



# VOICE USER INTERFACE

Sports activity slots and equipment booking

Human AI Coursework II

In the guidance of

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## ABSTRACT

The hands and eyes-free operations of the voice interface provide easy-going performance even for the people lacking technical knowledge and also provides a convenient and faster way by detecting task rather than typing it. With carrying out thorough research and observations on the user persona and creating an easy flowing dialog flow, a Voice User Interface is developed to help users to book a sports activity slot in Sports Centre with related equipment if required. Even though the system gets the correct data, it is not kept on a pure voice interface. The reason behind this is that deaf users should also be able to book a sports activity or equipment by communicating with the system.

## TECHNOLOGY USED

1. Voiceflow: Voice apps prototyping tool to design, prototype, and create for Google Assistant and Amazon Alexa
2. JavaScript: Object-oriented programming language used to add interactive effects to web pages
3. Airtable: Relational database tool

## PROTOTYPE

The expanding popularity of voice interface is used here to reenact the feeling of conversation between virtual assistant of the Sports Centre and user. With thorough research and observations, multiple sports activities and many types of equipment have been added to this prototype such as activities like Basketball, Volleyball, Swimming and equipment like Climbing shoes, Netballs etc. This prototype is a conversational VUI where the system does not have to give any indicator to speak. And uses a more natural turn-taking approach.

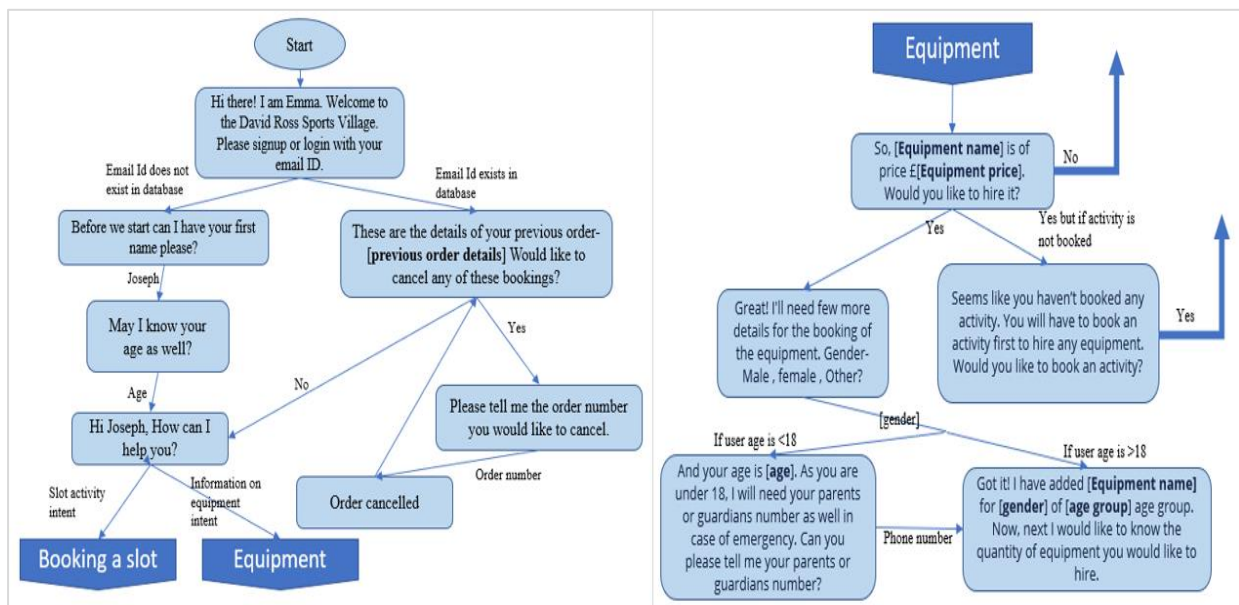
### Main functionalities:

Following are the tasks user can perform on this prototype:

1. User personalized system based on signup or log in details.
2. Book multiple slots of any available sports activities.
3. Change the slot date or slot time if required.
4. Hire related personalized equipment for booked sports activities.
5. Cancel the booked slot.

