Voice Controlled E-commerce Web App

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Abstract - *E-commerce has become a boom within the modern business world. E-commerce Systems allows the buying and selling of products and services using electronic medium i.e Internet. Voice/Speech Recognition Systems allows the user to make contact less interactions with the machine which makes the whole process a whole lot easier. At this point in time there has been a lot of research in the field of voice recognition. All of which can be used in web applications to make the tasks easier and enhance the user experience.This feature will also increase the accessibility of the web app as a large amount of population has some or the other sort of visual disabilities and for that reason this feature will be very useful for them. In the current apps available the voice recognition feature is only limited to searching the products but in this app the user will be able to control a whole lot of interactions in the web app using just their voice which enhances the user experience of this web app tremendously allowing more people to use and enjoy the privileges of Online Shopping.The app will be made a PWA(Progressive Web App) using service workers provided . All of this will collectively make the web app easier to navigate and use.*

Key Words: **E-commerce Web App,Voice Controlled, Web App, React JS**

1.INTRODUCTION

E-commerce is possibly the most in demand type of applications that is needed in the current world. But one thing about most e commerce applications is that they are not accessible to all kinds of people which reduces their target audience and also make it harder for people to use.Voice Controlled E-commerce Web app is one such attempt to make an e-commerce web app and integrate a Voice Controller in it using a Software as a Service(SAAS). The SAAS will provide the application two essential features to make use of voice that is the text to speech service and the speech to text service. These Services will basically take the input in term of speech or text and revert the other option. Using Such a Service is preferred as it will not put unnecessary load on the application and allow it to function as needed with great response time. The Main Objective of the Project is to make an e-commerce application which is more accessible to users.

1.1 Objectives

The objective of this work is as follows:

i)To study the limitations of existing e-commerce websites and propose a solution that can combat the limitations and ease user experience.

ii)To control a whole lot of interactions on the web app by using voice commands. The voice recognition feature is only limited to search the products but in this app the user will be able to do a lot more actions.

iii)When it comes to handicapped people, especially the visually impaired, the web application comes handy since most of the navigation and actions are based on voice commands.

1.2 Scope

The future scope of this project is to improvise the web app by adding voice authentication for the user while logging in into the website. This will ensure a good amount of security for the user and aid to the user experience. Addition of an Recommendation Engine for each individual user would also be an additional feature that could be added.

E-commerce is striving to offer highly customized solutions to ensure great user experience. These customized solutions will be made available to users to help them experience wonderful shopping. This would actually enable the dealers or business owners to sell more and consumers to shop online for the best products across the web.

2. LITERATURE SURVEY

A. Study & Development of E-Commerce Website [1]: The Papers explains the fundamentals of e-commerce by firstly explaining the concept of e-commerce and then moving forward explaining the modules in an e-commerce platform which include Coding, Seller, Customer, Management, Delivery.

B. E-commerce Based Online Shopping For Visually Impaired People Using Speech Recognition [2] : The Paper Explains the amount of difficulty, the visually challenged people face during usage of an e-commerce application and further goes on to explain how different speech recognition algorithms can be used to make it easier for navigation in an e-commerce web app for visually impaired.

C. Voice Automated Web Application [3]: This paper explains about speech recognition / voice automation

which is based on NLP(Natural Language Processing). This paper uses basic languages to build up the e-commerce web app but uses a JavaScript library called annyang.js to create voice automation for the e-commerce application.

D. A Voice Controlled E-commerce Web Application [4] : This paper firstly talks about the use of e commerce applications and how to make it more accessible by using SRS(Speech Recognition System) ,it further goes on explaining how speech recognition system are classified on various criteria and then goes on to compare various speech recognition systems available in the market and choose the IBM Watson speech recognition system to implement the Text to speech and Speech to text Services.

E. E-Commerce and Online Payment in the Modern Era [5] : This paper starts with explaining the concept of e-commerce and then further moves on to various methods of online payments that are available in the e-commerce platforms and discusses the safety issue and advantages of them.

3. REQUIRMENTS GATHERING

3.1 Functional Requirements

*i)User Friendly Design:*The UI should be easy and convenient for the users to use.

*ii)Easy Checkout Flow:*The checkout process is the series of steps a customer follows to   purchase the items in their shopping cart in an e-commerce store. This includes every step that a customer goes through to proceed through to checkout. An ideal checkout flow will have a smooth, friction less user experience.

iii)Speed: This is done by reducing the size of the pages, using a content delivery network ,using caching memory and in memory or by compressing the data.

