IEB VIRTUAL LAB

SIMUTECH (W)

Goal

Our team is developing a design proposal for a state-of-the-art 2098 sqft VR lab featuring digital twin technology in the University of Washington's new Interdisciplinary Engineering Building (IEB).

Phases

- UNDERSTAND DESIGN CONSTRAINTS
- PERFORM USE CASE ANALYSIS
- TRAVEL AND BENCHMARK
- CREATE CONCEPTUAL DESIGNS
- RECOMMEND AND IMPROVE

Use Case Analysis

Core Interest
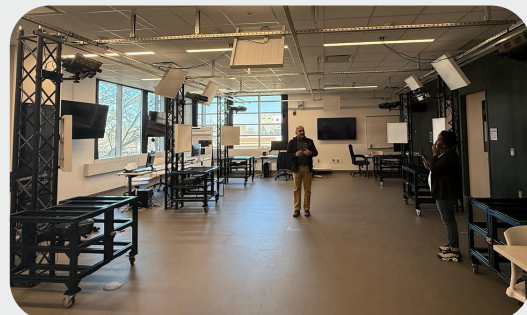- ISE
  - INDE 337
  - Capstone
- HCDE
  - Hybrid
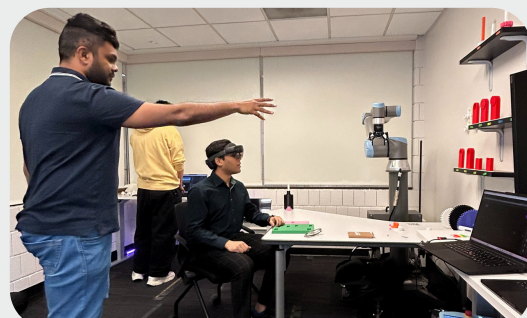
Moderate Interest
- AA
- CEE
- CHEM E
- ME
- MSE

Low Interest
- BIO E
- CSE
- ECE

Benchmark

Purdue University: Motion capture spaces advancing VR capability w/ Siemens Digital Twin at Gateway Complex.

Georgia Institute of Technology: Robot manipulator for robot-human interaction studies at ISyE SAIL.

University of Michigan: Equipping students with accessible VR tools for any desired work at the Visualization Studio.

Design Methodology

1. Metrics Rubric
- Assessed stakeholder priorities
- Established evaluation metrics that define performance and function

2. Survey
- Google Forms metrics survey ratings for stakeholders
- Qualitative input by connected COE staff

3. Tiered Designs
- Designed 3 alternative designs
- Performed metrics and cost analysis to evaluate optimal design

Metrics

Multipurpose ★★★★	Ease of Use ★★★☆	Classroom Integration ★★★★★
Disciplinary Flexibility ★★★☆	Aesthetics ★★★★ / Safety ★★★★★	Adaptability ★★★★ / Cost ★☆
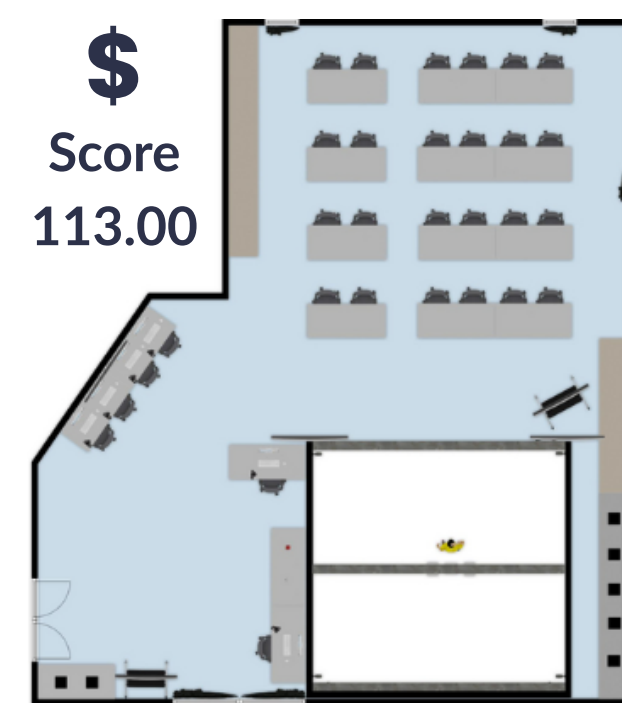
$ Score 113.00 — Adaptability-focused $91,769
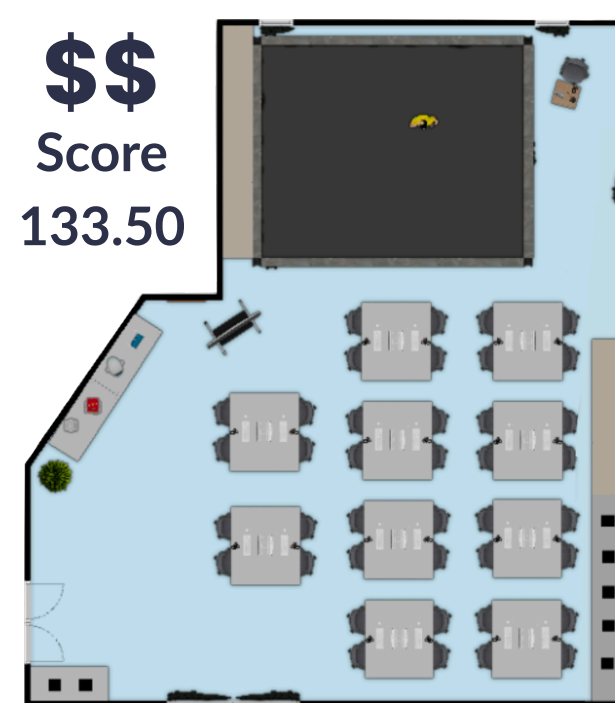
$$ Score 133.50 — Classroom-focused $170,366