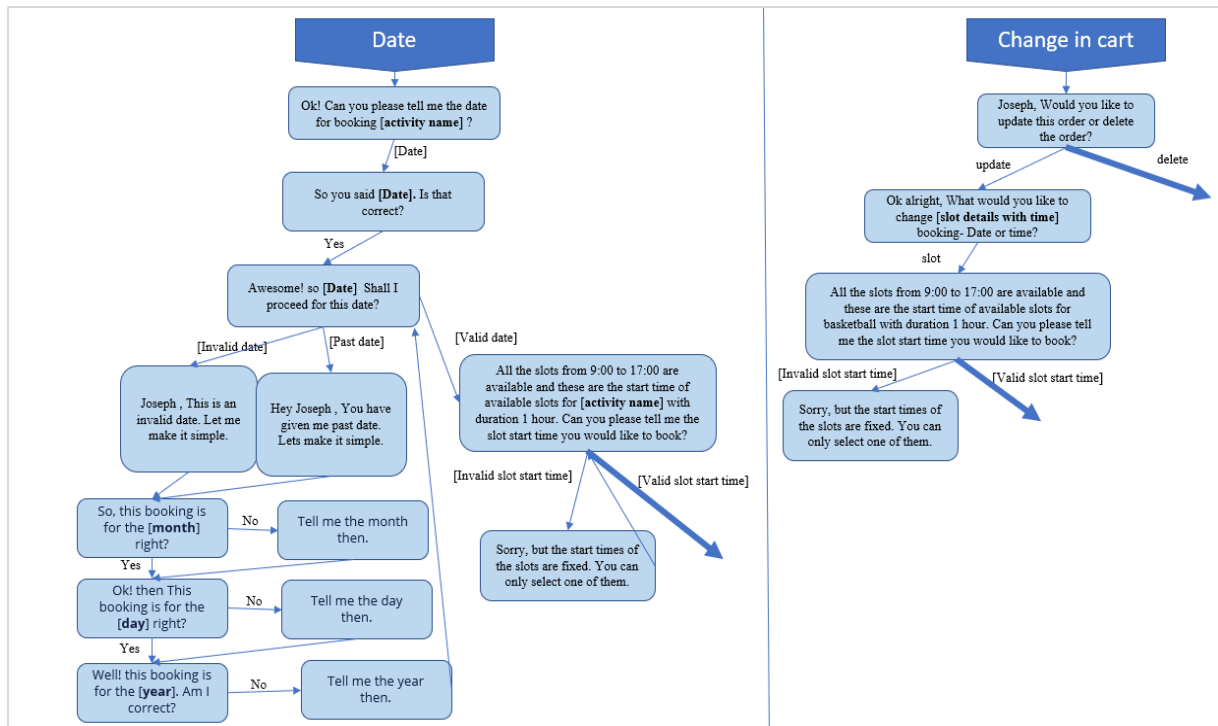
## DESIGN PROCESS

Here are the flow diagrams of the system based on the user requirements with user stories –



