Smart Accessibility Map

A Project Report Submitted to

Rajiv Gandhi Proudyogiki Vishwavidyalaya, Bhopal
Towards Partial Fulfillment for the Award of

Bachelor of Technology
(Computer Science and Engineering)

Submitted By
Abhishek Rawat (0827CS201011)
Aieshah Nasir (0827CS201018)
Akshat Singh Gour (0827CS201020)
Akshat Singh Rathore (0827CS201021)

Under the Supervision of
Prof. Priyanka Jangde
Prof. Narendra Pal Singh Rathore

Department of Computer Science and Engineering
Acropolis Institute of Technology & Research, Indore
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EXAMINER APPROVAL

The Project entitled "**Smart Accessibility Map**" submitted by **Abhishek Rawat (0827CS201012)**, **Aieshah Nasir (0827CS201018)**, **Akshat Singh Gour (0827CS201020)** and **Akshat Singh Rathore (0827CS201021)** has been examined and is hereby approved towards partial fulfillment for the award of Bachelor of Technology degree in **Computer Science & Engineering** discipline, for which it has been submitted. It understood that by this approval the undersigned do not necessarily endorse or approve any statement made, opinion expressed or conclusion drawn therein, but approve the project only for the purpose for which it has been submitted.

(Internal Examiner) **(External Examiner)**
Date: **Date:**

GUIDE RECOMMENDATION

This is to certify that the work embodied in this project entitled "**Smart Accessibility Map** " submitted by **Abhishek Rawat (0827CS201012), Aieshah Nasir (0827CS201018), Akshat Singh Gour (0827CS201020) and Akshat Singh Rathore (0827CS201021)** is a satisfactory account of the bonafide work done under the supervision of **Prof. Priyanka Jangde** and **Prof. Narendra Pal Singh Rathore** are recommended towards partial fulfillment for the award of the Bachelor of Technology (**Computer Science & Engineering**) degree by Rajiv Gandhi Proudyogiki Vishwavidhyalaya, Bhopal.

(Project Guide) **(Project Coordinator)**

STUDENTS' UNDERTAKING

This is to certify that a project entitled "**Smart Accessibility Map**" has been developed by us under the supervision of **Prof. Priyanka Jangde** and **Prof. Narendra Pal Singh Rathore**. The whole responsibility of work done in this project is ours. The sole intention of this work is only for practical learning and research. We further declare that to the best of our knowledge, this report does not contain any part of any work which has been submitted for the award of any degree either in this University or in any other University / Deemed University without proper citation and if the same work is found then we are liable for explanation to this.

Abhishek Rawat (0827CS201012)

Aieshah Nasir (0827CS201018)

Akshat Singh Gour (0827CS201020)

Akshat Singh Rathore (0827CS201021)

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Abhishek Rawat (0827CS201012)

Aieshah Nasir (0827CS201018)

Akshat Singh Gour (0827CS201020)

Akshat Singh Rathore (0827CS201021)

EXECUTIVE SUMMARY

This project is submitted to Rajiv Gandhi Proudyogiki Vishwavidhyalaya, Bhopal(MP), India for partial fulfillment of Bachelor of Technology in **Computer Science & Engineering** branch under the sagacious guidance and vigilant supervision of **Prof. Priyanka Jangde** and **Prof. Narendra Pal Singh Rathore.** The project is a website. In the project, Bing Maps API is used , which is a dynamic map. This project is mainly for people with special needs. They can find the accessible features of the property where he/she wants to visit. Also, they can find the route to visit the place and property owners can register themselves and show their accessibility features.

There is no greater disability in society than the inability to see a person as more

-Robert M. Hensel

List of figures

Figure 1 - Bing Map View 12

Figure 2 - Block Diagram 22

Figure 3 - Home Page (Frontend) 23

Figure 4 - Login page 24

Figure 5 -Map Interface with speech recognition 24

Figure 6 - Registration page 25

Figure 7 - use case diagram 26

Figure 8 - Data Flow diagrams 26-27

Figure 9 - ER Diagram 28

Figure 10 -Showing Direction on Bing Map 35

Figure 11 - Validation Field 36

Figure 12 - Pop up message 36

Chapter 1 . Introduction

Introduction

Accessibility data/information is necessary to support the everyday mobility of people with special needs. As a means to accommodate mobility of students with special needs, universities and colleges provide maps with accessibility data/information for their campus, where some are static and others are interactive. In this paper, we describe the concept of Personalized Accessibility Maps (PAMs) and discuss the development of a PAM for the University of Pittsburgh's main campus as a representative PAM. As a result of this development, there is a better understanding of the technologies and techniques needed for PAMs along with challenges and future research directions.

1.1 Overview

Mobility is a common and routine activity performed by all people. As people travel to unfamiliar locations, they commonly rely on online services (e.g., Google Maps, Bing Maps) and/or navigation systems/services (e.g., Garmin, TomTom) to find their way in new locations. For these systems and services, and the maps produced by them, to address mobility of people with special needs (e.g., people with mobility and visual impairments), they need to contain accessibility data/information. However,containing only accessibility data/information, while necessary, is insufficient to ad- dress the range of mobility challenges faced by special needs communities. For systems and services to be of value to special needs communities, they must: (a) contain useful accessibility data/information; (b) utilize accessibility data/information in meaningful ways (such as for trip planning and real-time navigation) that address specific special needs; and (c) present accessibility data/information, or their utilization, through easy-to-access and easy-to-use interfaces.

1.2 Background and Motivation

Disabled people are unable to browse and identify nearby locations having accessibility features. Offices, restaurants, bus stops, railway platforms, schools, cinema halls etc. which are having accessibility provisions can not be filtered and shown by any means today, which would be very helpful to persons with disabilities.There is no platform where restaurant owners, film hall owners, hotel owners etc. can register and declare that their properties are now accessible.

1.3 Problem Statement and Objectives

Development of a centralized platform with web-based portal or a mobile app for storing and sharing of information about accessible buildings,public places,offices. The system will also store their physical locations so that the information can also be shown on a on-screen map. The

system will store and share information about the accessibility features viz. provisions of ramps, handrails, accessible toilets, Braille signage, accessible counters, lifts, wheelchairs etc. The system will store and share photographs and videos of such places. Registration of accessible buildings or locations by the owners (private & Government both). Display of information to the disabled persons as per search criteria on a map based platform, like google map. After a disabled person chooses a building/ location he/she wants to travel using this system app, the app should guide him/her by showing directions on the dynamic map to navigate and reach the place. Facility should be similar to Google map or the app may integrate Google map for providing such a facility.Disabled people are unable to browse and identify nearby locations having accessibility features. Offices, restaurants, bus stops, railway platforms, schools, cinema halls etc. which are having accessibility provisions can not be filtered and shown by any means today, which would be very helpful to persons with disabilities.There is no platform where restaurant owners, film hall owners, hotel owners etc. can register and declare that their properties are now accessible.

1.4 Scope of the Project

The scope of this project increases from a narrow stream to a broader one. It aims to design a dynamic map for people with physical defects. A dynamic map will be designed to quickly identify locations across the area with accessibility features. Such people can search for all locations that have assisted accessibility and mobility accessibility. Government can use this application to recognize buildings and monuments that are accessible to all sections of the society and those that are accessible especially for the specially-abled people. Further the government can allocate sufficient budget to develop this aspect. Private and government holdings can optimistically compete to enhance their facilities to improve their business.

