



*Southern
Sweethearts*

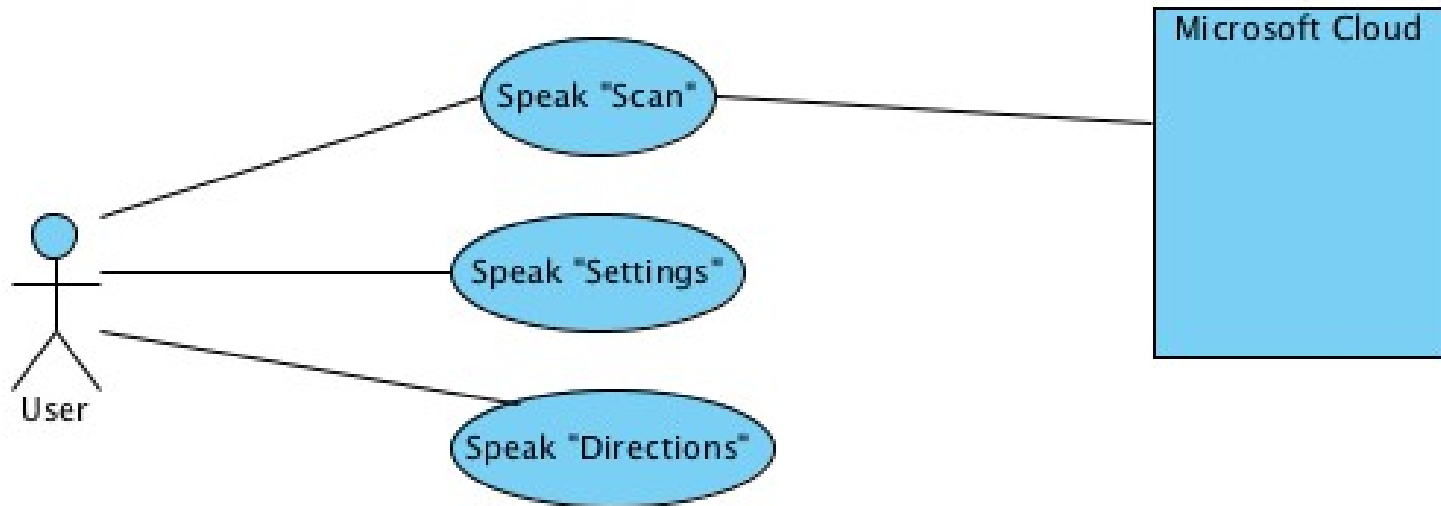
DIGITAL EYES

Digital Eyes Overview

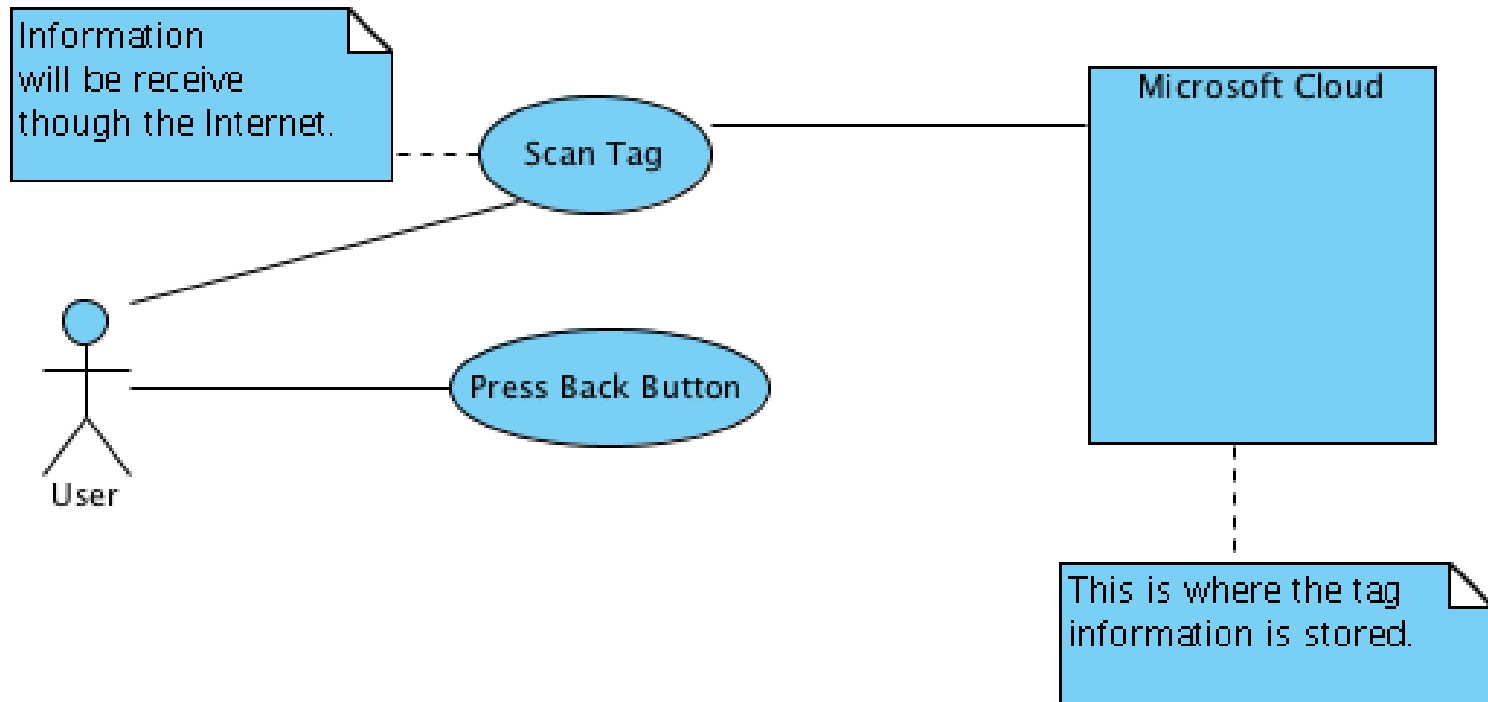
- ★ Windows Mobile app that gives vocal directions within buildings.
- ★ App intended for those with vision impairment, those who are blind, or those who simply get lost easily.
- ★ App is geared towards university students finding classes on campus.
- ★ Uses phone camera to scan Microsoft tags at doors, entrances, and permanent fixtures to hear room numbers and other information about the building.
- ★ Users speak into phone's microphone indicating room numbers or certain types of rooms they might want to visit and app gives audio directions to specified location.



