

PSCR 2021


THE DIGITAL EXPERIENCE

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NIST





LOCALIZATION GROUND TRUTH SYSTEM

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NIST

#PSCR2021



DISCLAIMER

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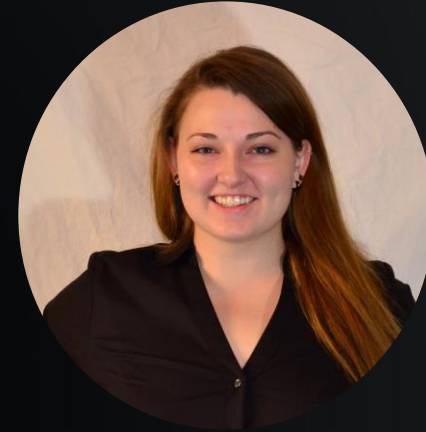
*** Please note, unless mentioned in reference to a NIST Publication, all information and data presented is preliminary/in-progress and subject to change**

PRESENTERS



JOE GRASSO

Joe Grasso is focused on accelerating innovation and adoption of technologies in the areas of indoor mapping, tracking and navigation for the Public Safety Community. He joined PSCR in 2019 after more than a decade of R&D and acquisition experience with the US ARMY where he worked in areas that included robotics, modeling, and computer vision.



CHARLSEA HANSEN

Charlseah joined PSCR in 2019 as a member of the Location Based Services portfolio. Before coming to NIST, she worked as a Software Engineer for Raytheon and the Department of Defense. She graduated from the University of Arizona with a master's in Electrical and Computer Engineering in 2018.



Location-Based Services

The Location-Based Services (LBS) portfolio focuses on indoor mapping, tracking, and navigation.

LOCALIZATION GROUND TRUTH SYSTEM (LGTS)

- What is an LGTS?
- Why is it necessary?