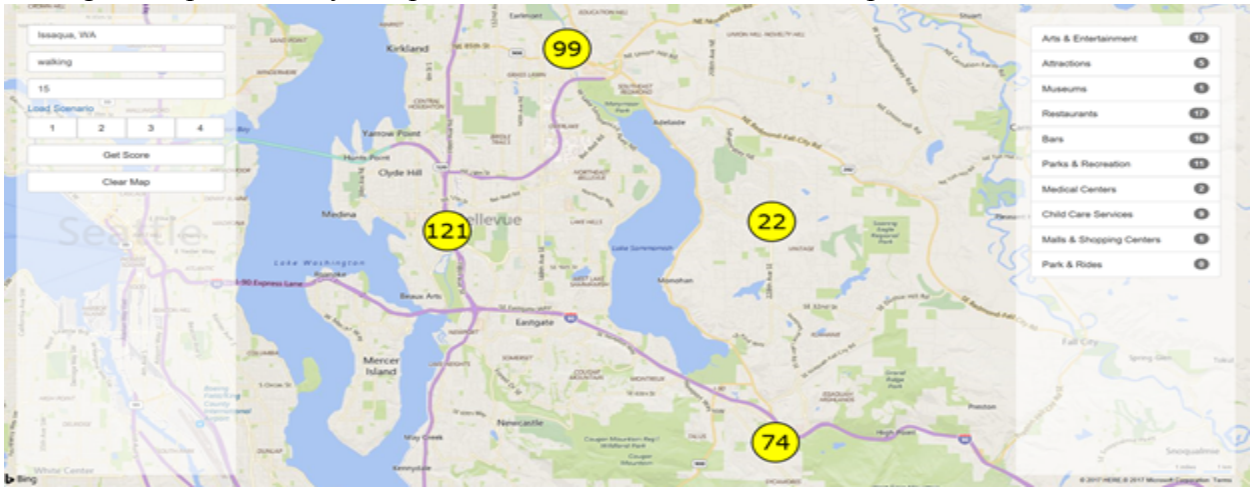


Figure 1.1 Bing Map view

1.5 Group Organization

- **Abhishek Rawat**
  Along with preliminary investigation and understanding the drawback of the current system, I studied about the topic and its scope. I surveyed various research papers related to object detection and the technology to be used. I also worked with Bootstrap5 to build the front-end along with DDL queries for the database by making tables in it and connecting it to the project. I integrated it with the Bing Maps SDK.

- **Aieshah Nasir**
  I investigated, found the right technology and studied it in depth. I decided which framework should be suitable for this project. I worked on database integration using DML and TCL queries and the Bing Maps SDK. I also organized and debugged the code of the project. Implementational logic of the project objective and coding of internal functionalities was done by me for the project.

- **Akshat Singh Gour**
  I worked on the front-end, making the HTML templates using the Jinja2 technology. I also worked with CSS. I implemented the favicon of this project. I helped with DDL queries on the backend of the project. Documentation is also a part of the work I did in this project

- **Akshat Singh Rathore**
  I made some of the HTML-Flask-Jinja2 templates and implemented CSS in it. I wrote the Javascript code for the search bar via Bing Maps and speech recognition via gTTS API for the project. I helped with the backend by implementing certain routes for the templates. Also I engaged in debugging the code and made the login and register pages with validation.

1.6 Report Structure

The project ‘Smart Accessibility Map’ is primarily concerned with the viewing routes to businesses and properties on a dynamic map and their accessibility features. The entire project report is categorized into five chapters.

Chapter 1: Introduction- introduces the background of the problem followed by rationale for the project undertaken. The chapter describes the objectives, scope and applications of the project. Further, the chapter gives the details of team members and their contribution in development of the project which is then subsequently ended with a report outline.

Chapter 2: Review of Literature- explores the work done in the area of Project undertaken and discusses the limitations of the existing system and highlights the issues and challenges of the

project area. The chapter finally ends up with the requirement identification for present project work based on findings drawn from reviewed literature and end user interactions.

Chapter 3: Proposed System - starts with the project proposal based on requirement identified, followed by benefits of the project. The chapter also illustrates the software engineering paradigm used along with different design representations. The chapter also includes a block diagram and details of major modules of the project. Chapter also gives insights of different type of feasibility study carried out for the project undertaken. Later it gives details of the different deployment requirements for the developed project.

Chapter 4: Implementation - includes the details of different Technology/ Techniques/ Tools/ Programming Languages used in developing the Project. The chapter also includes the different user interfaces designed in the project along with their functionality. Further it discusses the experiment results along with testing of the project. The chapter ends with evaluation of the project on different parameters like accuracy and efficiency.

Chapter 5: Conclusion - Concludes with objective wise analysis of results and limitation of present work which is then followed by suggestions and recommendations for further improvement.

Chapter 2 . Review of Literature

Review of Literature

2.1 Preliminary Investigation

Maps are inherently graphical and digital tools rely on gestures and complex mouse inputs for interactivity, which can limit use by those with visual, motor, or cognitive impairments. Blind people have been using tactile maps with braille legends for many decades . More recently, accessible interactive maps and models have been developed. Some technologies have been adopted commercially (e.g., IVEO uses tactile graphics as an overlay over a touch display). More recent research has attempted to integrate emerging technologies such as tangibles and augmented reality.

2.1.1 Current System and its Limitations

There aren't many systems that are dedicated to serve specially-abled people. Some notable systems which are designed for accessibility are as follows:

1. **Google Maps:**

Google Maps is a web mapping platform and consumer application offered by Google. It offers satellite imagery, aerial photography, street maps, 360° interactive panoramic views of streets (Street View), real-time traffic conditions, and route planning for traveling by foot, car, bike, air (in beta) and public transportation. As of 2020, Google Maps was being used by over 1 billion people every month around the world.

Google Maps began as a C++ desktop program developed by brothers Lars and Jens Rasmussen at Where 2 Technologies. In October 2004, the company was acquired by Google, which converted it into a web application. After additional acquisitions of a geospatial data visualization company and a real-time traffic analyzer, Google Maps was launched in February 2005. The service's front end utilizes JavaScript, XML, and Ajax. Google Maps offers an API that allows maps to be embedded on third-party websites, and offers a locator for businesses and other organizations in numerous countries around the world. Google Map Maker allowed users to collaboratively expand and update the service's mapping worldwide but was discontinued from March 2017. However, crowdsourced contributions to Google Maps were not discontinued

as the company announced those features would be transferred to the Google Local Guides program.

Advantages:

- Provides route planner
- Real-time traffic conditions for traveling by foot, car, bike, air (in beta) and public transportation

Disadvantages:

- Slow loading
- Inappropriate content
- Missing information

Gaps identified:

Crowdsourcing is used to obtain the GPS-determined locations of a large number of cellphone users, from which live traffic maps are produced. Street View garnered much controversy after its release because of privacy concerns.

Reference link:

Google Maps (https://www.google.com/maps/

2. Waze:

Waze,formerly FreeMap Israel, is a subsidiary company of Google that provides satellite navigation software on smartphones and other computers that support the Global Positioning System (GPS). In addition to turn-by-turn navigation, it incorporates user-submitted travel times and route details while downloading location-dependent information over a cellular network. Waze describes its application as a community-driven initiative that is free to download and use. The software was originally developed in Israel by Waze Mobile, a company founded by Israeli entrepreneurs Ehud Shabtai, Amir Shinar, and Uri Levine. Funding for the initial project was provided by two Israeli venture capital firms, Magma and Vertex Ventures Israel, as well as by an early-stage American venture capital firm, Bluerun Ventures. In June 2013, Waze Mobile was acquired by Google for US$1.3 billion.

The application generates revenue through hyperlocal advertising to an estimated 130 million users.

Advantages:

- Community-oriented.
- Helps check amenities around.
- Real-time traffic data.

Disadvantages:

- Little advantage in areas with few users.
- Drains battery in background.

Gaps identified:

Users suggest modifications and hazards which are promptly updated. These may not be accurate.

Reference link:

Waze (https://www.waze.com/live-map/)

3. Mapquest:

Mapquest is a very easy-to-use navigation app, where you just put in your destination and go. In addition, you can customize the map as you wish to show amenities, traffic hazards, and more.

Advantages:

- Easy to find amenities.
- Turn traffic alerts on or off.
- Ability to change the map style.

Disadvantages:

- Can be a little slow.
- No public transit directions.
- No photos option.

Gaps identified:

It has been developed mainly for the United States and Canada. Maps for other areas haven't been made for assisted accessibility.

Reference link:

Mapquest (https://www.mapquest.com/)

4. Bing Maps:

Bing Maps includes up-to-date maps, satellite and aerial photos of the highest quality. The service provides three-dimensional views of buildings with the so-called Bird Eye

function. Bing Maps also has a very good geocoding service with forward, reverse and batch geocoding functionality.