*iv)Payment integration:*With an integrated payment system, payments are entered directly into accounting software and applied to the general ledger or credited to an invoice. This simple process eliminates human errors and double data entry and helps businesses function as efficiently as possible.

v)Filtering: To filter out between different products present in the website.

vi)Accessibility: Web accessibility encompasses visual disabilities that affect access to the Web.

*vii)Mobile Friendly:*A mobile-friendly website is sized and coded for easy interaction on different mobile devices.

viii)Security: Since we are asking people to give their information , it should be protected .

*ix)Search Engine Optimization:*The internet is a big place, making it easy to exist without ever being noticed online. The most efficient way of doing so is making an investment into SEO optimization.

3.2 Non Functional Requirements

*i)Performance Requirements:*A local network with WiFi is required and internet is required

*ii)Scalability:*It is essential for the future of the product as the product should be scaleale with future technologies.

*iii)Quality :*Even the best e-commerce platforms can be used badly so you should insist that code is developed to a good quality standard

4. IMPLEMENTATION

4.1 Overview

*i)*Web Engineering: Web Engineering is the application of systematic, disciplined and quantifiable approaches to development, operation, and maintenance of Web-based applications. Web engineering focuses on the methodologies, techniques, and tools that are the foundation of Web application development and which support their design, development, evolution, and evaluation. Web engineering is multidisciplinary and encompasses contributions from diverse areas: systems analysis and design, software engineering, hypermedia/hypertext engineering, requirements engineering, human-computer interaction, user interface, information engineering, information indexing and retrieval, testing, modelling and simulation, project management, and graphic design and presentation.

*ii)*E-commerce: E-Commerce refers to electronic commerce. It is the process of doing business online through computer networks i.e. to sell goods and services online. E-commerce can be defined as buying and selling of products and services, or the transmitting of funds or data, over a system, predominantly the internet. Online shopping may be a type of electronic shopping store where the customer is directly online to the seller's computer usually via the net.Online-shopping System helps in buying of products, products and services online by choosing the listed products from an e-commerce website.

*iii)*Speech Recognition : Speech recognition which is a process of converting the sound of words or phrases spoken by humans into electrical signals to which a meaning is assigned by comparing the signals with sets of phonemic representations for a close match. The phonemic representations are matched against words that are predefined in a word vocabulary. Speech recognition in our web app is included as a Voice Controller which allows the user to navigate and use the entire application giving voice commands like searching for items in the

application or adding them into cart or deleting them from the cart.

4.2 Existing Methodology and Systems

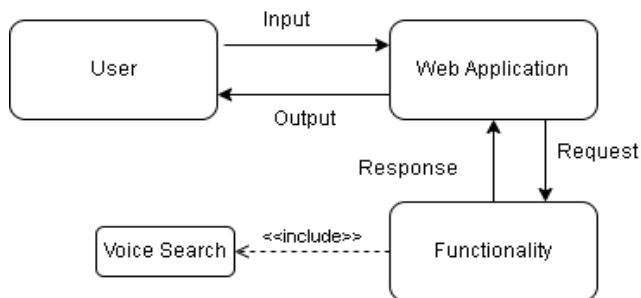The Current System Architecture in a generalized manner, as shown in Fig. 1.

Fig. 1 Current System Architecture

i)User :It is the actor who will be using the web application for the intended purpose of buying products. The User in the Real World Scenario is called the Consumer. The Actor Provides Input to The Web Application.

ii)Web Application :It is the application which will showcase all the products to the user to choose and buy from.

iii)Functionality :This includes all the processes that the user can perform on the web application. These include , adding to cart ,searching , deleting from cart , proceeding to checkout , viewing cart ,changing quantity of products from cart and many such functionalities.

Voice Search: This is an included functionality which allows the user to search products using their voice.

Now the current system works well but it is not fully optimized for the people with visual disabilities eg : color blindness , blur vision etc . This is because the applications are not fully accessible to each of the users in the same way . The only thing the user can do through their voice is to search for a product which limits the capabilities of the application.

4.3 Proposed Methodology and Systems

The previous sections discussed the strengths and weaknesses of the existing system. In order to achieve better results the proposed system(Fig 2) is designed in such a way that it consists of all the components of the existing system along with -

i)Voice Controller: This allows the user to perform most of the functions using their voice commands like adding items to cart or deleting them from cart User , Web Application , Functionality are the same as the existing

system.

ii)Speech To Text Service :These are SAAS(software as a service) which will basically take voice input from the web application and then process it to give a text output.

iii)Keyword Checking : In this component the text is analyzed under some set commands which will result in a boolean i.e if true then perform the functionality else go to the test to speech service.

iv)Text To Speech Service: This is similar to the Speech to Text Service with the only difference that it converts text to speech.

