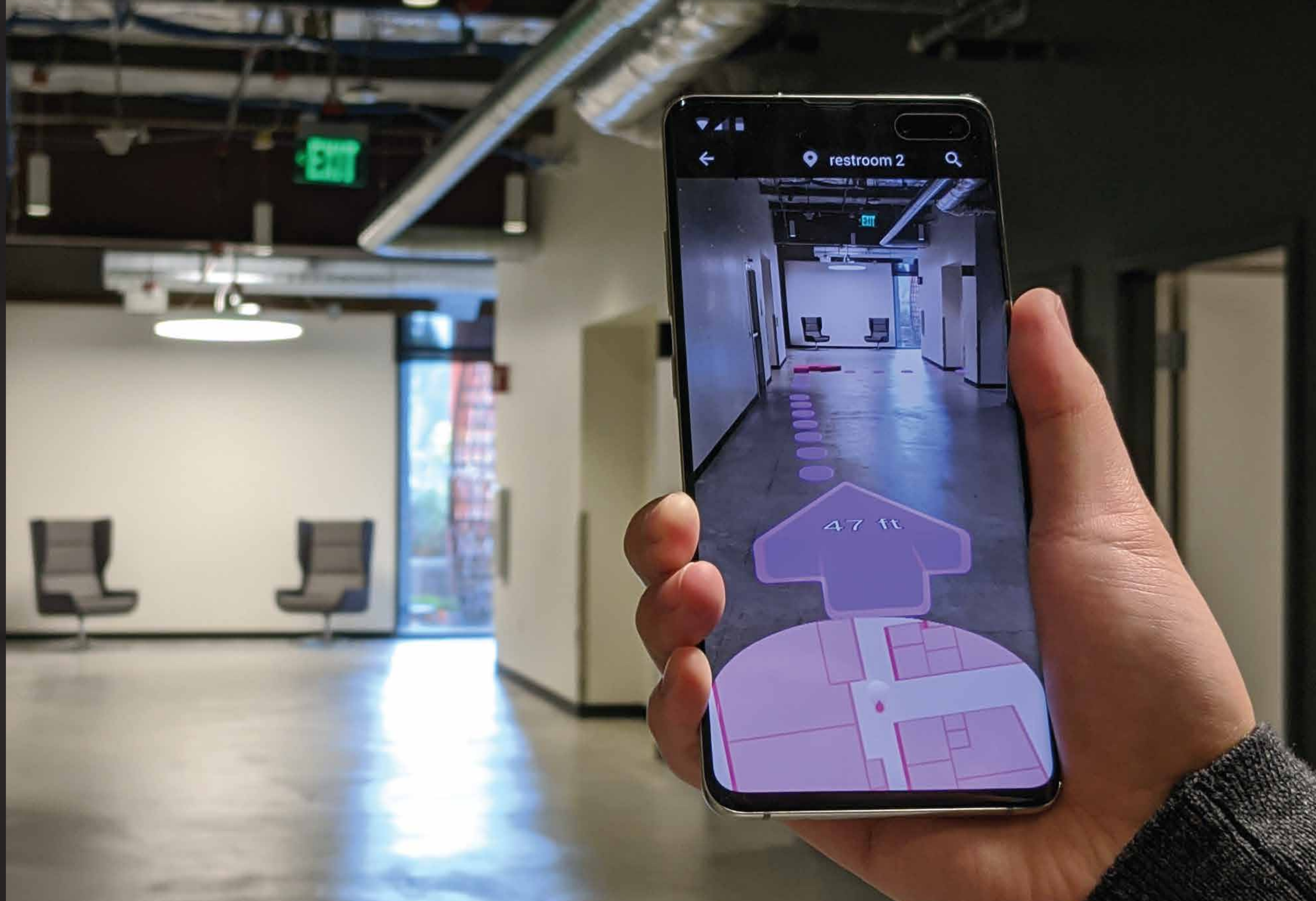


# AR-row

## 5G + AI Indoor Navigation

An Indoor AR Navigation app that incorporates:

- **SLAM-based indoor navigation** that allows cross-floor navigation
- **Image recognition** that improves localization accuracy and reliability
- **Machine learning capability** that increases accuracy as more data is collected
- **Measure and map out 5G indoor coverage** during usage
- **Documentation** that guides developers to apply the app to any building or campus



Use Case 1: Indoor Navigation for T-Mobile Park and T-Mobile Arena



Use Case 2: Map out indoor 5G signal coverage for T-Mobile 5G network



Use Case 3: Navigation for T-Mobile and other corporate buildings and campus

### Problem

In our project, we focus on creating a VIP experience for T-Mobile users visiting the T-Mobile Park using 5G. We believe that 5G is more than just high speed.