Features:

Street maps:

Users can browse and search topographically-shaded street maps for many cities worldwide. Maps include certain points of interest built in, such as metro stations, stadiums, hospitals, and other facilities. It is also possible to browse public user-created points of interest. Searches can cover public collections, businesses or types of business, locations, or people. Five street map views are available: Road View, Aerial View, Bird's Eye View, Street Side View, and 3D View.

Road view:

Road view is the default map view and displays vector imagery of roads, buildings, and geography. The data from which the default road map is rendered is licensed from Navteq. In certain parts of the world, road view maps from alternative data providers are also available. For example, when viewing a map of London, the user may see road data from the Collins Bartholomew London Street Map. In all parts of the UK, road data from the Ordnance Survey can also be displayed. A Bing Maps app is available that will display road data from OpenStreetMap.

Aerial view:

Aerial view overlays satellite imagery onto the map and highlights roads and major landmarks for easy identification amongst the satellite images. Since end of November 2010, OpenStreetMap mappers have been able to use imagery of Bing Aerial as a map background.At the end of January 2012, both Bing Aerial and Birds Eye View imagery at military bases in Germany became blurred. This was on request of the German government, obviously using data from OpenStreetMap.

Bird's-eye view:

Bird's-eye view displays aerial imagery captured from low-flying aircraft. Unlike the top-down aerial view captured by satellite, Bird's-eye images are taken at an oblique 45-degree angle, showing the sides and roofs of buildings giving better depth perception for geography. With Bird's Eye views, many details such as signs, advertisements and pedestrians are clearly visible. Microsoft has occasionally removed Bird's Eye view from areas where it was previously available.

Streetside:

Streetside provides 360-degree imagery of street-level scenes taken from special cameras mounted on moving vehicles. Launched in December 2009[it contains imagery for selected metro areas in the United States as well as selected areas in Vancouver and Whistler, British Columbia associated with the 2010 Winter Olympic Games (example:

Richmond Olympic Oval). Selected cities in Europe were also made available in May 2012.

Between August and September 2011, German customers were allowed to appeal against integration of their house or flat in Bing Streetside According to some officials, the number of appeals was significantly lower than with Google Street View. Only 40,000 requests were sent to Microsoft.

For OpenStreetMap editors, display of Streetside tracks and images can be enabled via a map data layer checkbox.

Venue maps:

Venue maps provide a way of seeing the layout of the venue. Currently, Bing Maps provides maps & level wise layouts of over 5300 venues across the world.

The categories are: Airports, Amusement Parks, Buildings, Convention Centers, Hospitals, Malls, Museums, Parks, Racecourses, Racetracks, Resorts, Shopping Centers, Shopping Districts, Stadiums, Universities and Zoos.

Advantages:

- Image search,video search.
- Free stuff.

Disadvantages:

- Can be a little slow.
- Mapping system is quite terrible.

Gaps Identified:

Bing Maps doesn't provide personalized accessibility features aimed at specific sections of the society.

Reference Link:

Bing Maps (https://www.bing.com/maps/)

★ This Map System is used in this project

2.2COMPARATIVE STUDY OF EXISTING SYSTEMS

Name	Map Type	Features	Limitations	Environment	URL
Google Maps	Static / Interactive	-enhanced crowdsourced data collection & storage -route planner -real time traffic analysis	-slow loading -inappropriate content	Outdoor features	https://maps.google.com
Bing Maps	Static / Interactive	- accurate route planner	-slow loading -incomplete	Outdoor & indoor features	https://www.bing.com/maps/

		- interactive with various views	database		
Waze	Static / Interactive	- driver focused - community based traffic & navigation app	- less comprehensive	Outdoor features	https://www.waze.com/live-map/
Mapquest	Static	- minimum distractions	- Low accuracy & reliability	Outdoor features	https://www.mapquest.com/
OpenStreetMap	static	- accurate & up-to-date - community driven	- incomplete database for places across the world	Outdoor features	https://www.openstreetmap.org/

2.3 Requirement Identification

Significant work has been done in the field of web development and connecting bing map with projects ; however, it is not easy to achieve desired results. The review of literature leads to draw certain major findings which are as under :

- The study brought out that web development will be done and the research of frameworks,databases is done.Users with/without disabilities register onto the proposed web application. Businesses can register separately. Database is maintained to contain the user's disability and related information essential for generating the map. Business account holders can modify the accessibility status of their holdings. Modifications are updated onto the database. User logs into his account and specifies the destination location to check if assisted accessibility or disable accessibility is available. Database is queried to get user information, home location (if any), latest information on the destination location (if any) etc., then Bing Maps API is called to fetch accessibility data. Accessibility information can be seen as text and converted to speech, as required.

- Study of Bing Map API is done and study about the way to use it. Using bootstrap in front end and flask framework in backend along with postgresql for data storing.

- It will make it much easier for wheelchair users to see accessibility information. It is very easy to use. Once the "Accessible Places" option is activated in the mobile application's settings, Google Maps will display wheelchair icons to indicate

locations with disabled access. Clicking on the icon will bring up further information about accessible seating, toilets and parking. Google already has information on wheelchair accessibility for more than 15 million locations around the world, mainly thanks to the participation of contributing Internet users, and it is this information that can now be permanently displayed in Maps. It should be noted that anyone can contribute information on disabled access to the service directly from an Android or iOS smartphone.

2.4 Conclusion

This chapter reviews the literature surveys that have been done during the research work. The related work that has been proposed by many researchers has been discussed. After surveying the existing systems,finding out the advantages and disadvantages .We have decided to use Bing Maps for our project and to connect accessibility features in it. Bing Maps api suits our project.

Chapter 3 . Proposed System

Proposed System

3.1 Proposal

The proposal is the system will make it much easier for wheelchair users to see accessibility information. It is very easy to use. Once the "Accessible Places" option is activated in the mobile application's settings, Google Maps will display wheelchair icons to indicate locations with disabled access. Clicking on the icon will bring up further information about accessible seating, toilets and parking. Google already has information on wheelchair accessibility for more than 15 million locations around the world, mainly thanks to the participation of contributing Internet users, and it is this information that can now be permanently displayed in Maps. It should be noted that anyone can contribute information on disabled access to the service directly from an Android or iOS smartphone.

3.2 Benefits of Proposed System

The current project had a lot of challenges that are overcome by this system :

- **Easy to Use :** The user interface is so basic that it is very easy to understand and operate.
- **Speech recognition :** Users, especially blind can use it because of its speech recognition feature.
- **Proposed Bing Map :** Users can find the routes of location wherever they want to go.

3.3 Block Diagram

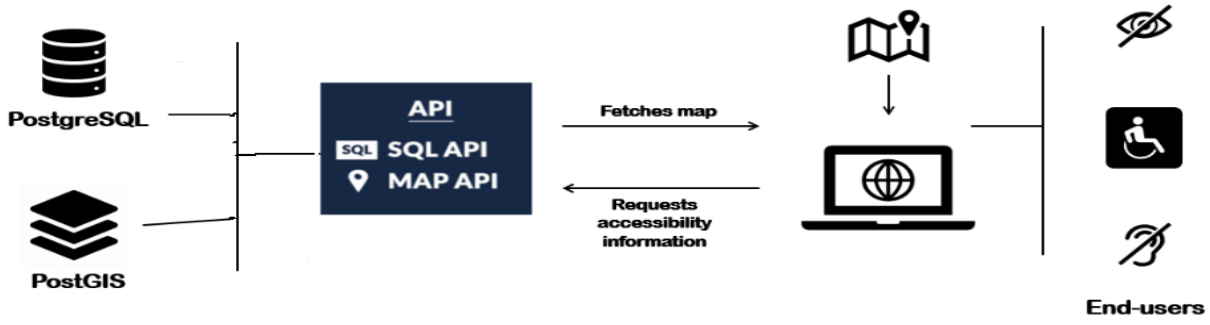


Figure 2 : Block diagram

Users with/without disabilities register onto the proposed web application. Businesses can register separately. Database is maintained to contain the user's disability and related information

essential for generating the map. Business account holders can modify the accessibility status of their holdings. Modifications are updated onto the database. User logs into his account and specifies the destination location to check if assisted accessibility or disable accessibility is available. Database is queried to get user information, home location (if any), latest information on the destination location (if any) etc., then Bing Maps API is called to fetch accessibility data. Accessibility information can be seen as text and converted to speech, as required.

