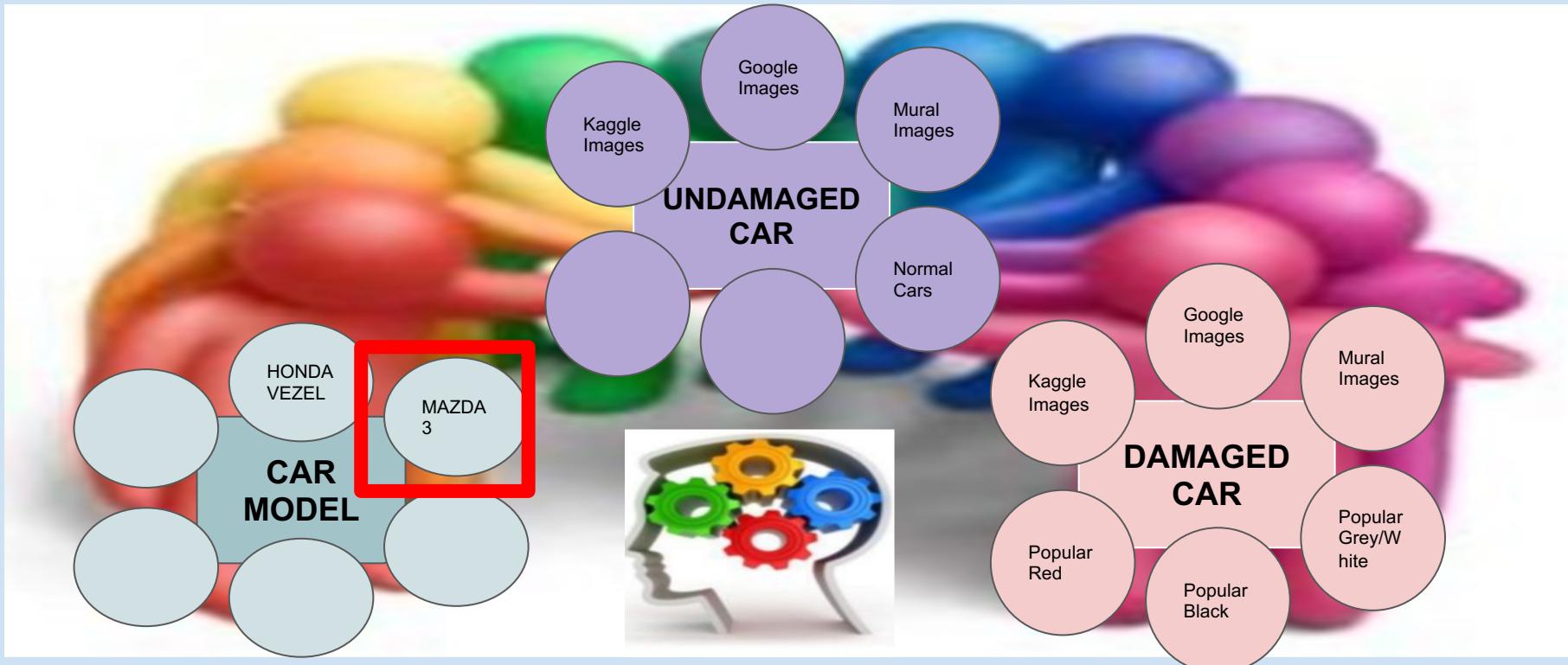
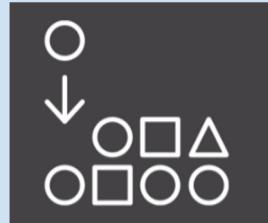
WANT/NEED

  Bootstrap	 GitHub	<ol style="list-style-type: none"><li>1. Past insurance claim history</li><li>1. Credit Bureau Profile</li></ol>
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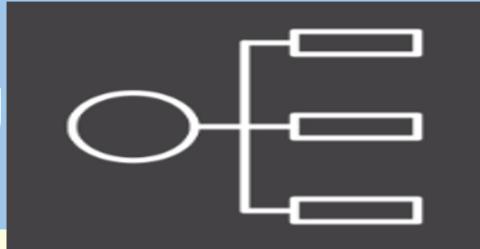
NICE TO HAVE

