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NavigateU

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Abstract: *The progress in digital and information technology has made various types of maps crucial for information and navigation technologies. Although paper-based maps are accessible to individuals with disabilities, they lack certain functionalities and features that are inaccessible to a typical disabled user. Due to this limitation, it is essential to incorporate provisions, easy road-to-road navigation, user-friendly interfaces, cognitive and voice assistive technology for disabled individuals. Moreover, additional considerations are necessary to ensure that these users can fully utilize web maps and Android apps. This paper presents the design, implementation of our project, and offers recommendations and solutions.*

Keywords: Technological advancements, navigation systems, user interfaces, assistive technology, design

I. INTRODUCTION

In the contemporary era, Google Maps has significantly simplified the process for businesses and organizations to mark or upload their landmarks, such as Hospitals, Hotels, Theaters, Schools, and Colleges. For non-disabled individuals, accessing and utilizing these locations is straightforward. However, for people with disabilities, accessing locations according to their needs can be challenging. Even if they manage to access a location, they may be unaware of the facilities offered for disabled individuals by the respective organization. To address this issue, we are developing a portal and an application where business owners can specify all the facilities they provide for disabledpersons. This allows disabled individuals to easily determine whether they can visit a place. Additionally, we are focusing on creating an application that can be easily operated by a disabled person through voice instructions.

II. PROBLEM STATEMENT

The current solution involves a web-based platform that is widely accessible for storing and sharing information about buildings, offices, schools, marketplaces, etc. While existing map-based platforms provide information about various locations, disabled individuals face challenges in identifying places with accessibility features. There is currently no centralized web portal or app for storing information on accessible offices, buildings, departments, or public places. The objective is to develop a centralized platform with a web-based portal and a mobile app for storing and sharing information about accessible buildings, public places, and offices. This system will also include physical locations, making the information visible on a map. The platform will store and share details about accessibility features, including ramps, handrails, accessible toilets, Braille signage, counters, lifts, and wheelchairs. The registration of accessible buildings and locations by both private and government owners will be facilitated. Information will be displayed to disabled individuals based on search criteria on a map-based platform, similar to Google Maps or Ola. The app will guide disabled individuals with voice-based announcements and dynamic map directions when they choose a building or location to travel to. The system will include a centralized server for secure information storage.

III. LITERATURE REVIEW

1. "Accessibility Map" and "Social Navigator Services for Persons with Disabilities" (Research Gate, 2014) discuss common applications architecture and technologies utilized in creating maps for individuals with disabilities. The focus is on a shared data model that includes route descriptions, roads, and information about object accessibility stored in the "Accessibility Passports" service database.
2. "Accessible Wayfinding and Navigation: A Systematic Mapping Study" (Springer, 2021) aims to describe the characteristics and evolution of systems for accessible wayfinding and navigation found in the literature. The paper

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explores interesting features and weaknesses to consider in future system development.

3. "Assistive Technology for Disabled People" (International Conference on Recent Advances in Computer Systems, 2015) emphasizes the role of assistive technology in aiding disabled individuals in their daily routines. The study focuses on understanding the specific uses of modern devices introduced nowadays.

4. "Geographic Information Systems in the Context Of Disabilities" (Journal of Accessibility and Design for All, 2018) provides a synopsis of research results and practical approaches of GIS applications in disability-related contexts. The paper highlights mapping, identifying accessibility, wayfinding tools, and their role in disaster and emergency management.

5. "Mobile Follow-Up System for Elderly and Disabled People" (Congreso Argentino de Ciencias de la Informática y Desarrollos de Investigación, CACIDI, 2018) introduces a mobile app prototype for planned care and follow-up of elderly or disabled individuals, integrating sensors for non-invasive monitoring.

6. "Speaking Map: An Application for the Visually Impaired" (Contemporary Issues in Computing, CIC-2020) presents an android-based application designed to inform visually impaired users of their current location, nearby places, and directions vocally. The system includes intelligent obstacle detection features.