3.4 Design Representations

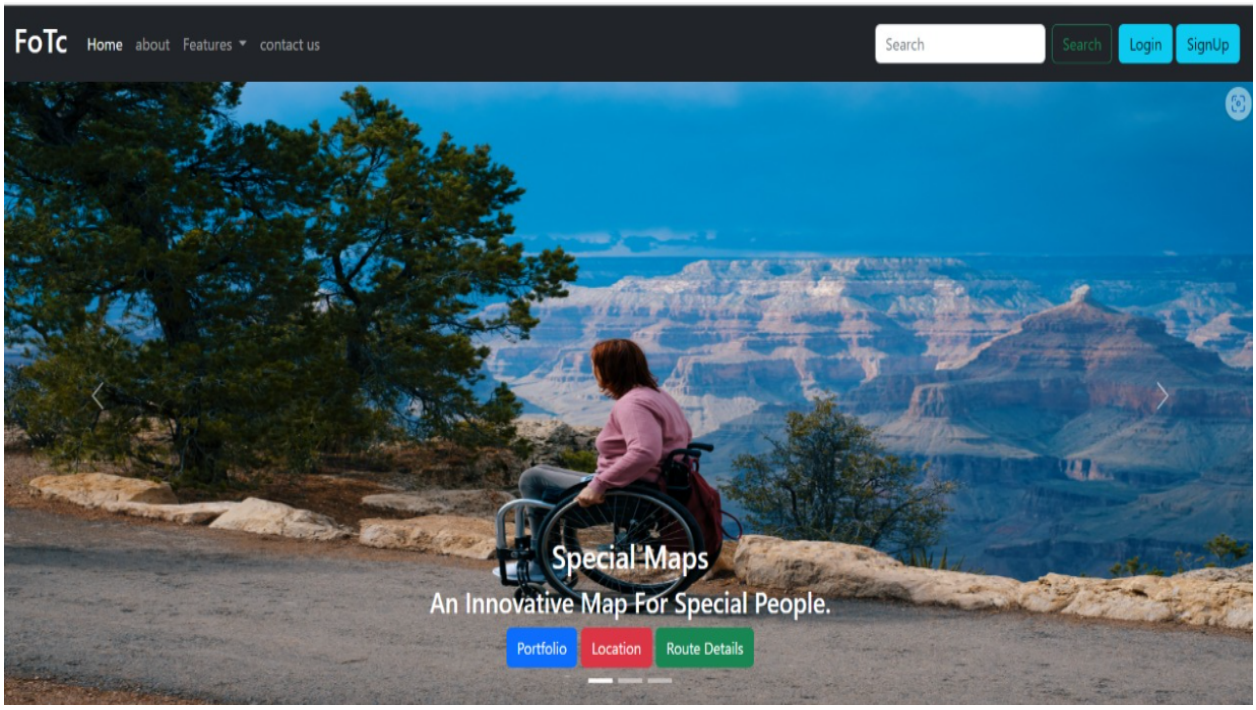


figure 3: Home page (frontend)

