FIT AR Navigation App (FITARNA)

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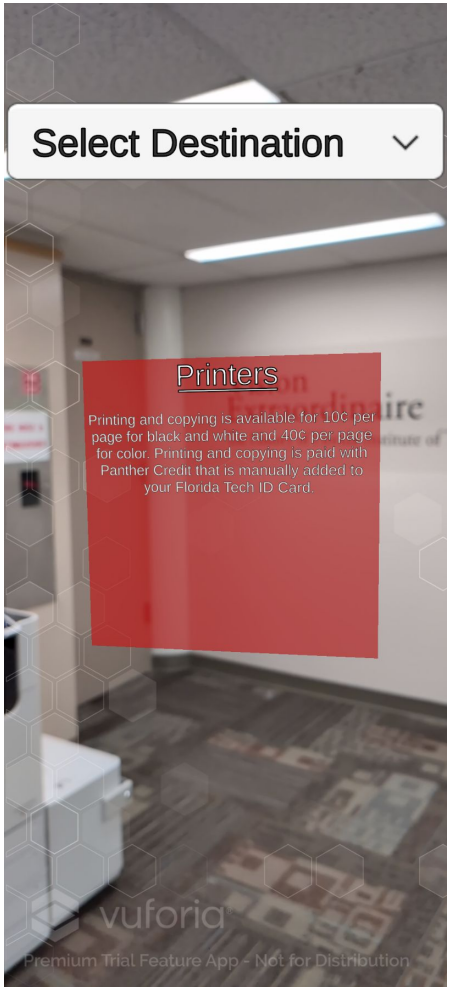


Goals and Motivation

- Locating specific rooms can be confusing for those unfamiliar, and while staff could help with this, they may not be around or available to guide those in need.

- Navigation becomes especially difficult when a user has a specific destination without knowing its room number or general location.

- Maps take time to comprehend and offer limited information.

Our project aims to help students and visitors navigate and become acquainted with Florida Tech's buildings

Approach #1

- Navigate to Any Room With Ease
  - Choose any room from a dropdown list or search by name/ room number.
  - Follow AR directional overlays straight to the destination.
  - Start navigation anywhere in the library and discover points of interest along the way with AR pop-ups that share context and history.

Approach #2

- Take an Interactive Self-Guided Tour
  - Explore the Evan's Library's most important features, such as the Digital Scholarship Labs, reservable private rooms, offices, and more.
  - Learn the history and functionality of each stop through a series of interactive AR pop-ups that'll teach and quiz you as you go.
  - Pause the tour anytime and resume when ready.

Approach #3

- Learn About the Library As You Walk
  - During tours and navigation, pop-ups will appear and feature relevant information, teaching context, and history.
  - Click on pop-ups during tours to advance, and click on links within some pop-ups to access their links.
  - Some pop-ups during tours will show a question; click on your answer to advance and receive feedback.

Novel Features/ Functionalities

- Informational AR Pop-ups
  - Appear next to locations like offices and places of interest like statues or resource desks during navigation travel
- AR Navigation of Evans Library
  - AR Navigation will provide a new way for students and visitors to navigate the library
- Self-Guided Tours of Evans Library
  - Currently, the only way for students/visitors to get a tour of the library is with a tour guide, which isn't present normally