7. "Future Challenges in Next the Generation of Voice User Interface" (International Conference on Computing and Data Science, CDS, 2020) introduces key elements and core techniques in Voice User Interface (VUI) from the perspective of disabled individuals, discussing future challenges in empathy, ethics, and accessibility.

8. "The Route Planning Services Approach for People with Disability" (Conference of Open Innovation Association, 2015) describes the development of navigation services for people with disabilities, presenting methods, algorithms, and practical opportunities for supporting disabled individuals.

9. "Voice Helper: A Mobile Assistive System for Visually Impaired Persons" (International Conference on Computer and Information Technology, CIT, 2015) focuses on designing and implementing an assistive system for visually impaired individuals using Android smartphones. The system, Voice Helper (VH), integrates open sources and enhances various functions to facilitate daily activities for visually impaired persons.

A. Diagram:

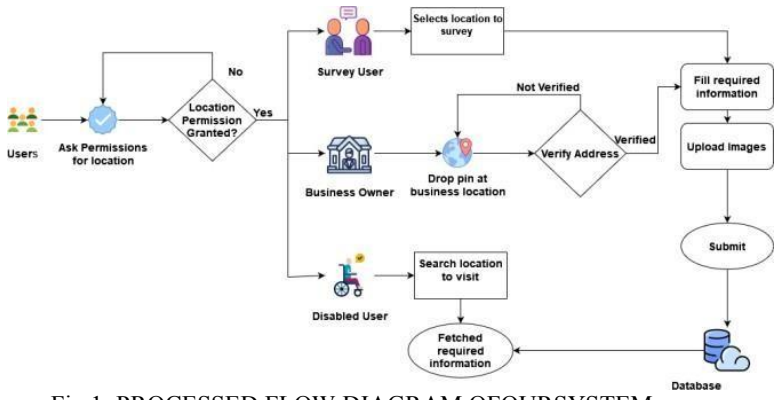

Fig 1: PROCESSED FLOW DIAGRAM OFOURSYSTEM

B. Explanation

The application is designed for a diverse group of users who will initiate their interaction on the landing page. Upon arrival, users will be prompted to provide their location, and upon granting permission, they will be categorized into three user types: Survey Users, Business Owners, and Disabled Users.

Survey Users, whether disabled or non-disabled visitors, can use the application to share insights about places they have visited or plan to visit. They can complete a survey form, providing details, images, reviews, and ratings about the accessibility provisions of those places. Uploading images is mandatory for validation, and the information submitted will be stored in the application's database. Business Owners play a crucial role in this model. They need to pin the location of their business, store, or organization and then complete a survey form with essential details about their

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establishment. Mandatory image uploads contribute to the validation process, and the information will be stored in the database. Finally, Disabled Users can utilize the application similar to Google Maps. The system will fetch data from the database and present it to disabled users, offering them information about the accessibility features of various locations. This process aims to facilitate easier navigation and access for individuals with disabilities.

C. IDEA

- Addressing challenges encountered by individuals with special needs.
- A solution accessible through both web and mobile platforms.
- Classification of users into three categories: Business owners, Surveyors/Visitors, and Disabled users.
- Displaying features such as ramps, handrails, accessible toilets, Braille signage, accessible counters, lifts, wheelchairs, etc., along with supporting images for the benefit of disabled users.
- Providing users with the ability to search for a location similarly to Google Maps, obtaining comprehensive information with a single click.
- Voice-guided instructions will be activated through a prolonged click on options. Additionally, users can employ voice commands for location searches.
- During registration, business owners will input location specifics, business details, and images.
- Essential information will be collected from business owners during the registration process.
- Visitors will contribute supplementary details such as ratings and service images through surveys.
- Google Maps will be utilized for navigation and direction-related purposes