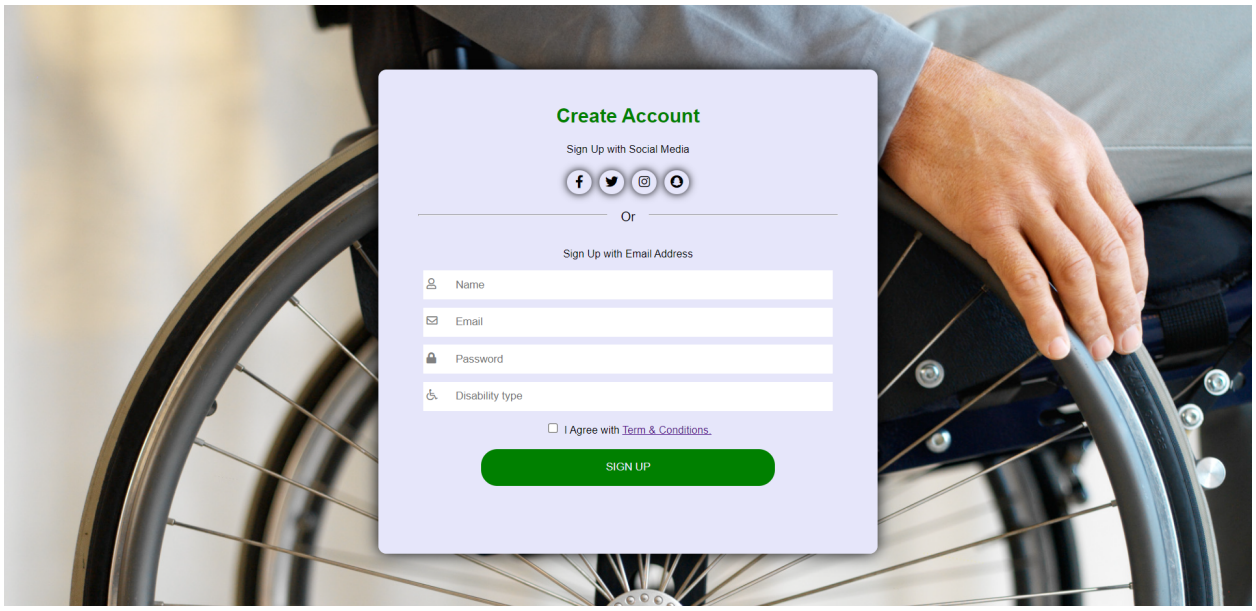


Figure 4 : Login page

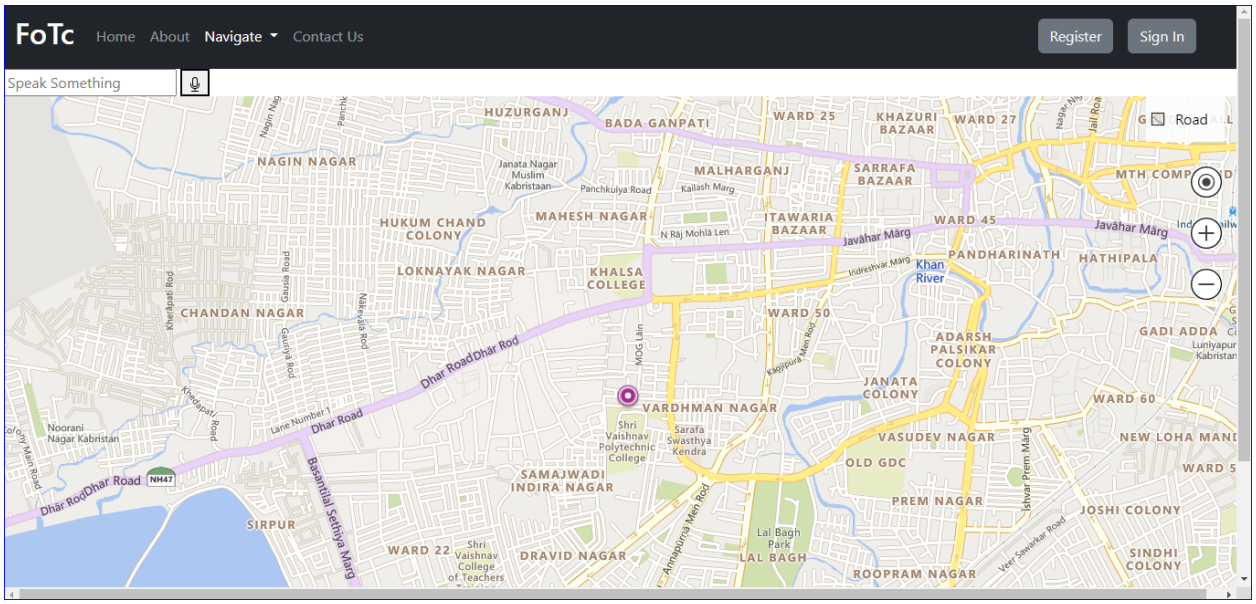


Figure : 5 Map Interface with speech recognition

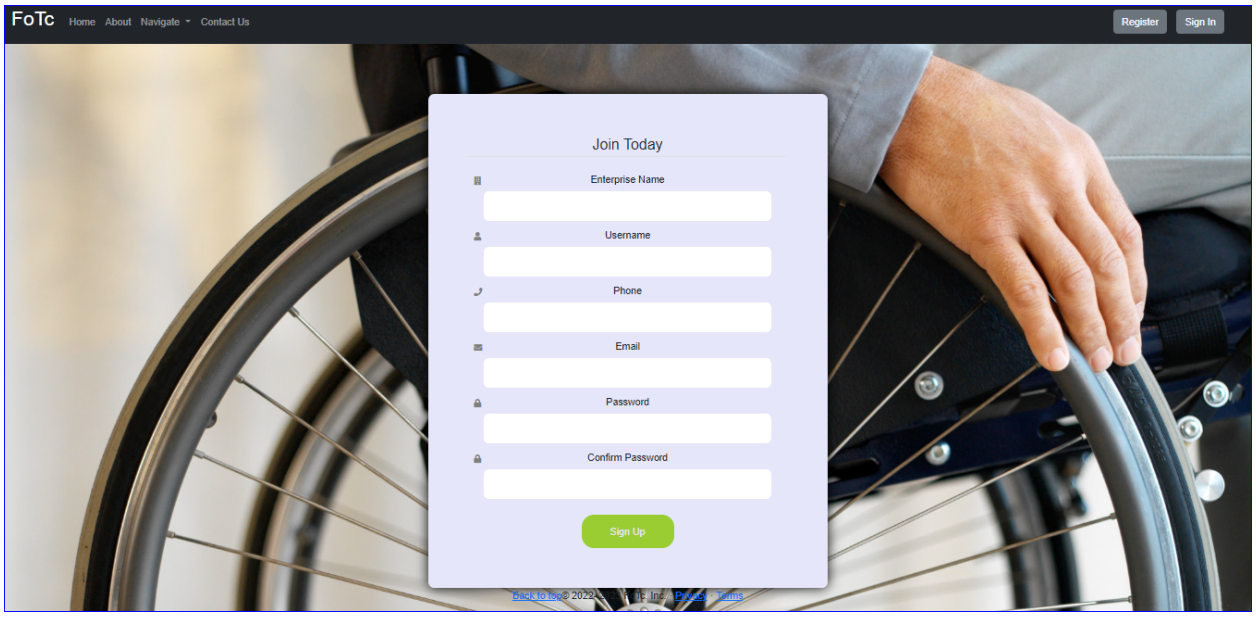


Figure 6 : Registration page

3.5 Diagrams

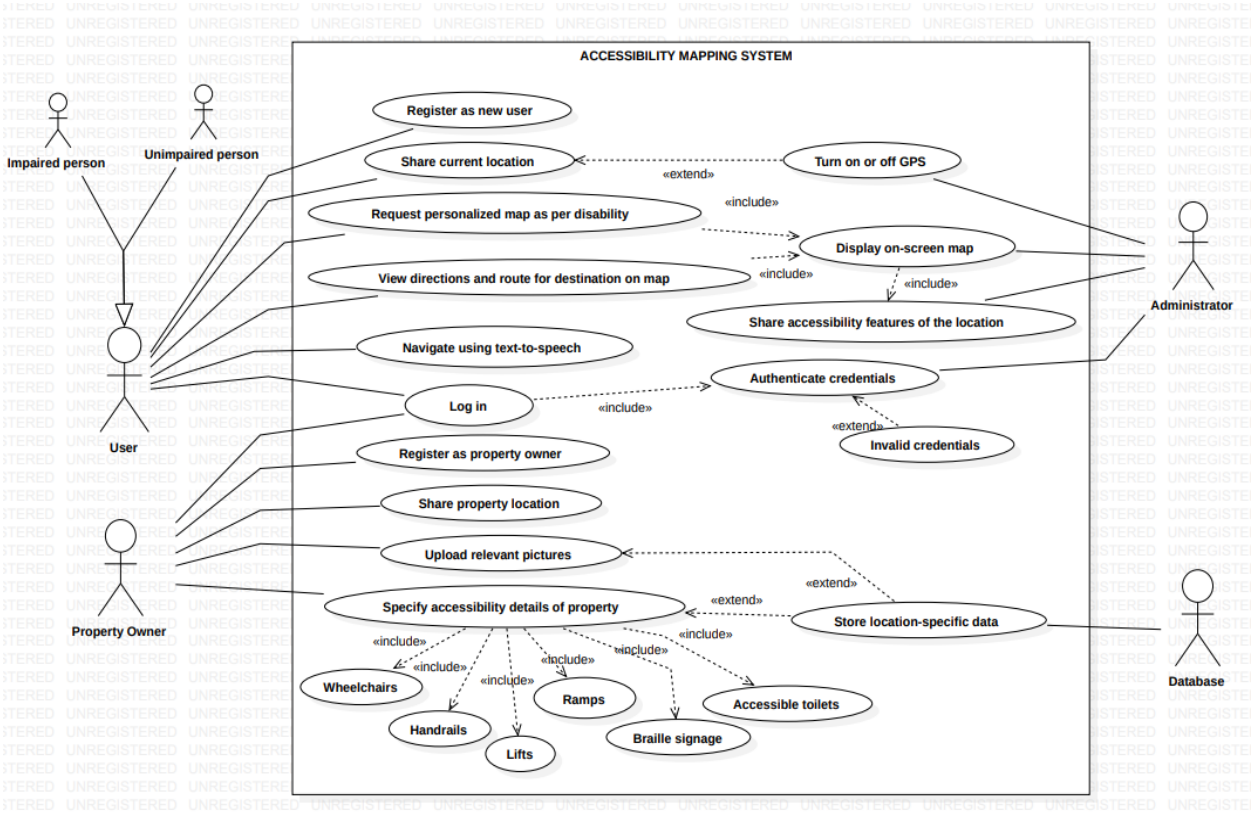
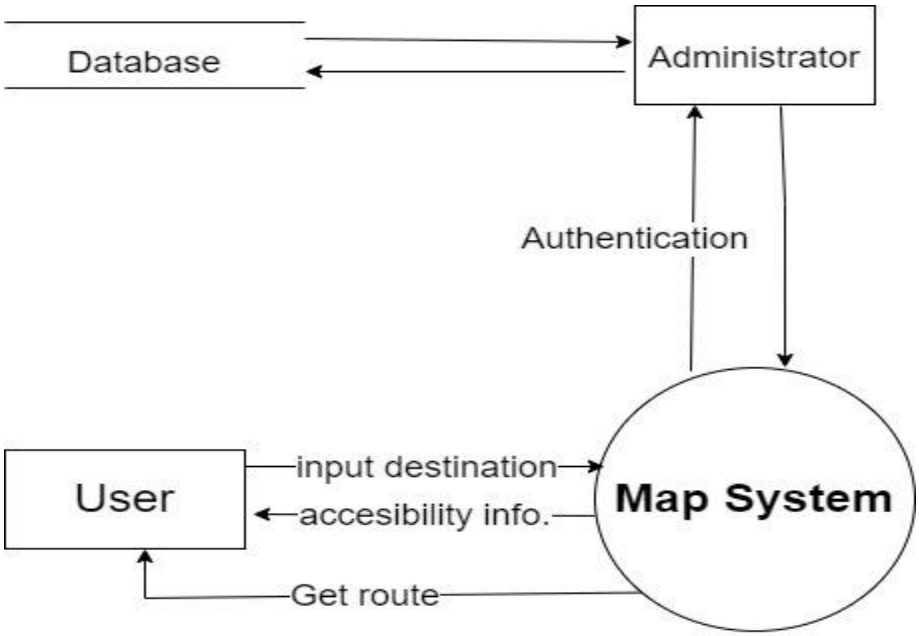


Figure 7: use case diagram

A use case is a methodology used in system analysis to identify, clarify and organize system requirements. The use case is made up of a set of possible sequences of interactions between systems and users in a particular environment and related to a particular goal. The method creates a document that describes all the steps taken by a user to complete an activity.According to the use case diagram proprietors will register themselves by giving the required details and their info will be stored in the database,after registration they can login their account and can update their details ,upload pictures etc. Users can directly search for the place where they want to visit and information of the place will display along with the accessibility status,pictures etc. User can find the direction for the place from bing maps.