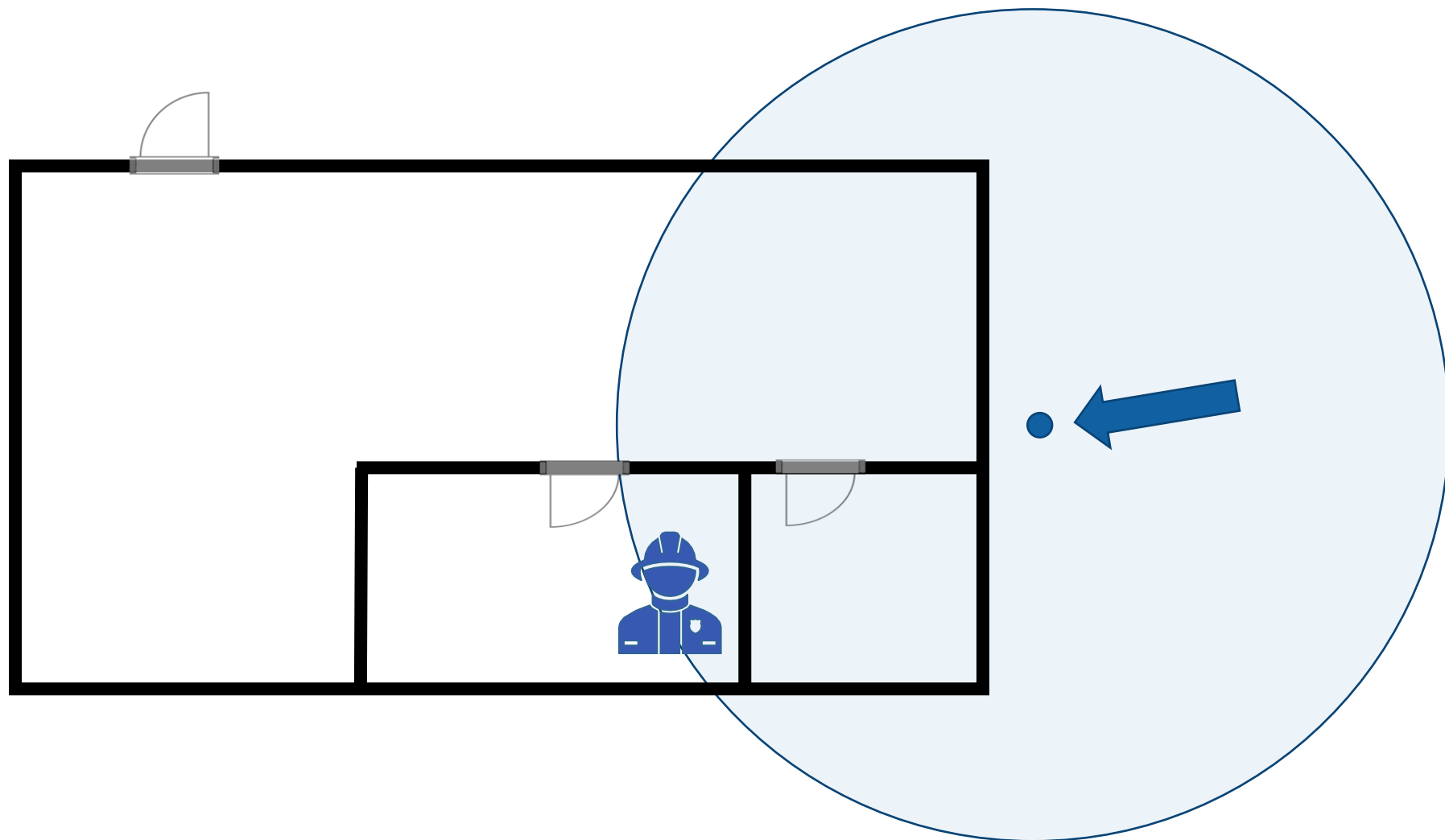


LOCALIZATION GROUND TRUTH SYSTEM (LGTS)

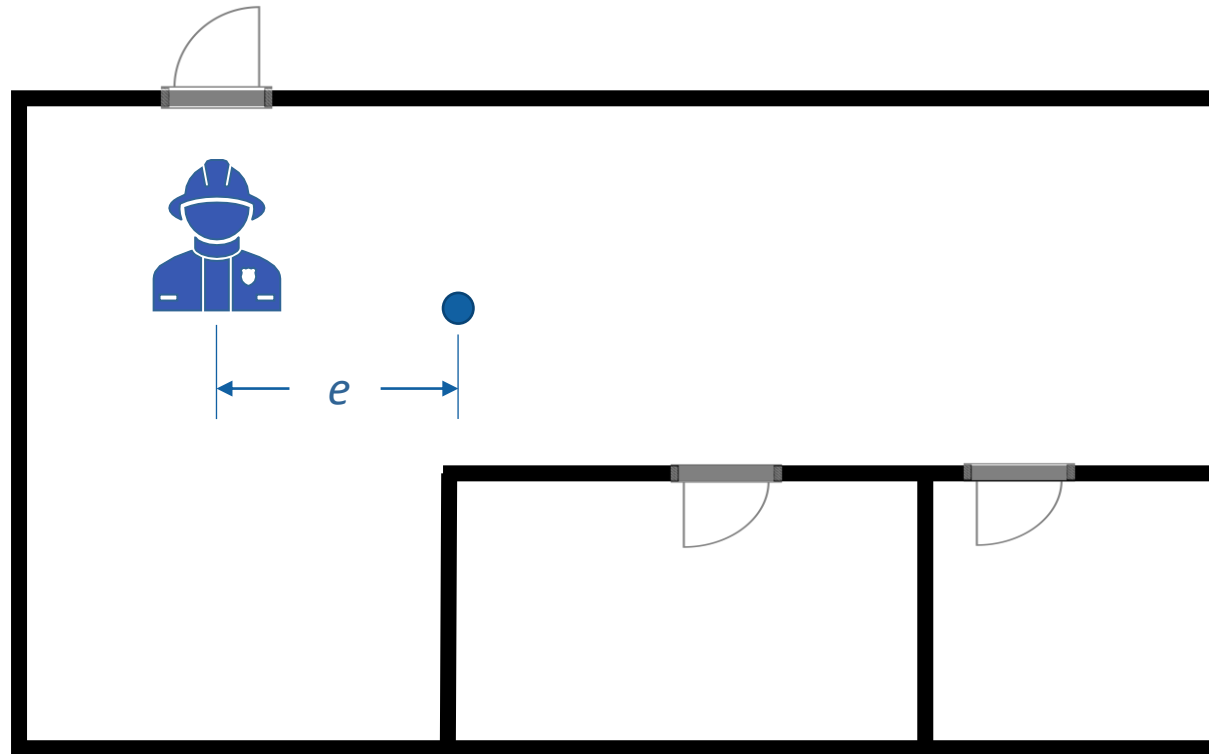
An LGTS is a tool to measure the performance of a localization system.