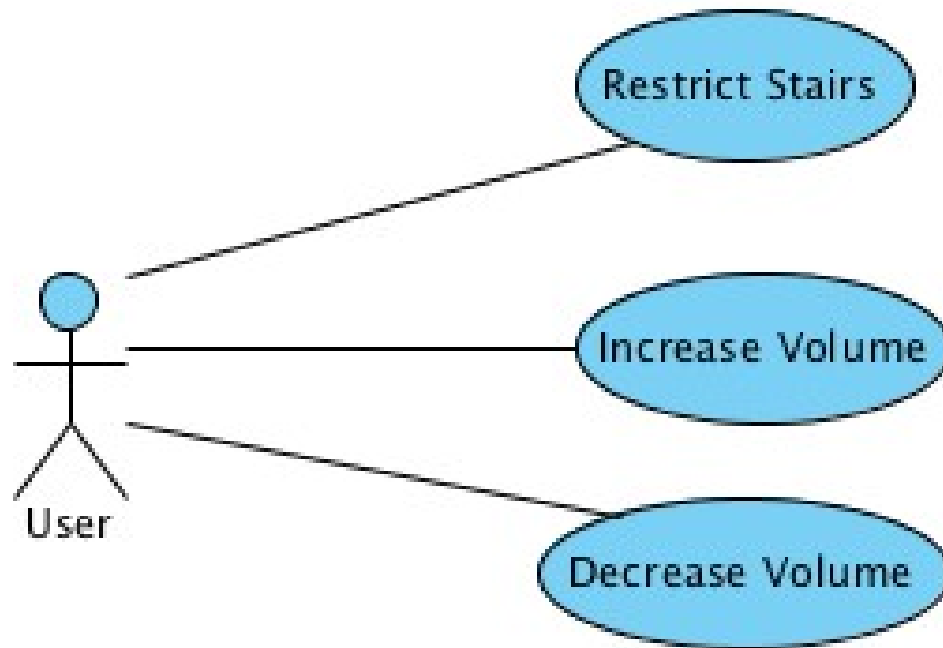
High Level Use Case Diagram



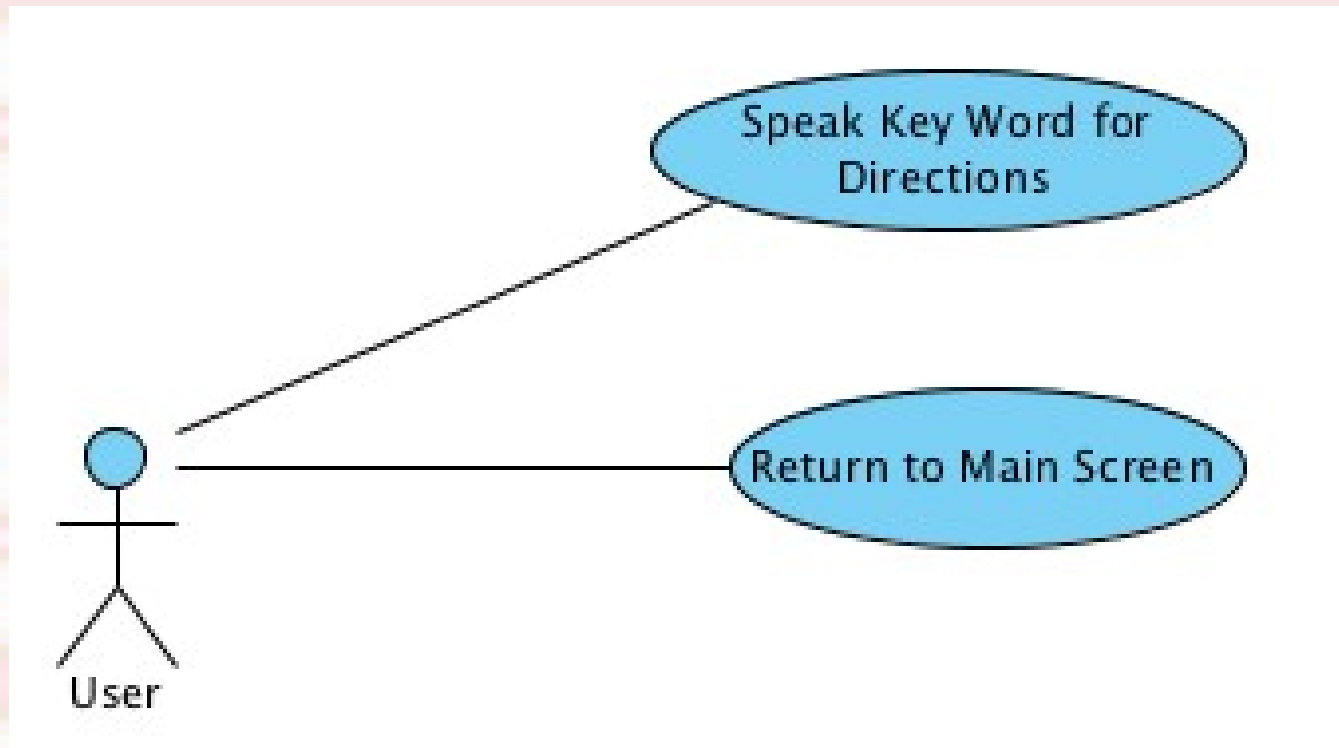
Speak “Scan” Use Case Diagram