Level 0

A data flow diagram (DFD) maps out the flow of information for any process or system. It uses defined symbols like rectangles, circles and arrows, plus short text labels, to show data inputs, outputs, storage points and the routes between each destination According to the DFD level 0 diagram, the user will input the destination in our map system (bing map) from the database user will get the accessibility information of the destination and he/she will get the route for the destination. DFD level 0 diagram shows the interaction between the database,administrator and the user.

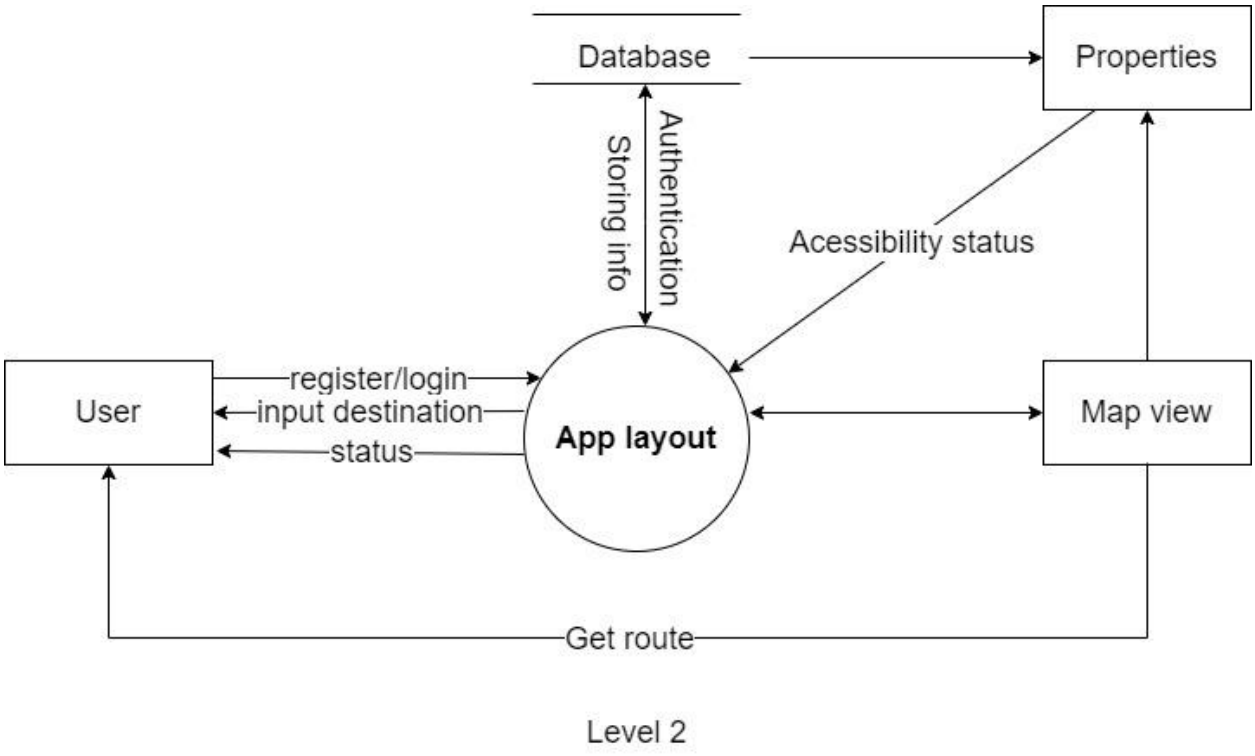


Figure 8 :Data Flow diagrams

Level 2 of the data flow diagram shows the app layout as the front end of our project user(proprietors) will register themselves and their information will store in the database. When the proprietors try to login to update their info authentication will be done by database and if the login info is match with the info which was previously stored in the database then only the app user logins the system. Now when the user(disable) will search for the place to visit app layout will show the map view and map view will search the information of the proprietors and will display the accessibility status of the place when user will select the get direction button he/she will get the route for the place.

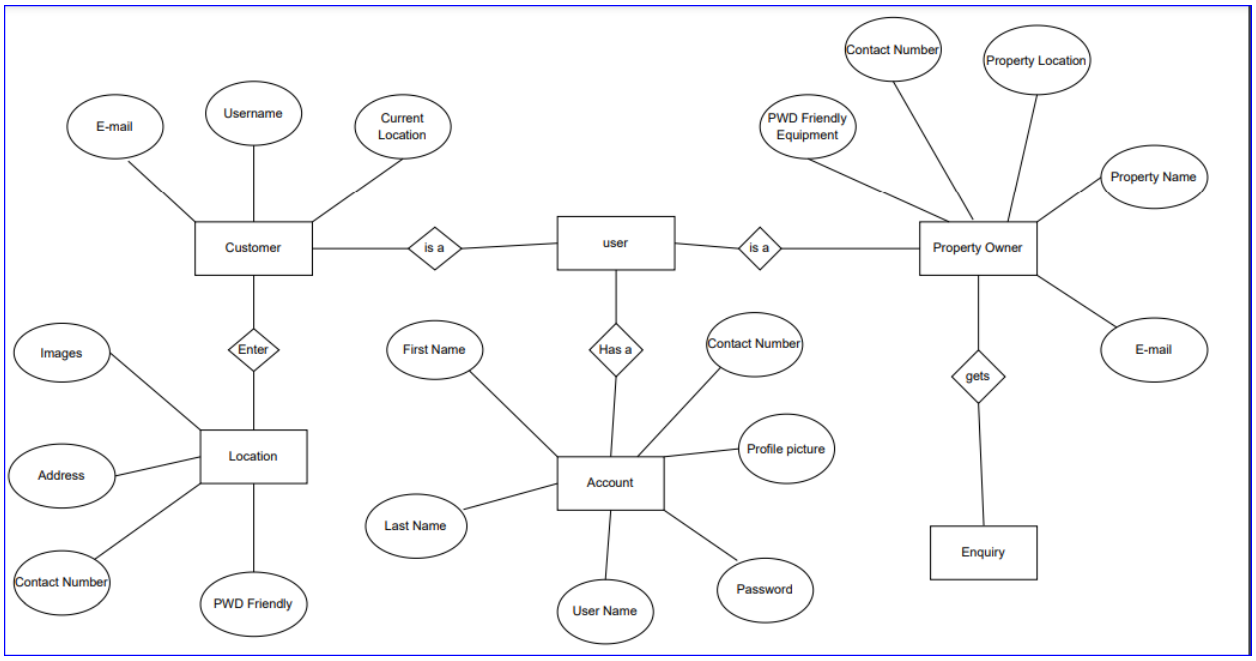


Figure 9 : ER Diagram

ER Diagram stands for Entity Relationship Diagram, also known as ERD is a diagram that displays the relationship of entity sets stored in a database. In other words, ER diagrams help to explain the logical structure of databases. ER diagrams are created based on three basic concepts: entities, attributes and relationships. ER Diagrams contain different symbols that use rectangles to represent entities, ovals to define attributes and diamond shapes to represent relationships.
This ER diagram has 5 entities Customer,user,properties,Location,account and enquiry. Customer is a user which has a username password and the email user is a disable and a property owner having property name,pictures, PWD friendly equipment and accessibility information. Customer enters the location which has route,amenities and accessibility information. Customer gets the direction for the place.

Chapter 4 . Implementation

Implementation

The Smart Accessibility Map website is designed in such a way that disable has to visit site and search for the place where he/she will find the accessibility features along with the route to go to that place. Also, the property owners can register themselves and can show their accessibility features with pictures.