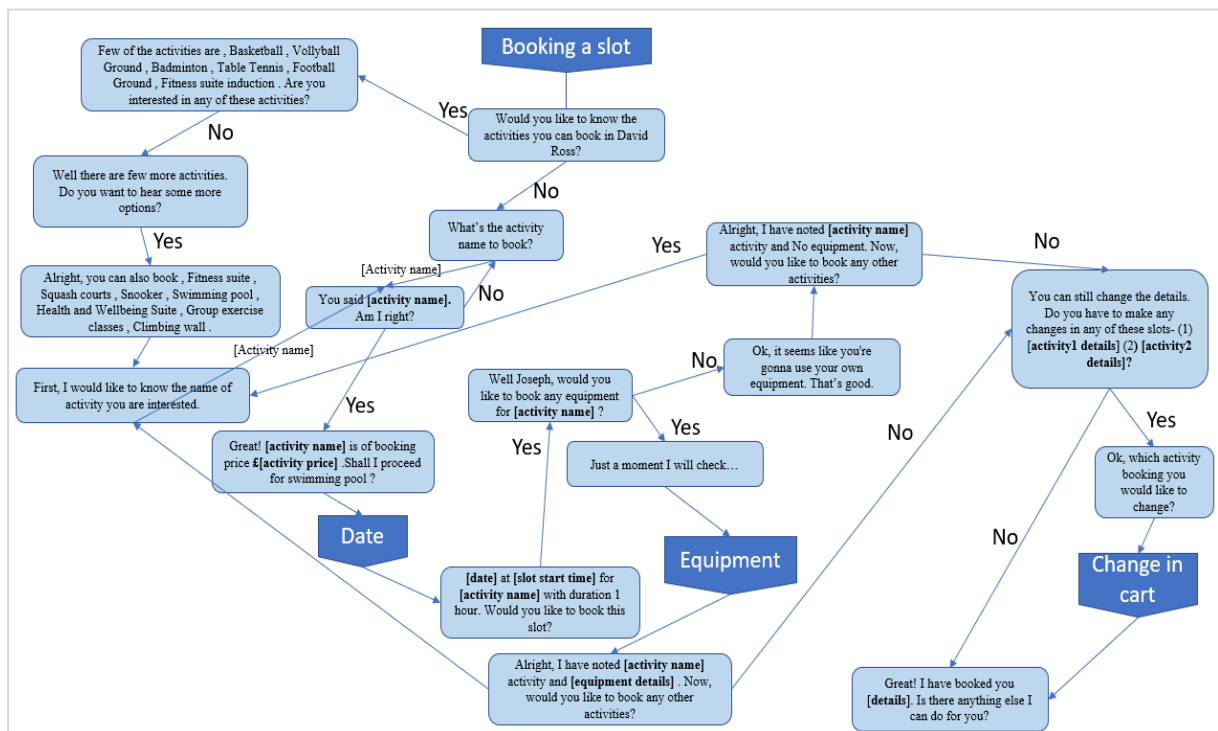
Flow diagram 1: Main flow

Flow diagram 2: Equipment flow



Flow diagram 3: Date flow

Flow diagram 4: Change in cart



Flow diagram 5: Booking a slot

The flow diagram is divided into 5 parts:

- (1) Main flow: To get user information based on the sign-up/login and task to perform
- (2) Equipment flow: To hire equipment for the booked sports activity
- (3) Date flow: To finalize the date and slot timings of booking slot of sports activity

(4) Change in cart flow: To change the date and timing of any booked slot for sports activity

(5) Booking slot: To book a slot of user-selected sports activity including date, equipment and change in cart flows.

## VUI DESIGN PRINCIPLES

### 1. Prompt-

Conversational Marker: To engage the user more and to make it more human-like, a few **conversational markers** are designed in this prototype as per the system's persona.

Conversational component	Examples from the project
Acknowledgements	Ok
Apologies	Sorry
Commands	Tell me the month.
Confirmations	Got it
Discourse markers	Well, So
Earcons	<Welcome to David Ross centre.> when a conversation starts.
Endings	Is there anything else I can do for you?
Error	Sorry, can you please check the date again.
Greetings	Have a great day!
Informational statements	You have provided an invalid date.
Questions	Which equipment would you like to hire?
Suggestions	You can also hire equipment.
Positive feedback	Great!
Timelines	Firstly

Error prompts: Error prompts is used to gently guide users back to successful paths or to reset their expectations about what is and isn't achievable.

All the slots from 9:00 to 17:00 are available and these are the start time of available slots for swimming pool with duration 1 hour. Can you please tell me the slot start time you would like to book?

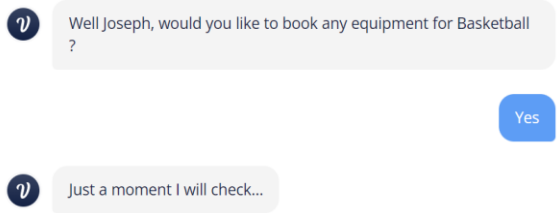
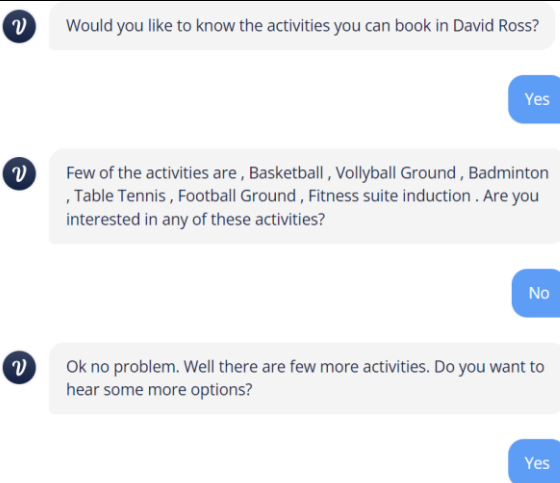
12:30-13:30



Sorry, but the start times of the slots are fixed. You can only select one of them.