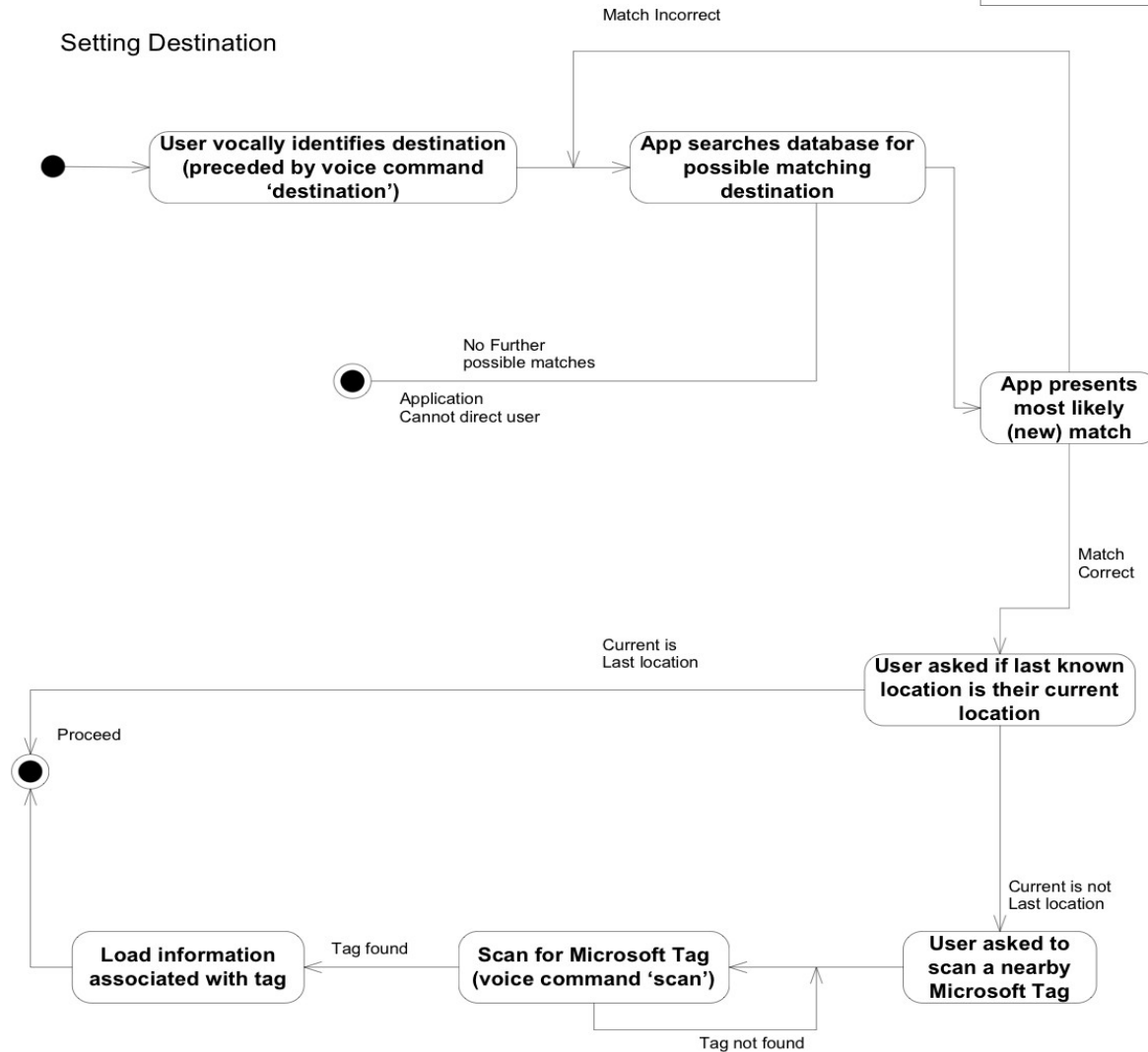
Speak “Settings” Use Case Diagram



Speak “Directions” Use Case Diagram



Activity Diagram 1