4.1 Technology Used

4.1.1 Bootstrap (For Front End)

Bootstrap is a free and open-source CSS framework directed at responsive, mobile-first front-end web development. It contains HTML, CSS and (optionally) JavaScript-based design templates for typography, forms, buttons, navigation, and other interface components. Bootstrap is an HTML, CSS & JS Library that focuses on simplifying the development of informative web pages (as opposed to web apps). The primary purpose of adding it to a web project is to apply Bootstrap's choices of color, size, font and layout to that project. As such, the primary factor is whether the developers in charge find those choices to their liking. Once added to a project, Bootstrap provides basic style definitions for all HTML elements. The result is a uniform appearance for prose, tables and form elements across web browsers. In addition, developers can take advantage of CSS classes defined in Bootstrap to further customize the appearance of their contents. For example, Bootstrap has provisioned for light- and dark-colored tables, page headings, more prominent pull quotes, and text with a highlight.

- **HTML**

HTML stands for Hyper Text Markup Language. It is the standard markup language for creating web pages. It describes the structure of a web page. HTML consists of a series of elements. HTML elements tell the browser how to display the content.

- **CSS**

CSS stands for Cascading Style Sheets. It describes how HTML elements are to be displayed on screen, paper, or in other media. It can control the layout of multiple web pages all at once, and saves a lot of work. External stylesheets are stored as CSS files.

- **Javascript**

JS or Javascript is used to program the behavior of web pages. JS libraries and frameworks make website and application development easier with wide-ranging features and functionalities. In this project, JS will be mainly used in the front-end for client-side validation.

4.1.2 Bing Map API

An application programming interface (API) key is a code used to identify and authenticate an application or user. API keys are available through platforms, such as a white-labeled internal marketplace. They also act as a unique identifier and provide a secret token for authentication purposes.

Bing Maps provides Representational State Transfer APIs (REST / RESTful APIs) which are flexible, scalable, lightweight and independent. The API returns details in JSON format which can be used efficiently with pandas dataframes. Some features of Bing Maps API are:

1. *Directions*
2. *Search*
3. *Imagery*
4. *Geocoding*
5. *Elevation data*
6. *Location Recognition*
7. *Driving Directions*
8. *Pushpins*

9. *Location Search*

4.1.3 Python Libraries

Normally, a library is a collection of books or is a room or place where many books are stored to be used later. Similarly, in the programming world, a library is a collection of precompiled codes that can be used later on in a program for some specific well-defined operations. Other than pre-compiled codes, a library may contain documentation, configuration data, message templates, classes, and values, etc.A Python library is a collection of related modules. It contains bundles of code that can be used repeatedly in different programs. It makes Python Programming simpler and convenient for the programmer. As we don't need to write the same code again and again for different programs. Python libraries play a very vital role in fields of Machine Learning, Data Science, Data Visualization, etc.
Various python libraries will be used along with the Flask framework. Some notable dependencies include:

- *psycopg2*
- *logging*

4.1.4 Postgresql

SQL is a short-form of the structured query language. This database language is mainly designed for maintaining the data in relational database management systems. It is a special tool used by data professionals for handling structured data (data which is stored in the form of tables).You can easily create and manipulate the database, access and modify the table rows and columns, etc. We will use PostgreSQL for querying and pgAdmin 4 to maintain the database.

4.1.5 Flask

Flask is a micro web framework written in Python. It is classified as a microframework because it does not require particular tools or libraries. It has no database abstraction layer, form validation, or any other components where pre-existing third-party libraries provide common functions. However, Flask supports extensions that can add application features as if they were

implemented in Flask itself. Extensions exist for object-relational mappers, form validation, upload handling, various open authentication technologies and several common framework related tools.

The microframework Flask is part of the *Pallets Projects* (formerly *Pocoo*), and based on several others of them, all under a BSD license.

Werkzeug

Werkzeug is a utility library for the Python programming language for Web Server Gateway Interface (WSGI) applications. Werkzeug can instantiate objects for request, response, and utility functions. It can be used as the basis for a custom software framework and supports Python 2.7 and 3.5 and later.

Jinja

Jinja is a template engine for the Python programming language.

Similar to the Django web framework, it handles templates in a sandbox.

MarkupSafe

MarkupSafe is a string handling library for the Python programming language. The eponymous MarkupSafe type extends the Python string type and marks its contents as "safe"; combining MarkupSafe with regular strings automatically escapes the unmarked strings, while avoiding double escaping of already marked strings.

ItsDangerous

ItsDangerous is a safe data serialization library for the Python programming language. It is used to store the session of a Flask application in a cookie without allowing users to tamper with the session contents.

4.2 Testing

Testing is the process of evaluation of a system to detect differences between given input and expected output and also to assess the features of the system. Testing assesses the quality of the product. It is a process that is done during the development process. Tests can be conducted based on two approaches –

- Functionality testing
- Implementation testing

The testing method used here is Black Box Testing. It is carried out to test functionality of the program. It is also called ‘Behavioral’ testing. The tester in this case, has a set of input values

and respective desired results. On providing input, if the output matches with the desired results, the program is tested ‘ok’, and problematic otherwise.

Everything in this project is tested, testing was also done while making this project simultaneously and after making the project.

4.2.1 Test cases

A test case is a specification of the inputs, execution conditions, testing procedure, and expected results that define a single test to be executed to achieve a particular software testing objective, such as to exercise a particular program path or to verify compliance with a specific requirement.

Test cases for this project:

- **Test cases for Registration form**

1. Verify that the Registration form contains Username, First Name, Last Name, Password, Confirm Password, Email Id, Phone number,Enterprise name, Location, Verify that tab functionality is working properly or not
2. Verify that Enter/Tab key works as a substitute for the Submit button
3. Verify that all the fields such as Username, First Name, Last Name, Password and other fields have a valid placeholder.
4. Verify that the labels float upward when the text field is in focus or filled (In case of floating label)
5. Verify that all the required/mandatory fields are marked with * against the field
6. Verify that clicking on submit button after entering all the mandatory fields, submits the data to the server
7. Verify that the system generates a validation message when clicking on submit button without filling all the mandatory fields.
8. Verify that entering blank spaces on mandatory fields lead to validation error
9. Verify that clicking on submit button by leaving optional fields, submits the data to the server without any validation error
10. Verify that system generates a validation message when entering existing username
11. Verify that the validation of all the fields are as per business requirement.
12. Verify that the validation of email field by entering incorrect email id
13. Verify that the password is in encrypted form when entered
14. Verify whether the password and confirm password are same or not.

- **Test Cases for Login form**

1. Verify if a user will be able to login with a valid username and valid password.
2. Verify if a user cannot login with a valid username and an invalid password.
3. Verify the login page for both, when the field is blank and Submit button is clicked.
4. Verify the messages for invalid login.
5. Verify if the data in password field is either visible as an asterisk or bullet signs.
6. Verify if the ‘Enter’ key of the keyboard is working correctly on the login page.
7. Verify the time taken to log in with a valid username and password.
8. Verify the login page and all its controls in different browsers.

- **Test Cases For Upload features form**

1. Verify if a user will be able to upload pictures.
2. Verify if all fields are working properly.

- **Test Cases for Layout page GUI**

1. Testing the size, position, width, height of the elements.
2. Testing of the error messages that are getting displayed.
3. Testing the different sections of the screen.
4. Testing of the font whether it is readable or not.
5. Testing of the screen in different resolutions with the help of zooming in and zooming out like 640 x 480, 600×800, etc.
6. Testing the alignment of the texts and other elements like icons, buttons, etc. are in the proper place or not.
7. Testing the colors of the fonts.
8. Testing the colors of the error messages, warning messages.
9. Testing whether the image has good clarity or not.
10. Testing the alignment of the images.
11. Testing of the spelling.
12. The user must not get frustrated while using the system interface.
13. Testing whether the interface is attractive or not.
14. Testing of the scrollbars according to the size of the page if any.
15. Testing of the disabled fields if any.
16. Testing of the size of the images.
17. Testing of the headings whether it is properly aligned or not.
18. Testing of the color of the hyperlink.

