

INDOOR NAVIGATION

Using Augmented Reality

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01. Abstract

- With a Smartphone in hand, it is pretty easy for us to find our way to the destination using Google maps, even when we are in an unfamiliar city.
- However, it is possible to get lost indoors like in Shopping Malls, Office buildings, etc.
- Indoor navigation deals with navigation within buildings.



02. Literature Survey

1. Bluetooth-based Indoor Navigation Mobile System

Authors: Adam Satan

Year of publishing: 2018

Technology used: Bluetooth

Limitations: Costly Hardware. Less Accuracy.



2. Indoor Navigation System Using Visual Positioning System with Augmented Reality

Authors: Ravinder Yadav, Vandit Jain, Himanika Chugh, Prasenjit Banerjee

Year of publishing: 2018

Technology Used: AR Toolkit with Dijkstra's Shortest Path Algorithm

Limitations: Dijkstra's algorithm is slower and less efficient than A * algorithm.



3. A multi-functional method of QR code used during the process of indoor navigation

Authors: Daria Mamaeva, Mikhail Afanasev, Vitaliy Bakshaev, Mark Kliachin

Year of publishing: 2019

Technology Used: QR Code based Positioning with basic AR navigation.

Limitations: Must scan every QR code in the path from source to destination.



03. Problem Statement

- To develop a mobile application which can scan QR codes for live positioning of the user and can navigate the user from current location to any destination chosen within the building using Augmented Reality by showing directions in the camera.

04. Proposed System

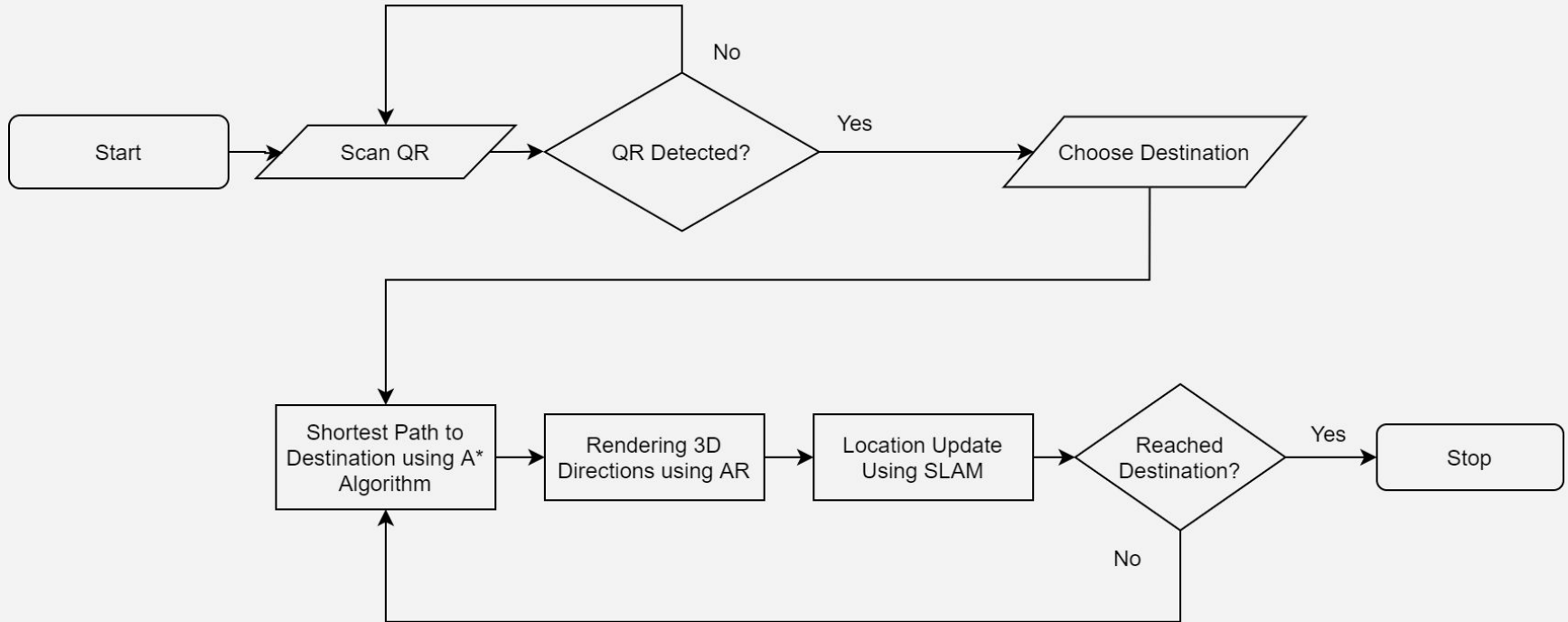
The proposed system consists out of five big parts:

1. Developing the 3D map using building floor plan.
2. QR-code based positioning of the user.
3. Google ARCore based simultaneous localization and mapping.
4. Finding shortest path to chosen destination using NavMesh (A * algorithm).
5. Navigation in the AR view.