ACCURATE AND PRECISE



LOCALIZATION GROUND TRUTH SYSTEM (LGTS)



PULLING THE FUTURE FORWARD

LGTS CONSIDERATIONS



Potential for cm-level accuracy



Minimal user interaction



Ability to operate on multiple floors

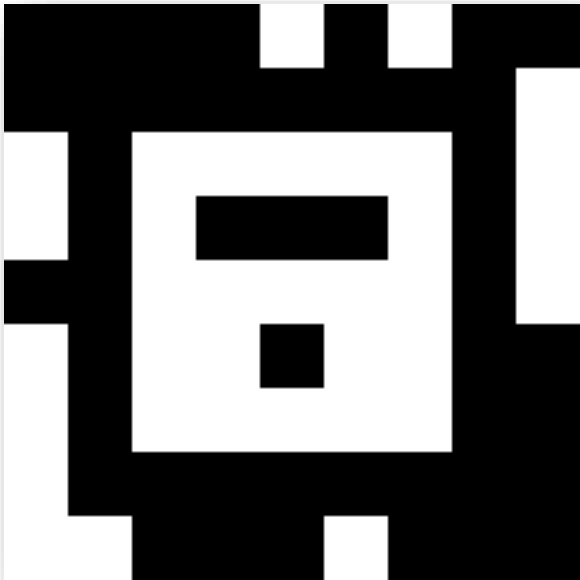
SOME OPTIONS WE EXPLORED...

- Lidar - Light Detection and Ranging
- RFID - Radio Frequency Identification
- Electronic check-in points
- Surveyed checkpoints

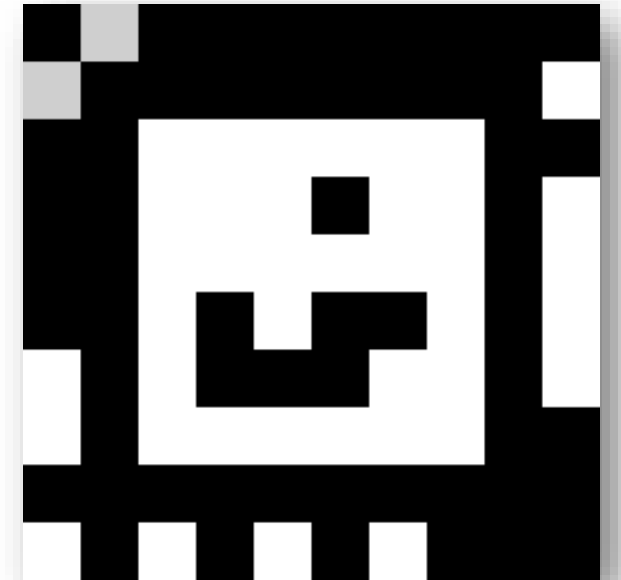


AprilTags

APRILTAGS



- Visual fiducial system developed at APRIL Robotics Laboratory
- Optimized 2D barcode
- High accuracy
- Low cost of entry
- Simple setup



