MICHIGAN STATE UNIVERSITY

Beta Presentation
Virtual Reality Inspection Training

The Capstone Experience

Team Union Pacific

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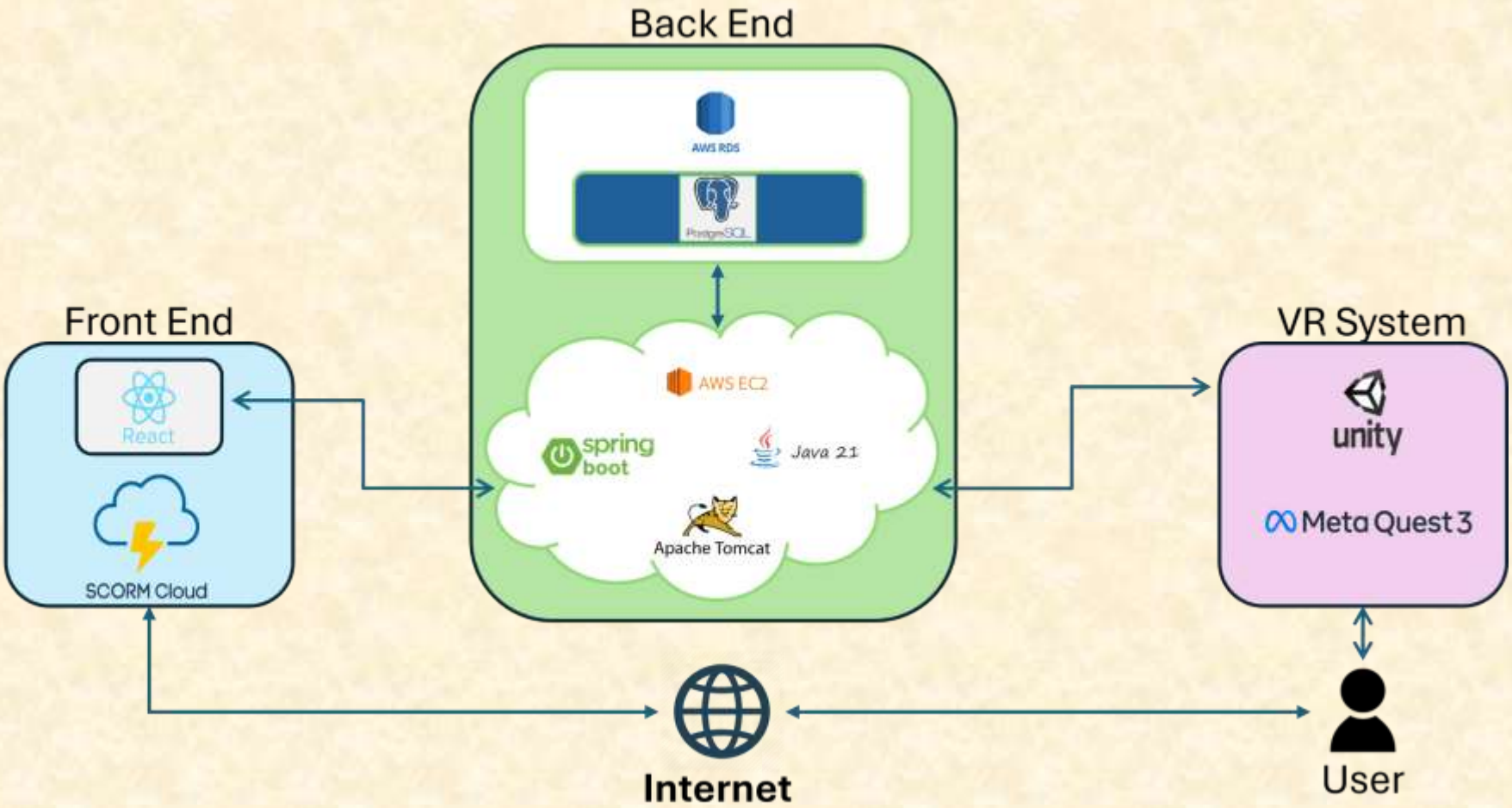
From Students…
…to Professionals

Project Overview

- Traditional training at Union Pacific is limited by real-world defects for effective inspection training
- Re-platform inspection training into an immersive VR application
- Uses Meta Quest 3 for defect identification, integrated with LMS via SCORM
- Scalable, realistic training without needing physical equipment

