# *"Controlling IKEA with a voice-controlled system!"*

Multimodal Interaction

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# 1.  Introduction

This project presents a **voice-controlled shopping assistant** designed to enhance the user's online shopping experience on the **IKEA website**. By interpreting voice commands, the assistant facilitates various shopping tasks, such as browsing products, managing the cart, and finalizing purchases, making online shopping more accessible and efficient.

# 2.  Architecture of the system

## 2.1.  Overview

The system can be split into five main components:

- **Speech Interface:** Uses Text-to-Speech (TTS) and Multimodal Interaction (MMI) protocols to generate responses and interpret user commands.
- **Natural Language Understanding (NLU):** Rasa processes voice commands, identifying intents and extracting relevant entities.
- *Main.py*: This python component receives via WebSockets each intent, processing it and controlling the IKEA's website via *Selenium WebDriver*. It also fetches product data directly from the IKEA API (*RapidApi*) based on user queries.
- **WebAssistantApp:** This web application handles communication between the user and the system itself.
- *Selenium WebDriver:* Automates the website's interaction layer, executing user actions like scrolling, clicking buttons, and navigating product pages.
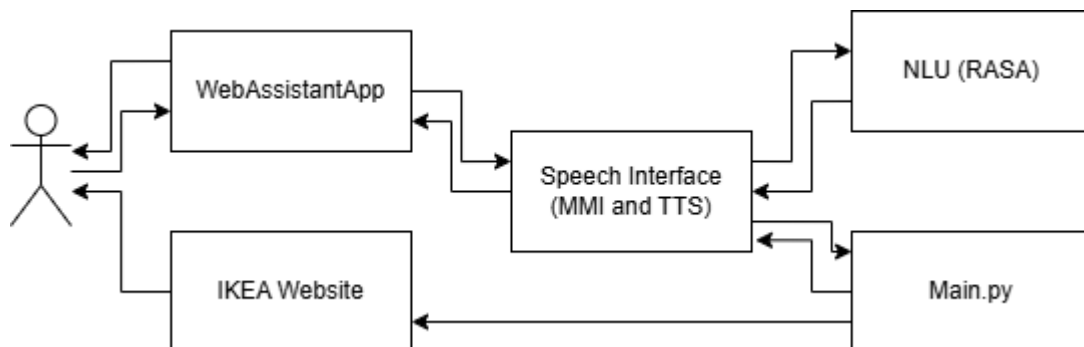


*Figure 1 -* Architecture Diagram

## 3. Intent Description and Examples

### 3.1. *ask_help*

The purpose of this intent is to assist users by providing some guidance on the availability of commands that they can perform. Some examples include:

- "Podes-me ajudar?"
- "Preciso de ajuda?"
- "Como faço isso?"
- "Não sei como fazer isso."
- "Tens alguma sugestão?"

We decided to implement it because it provides some guidance to users, thus increasing their satisfaction by clarifying the system's capabilities and guiding them.

### 3.2. *open_website*

The purpose of this intent is to open the IKEA website, allowing the user to then start searching and browsing the page. The commands that the user can say to enable this action are:

- "Vamos às compras"
- "Abre o IKEA"
- "Mostre-me o site"
- "Quero aceder a página"
- "Abre o catálogo da IKEA"
- "Mostre-me o catálogo"

We decided to implement it because it enhances navigation without physical interaction.

### 3.3. *show_products*

The purpose of this intent is to fetch products from the *IKEA API* and control the website and show the user the products it wants to see. The **show_products** intent uses the entity *"category"* to distinguish between the many products that exists. To do this he must say one of the following commands (few of them):

- "Quero ver [cadeiras](category)"
- "Mostra-me [mesas](category)"
- "Exibe [sofás](category)"
- "Preciso de [cadeiras](category)"
- "Procuro por [sofás](category)"
- "Procura por [sofás](category)"
- "Pode mostrar-me as [cadeiras](category) disponíveis, por favor?"

We decided to implement it because it helps the user see the products without having to manually search for them.

### 3.4. *scroll_up/scroll_down*

The purpose of these two intents is nearly the same: to make the page go up or down. Some commands associated with this intent are:

- "Suba"
- "Quero subir"
- "Vá para cima"
- "Sobe a página"
- "Cima"
- "Desça"
- "Quero descer"
- "Vá para baixo"
- "Desce a página"
- "Desce"

We decided to implement it because it helps the user to navigate throw the products page without having to scroll up or down manually, providing him with a much better experience navigating the website.

### 3.5. *select_product_by_position*

The purpose of this intent is to select one product, based on its position in the list, from the many products that appear when we search for some type of product. The **select_product_by_position** intent uses the entity *"position"*. Some examples of commands are:

- "Quero o produto número [1](position)"
- "Escolha o produto número [2](position)"
- "Mostre or detalhes do produto na posição [3](position)"
- "Eu quero o item número [4](position)"
- "Selecione o item [5](position), por favor"

This intent facilitates the selection of a specific product from a list or catalogue without having to select it manually with a mouse.

### 3.6. *add_to_cart*

The purpose of this intent is to add a product to the cart. The commands that can be said are:

- "Adiciona o produto ao carrinho."
- "Adiciona-o ao carrinho."
- "Podes adicioná-lo ao carrinho."
- "Coloca o primeiro produto no carrinho."
- "Adiciona-me este produto ao carrinho."
- "Gostaria de adicionar este item ao carrinho."
- "Adicione ao carrinho, por favor."