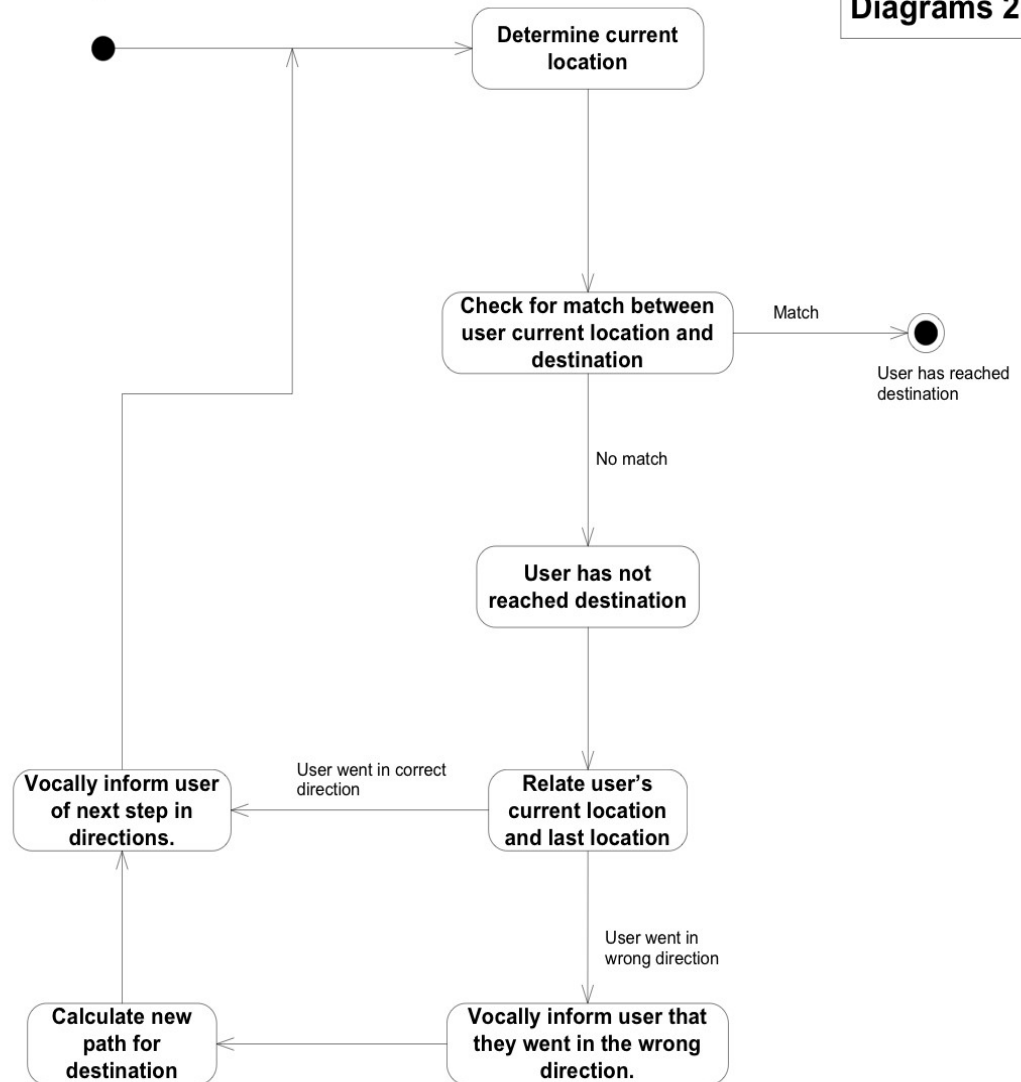


Overall Activity Diagram

Activity Diagram for Path Calculation

Destination Has Been Set:
Application Directing User