System Architecture

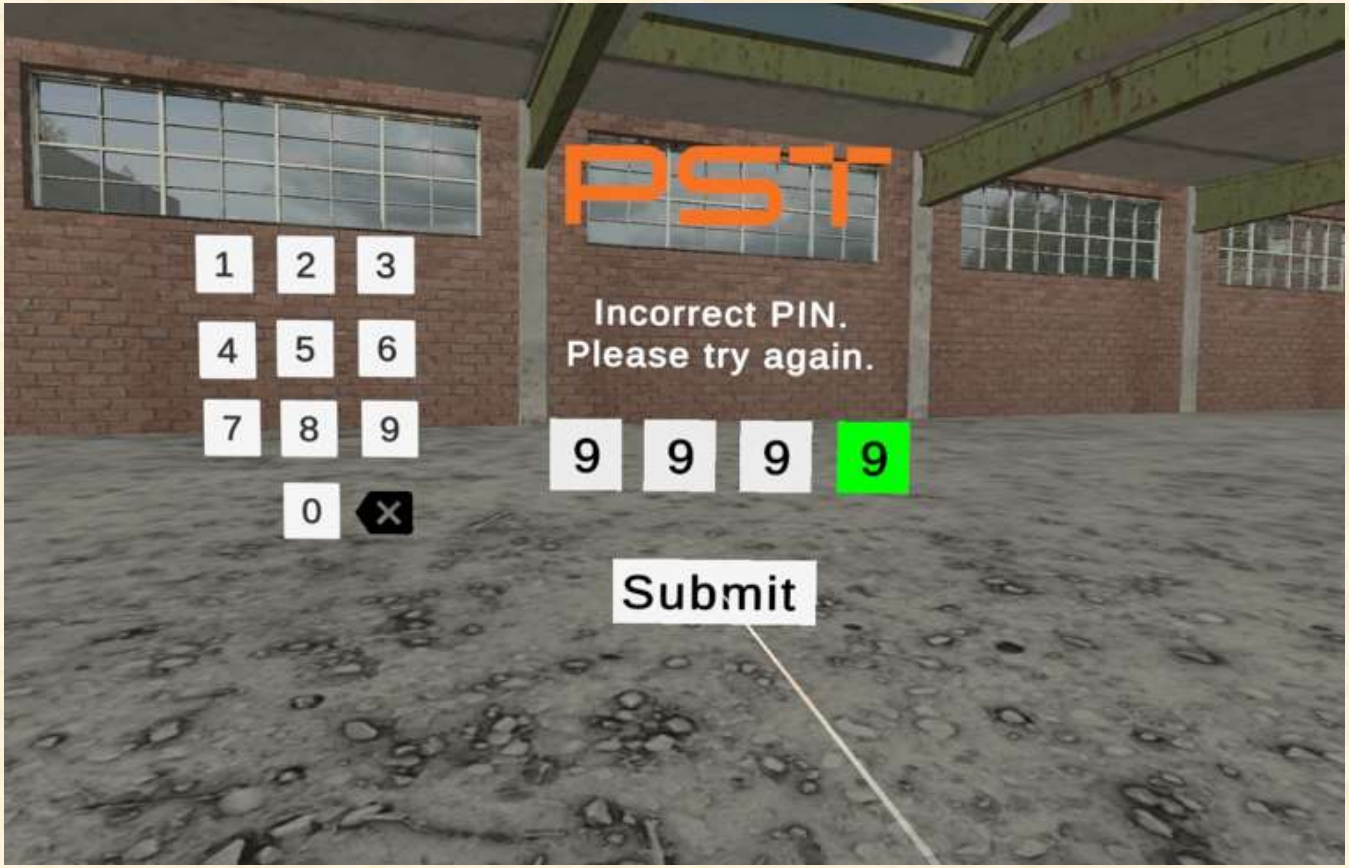


Teleportation Feature

Radial Menu

Passthrough Mode

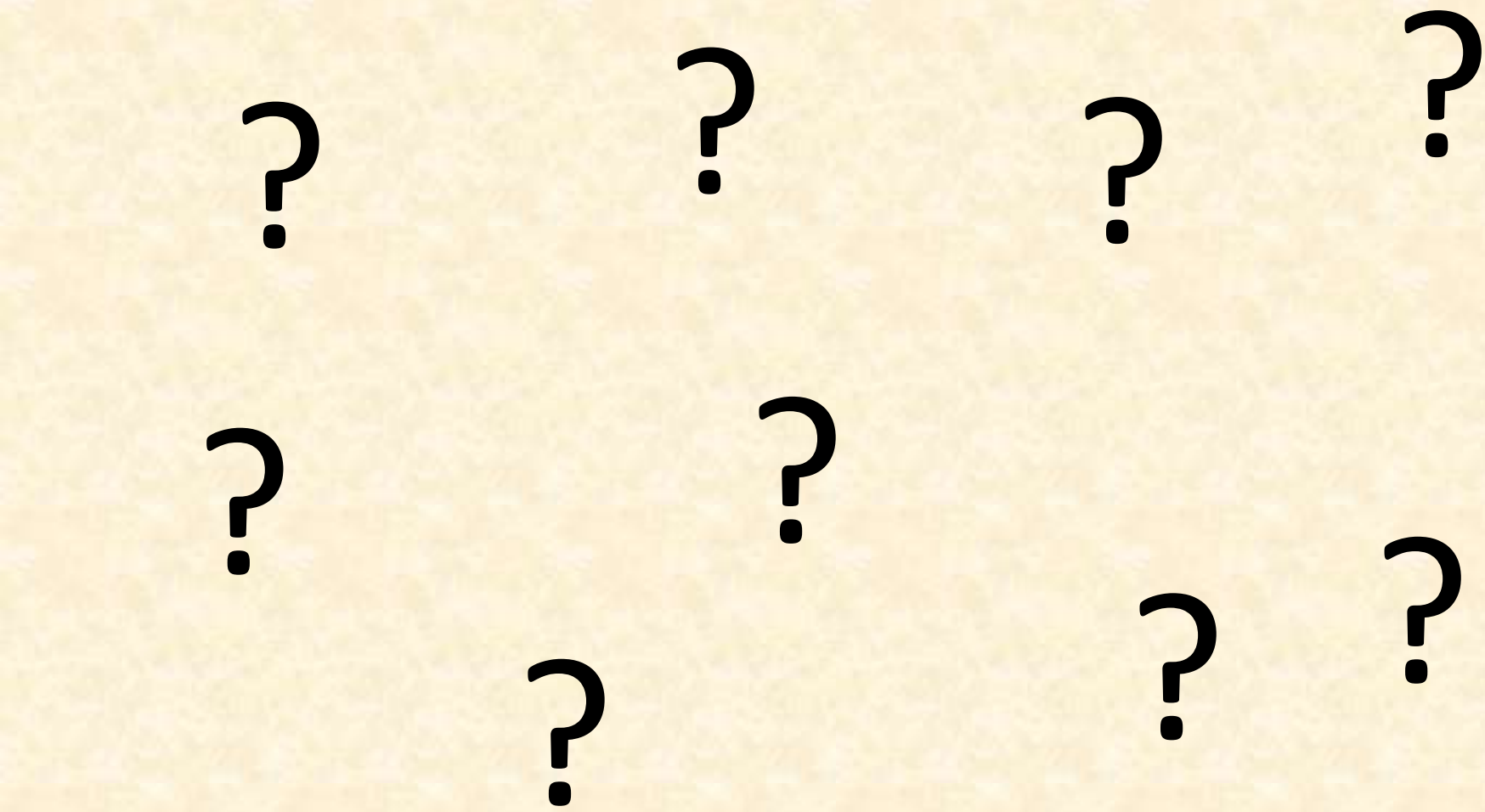
Pin Screen Features



What's left to do?

- Stretch Goals
  - AR setup mode research for client
- Other Tasks
  - Align LMS Courses with proper UP naming
  - Polishing the look and feel of the UI menus

Questions?