1. Criminal records

# Understanding



# Reasoning Statement



AUTORENT

can

identify car  
damages

by

having a reliable “helper” that can perform  
real-time image classification

based on

individual images uploaded by the user

# Project Planning & Design

Training data set search, modification and collection

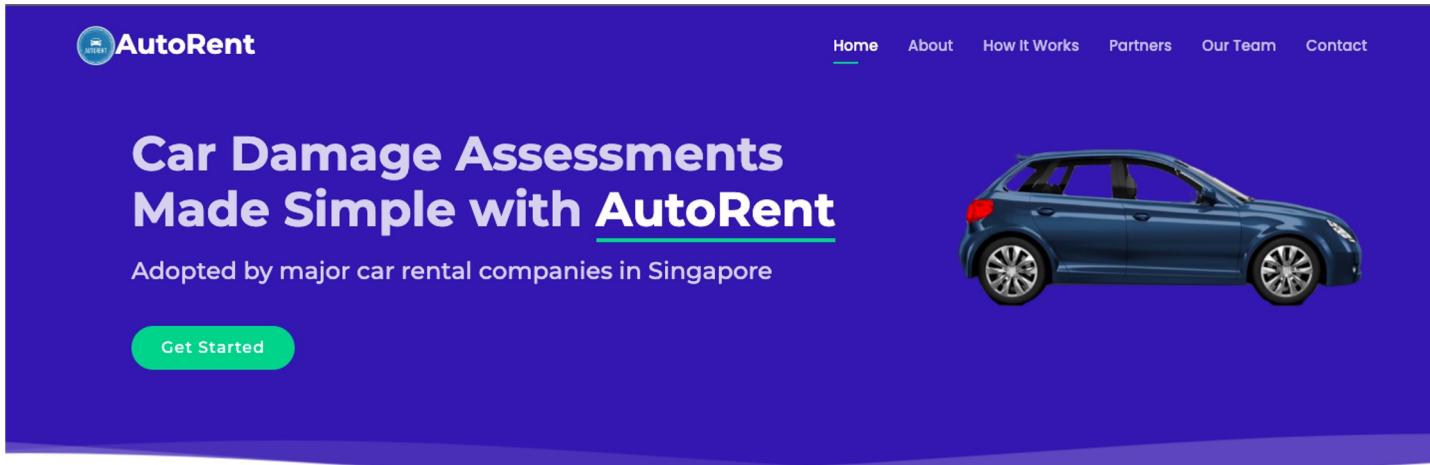
AI training

Integration of AI with website

Chatbot flow design and building

Chatbot integration with website

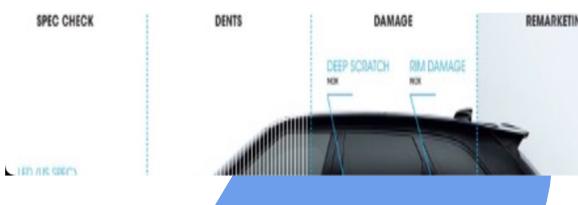
# AutoRent Business Page



The banner features a dark blue background with white text. At the top left is the AutoRent logo. To its right is a navigation menu with links: Home (underlined), About, How It Works, Partners, Our Team, and Contact. Below the menu is a large title: "Car Damage Assessments Made Simple with AutoRent". Underneath the title is a subtitle: "Adopted by major car rental companies in Singapore". A green button labeled "Get Started" is positioned below the subtitle. To the right of the text is a side-view photograph of a teal-colored hatchback.