D. OUR APPROACH

- Our primary focus is on users with special needs, allowing them to effortlessly search for locations, similar to the process in Google Maps. Detailed information, including supporting images, ratings, comments, and more, will be readily available for each location.
- For business owners, the process involves dragging a pin to the selected location, akin to platforms like Swiggy or Ola. Once the user confirms the location, they are prompted to provide comprehensive details and necessary images about their business. Upon successful submission, the place is added to the database and made accessible to users.
- Users have the option to conduct visitor surveys when they are present at a particular location. To initiate a survey or rating, the user selects the location, and geo-fencing verifies their presence at that specific place. Alternatively, if images are provided as validation, the user completes the required information, and upon submission, the data is added to the database.

E. DEPENDENCIES

- Our primary challenge lies in catering to users who may have visual impairments. To address this, we will integrate voice-based features into both the app and website.
- Another significant hurdle is the lack of awareness, particularly among disabled users, regarding technologies such as Google Maps and mobile phones. To mitigate this, we plan to conduct awareness sessions and campaigns to educate them about these tools.
- An essential dependency is an internet connection since the location service relies on it. To overcome this, the proposed solution includes spreading awareness about the importance of internet connectivity for the proper functioning of location services.

F. IMPACT

- Individuals with disabilities will have access to crucial information about a location's facilities before making a visit. Reviewers will experience the satisfaction of contributing to a valuable cause.
- The initiative aims to raise awareness among the youth about the challenges faced by individuals with disabilities. Consequently, this awareness can lead to more innovations aimed at addressing such issues.

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- This is a significant global issue that often goes overlooked. The proposed solution has the potential to make a substantial impact on this problem, prompting increased consideration for the needs of disabled individuals.
- Following the implementation of this solution, venue owners may become more mindful of the requirements of disabled individuals and subsequently enhance their facilities. This positive shift in societal attitudes will have a lasting impact.

G. OUR SOLUTION VS GOOGLE MAPS

Our solution places a specific emphasis on catering to the needs of disabled individuals, focusing on their requirements and related information. Unlike Google Maps, we do not delve into features such as navigation, directions, or place contacts, as these functionalities are already well-established in Google Maps. Our goal is to provide detailed information about a place to our primary user, who is a person with a disability. This includes information on facilities like ramps, handrails, accessible toilets, Braille signage, counters, lifts, wheelchairs, etc., contributing significantly to a social cause.

Google Maps, a widely utilized technology, offers an array of features such as nearby places, navigation, directions, location sharing, and saving. It is a comprehensive application with various useful functionalities. Users can also comment, rate places, and upload images, while details like timings and contact numbers are readily available. However, Google Maps lacks specific information tailored for disabled individuals. Moreover, the software can be challenging for disabled users to navigate. While it is an excellent product by a tech giant, it does not provide the specialized information that our solution focuses on.

IV. TECHNOLOGY STACK

To implement our extensive technological system, a diverse technology stack is imperative. Therefore, our project will leverage the following technologies:

- For Android development, we will employ Java, Kotlin, or Flutter, utilizing the Android SDK due to its robust community support.
- Crafting visually appealing UI applications will be achieved using XML Jetpack Compose.
- The integration of maps and related technologies in both the app and website will make use of Maps SDK, Geo-coding, and Places API.
- For database management, real-time CRUD operations, and scalability, we have opted for Firebase.
- The web application's frontend will be built using HTML, CSS, and JavaScript. These technologies collectively form the comprehensive technology stack required for the successful implementation of our system.

V. CONCLUSION

We know have come to know that over 21 million people in India are suffering from some or the other kind of disability. The numberishugeinruralareasthantheurbanareas.Thissystemaimstofosterandlendahandtosuchkindofpeople seeking for help. Our system would prove to its very best for the disabled to navigate to their selected destination and enjoy their time in comfort. Not only this but we tend to encourage researchers and people to serve at this noble cause by developing and enhancing such systems which are beneficial for such group of people.

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