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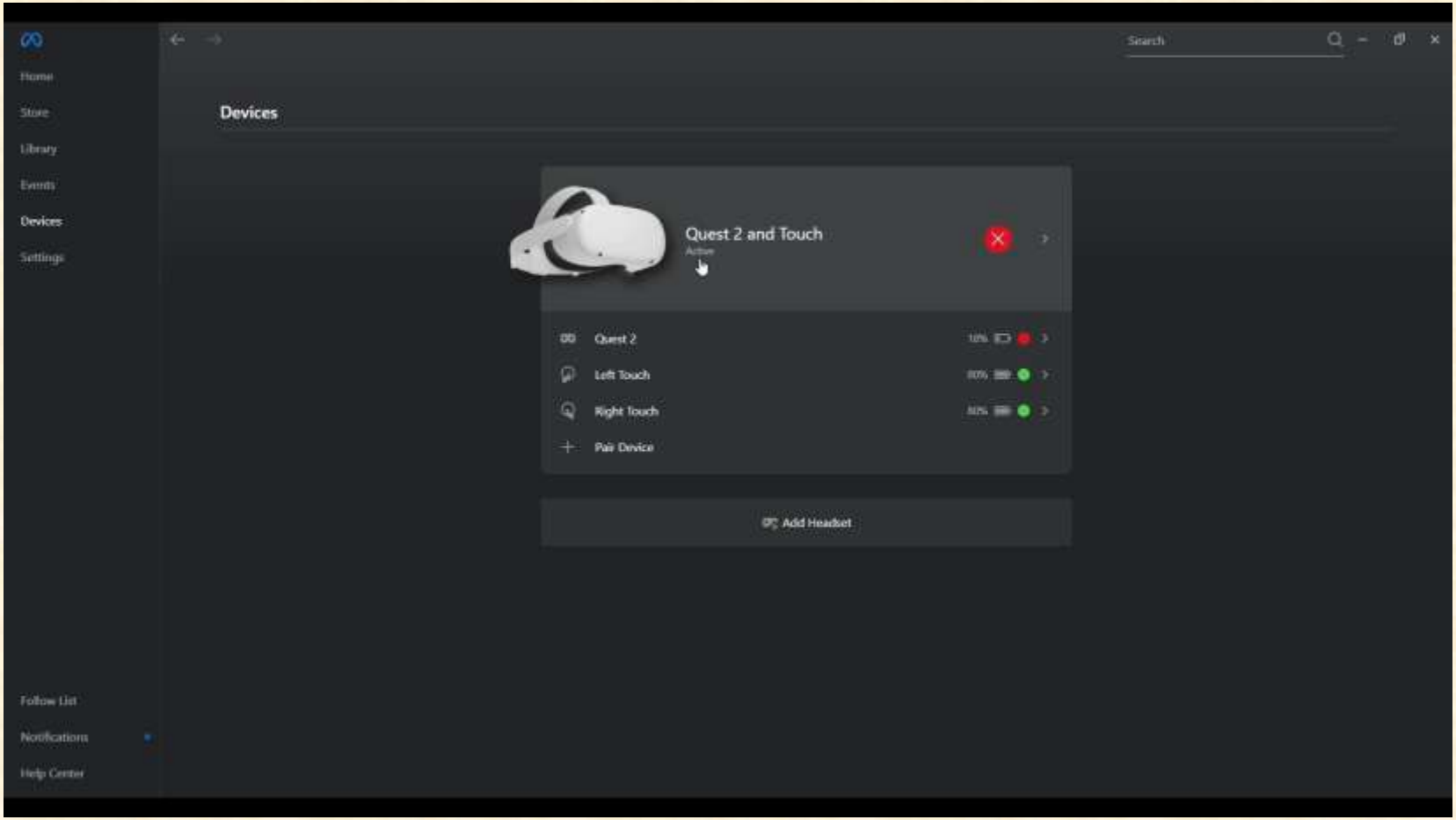
Use Cases

•New employee training: Day one Freight Car Anatomy Testing, learning about the components. Not a course for an experienced person.

•Later in training (10 week training course): Learning specific procedures required by law, each railroad has their own. Before the train leaves the yard, it must undergo an Airbreak Test and Inspection. This is much more efficient to teach this in the classroom than doing so on the yard.

•LDI (Locomotion Daily Inspection) and ATM (Airhose have a certification requirement: Employees must go through a recertification process and go through the courses and prove they can complete the steps. Limited to what's there in the real world, but our course allows for a wide range of scenarios and a one-on-one time between teacher and student.

Meta Quest 2 Demo Video



Project Risks

- Risk 1
  - Difficulty optimizing VR performance.
  - Mitigation: using Unity's profiler and texture compression.
- Risk 2
  - Misconfigured security groups in AWS EC2 instance could expose sensitive data or allow unauthorized access.
  - Mitigation: apply least privilege principles for AWS security groups, only opening necessary ports like SSH or HTTP.
- Risk 3
  - Making sure that our VR application doesn't cause motion sickness.
  - Mitigation: testing our application with multiple students outside of our team who are prone to motion sickness.
- Risk 4
  - Platform specific issues between different VR systems.
  - Mitigation: researching device-agnostic libraries, and testing on available headsets.