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SPECIAL THANKS TO FRAUKE KASTING AND KATRIN FIMPEL AT TUHH CAREER CENTRE

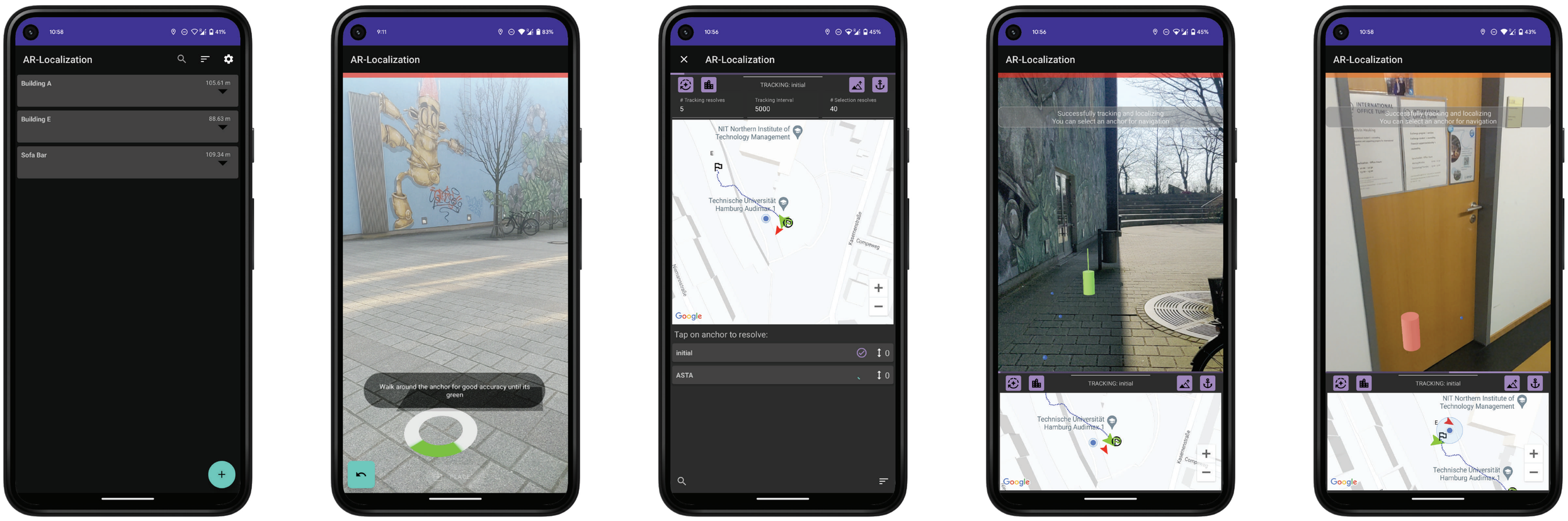
FISHING FOR EXPERIENCE

PUBLIC SECTOR AUGMENTED REALITY NAVIGATION

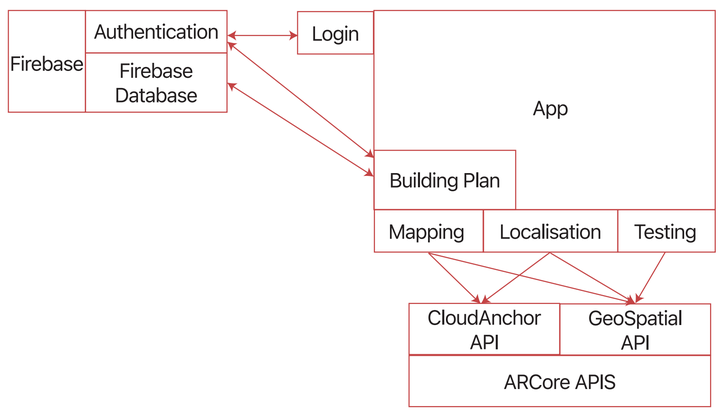
AIM

While open-source solutions for Mixed and Augmented Reality (AR) navigation are emerging, their real-world deployment in the public sector, particularly for authority visits, remains scarce. Existing open-source options based on BLE beacons often face limitations in cost, complexity, and accuracy. Our current open-source solution tackles the use case of authority visits using BLE beacons. However, floorplan generation, beacon installation and maintenance, and navigation itself prove relatively expensive. Additionally, accuracy suffers when beacon distances are large. This research proposes an alternative. We present an Android application that leverages open source ARCore technologies for indoor positioning without expensive infrastructure.

Map Menu **Anchoring** **Mapping** **Localisation** **Navigation**

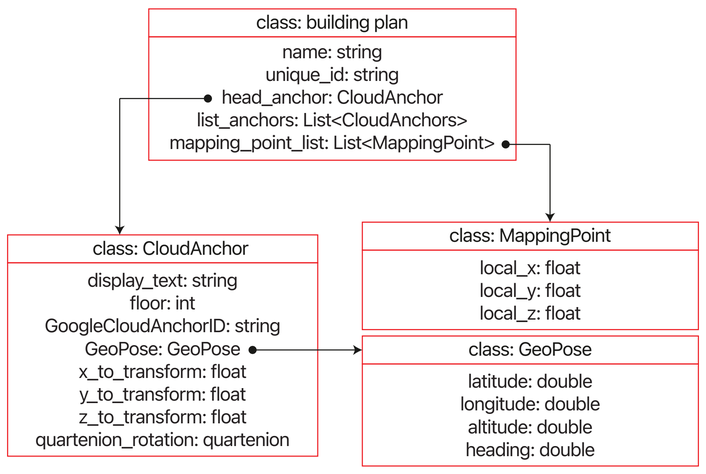


SYSTEM ARCHITECTURE



- Simultaneous Localisation and Mapping
- Firebase Database
- Simple Security Authority Permissions
  - allow read, create: if request.auth != null;
- Google One Tap Login

DATA STRUCTURES



- Start scene in Map Selection Menu
- Drop a starter ARCore Cloud Anchor and Google Maps to approximate location using Street View
- Relative ARCore positioning continuosly and comparing with GeoSpatial API
- Cloud Anchors dropped approximately every meter
- Storage of geospatial coordinates translated to quaternion matrix
- Final Cloud Anchor is dropped as Destination Node

PATHFINDING

- As soon as the user selects localisation, the Google Map API generates a rudimentary building outline and the marker approximates position of initial anchor to map
- The route is higlighted in blue waypoints, an augmented reality fragment will point in direction to next node
- The node points to the subsequent nodes via a famous pathfinding algorithm called an A* algorithm
- Alternative option for initial localisation includes the Street View geospatial approximation

SUMMARY

- Not entirely open-source
- Made in Android Studio, Kotlin
- Data Stored in Firebase
- Google Authentication
- Free for Small Scale Operations
- Running Prototype Application Implemented

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