REQUIREMENTS

Hardware/Software

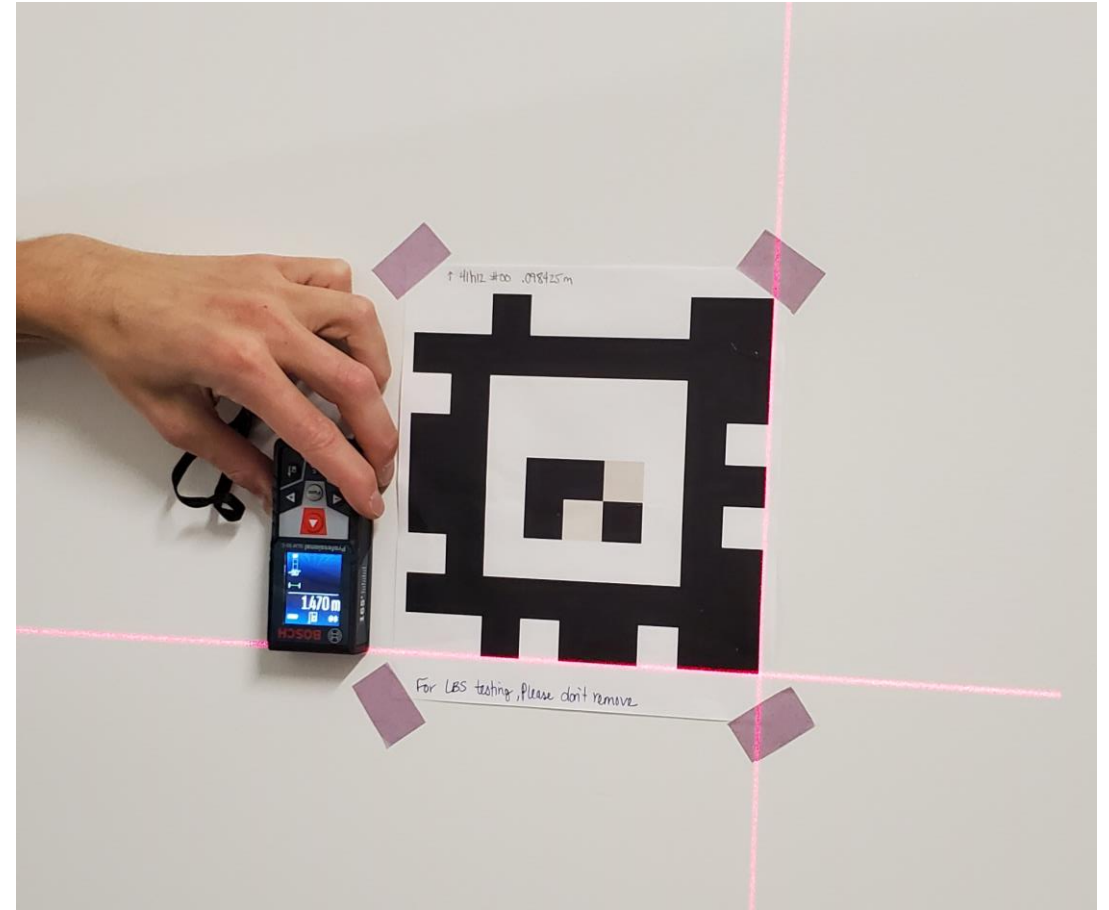


Test Space



APRILTAG SURVEYING TECHNIQUES

- Land surveying/metrology company
- Tape measures and other physical measurement tools
- tagSLAM – Simultaneous Localization and Mapping with AprilTags