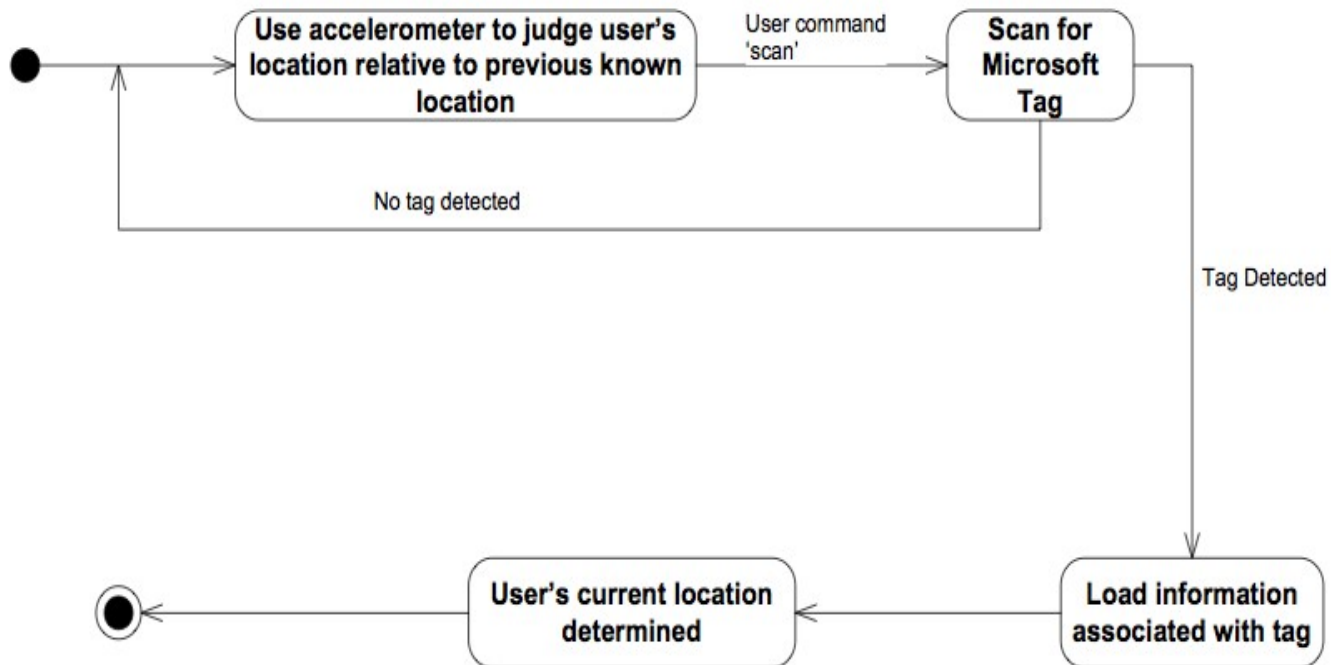
Activity Diagrams 2



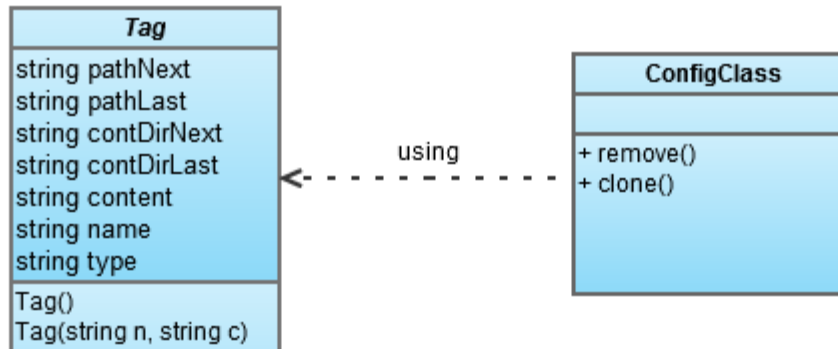
Activity Diagram for Determining Current Location of User