- "Quero este produto no carrinho."
- "Por favor, coloca isso no carrinho."

We decided to implement it because it speeds up the purchase process and makes it easier to finalize it.

### 3.7. *add_to_favorites*

This intent works the same as the *add_to_cart* one. The difference is that this one adds a product to the favorites list. Some commands include:

- "Adiciona o produto aos favoritos."
- "Adiciona-o aos favoritos."
- "Podes adicioná-lo à lista de favoritos."
- "Adiciona-me este produto aos favoritos."
- "Gostaria de adicionar este item aos favoritos."
- "Adicione aos favoritos, por favor."
- "Quero este produto na lista de favoritos."
- "Por favor, coloca isso nos favoritos."

We decided to implement it because it helps the user to keep track of his favorites products and because it helps improve the user experience.

### 3.8. *show_cart*

The purpose of this intent is to display the current items in the cart. In this intent, the system opens the cart page. Some examples include:

- "Mostra-me o carrinho."
- "Quero ver o que tenho no meu carrinho."
- "Abre o carrinho."
- "Mostra o carrinho, por favor."
- "Gostaria de verificar o carrinho."

We decided to implement it because it offers users a quick overview of the selected products, ensuring better purchase control.

### 3.9. *show_favorites*

The purpose of this intent is to open the favorites page of the website, listing, quickly, in that way the wishes of the user. Some examples include:

- "Mostra-me os favoritos."
- "Quero ver o que tenho nos favoritos."
- "Abre os favoritos."
- "Mostra os favoritos, por favor."
- "Gostaria de verificar os favoritos."

We decided to implement it because it provides easy access to the users' wishes, enhancing user experience.

### 3.10. *remove_cart*

The purpose of this intent is to delete a product from the cart. As well as in the *"select_product_by_position"* this intent uses the entity called *"posisiton"*. Some examples include:

- "Quero remover do carrinho o produto número [1](position)"
- "Remove o produto número [2](position) do carrinho"
- "Elimina o produto na posição [3](position) do carrinho"
- "Eu quero eliminar o item número [4](position) do carrinho"
- "Selecione o item [5](position) e elimina do carrinho"
- "Produto número [7](position) fora do carrinho"
- "Remove o item [8](position) do carrinho"

We decided to implement it because it ensures accurate cart management and avoids the user from making accidental purchases.

### 3.11. *remove_favorites*

The purpose of this intent is to delete an item from the favorites. In this intent we also use the entity called *"position"* to keep track of the product that the user wants to remove. Some examples include:

- "Quero remover dos favoritos o produto número [1](position)"
- "Remove o produto número [2](position) dos favoritos"
- "Elimina o produto na posição [3](position) dos favoritos"
- "Eu quero eliminar o item número [4](position) dos favoritos"
- "Selecione o item [5](position) e elimina dos favoritos"

We decided to implement it because it provides users with flexibility in managing their wish lists.

### 3.12. *go_back*

The purpose of this intent is to navigate to the previous page. Some commands are:

- "Quero voltar a trás"
- "Anda para trás"
- "Volta para a última página"
- "Volta atrás"
- "Mostra-me a página anterior"
- "Volta para trás"

We decided to implement it because it provides smooth navigation throw the IKEA website and helps in recovery from errors that the user can make mistakenly.

### 3.13. *show_more*

The purpose of this intent is to display additional products on the page. The system understand this commands:

- "Quero ver mais opções"
- "Mostra mais opções"
- "Ver mais opções"

We decided to implement it because it allows users to browse beyond the initial products that appear in the search, helping them make much wise decisions.

### 3.14. *finalize_order*

The purpose of this intent is to complete the purchase by proceeding to checkout. Commands like them below are understood:

- "Finaliza a compra."
- "Procede para o checkout."
- "Já vi tudo o que tinha de ver."
- "Por hoje, já escolhi tudo."

We decided to implement it because it speeds up the purchasing process by quickly accessing the checkout page, thus saving the user a lot of time.

### 3.15. *main_page*

The purpose of this intent is to return to the main page of the IKEA website. The system will recognize commands like:

- "Volta à página inicial"
- "Regressa ao início"
- "Quero voltar ao início"
- "Por favor, mostra-me a página inicial"
- "Página Inicial"

We decided to implement it because it enables the user to quickly return to the main page when he desires to do it.

### 3.16. *order_products*

The purpose of this intent is to allow product ordering to be possible. The ordering can be done by different criteria like *price*, *popularity*, or *dimensions*. And this is possible because it uses an entity called *"criterio"*. The commands that can be said include:

- "Mostra os produtos do [mais baixo ao mais elevado](criterio).
- "Ordena por [do mais baixo ao mais elevado](criterio).
- "Quero ver em ordem [do mais baixo ao mais elevado](criterio), por favor.
- "Podes organizar os produtos [do mais elevado ao mais baixo](criterio)?
- "Ordena do [mais elevado ao mais baixo](criterio), por favor.
- "Ordena pelos produtos [Mais Recente](criterio), por favor."
- "Podes ordenar pelos [Mais Populares](criterio)?"

We decided to implement it because it allows the user to order the products based on his preferences, making the process of selection of a product more efficient.

## 4. Conclusion

This system bridges the gap between traditional website navigation and modern voice-controlled interfaces. It allows users to browse and search for products on the IKEA website without the need for physical contact. This contributes to a much more efficient interaction, making shopping on the IKEA website much more accessible and convenient for everyone.