- **Test Cases for Map**

1. Verify map is displayed on clicking the get direction and search locations.
2. Verify on entering the location of place, place is displayed in maps.
3. check for any location/business address in the selected area.
4. Check whether Zoom in works for a clear view.
5. check directions click on ‘Get Directions’ and type locations A and B and click on ‘Get Directions’; should display directions to reach B from A.
6. Check for street view click on ‘Street View’ button and view should be displayed.
7. Verify accessibility status and features are showing .

4.2.2 Test Results

Test Cases	Executed	Passed	Pending	Performance (positive/negative)
Registration form	100%	100%	0	Positive
Login form	100%	100%	0	Positive
Upload Features	100%	100%	0	Positive
Home page	100%	99%	1%	Negative
Map	100%	100%	0	Positive

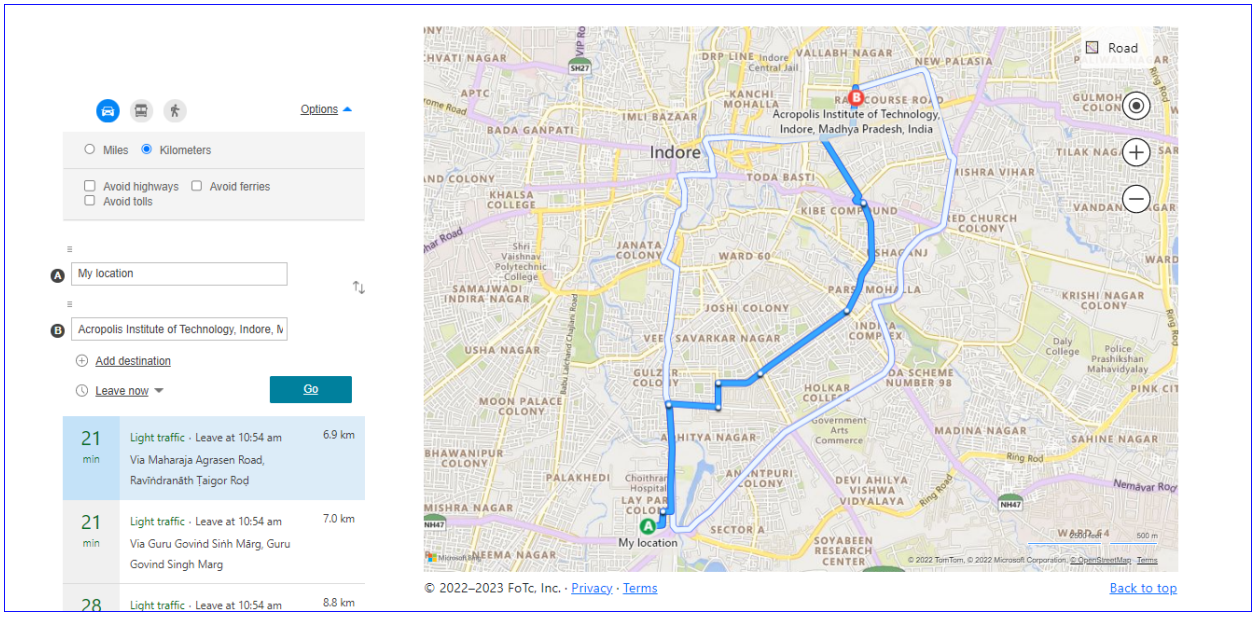


Figure10. Showing Direction on Bing Map

Figure11. Validation field

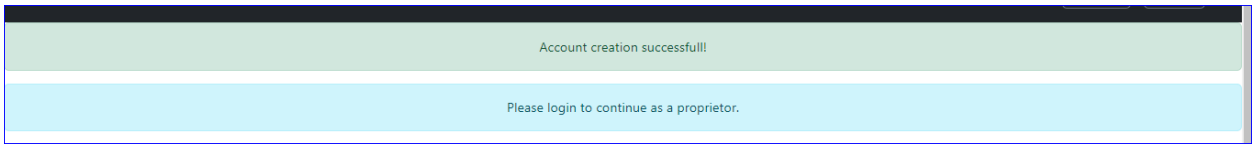


Figure 12. Colour-coded Flash Messages

Chapter 5.Conclusion

Conclusion

The disabled people have difficulties in accessing various facilities. They cannot easily move due to the discriminatory manner buildings were built. Visually impaired people would have difficulties in finding bus stops as not every bus stop has guiding tracts and not every bus has the facility to provide a slope for people on the wheelchair to get on and off the buses. Minibuses and trams do not have audible announcement systems and mostly make use of stairs, which causes inconvenience for people with impaired vision, hearing or walking impairment. Some MTR stations are not equipped with or only have one lift or lifting platform for people in wheelchairs. Sometimes a wheelchair person doesn't get the proper location and they might reach somewhere else. This friendly map android application will help disabled people to find the way on their own just by speaking up on the phone. This android application will ask for the desired place where the person wants to reach and guide navigation.

In this Project we've created a smart map for disabled people with Bing Maps API with Python. We've used the Geocoding API to fill in information in a database. We have used HTML, CSS, Bootstrap for front end development of the project.We have also use PostgreSQL for maintaining the data in relational database management systems.

5.1 Limitations

- **Speed**

Speed, or the lack of it, can be a major issue. Since it is an interpreted language, Python can be slower than other compiled languages.

- **Lack of mobile computing and browsers**

It is strong in desktop and server platforms but weak in mobile platforms. There have only been a handful of smartphone apps developed using Python, and the language is rarely seen in the client-side of web development applications.The language is also not present in web development browsers. The major reason for this is that it is difficult to secure.

- **Design restrictions**

Python has some major design restrictions in the language because it is dynamically typed. This requires more testing and errors to turn up only during runtime. The language's global interpreter lock means that just one thread can access Python internals at any time.

5.2 Suggestion and Recommendations for Future Work

- The website interface would be more vibrant.
- gTTS features should be improved.
- Should be more informative.
- Interface should be enhanced for ease of accessibility. Proprietors

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Guide Interaction Sheet

Acropolis Institute of Technology and Research, Indore

Computer Science and Engineering Department

PROJECT - LOG BOOK

Project Title:	*Web assistance for physically disabled people*		
Team Name:	Friends of the Community (FoTc)	**Team Id:**	
Coordinator 1 Name:	Priyanka Jangde	**Semester:**	5th
Coordinator 2 Name:	Narendra Pal Singh Rathore	**Section:**	CS-1
Technology:	Python, JS, Flask, PostgreSQL, CSS, REST API	**Domain:**	Web Development

S No	Enrollment	Team Member Name	Mobile Number	Email Id	Role
1	0827CS201011	Abhishek Rawat	9981655308	abhishekrawat20210@acropolis.in	developer(frontend,backend)
2	0827CS201018	Aieshah Nasir	8989941066	aieshahnasir20729@acropolis.in	developer(frontend,backend)
3	0827CS201020	Akshat Singh Gour	9109643353	akshatsingh20037@acropolis.in	developer(frontend,backend)
4	0827CS201021	Akshat Singh Rathore	8349309934	akshatrathore20505@acropolis.in	developer(frontend,backend)

S No	Meeting Date	Summary of Work & Discussion	Member Present	Remarks/ Suggestions Given	Guide Sign
1	05/08/22	Work distribution & dicussion on synopsis. Made ER, DFD diagrams.	Abhishek, Aieshah, Akshat, Akshat		
2	10/08/22	Built frontend: homepage, register page done	Abhishek, Akshat, Akshat		
3	17/08/22	worked on backend, completed the python code of finding destination's latitute and longitude.	Abhishek, Aieshah, Akshat Rathore		
4	24/08/22	got Bing Maps API key, made ppt & synopsis for presentation, frontend layout almost completed.	Abhishek, Aieshah, Akshat Rathore		
5	26/08/22	project presentation: progress + demo of implemented code with Q&A	Abhishek, Aieshah, Akshat, Akshat		
6	07/09/22	worked on DBMS using PostgreSQL	Abhishek, Aieshah		
7					
8					
9					
10					

S No	Due Date	Particular	Submission Date	Observations	Guide Sign
1		Team Formation			
2		Project Title			
3		Synopsis			
4		Synopsis Presentation			
5		Design Diagrams			
6		Paper Publication			


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SPECIAL APP FOR SPECIAL COMMUNITY