After spending 40+ hours conducting field study at T-Mobile Park during baseball games, we realized that although stadiums are often fun, exciting environments, one of the top pain points is navigating through crowds inside the stadium.

### Solution

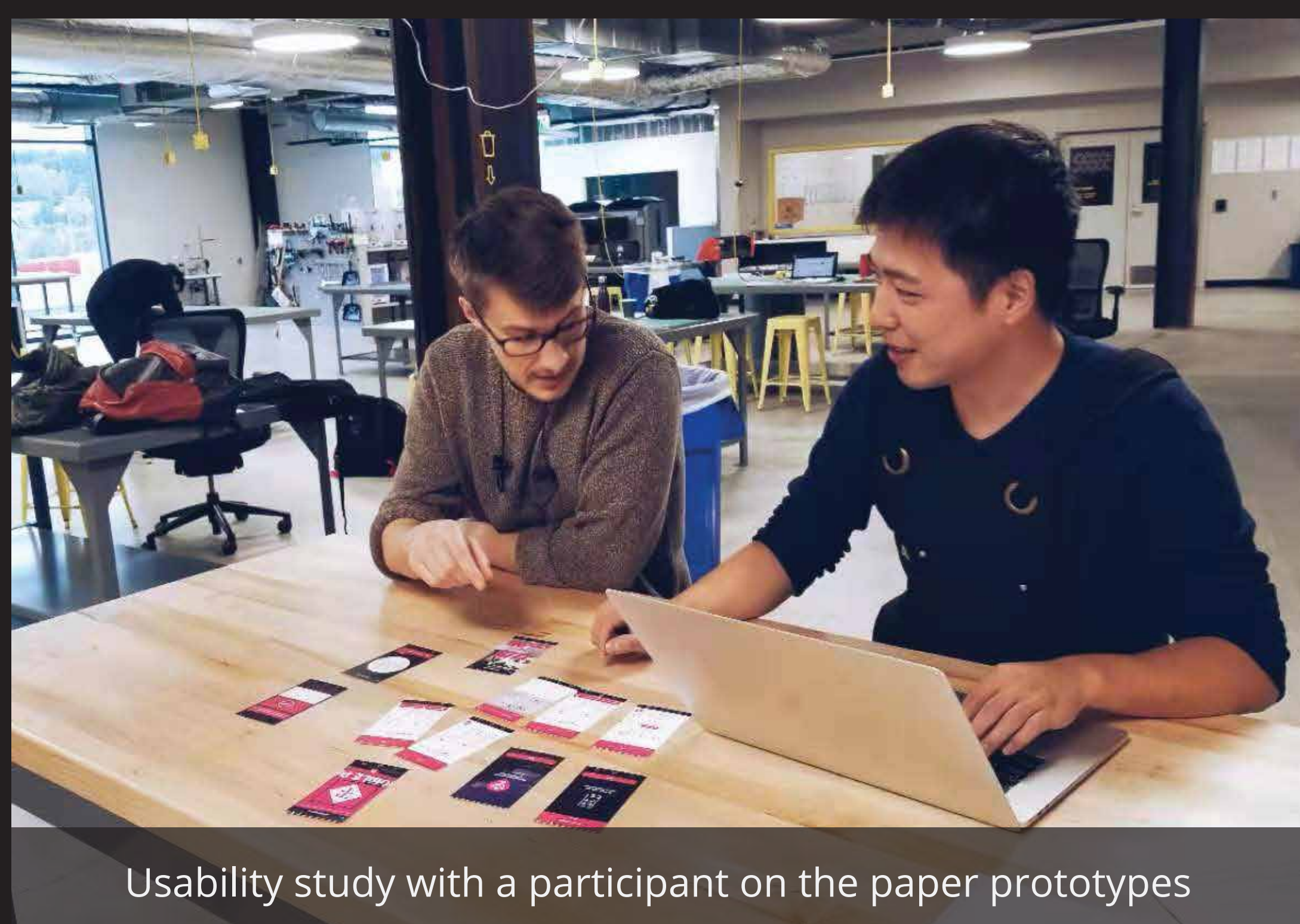
Our solution is an indoor AR navigation app that uses machine learning + SLAM (Simultaneous Localization and Mapping) to provide a reliable, high accuracy means of indoor navigation— along with auto-correction and auto-recalibration. Users can select a destination from a map, scan a marker to detect their current location, and follow AR arrows to their destination. To ensure safety while walking, we included a compass mode that allows users to still view directional information while their phone is down.