ABOUT US

## THE AUTORENT STORY



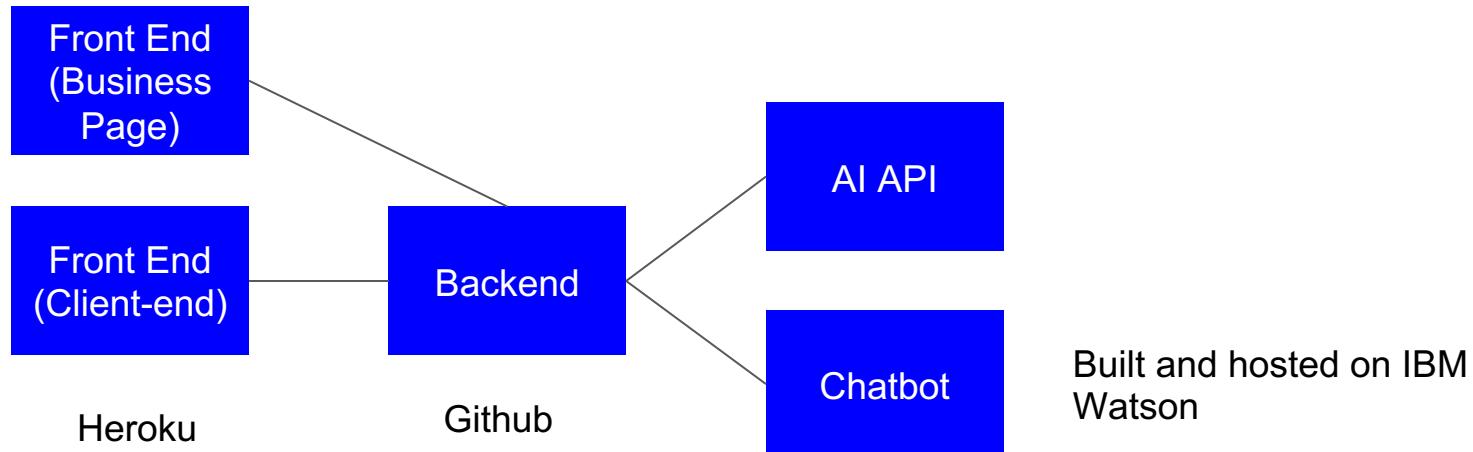
### Our Journey

We are a team of potential graphic designers that comes from different background. We embarked on our journey since March 2022 and will strive to be even better by end of 2022. We aim to market our products to car rental services to assist them on car images classification. Apart from it, we

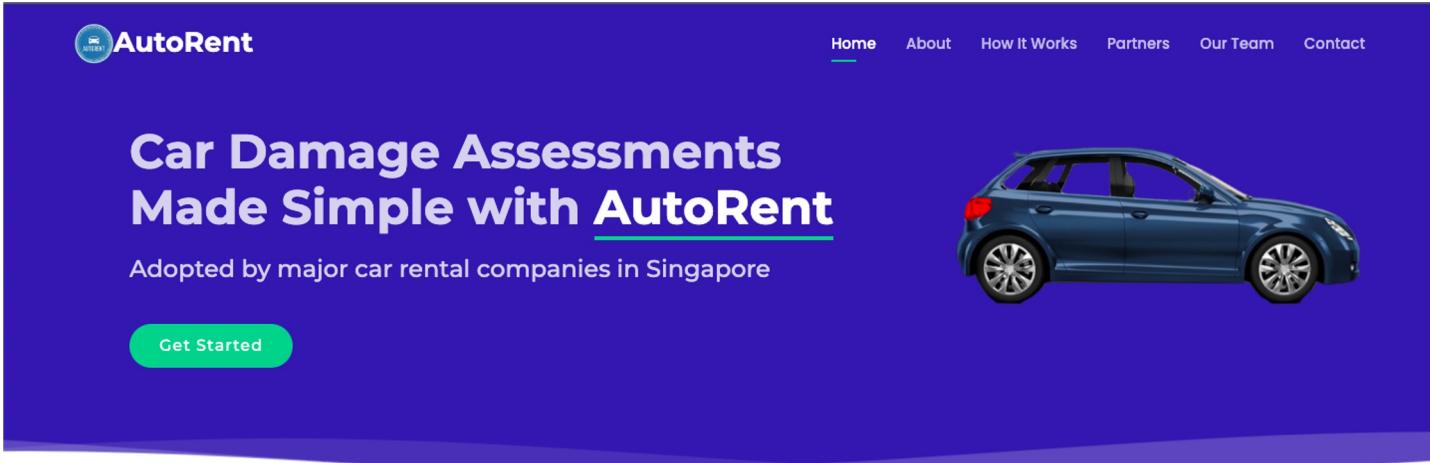
# Flask Framework

- Connect web pages (html) to the Python programming language  
Modular (light), with ease of setup and scalability
- Ability to generate our own API to route through with our partner's API
- Ability to render dynamic pages, well suited for machine learning

# Integration/Technical Architecture



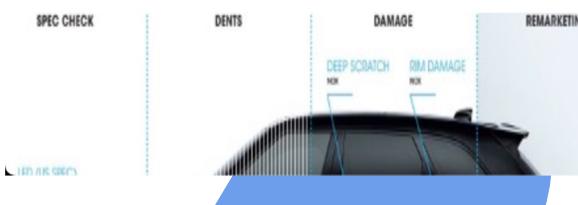
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# MVP Demo of Car Damage Assessment and Chatbot

The team built a Minimum Viable Product (version 1.0) of a Car Damage Assessment Tool and a Chatbot built with Watson Assistant and implemented this for one of AutoRent's major clients - GetGo Car Rental in Singapore.