### 2. Discoverability-

This prototype not only follows a specific command but also considers what comes next. Dialog flow successfully guides users. In case the choice is not matched, the system listens to the intent and performs the required intent-based task.

Sr. No.	Discoverability	Few examples from the project
1	Book equipment with activity	
2	Activities that can be booked	

### 3. Error handling-



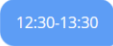




As the system requires a response to continue the task, it is important to add error handlings at every input step. The few cases of such errors and how they are handled are given below-

- No speech detected:  
If no speech is detected then the system asks for the input or gives options from which the user can select one as input and can respond to the system.
- Speech detected, but nothing recognized:  
In such cases, the 'No match' of a choice block is used to redirect the system flow to asking the input again.
- Recognized incorrectly:  
Continually telling the user that the input is not recognized and asking the user to repeat can make the user frustrated and can also cause the user to lose faith in the system. To handle such cases, in the case of date recognition some confirmations are added by dividing the expected input into a few questions. E.g., case 2 in the following table

#### Escalating error:

In a case where the speech input is required to continue the main functionality, some escalating error handling strategies are used.

Sr. No.	Error handling strategies used	Few examples from project
1	A strong error strategy is used here in case of invalid date input for booking slot.	 Ok! Can you please tell me the date for booking Basketball?  30 February 2022  So you said 2022/2/30 . Is that correct?  Yes  Awesome! so I have to check Basketball on 2022/2/30 . Shall I proceed for this date?  Yes  Joseph , This is an invalid date. Let me make it simple.
	Extra level of strong security – If input is not clear then it is divided into 3 steps- month, day and year	 Joseph , This is an invalid date. Let me make it simple.  So, this booking is for the February right?  Yes  Ok! then This booking is for the 30 right?  No  Tell me the day then.  13  Ok! then This booking is for the 13 right?
2	Speech detected but invalid input	 Awesome! so I have to check Basketball on 2019/2/13 . Shall I proceed for this date?  Yes  Hey Joseph, you have given me past date. Please provide me the future date for booking you slot.  Ok! Can you please tell me the date for booking Basketball?  13 February 2022  So you said 2022/2/13 . Is that correct?

3	No speech detected	 All the slots from 9:00 to 17:00 are available and these are the start time of available slots for swimming pool with duration 1 hour. Can you please tell me the slot start time you would like to book?  Sorry, but the start times of the slots are fixed. You can only select one of them. All the slots from 9:00 to 17:00 are available and these are the start time of available slots for swimming pool with duration 1 hour. Can you please tell me the slot start time you would like to book?
4	Speech detected but nothing recognized because of incorrect input	All the slots from 9:00 to 17:00 are available and these are the start time of available slots for swimming pool with duration 1 hour. Can you please tell me the slot start time you would like to book?   Sorry, but the start times of the slots are fixed. You can only select one of them.
5	Escalating Error	 May I know your age as well?  Your age is required to assist you further. 

#### 4. Personalization-

This system is personalized on the name, age and gender of the user. Throughout the application, the users' name is used to make the conversation more friendly and while hiring the equipment for any activity, the gender and age are asked to personalize the equipment.

Sr. No.	Personalization	Few examples from the project
1	The system shows the previous records if exists.	
2	Asks for name and age to new user. Then uses name of user in conversation.	
3	If the user is under 18 then asks for parents or guardians' number. If not provided slot will not be booked for under 18 users.	

## 5. Confirmation-

To know the users that they were understood, confirmation strategies are added at every possible step in the design with avoiding over confirmation as well.