v)Flow of The System: In the proposed system once the user is logged in into the web app they will have options to either use traditional means or give the voice commands for example is user wants to search for a black shirt ,they simply say "show black shirts" the web application passes this input to the Speech to Text Service and converts this speech input by the user to text by the speech to text algorithm of the service that is being used. Now once the web application gets the text input it then does the keyword checking like the words said by the user match with any of the products present in the application or not. If true the system then searches for the desired items and once the closest match is found it returns the output to the web application. if the Keywords are not understood then the user is alerted by the text to speech system about the error.
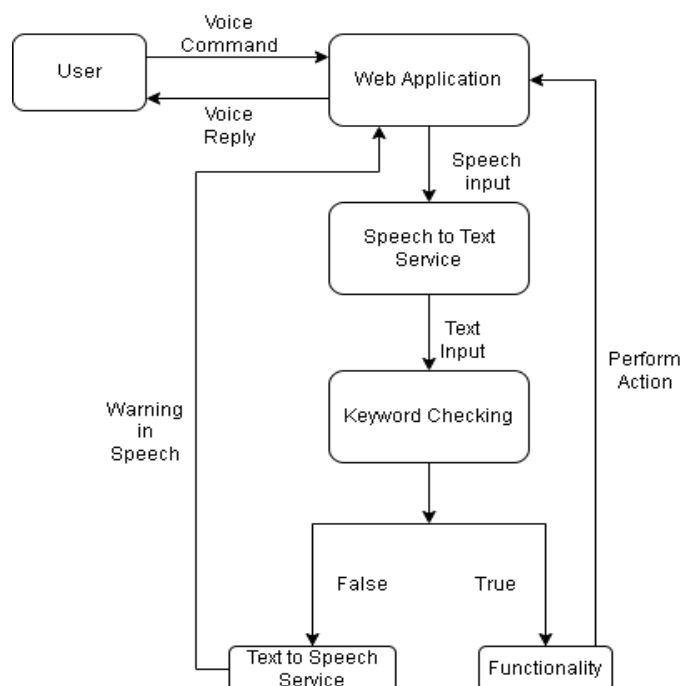

Fig 2.

4.4 Implementation Details

The implementation of the proposed system creates an e-commerce web app where the users can access the application by both ways that is by the traditional way of surfing using keyboard and mouse and also additionally through the voice controller by implementing the Speech to Text Service(STT) and Automatic Speech Recognition(ASR) for giving inputs. The correct and efficient patterns are matched by using Spoken Language Understanding(SLU) along with the Named Entity Recognition(NER). The Methods/Techniques used while creating the application includes:

i)Performance Optimization: Optimized performance of the application by using Stateless Components, Fragments to avoid additional wrapper elements, using re-select in redux for avoiding frequent and unnecessary re-renders of the page, used memoization which is primarily to speed up computer programs by storing the results of expensive function calls and returning the cached result when the same inputs occur again, g zip compression on the web server to provide smaller file sizes allowing for better performance, components splitting into chunks to provide only for data that is currently required by the application.

ii)State Management: State Management of the application is done using the redux library to create a global state for easy and faster access by all components and to avoid prop drilling, for asynchronous calls redux sagas are used to optimize the whole process

iii)PWA(Progressive Web App):Added Service Workers for the application which acts as an interface between the application and the web to create an appropriate build of the application for that operating system.

iv)SEO(Search Engine Optimization):Added various meta tags ,keywords to improve ranking on google along with google crawler meta tag for our applications sitemap.

5. SUMMARY

In this report, we have first explained the domain of our project, which is E-commerce in Web Engineering. Further we have described the implementation of the proposed system, the techniques required to develop the system considering all the drawbacks of the existing system. The literature survey of all the research papers used for reference to build the system is well explained. We have also explained how adding a voice controller for all the activities while using the web app can be implemented. The SRS Technique that is being used for the speech to text and text to speech services. It also explains the proposed system with the help of the system architecture and use case diagrams which makes it easier to understand and implement the system. All the functional and nonfunctional requirements along with the hardware and software components required for developing the system are specified. The areas of application for the voice controlled e-commerce web-app and its future scope is also mentioned.

6. FUTURE SCOPE

The Scope of this project in the coming future can lead to the following things-Many applications will integrate with voice to receive input as well as to give output as voice-powered applications will increase functionality, and save users from complicated navigation making it easier for the end-user to navigate an application. Chat bots or virtual assistants will be replaced for example in the healthcare industry. The search behaviors of web applications will also change, experiencing a shift in which touch points are transforming to listening points.Voice assistants will also continue to offer more individualized experiences as they get better at differentiating between voices which allows users to customize many features.

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