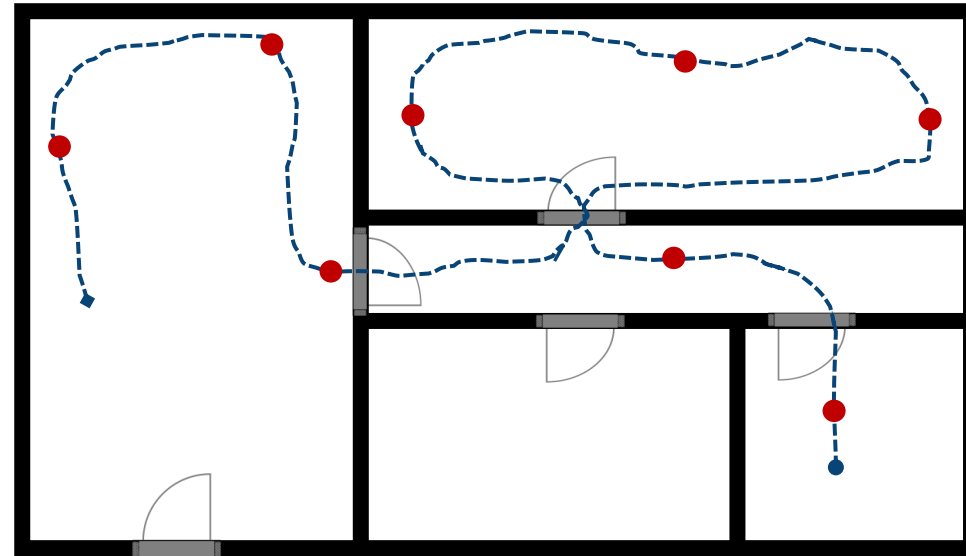




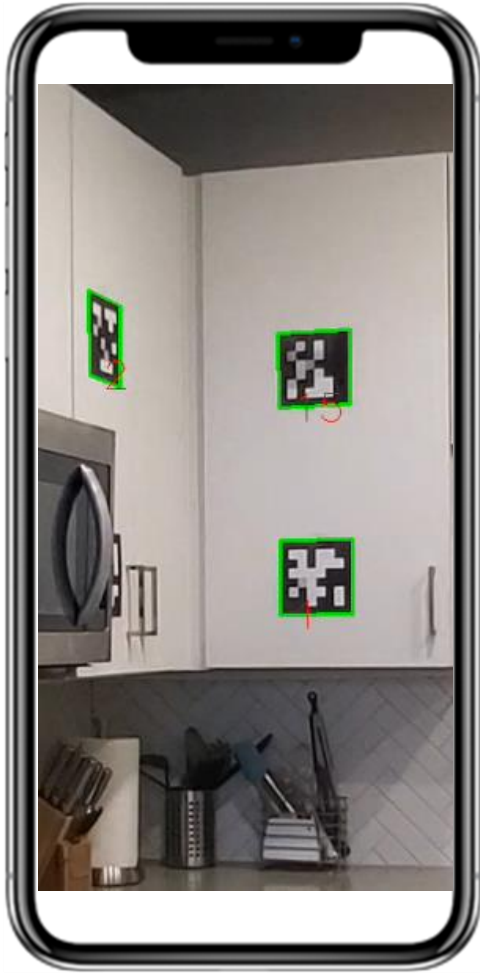
X, Y, Z: 2.648, 3.240, 1.571

Yaw, Pitch, Roll: 86.41, 2.94, 77.41¹⁶

TESTING A LOCALIZATION SYSTEM

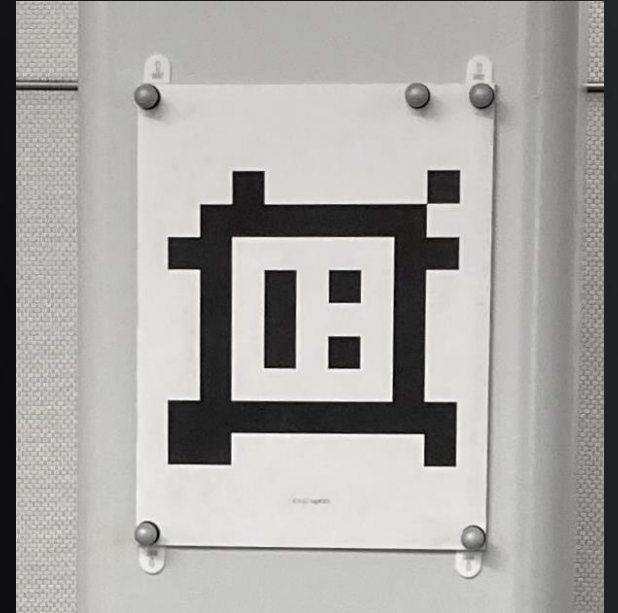


SMART PHONE APP

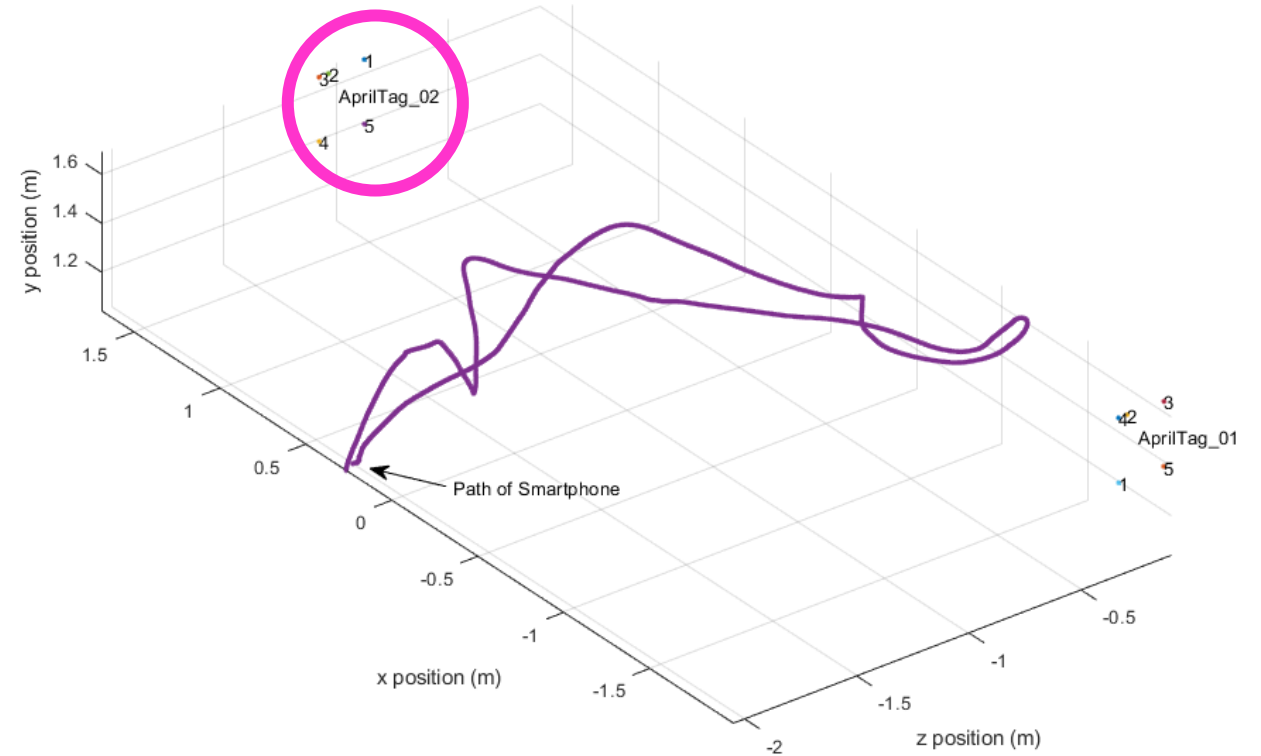
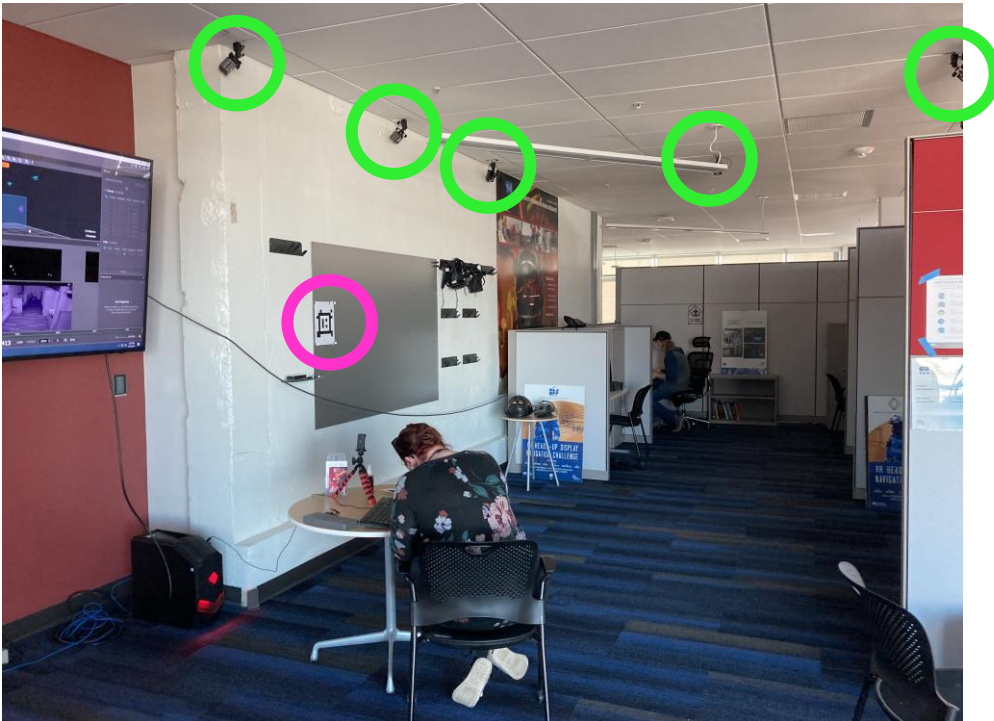


- User-friendly mobile app
- Open-source software

TESTING WITH OPTITRACK



TESTING WITH OPTITRACK



LGTS USER GUIDE

- Lessons learned
- How we collected data
- How we analyzed data



GET CONNECTED



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THANK YOU

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