05. Algorithms and Technologies used

- Unity
- Google AR Core
- C#
- Blender
- A* Algorithm

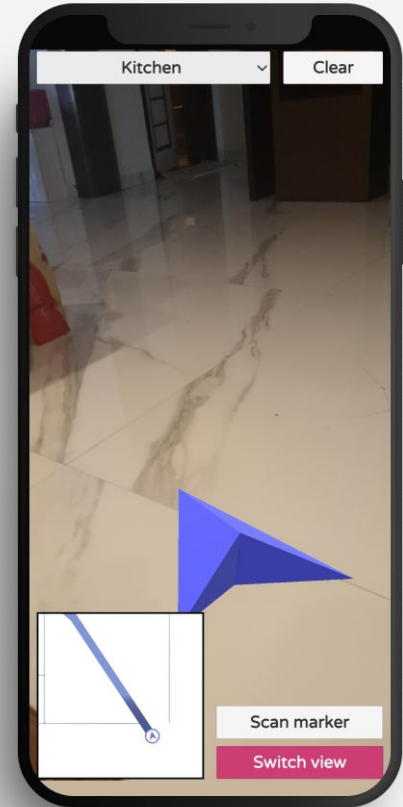
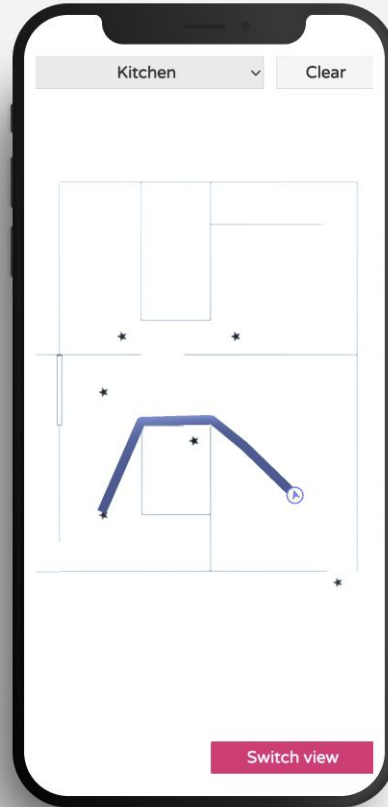
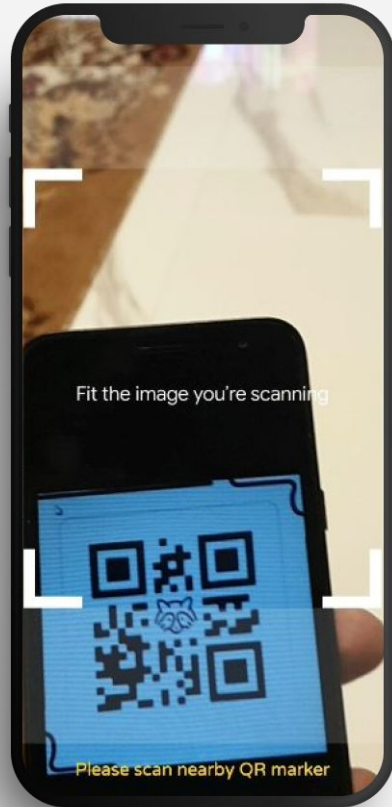
06. System Design



07. Conclusion of Work Done

- Created a 3D model of the building using blender.
- Integrated the model with unity and added obstacles.
- Added all the destinations as nodes in model.
- Built a Navmesh Agent for getting the directions.
- Built a 3D Arrow object to show directions in AR.
- Added a 3D marker to indicate when the user reaches their destination
- Tested and Deployed the application on an Android device.

08. Implementation



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References

- ➔ **IEEE Paper:** Bluetooth-based Indoor Navigation Mobile System
- ➔ **IEEE Paper:** A multi-functional method of QR code used during the process of indoor navigation
- ➔ **IEEE Paper:** Indoor Navigation System Using Visual Positioning System with Augmented Reality

THANKS!

Does anyone have any
questions?