Determining User Current Location

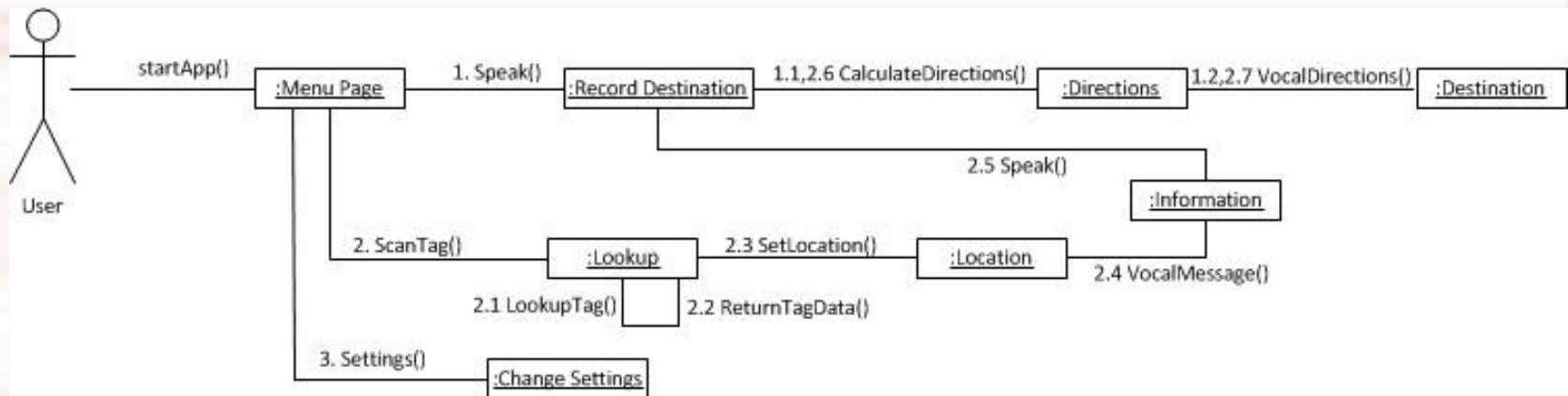
Activity Diagram 3



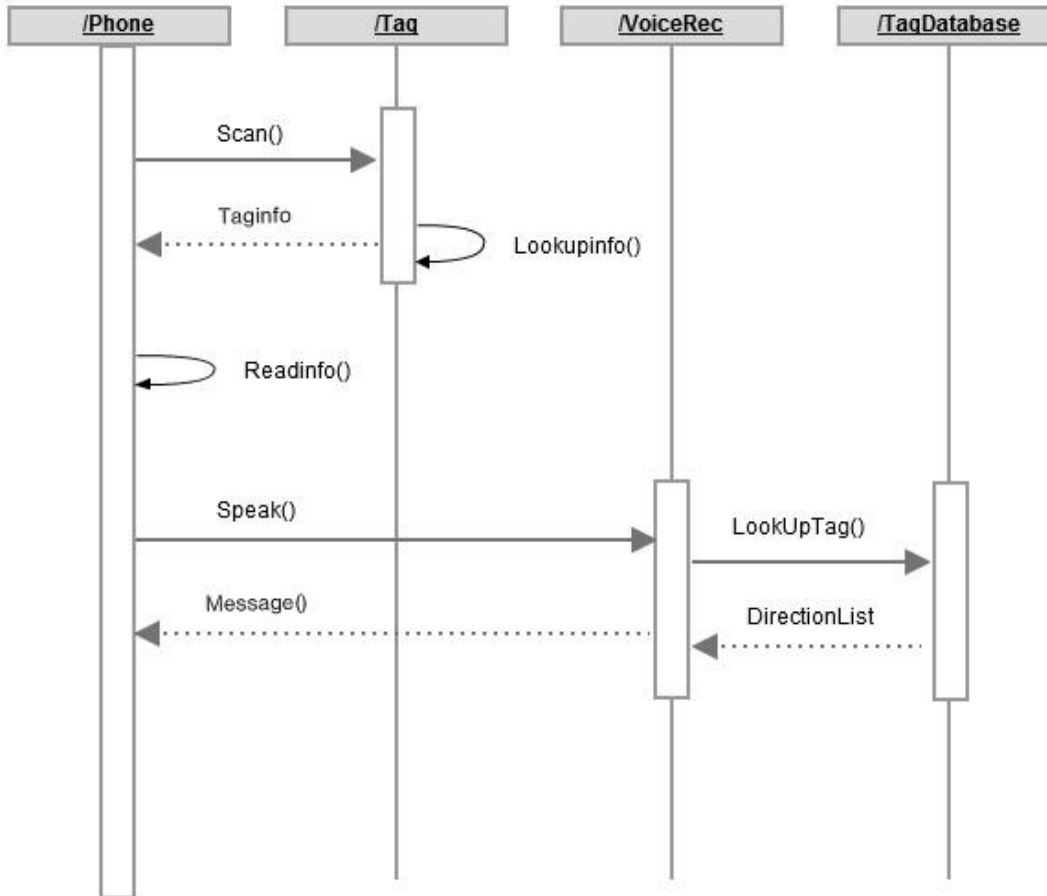
Overall Class Diagram



Collaboration Diagram



Sequence Diagram



**Sequence
Diagram**

Test Case # 1

Use Case Name Load Digital Eyes

Use Case Flow Basic Flow

Objectives Verify that the application loads.

Preconditions User is familiar with basic phone functions.

Input The user selects application on phone app screen.

Expected Results Digital Eyes main app screen loads.

Tester Name Southern Sweethearts

Test Date

Actual results Pass

Additional Comments

Test Case #	2
Use Case Name	Speak "Scan"
Use Case Flow	Basic Flow
Objectives	Verify that voice recognition works properly and follows the appropriate protocol for the scan function.
Preconditions	User has successfully loaded application and is familiar with the application.
Input	User speaks clearly "Scan" into the phone.
Expected Results	The phone recognizes the command and the Microsoft Tag Reader appears on the screen.
Tester Name	Southern Sweethearts
Test Date	
Actual results	Pass
Additional Comments	

Test Case #	3
Use Case Name	Change “Settings”
Use Case Flow	Basic Flow
Objectives	Verify that the settings change according to user input.
Preconditions	User has successfully navigated to the settings screen.
Input	User chooses a different background color in given palette, changes text color and increases text size.
Expected Results	The phone recognizes the chosen changes and updates the new settings to the screen.
Tester Name	Southern Sweethearts
Test Date	
Actual results	Pass
Additional Comments	

Test Case #	4
Use Case Name	Receive directions
Use Case Flow	Basic Flow
Objectives	Verify that directions are formed accurately..
Preconditions	User has successfully loaded the scan screen.
Input	User scans tag nearest their location and identifies destination.
Expected Results	The phone recognizes the scanned tag as well as the future destination and outputs directions to the screen while reading them aloud.
Tester Name	Southern Sweethearts
Test Date	
Actual results	Pass