Algorithms and Tools

Scanning: Vuforia Creator

Generating Area Targets: Vuforia Area Target Generator

Engine: Unity

Languages: C#, Swift, Kotlin

AR Framework: Vuforia

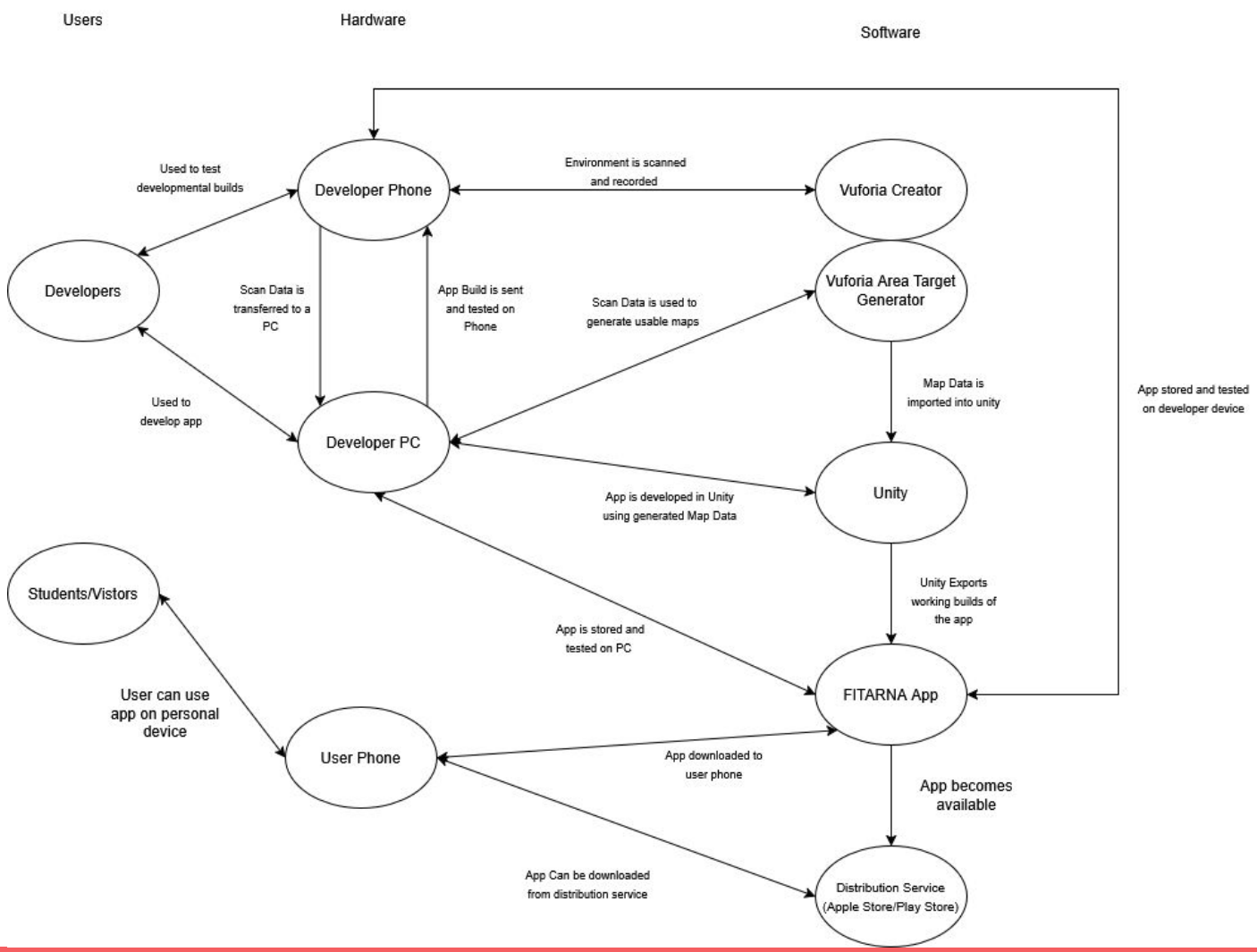
SDKs: Google ARCore (Android) / ARKit (IOS) (XR Plugins)

Algorithms: A*

Technical Challenges

- Limited experience with AR and Mobile Development
  - Our team lacks experience developing a mobile app or working with AR
- App Size
  - Area targets are rather large in size so keeping the app under 200 MB will be difficult
- Integrating Backend and Pathfinding into AR (Unity)
  - Connecting the A* algorithm introduces the challenge of managing data flow, maintaining a reliable network, and syncing coordinates together.

Design


Users
Hardware
Software
Used to test developmental builds
Developer Phone
Environment is scanned and recorded
Vuforia Creator
Developers
Scan Data is transferred to a PC
App Build is sent and tested on Phone
Scan Data is used to generate usable maps
Vuforia Area Target Generator
Map Data is imported into unity
App stored and tested on developer device
Used to develop app
Developer PC
Unity
App is developed in Unity using generated Map Data
Students/Vistors
Unity Exports working builds of the app
App is stored and tested on PC
FITARNA App
User can use app on personal device
User Phone
App downloaded to user phone
App becomes available
App Can be downloaded from distribution service
Distribution Service (Apple Store/Play Store)

Evaluation

Some success metrics are:

- The system shall calculate and display the route to their destination within 4 seconds of the user selecting their destination.
- The system shall maintain AR anchor accuracy within 2 feet.
- The system must stay under 200 MB of data.
- The app must comply with Section 508 of the U.S. government if it is to be officially released by FIT.
- The system shall provide an intuitive user interface that requires no external help to understand.
- The system shall handle errors gracefully.
- The system shall be designed for easy updating and maintenance for future use.

Progress Summary

Module/Feature	Completion	To do
Library Scans	50%	Finish scans of floors 2, 3, and 4
Pop-ups	25%	Floor 2, 3, and 4 popups.
Navigation Mode	20%	Implement destinations and navigation algorithm
Tour Mode	5%	Implement tour

Milestone 4

- Finish scans of floor 2, begin scans of floor 3 and 4.
- Implement pop-ups for floor 2, and begin adding pop-ups for floor 3.
- Implement the navigation algorithm and add destination/pathways for floor 1, and begin the process for floor 2.
- Add tour mode to the main menu.
- Finalize tour mode plan.
- Demo navigation mode.

Milestone 5

- Finish all library floor scans.
- Finish pop-ups for all floors.
- Implement navigation functionality for floors 2 and 3.
- Implement tour mode through floors 1 and 2.
- Demo tour mode.
- Conduct evaluation and analysis results.
- Create a poster for the senior design showcase.

Milestone 6

- Finalize Navigation Mode
- Finish Tour Mode
- Test/demo of the entire system
- Conduct evaluation and analyze results
- Create user/developer manual
- Create a demo video

Task Matrix

Task	Dathan	Ethan	Jacob	Vincenzo
Floor 3 and 4 Scans	50%	0%	0%	50%
Floor 2 pop-ups for floor 2.	25%	25%	0%	50%
Navigation algorithm and add destination/ pathways.	0%	50%	50%	0%
Tour Mode	30%	30%	30%	10%
Add tour mode to the main menu.	33%	33%	33%	0%
Tour mode plan.	0%	0%	25%	75%

Questions?