## Car Damage Assessment Tool

Function for customer to upload the 4 necessary images to complete and to end a booking

Front Left Right Rear



Upload Image For A New GetGo Car Booking

GetGo requires all customers to upload a before and after pictures of each car being rented. Please refer to these 4 angles that you are required to upload before you can complete your booking and start driving.

You have returning a **Mazda 3**  
Booking period: **7th September 2022 from 9am to 12pm**  
Vehicle number: **SLP3459W**

Upload one picture at a time

Choose File No file chosen Upload

Tool takes the 4 images submitted before the customer takes over the vehicle and compares against the same 4 angles submitted when the customer returns the vehicle to scan for damages

GetGo Carsharing

Thank you for your image submission

This table displays the status of vehicle number **SLP3459W** and whether it has any potential damages. Please contact a GetGo staff for assistance before we can end your booking.

Assessment	Status	Probability of Damage
Most Likely Status of Vehicle:	Damaged cars	0.7431964

Upload a fresh image

Tool predicts high probability of some damage

To the top

# Chatbot User built in Watson Assistant

**Chatbot (Powered by AutoRent)**

Hello and welcome to GetGo. You can book a car directly through our web app in 3 simple steps. If this is your first time renting with us, here are some handy tips.

**Get Started**

[Our Rates](#) [Locations](#) [Make a booking](#)

[Technical Issues](#)

**Buttons to guide customers through the process**

Type something... 

Built with IBM Watson® 

**Chatbot (Powered by AutoRent)**

[Our Rates](#) [Locations](#) [Make a booking](#)

[Technical Issues](#)

**Our Rates**

**Our rates are:**

- Fee per hour at \$ 6
- Mileage at \$ 0.39 per km. There is no capacity limit imposed on rental. You will be charged for the distance driven.

For e.g., if you made a booking on Monday, 2pm to 4pm, and travelled 20km, you would pay: (2 hours x \$ 6) + (20km x \$ 0.39) = \$ 19.80

Note: All prices stated are inclusive of GST

**Back to main**  

**Button to always take customers back to the main page**

Type something... 

Built with IBM Watson® 

**Chatbot (Powered by AutoRent)**

**Mazda 3**

The Mazda 3 aspires to compete with more premium cars—and in many ways it does. The 3 is available as either a sedan or a hatchback, and both are equally as handsome and agile. Two four-cylinder engines are offered: a punchy turbo, and you can drive it if you want—though the excellent six-speed manual transmission makes the Mazda's compact sedan an sharp, feel upscale, and are that make the 3 special in its class.

**Images to enhance the customer experience and awareness of the vehicle they are interested to rent**



If you would like to book a Mazda 3, simply type "Book Mazda 3"

OR

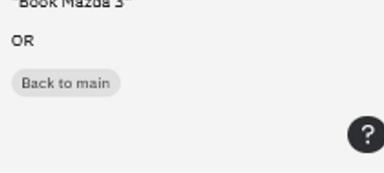
**Back to main** 

Type something... 

Built with IBM Watson® 

**Chatbot (Powered by AutoRent)**



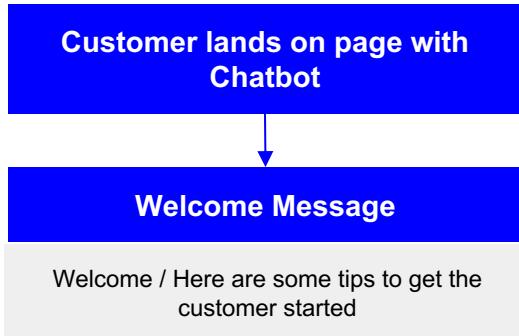


Type something... 