In the early stages of development, we attempted to solely use SLAM to build our app. After initial development and deployment, we noticed the accuracy of SLAM is not enough to facilitate stable indoor navigation with low deviation. Thus, we decided to include machine learning and image recognition to help improve the accuracy of the indoor localization.

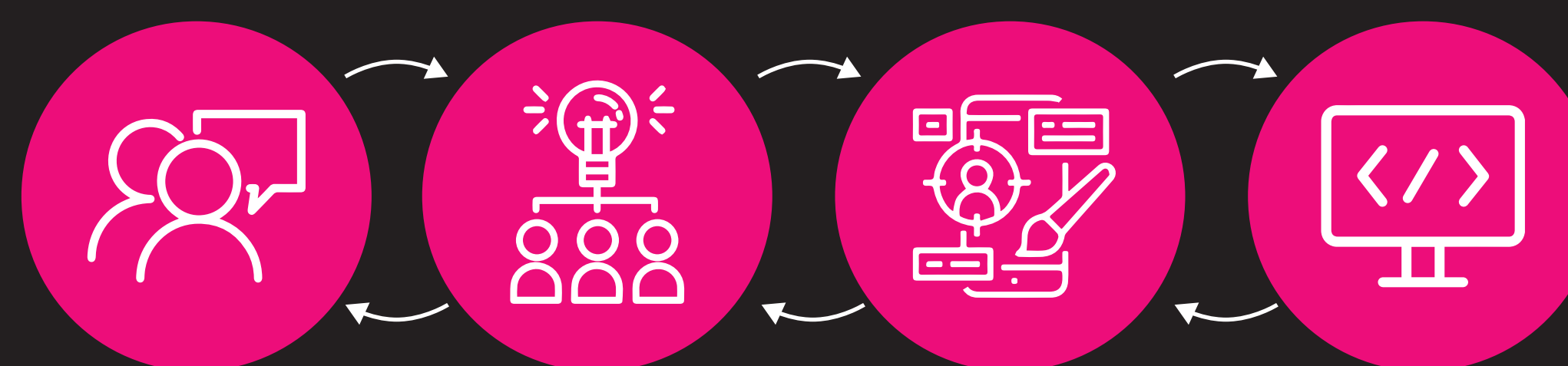
### Approach

From conducting primary and secondary research, we scoped down to an AR navigation app since we discovered navigation inside the stadium to be a major pain point. We worked closely with our sponsors at T-Mobile to scope down our project and fine-tune how our work plays a role in the 5G story. Our sponsors offered us mentorship and aligned us with the industry standards. Most importantly, we made decisions together based on the evidence gathered during user research and usability studies.

The design process included several iterations and evaluations. We created wireframes and conducted multiple rounds of usability studies to improve the user experience of our app. For development, we collected thousands of images to train a machine learning model, created 3D maps, and built out the full app design and functionality in Unity. We worked to not only design an app that is user-friendly and appealing, but also ensure our app can contribute to the larger success of T-Mobile as an organization



Usability study with a participant on the paper prototypes



#### Field Study + Expert Interview

60+ hours of observation in T-Mobile Park  
Expert interview with MLB

#### Ideation & Brainstorming

Addressed one of the top 3 main user painpoints  
Scoped down to the indoor nav. idea

#### Design & Usability Study

Created mobile mockup in Sketch and Figma  
Conducted 5 rounds of user study and reiteration

#### Implementation & Field Tests

Implemented the design as a Unity mobile app  
Deployed the app in GIX and T-Mobile TechX