Additional Comments	

Imagine Cup

- ◆ Theme: Imagine a world where technology helps solve the toughest problems.
- ◆ Competitions: Software Design and Windows Mobile 7



Imagine Cup 2011

HONORABLE MENTION

Andrea Torske

Name

Southern Sweethearts

Team

Mark Hindsbo

Mark Hindsbo, Vice President-Developer & Platform Evangelism

imagine  cup™ | USA
by Microsoft



US Software Design Semi-Finalists

...and



Melissa Bowman, Andrea Torske, Elizabeth Williams, Leah Boling

University of Alabama Computer Science Department, Dr. Jeff Gray

Problem

Every 7 minutes someone in the United States loses their sight. According to the Research to Prevent Blindness, there are fifteen million blind and visually impaired people in the United States alone. The Braille Institute states that visual impairments affect the lives of nearly five million preschool-age children and approximately twelve million school-age children. To put those numbers into perspective, one in twenty children age three to five and twenty-five percent of children from the ages of six and seventeen are affected by a vision problem. With a visual impairment, one has to discover a way to navigate through the world. Only two percent among the legally blind use a guide dog and only thirty-five percent use a directional long-cane to guide them. This leaves sixty-three percent of the visually impaired with a need for an alternative guide. There is a deep need for new research that can advance the technology offered to those who are challenged by mobility and navigational restrictions. Several technology options exist to assist the visually impaired in navigating outdoors. Such technologies are often based on GPS and location-aware sensing. However, such an approach does not work indoors where the satellite signal strength is too low. If those affected by visual impairments had access to technology that could help them navigate throughout buildings and increase the perception of their surroundings, they could be assisted with common daily tasks that they encounter related to work or general activities.