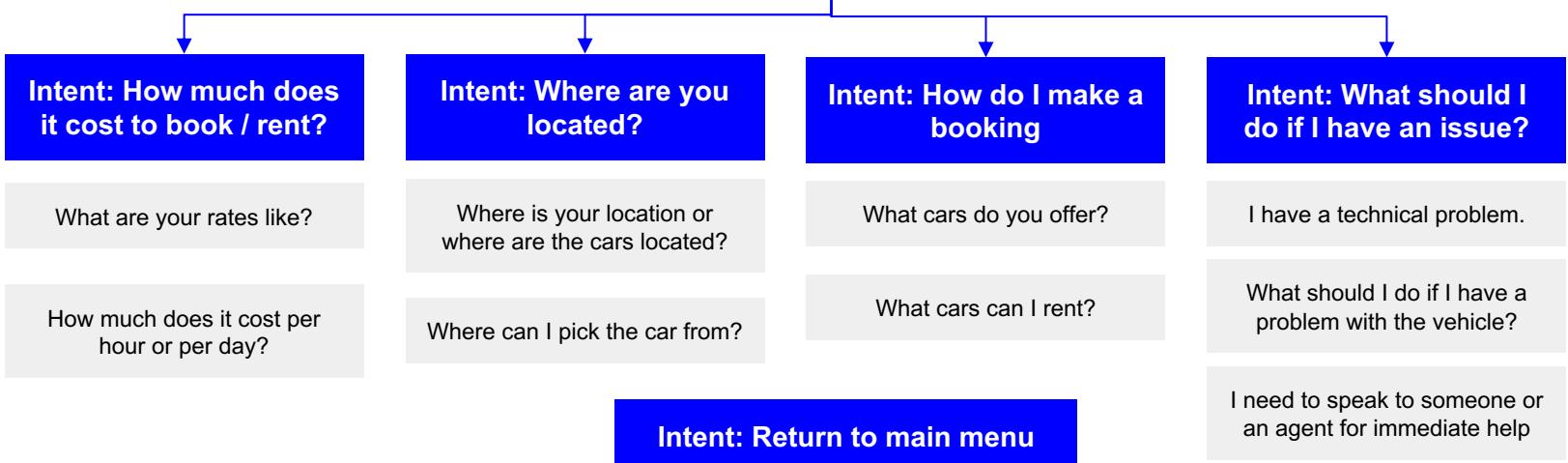
Built with IBM Watson® 

# Chatbot Flow in Watson Assistant

The team mapped out potential questions that customers would be asking during a typical car rental process and used that to design the structure and flow of information in Watson Assistant



What would a customer likely want to know when it comes to renting a vehicle?



# Intents

An intent is a category that defines a user's goal or purpose when using the chatbot.

Intents (19) ↑		Description
<input type="checkbox"/>	#BookHonda	Booking a Honda
<input type="checkbox"/>	#BookMazda	Booking a Mazda
<input type="checkbox"/>	#Bot_Control_Start_Over	Restart bot or current flow.
<input type="checkbox"/>	#Bot_Control_Unsure	Indicate no definite answer to a question.
<input type="checkbox"/>	#Cars	Choose a car
<input type="checkbox"/>	#ConfirmMazda	Get customer's booking date and time
<input type="checkbox"/>	#ConfirmVezel	Get customer's booking date and time
<input type="checkbox"/>	#CustomerEndChat	Customer ends chat
<input type="checkbox"/>	#CustomerThanks	Customer says thanks
<input type="checkbox"/>	#FAQ	
<input type="checkbox"/>	#Greetings	Greetings
<input type="checkbox"/>	#Home	

| #BookHonda | #ConfirmMazda

Intent name  
**#BookHonda**  
Name your intent to match a customer's question or goal

Description (optional)  
**Booking a Honda**  
Description (optional)  
**Get customer's booking date and time**

User example  
Type a user example here  
Add unique examples of what the user might say. (Pro tip: Add at least 5 user examples)

Add example

User examples (5) ↑

- Book Vezel
- Do you have a Vezel
- I want a Vezel
- I want to book a Vezel
- Vezel

