Project Plan Presentation
Gate Hazard Geo-Mapping

The Capstone Experience
Team United Airlines Airport Operations

Alexander Brandt
Zachary Yarost
Gitika Kumar
Mihir Bhadange

Department of Computer Science and Engineering
Michigan State University
Fall 2021
Functional Specifications

• United Airlines employees encounter hazards around the gates they work at. To ensure everyone is aware of these hazards, the Airport Operations Team has created a list of all the hazard information. This data is in a non-uniform format, which can lead to some hazards being missed by employees.

• To combat this, UA envisions a mobile application which can display this hazard information and highlight the exact location on a map in an organized way.

• UA hopes this app will allow employees to avoid any dangerous situations and increase their safety.
Design Specifications

• The application must be device-agnostic, working on both Android and iOS
• The app will display a map, able to focus on a specific area by selecting airport, terminal, concourse, and gate from a drop-down menu
• The main view will be of a 2D map with hazards visible as outlined shapes
• Hazards will be displayed by gate, and filtered by affected department
• Administrators may add hazards and update hazard information
• There will be a web interface to add new airports, as well as hazards outside of the application
• If time permits, an AR view of the hazards will be included in the mobile apps
Screen Mockup: Opening Screen
Screen Mockup: Add-Hazard Points
Screen Mockup: Hazard Details
Screen Mockup: Hazard 2D View
Screen Mockup: Hazard List View

Gate Hazards

Wing Sweep Area

The area directly across from gate must remain clear for aircraft to maneuver.

Water Pooling

There is water pooling in the gateway due to heavy rain. Be careful when walking in this area.

Exit

Gate Hazards

Wing Sweep Area

The area directly across from gate must remain clear for aircraft to maneuver.

Water Pooling

There is water pooling in the gateway due to heavy rain. Be careful when walking in this area.

Exit
Screen Mockup: Main Web Page
Screen Mockup: Add Hazard Page

Hazard Application Data Entry

Add Hazard

Select Airport: LAX
Select Terminal: 7
Select Concourse: 7
Select Gate: 70A
Describe Hazard:
The south side of the gate is a high traffic area for multiple types of vehicles. Ensure there is clear visibility to the aircraft right wingwalker.

Select Affected Departments:
- CS
- CG
- MT
- SOC

Select Risk Rank: Red

Submit Hazard
Technical Specifications

• End user can access app on iPhone 6+ or Zebra TC75 Scanner
• App developed in Visual Studio 2019 using C# and the Xamarin platform
• Backend and website developed in PHP using PhpStorm
• Server hosted on phpMyAdmin and supports a MySQL database
• User can manually enter hazard data on the website to upload to the database
System Architecture
System Components

• Hardware Platforms
  ▪ iPhone 6+ running iOS 12.5.4 and newer
  ▪ Zebra TC75 Scanner running Android 4.4 and 5.1

• Software Platforms / Technologies
  ▪ Visual Studio 2019
  ▪ PhpStorm
  ▪ GitLab
  ▪ phpMyAdmin
  ▪ Xamarin
Risks

- **Ensure our User Interface is intuitive and user friendly**
  - Description: The application UI must be created so that users are able to navigate the app intuitively
  - Mitigation: Testing with United Airlines employees to polish the design to their needs

- **Different map software on iOS and Android**
  - Description: Unable to get same map software on iOS and Android using Xamarin efficiently
  - Mitigation: Utilize Xamarin’s ability to share functionality across both platforms

- **Difference in functionality across platforms**
  - Description: Required Android and iOS versions are different (Android is much older)
  - Mitigation: Pointedly developing for both platforms at the oldest operating system versions

- **Non-uniform hazard data**
  - Description: The hazard data is non-uniform and has to be entered in manually, which can be inefficient
  - Mitigation: Make it quick and easy to add, edit and delete hazards to reduce the time needed to manually enter the data

- **Android 4.4 bug in Xamarin**
  - Description: Android 4.4 has a bug in Xamarin when it comes to making network calls with http clients
  - Mitigation: Force android to use TLS 1.2 instead of the default network communication method
Questions?