- Explicit confirmation: Forcing the user to confirm the details
- Implicit confirmation: Let the user know that the input is understood

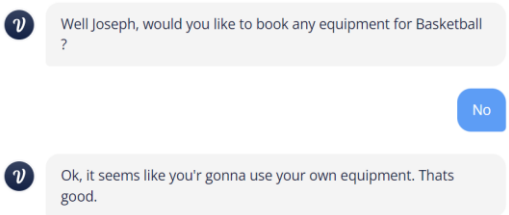
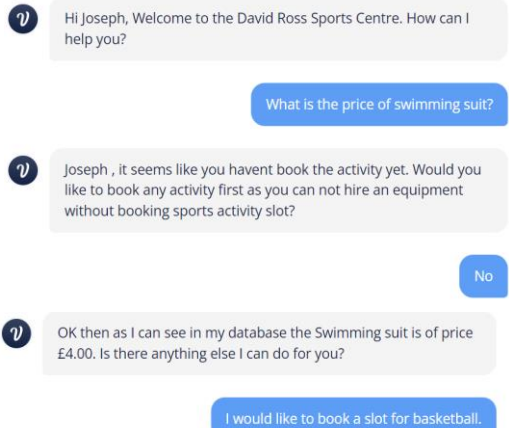
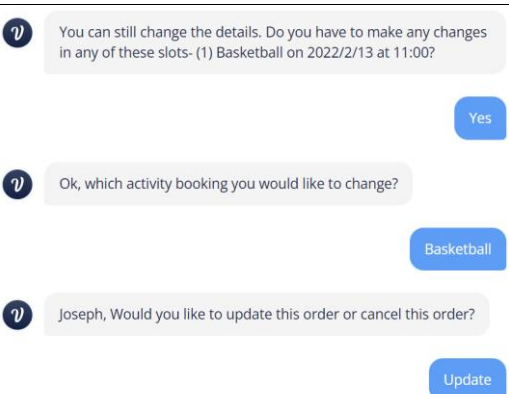


c.

Sr. No.	Confirmation strategies used	Few examples from project
1	Explicit confirmation	<p>ψ Before booking a slot please confirm the following slot details- 2022/2/13 at 11:00 for Basketball with duration 1 hour. Would you like to book this slot?</p> <p>Yes</p>
2	Implicit confirmation	<p>ψ Great! I'll need few more details for the booking of the equipment.</p> <p>Gender- Male , female , Other?</p> <p>Male</p> <p>ψ And your age is 12 .</p> <p>As you are under 18, I will need your parents or gaurdians number as well in case of emergency. Can you please tell me your parents or gaurdians number?</p>
3	Generic Confirmation	<p>As you are under 18, I will need your parents or gaurdians number as well in case of emergency. Can you please tell me your parents or gaurdians number?</p> <p>0781234567</p> <p>ψ Got it! I have added Swimming suits for Male of Child age group .</p>

#### 6. Context-

This system keeps a track of the context while hiring equipment as it is based on the sports activity booked by the user. If the activity is not booked, the system asks the user to book an activity first and then hire equipment for the same.

Sr. No.	Context track	Few examples from project
1	Sports Equipment are booked on the basis of persons gender and age group.	 <p>Well Joseph, would you like to book any equipment for Basketball ?</p> <p>No</p> <p>Ok, it seems like you'r gonna use your own equipment. Thats good.</p>
2	User cannot book an equipment until the activity is not booked.	 <p>Hi Joseph, Welcome to the David Ross Sports Centre. How can I help you?</p> <p>What is the price of swimming suit?</p> <p>Joseph , it seems like you havent book the activity yet. Would you like to book any activity first as you can not hire an equipment without booking sports activity slot?</p> <p>No</p> <p>OK then as I can see in my database the Swimming suit is of price £4.00. Is there anything else I can do for you?</p> <p>I would like to book a slot for basketball.</p>
3	User can change the booking.	 <p>You can still change the details. Do you have to make any changes in any of these slots- (1) Basketball on 2022/2/13 at 11:00?</p> <p>Yes</p> <p>Ok, which activity booking you would like to change?</p> <p>Basketball</p> <p>Joseph, Would you like to update this order or cancel this order?</p> <p>Update</p>

## 7. Integration-

This prototype is integrated with an external database containing tables Book Slot, Slot Activities and Equipment Prices using Airtable API documentation and Voiceflow API blocks. Following are the tables from the Airtable database.

a. Book slot table:

	A Name	A SlotDate	# Slot	A UserEmail	A EquipmentBooked	A Gender	A Age	A FirstName
1	Basketball	2022/2/9	2	nl@gmail.com	1 Basketball	Female	27	Niraj
2	Climbing wall	2022/01/25	6	tr@gmail.com	1 Climbing belay	Male	35	Tom
3	Swimming pool	2022/01/23	1	ba@gmail.com	1 Swimming suit	Male	20	Ben
4	swimming pool	2022/2/13	5	asd@gmail.com	1 Swimming suits	Male	12	Joseph
5	Basketball	2022/9/9	1	jk@gmail.com	1 Basketball	Male	23	Joseph

b. Slot Activities:

<input type="checkbox"/>	A Name ▾	A Prices ▾	A Capacity ▾
1	Fitness suite	£2.00	20
2	Fitness suite induction	£2.00	20
3	Swimming pool	£2.00	20
4	Group exercise classes	£2.00	20
5	Squash courts	£2.00	5

c. **Equipment Prices:**

<input type="checkbox"/>	A Name ▾	A Prices ▾	# Available... ▾	# TotalQuan... ▾	A Activities ▾
1	Badminton racket	50p	6	10	Badminton
2	Table tennis bat	50p	6	10	Table tennis
3	Netball	50p	5	10	Netball
4	Climbing harness	£2.50	4	10	Climbing
5	Climbing belay	£1.00	5	10	Climbing

**Other important design elements:**

1. Universal commands:

A 'Help' command is added to resolve users queries at any point in time. Apart from 'Help', this system also supports some universal commands like cancel, stop, thank you or goodbye etc. to change the conversational flow or to exit the conversation.

2. Latency:

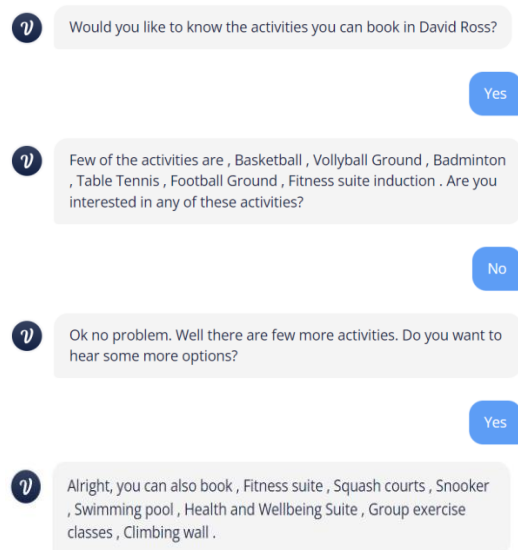
In case of latency in this system conversation, a cue like "Just a moment I will check..." is added to keep the user attentive.

3. Disambiguation:

In the case of asking date from the user for booking sports activity, even if the user didn't specify the year the system uses the current year as a year of input date.

4. Accessibility:

- Time-efficient:* Instead of asking Year, Month and date separately and increasing the number of calls and responses, this system have been made more efficient by just a single interaction with a confirmation prompt. This makes the design more responsive.
- Keep it short:* A new user who is not aware of the exact name of the sports activities he/she can book can demand the activity list. The system will show half of the activities first and if demands the next half of the list then will show the next half. In such a way, it will react faster and will not take much time for the user to interact.



- c. *Talk faster*: Voice assistant is tried to keep it at a normal medium pace and with less content.
  - d. *Interrupt me at any time*: For the novice and expert users, sometimes there is no need to give full details to them if they want to use shortcuts to ease the process.
5. Persona: The conversational partner in this prototype created in the front end of the technology that the user is going to interact with is a synthesized voice of "Emma" from Amazon. To avoid stilted and robotic sounds the contractions are added such as I'll instead of I will.

## CONCLUSION

The project successfully takes the data correctly even in case of the date (handles error for invalid and past dates), If we consider physically challenged people, where hand-free activity is a must, it is important to get all transactions successful. In the case of the email ID input of the user, the system didn't consider it correctly in voice recognition. As in today's world, most of the bookings are based on email confirmation, it is necessary to find the solution for this problem. In future, the user should be able to book training, competitions, seminars and merchandise products. Also, the system can be modified for people suffering from speech impairments.

## REFERENCES

[1] Pearl, Cathy. Designing voice user interfaces: principles of conversational experiences. " O'Reilly Media, Inc.", 2016.

[2] <https://www.voiceflow.com>