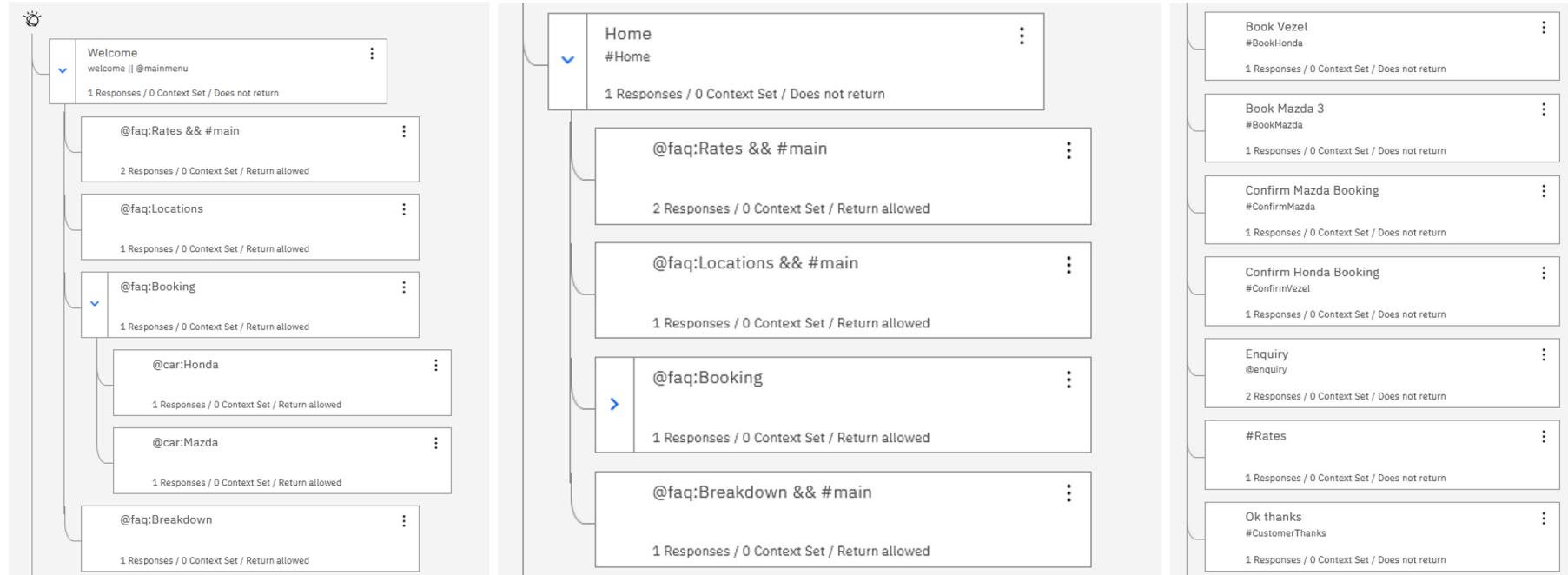
User examples (2) ↑

- Mazda 2pm to 4pm 01/09/2022
- Mazda today from 2pm to 4pm

Showing 1–5 of 5 examples

# Dialog

The dialog uses the intents that are identified in the user's input, plus context from the application, to interact with the user and ultimately provide a useful response.



# Entities

Represent information in the user input that is relevant to the user's purpose. The team used synonyms to for Watson to recognize terms in the user input that exactly match the values or synonyms that are defined

The screenshot displays a user interface for managing entities. At the top, there is a header with a search bar and a 'Type' dropdown set to 'Entity'. Below the header, there are two main sections: 'Values' and 'Entity'.

**Values Section:**

- Values (6) ↑**: A button to sort the values.
- Type**: A dropdown menu currently set to 'Type'.
- Booking**: A value listed under the 'Values' section. It has a checkbox next to it and a 'Synonyms' dropdown menu open, showing 'Reserve', 'Book', and 'Rent' as options. There is also a 'Type a synonym' input field and a '+' button to add more.

**Entity Section:**

- Entity (3) ↑**: A button to sort the entities.
- Values**: A column header for the entity details.
- @car**: An entity with a value of 'CarsList, Mazda, Honda'.
- @faq**: An entity with a value of 'Breakdown, Booking, Returns, Locations, Rates'.
- @mainmenu**: An entity with a value of 'Main Menu'.

# Project Learnings

- Data is of utmost importance to training of models
- Whilst we were able to complete the integrations, there were so many possible ways to go about the design and execution
- There is no single best way to approach the problem and solution ingredients
- We made a point that each team member has the full experience of building the application. And we each did. It pays off for the group alignment and discussions.

# Constraints & Challenges

- We experimented with different data sets but the accuracy of the AI model has been limited
- Possible causes could be insufficient set of data or lack of standardisation of data
- We were also limited by the file size allowed by github for the h5 file, driving us to settle for lower image resolutions (reduced from 64x64 to 32x32pixels)
- Various factors affect the dataset which therefore affect the model - such as background of image, colour, angles etc.

# THANK YOU

