# iOS Application for Guiding Visually Impaired People at the University of Alicante

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**Abstract.** This paper shows the development of an iOS application to guide visual disabled people at the University of Alicante by voice indications. The user interface has a bigger visual typography and a bigger contact buttons area. Moreover, the application provides voice indications when the user touches any of the elements in the interface.

**Keywords:** Mobile application, Visual disabled people, Voice messages, iOS.

## 1    Introduction

This paper shows an application to guide people with visual disability at the University of Alicante. This application has been developed for mobile devices, specifically for iOS [1, 2].

General applications oriented to visual disabled people area available. J. Roig [3] has developed "OnTheBus", which is an application to guide blind people by by voice (only Android operating system). Sergio Macetti [4] presents "ZebraLocalicer", which is an application to find crosswalks in cities for blind people. Related to voice guidance, we can find "WalkyTalky" [5]. Google also has another application called "Intersection Explorer" [6]. Moreover, we find "Kapten for Smartphone" [7], a GPS navigation app with a fully vocal and accessible user interface.

Paper is organized as follows: Section 2 deals with the methodology and procedure carried out. In Section 3 we report the experimental results of the algorithm. Finally, in Section 4 we show the main conclusions.

## 2    Development of the Application

### 2.1    Resources

The development of the new application has been possible by means a variety of tools that Apple provides for developing applications in iOS. We have employed Xcode [8]. Also, we have used the universities license provided by Apple, known as iOS Developer University Program (Licensed to the University of Alicante). We use the other app of the University of Alicante (iUA) to access the buildings data. [9].

## 2.2     User Interface and Map Controller

The application provides two functionalities: first, a guide to go to any particular building along the Campus and on the other hand, an audio database with a brief description of the different buildings around the user. Thus, the interface presents two different tabs.

The main element of the application is the map view controller [10] since it's in charge to control, at any time, the position of the user and the direction towards which the phone device is pointing, to generate the proper indication in each situation: go straight, turn right, turn left, turn around.

Our controller also checks the position where we are, in order to adapt the view of the map to the characteristics of each function, showing only the position of the building where we want to go, or all the other buildings around us. This controller changes the message with vocal indications according to each situation whenever the user touches on the map view.

Once the application knows where the user is pointing, it generates a message through a set of conditional blocks (Fig. 1). The emitted message by the app has two indications for guiding the user: go "forward / back" and turn "left / right".
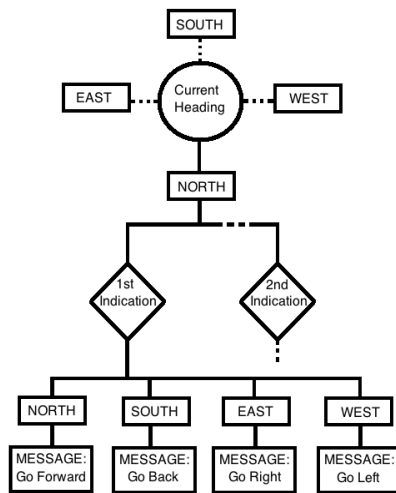


**Fig. 1.** Conditional blocks for generating voice message in "OrientatUA". If the user is taking a wrong route, the app corrects him. The user can check if he is on the right track at any time just by touching on the screen.

## 3     Results

Table 1 shows the data used by our application to generate voice messages along the route. In this example, the route begins at the campus entry and goes until the Science building of the University of Alicante.   Fig. 2 shows four indications of the route that the user should follow.

**Table 1.** Data for generating voice messages in "OrientatUA"

| Positions | Latitude | Longitude | Pos_Lat | Pos_Long | Dist_A – Dist B (m) |
|---|---|---|---|---|---|
| Building | 38.3872 | -0.5134 | -------- | -------- | -------- |
| Position #1 | 38.3865 | -0.5113 | NORTH | WEST | 300 – 300 |
| Position #2 | 38.3863 | -0.5124 | NORTH | WEST | 200 – 150 |
| Position #3 | 38.3870 | -0.5128 | NORTH | WEST | 100 – 100 |
| Position #4 | 38.3872 | -0.5136 | NORTH | EAST | 50 - 20 |



(a)                                    (b)



(c)                                    (d)

**Fig. 2.** App running. Steps to locate the Science building (University of Alicante)

Voice messages:

(a) Voice message, Position# 1: "The building you are looking for is about three hundred meters to the forward direction and about three hundred meters to the right".

(b) Voice message, Position# 2: "The building you are looking for is about three hundred meters to the right and about one hundred meters to the forward direction".

(c) Voice message, Position #3: "The building you are looking for is about one hundred meters to the left and about one hundred meters to the forward direction".

(d) Voice message, Position #4: "The building you are looking for is on your right."

## 4     Conclusions

In this paper we have shown an application to guide visual disabled people at the University of Alicante. The application works properly and provides the right indications in every moment for all the buildings of the Campus, with an accuracy of 100%. The application can be easily updated to new facilities by just updating the database with the new information about the position of the buildings. Currently, we are implementing the application "OrientaUA" for Android OS devices.

For future development, we would like to adapt this application to the iPad device, and including the voice messages information about the estimated time to reach any destination, based on the speed at which the user walks. Moreover, a new tab with language selection will be also included.

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