

Binghamton University Outdoor Map

Zeynep Uslu
Binghamton University
Department of Computer Science
Binghamton, USA
(607) 232-7413
zuslu1@binghamton.edu

Mehmet Karahan
Binghamton University
Department of Computer Science
Binghamton, USA
(607) 768-5880
mkaraha1@binghamton.edu

ABSTRACT

The outdoor maps are used in our daily lives. It enhances the quality of our life. Thanks to these kind of applications people can go to from a specific point to another. These kinds of applications improve safety, efficiency of people's life. These apps achieve their goals by continuously monitoring their movement and accessing their location and it benefits from the network and the GPS services of smartphones. However, these applications usually target consumers who have no disability, although they would be very helpful for disabled people.

In this paper, we are going to introduce our project; Binghamton University Outdoor Map, which is intent to solve problems visually, impaired students of Binghamton University. Binghamton University Outdoor Map is an android application designed to access android smart devices GPS and network to guide the users without the need of outside assistance. This application facilitates the users work by providing a particular map for campus, which involves each building in the Binghamton University Brain. Moreover, reading directions and the destination's name out loud to user helped us to achieve our goal to create a full-fledged application for visually impaired students.

General Terms

Design, Experimentation, Algorithm

Keywords

Outdoor map, Polyline, Google Maps API, Google Directions API

1. INTRODUCTION

Nowadays we have applications for every area of our daily lives. Applications are easy to access and usually free therefore they are one of the essential technological innovations for everyone. The most common applications, which address every smartphone user, are navigation applications. They are helpful for anytime we need to travel somewhere we do not know or not familiar with. The option for specifying the vehicle for transportation also makes them very useful for users since they provide the shortest route for the destination. Although it is an undeniable fact that these applications makes users' lives a lot easier, they are not really applicable for disabled people especially visually impaired individuals who can take advantage of these applications the most. With our application, Binghamton University Outdoor Map we aim to propose a convenient navigation system peculiar to Binghamton University campus for visually impaired students. The application works only for Binghamton University and provides destinations in order to prevent user to get confused and lose time.

2. DESIGN

In this part of the project, the high level design and the connection between front end and the back end are going to be explained. Due to the fact that Binghamton University Outdoor Map is an mobile application, we did not need to create a detailed plan for designing the front end like in the website or desktop application. However, we had meet with some design criteria in order to provide a practical and easy interface for visually impaired users to get accustomed to the application in a short time.

2.1 User Interface

The user interface of the application consists of a Google Map layout, a list of the buildings in the campus and the written directions for the calculated route.

2.1.1 Map Layout

Google Maps API has been used to provide the Binghamton University map. We limited the area that the Maps API going to work by Binghamton University bounds. As soon as application is forced to run, it creates a marker on the user current location and calculates to route from there to University Union which is the default destination value. After calculating the route, application shows the directions on the left bottom corner and read them out loud to the user.

2.1.2 Spinner

This is the tool that we benefited from for holding the buildings names as destinations. Spinner is located on the top left corner of the interface. Starting from University Union, this list provides each building in the Brain (except dormitories). As user selects that she would like to go from the list, application reads the name out loud and gives the directions for selected the destination.

2.1.3 Direction

This part of the application is calculated as the user selects her destination. Application takes user location as the starting point and calculates the route accordingly. After calculation is done, the written instructions are shown up on the left bottom corner and application reads them to the user step by step.

3. IMPLEMENTATION

This application is designed for getting giving directions to the user in Binghamton University Brain. In order to complete this part, Google Maps and Directions API's are used in order to provide map and directions. The project is registered to the Google Developer console to access the API's, before it is started to build.

android.os.Bundle;
android.os.IBinder;

This class is responsible for finding the current location of user and returns the value as latitude and longitude.

getLocation function implements a location manager object which controls nearly every settings in the application(network connection, GPS connection, time intervals for updates etc.). Program moves with checking the settings of Network and GPS connections. According to their situation program sets up the location manager and access the user's last known location coordinates. Using the locationManager sets up every update in the program. getLatitude and getLongitude functions are not build-in, the location's latitude and longitude values are returned in these functions.

3. Google_maps_api.xml

An automatically created xml file when the layout is set up the Google Activity. I specified my google API key here to access the direction and maps APIs.

4. AndroidManifest.xml

I indicated the permissions that I needed for my applications the work and the API key in this file. The permissions that I used are :

- ACCESS_NETWORK_STATE
- WRITE_EXTERNAL_STORAGE
- READ_GSERVICES
- ACCESS_FINE_LOCATION
- ACCESS_COARSE_LOCATION
- ACCESS_FINE_LOCATION

The other attributes in this file created automatically.

4. EVALUATION

In this section the conditions which users can encounter are going to be explain. The user cases are divided into two sections: Inbound and Outbound

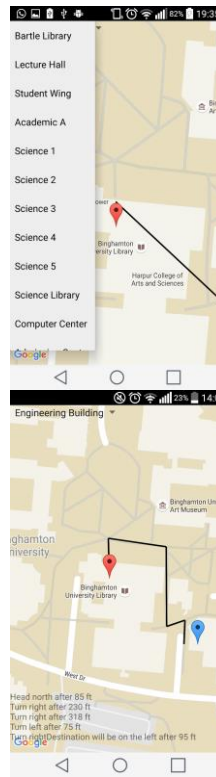
4.1 Inbound

Application is designed to give directions inside the Binghamton University campus. So in this part, we are going to demonstrate how the application responds when it is run in the Binghamton University bounds.

First of all, application detects your location and indicate that by a red marker. The default destination is set the UNiversity Union therefore application automatically gives user the directions from her current point to the Union as soon as user opens it.

Image insert

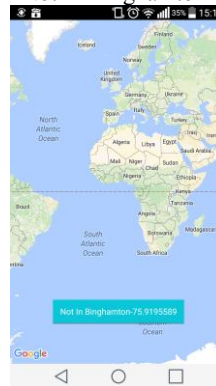
When user wants to pick a destination she can display her options by using the top-down list (spinner) to select her destination. As soon as she clicked an option(building name sin the campus) the name of the destination name and the directions are going to be read out loud to the user.



Application also updates the user location as she walks. However, it does not follow user second by second therefore the location update is slow.

4.2 Outbound

The aim of the Binghamton University Outdoor Map is creating a particular map tailored for Binghamton University. Therefore we limited the application by four location points which so that the application is going to encircle Binghamton University. When user tries to run the application outside the Binghamton University, application gives a toast which includes a warning as "Not in Binghamton University".



4.3 Limitation

The application requires users to turn on the GPS and the location services on their Android devices or else the application gives a warning stating the application cannot be started.

5. REFERENCES

- [1] "Markers." Google Developers. Google, n.d. Web. 12 May 2016.
- [2] "Camera and View." Google Developers. Google, n.d. Web. 12 May 2016.
- [3] "Process and Threads." Developer.Android.N.p., n.d. Web. 12 May 2016.
- [4] "Map Objects." Web log post. Google Developers. N.p., n.d. Web. 12 May 2016