Project Flow



Digital Eyes

Project Details: Our project is a Windows Phone 7 application that assists the visually impaired navigate inside buildings. The application interfaces with posted Microsoft Tags and guides the user to their specified destination inside of a building.

Possible Destinations:

- Common features of the building:
 - Restrooms
 - Nearest exit
 - Vending machines
 - Room numbers

Navigation within buildings:

Our product is unique for several reasons. Although GPS is included on almost every Smartphone, navigation within buildings is not currently well supported. With Digital Eyes, we are combining indoor navigation using tag technology and the phone's on-board accelerometer to create a more interactive experience for the user.

Vocal interaction with phone:

The application will be accessible fully through vocal commands. A user of our technology will be able to hear information about rooms and other points of interest within a building. Our product also allows users to set restrictions for their navigation around the building, such as avoiding stairs.

The experimental evaluation of our project will be performed by:

- 1) classmates who will use the system blindfolded, and
- 2) students on our campus, identified by the Office of Disability Services, who are among those in the target population of vision impaired students.

Calculating the User's Path



Technical Details

Technology Used:

- Microsoft Tags (associated with Microsoft Tag Reader)
- Voice recognition
- Phone with the Windows Phone 7 operating system
- Routing algorithm to determine the shortest path to the user's desired destination

Application Requirements:

- Internet Access

Project Details:

- The user will interact vocally with the application
- Keywords such as 'find restroom', 'find room 345', or 'exit' will be captured by the phone's microphone
- The phone will respond with verbal step by step directions to obtain the intended destination
- The user's starting location, or current location, will be determined by the user scanning a Microsoft Tag, placed directly above the existing Braille room tags.
- Any movement the user makes will be tracked using the phone's accelerometer. It will track the user as they proceed to their destination and voice the next instruction as the user approaches the appropriate area.
- The user can also simply request information about their current location by scanning the nearest Microsoft Tag. The phone will read the room information out loud using text-to-speech.

Windows 7 Phone scanning a Microsoft Tag



Determining Current Location of User



Conclusion

Digital Eyes has the potential to be a transformative technology offering practical capabilities as a navigational aid for the visually disabled. There are also many intriguing and extremely viable options for future expansion of the application.

About the Users:

- Used mainly by the visually impaired as a navigation aid inside of buildings.
- Intends to make navigation easier for those with partial or total visual disability.
- Though the application's core impact will be focused toward helping the visually disabled gain independence and mobility, this does not preclude others from using the application. Vocal directions also could be used by sighted users. The application could be used by anyone who needs to find their way through an unfamiliar or confusing building complex. The application's directions could also be very useful for those who are frequently lost inside of buildings.

Future:

- Onscreen map: Map will follow user's movements inside of the building. This will be useful for users with partial or no vision impairment, giving them additional information about their environment and final destination.
- Verbal warnings: Addition of warnings about possible safety risks inside the building. The user will be warned vocally about dangers which would otherwise be unknown to the visually disabled.
 - Examples of this would be posted warnings signs, open stairwells, or any other possible dangers in the building.

Free Download:

- The Digital Eyes application will be available as a free download via the Windows 7 App Marketplace.

Easy to Use:

- Initial implementation: Digital Eyes will be preloaded with maps and Microsoft Tags for the Science and Engineering (SEC) building.
- Final implementation: User will scan the Microsoft Tag at the entryway to any tagged building. Application will automatically reference the appropriate map and Microsoft Tags for that building.



Lessons Learned

★ It takes multiple forms of identification to register an app in the app hub on Windows phones.

★ It is a long, difficult process to gain access to Microsoft tag info.

★ Windows Speech recognition is sketchy.

★ QR codes and MS tags are more similar than we thought!

★ Research more before design to make sure it can be implemented in the time frame.

Questions or Comments?

Elizabeth Williams

Andrea Torske

Leah Boling

Melissa Bowman