$$$ Score 141.75 — Multipurpose-focused $355,471
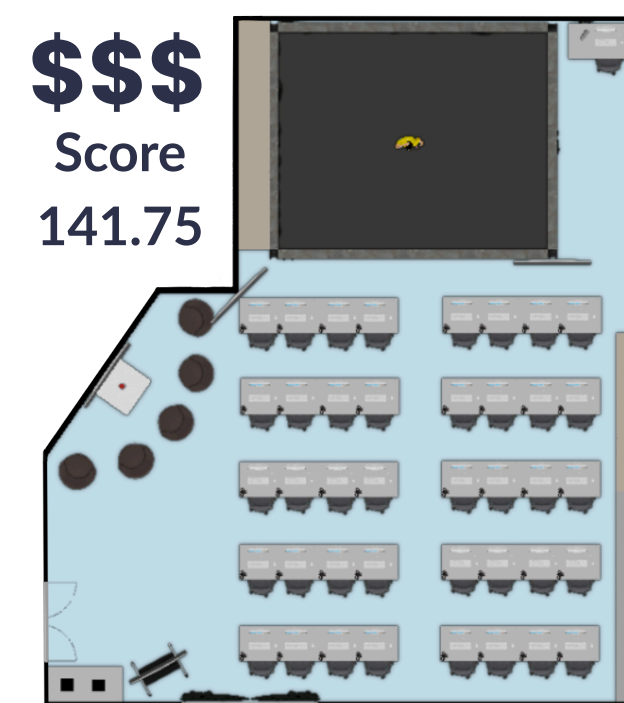
Cost Breakdown Comparison
Cost (Thousands)$

- 3D Printers & Cameras
- Motion Capture
- VR Headsets
- Computers & TVs
- Robotics

High Tier / Medium Tier / Low Tier
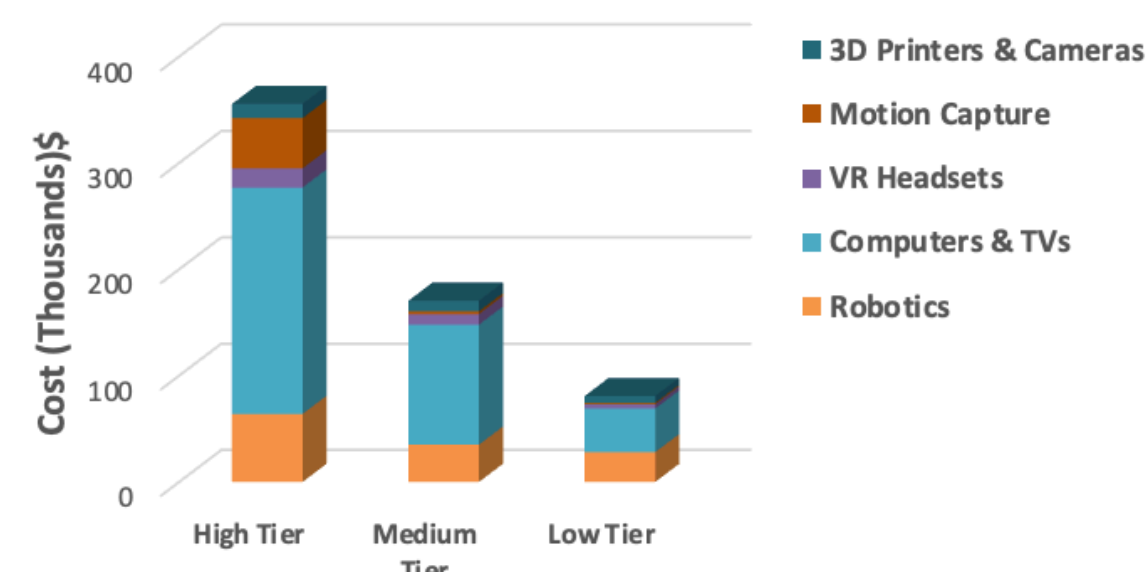
VR Lab Design Comparison
- HIGH
- MEDIUM
- LOW

(Radar chart: Multipurpose, Disciplinary Flexibility, Space Utilization + Capacity, Ease of Use, Aesthetics, Safety, Classroom Integration, Adaptability, Budget)
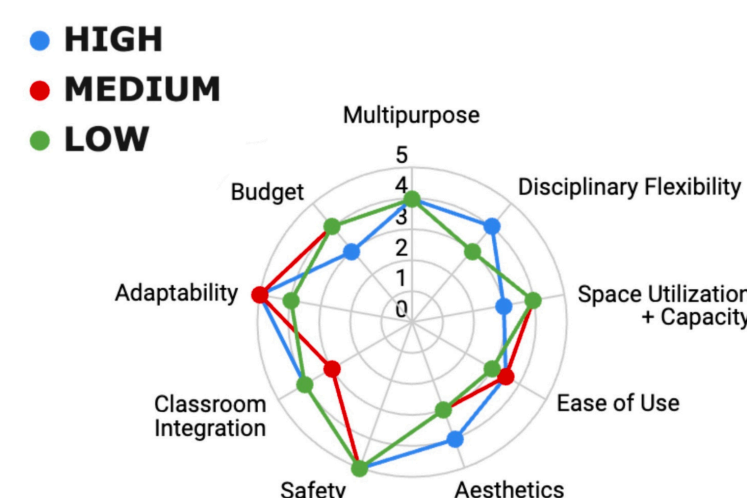
Recommendation
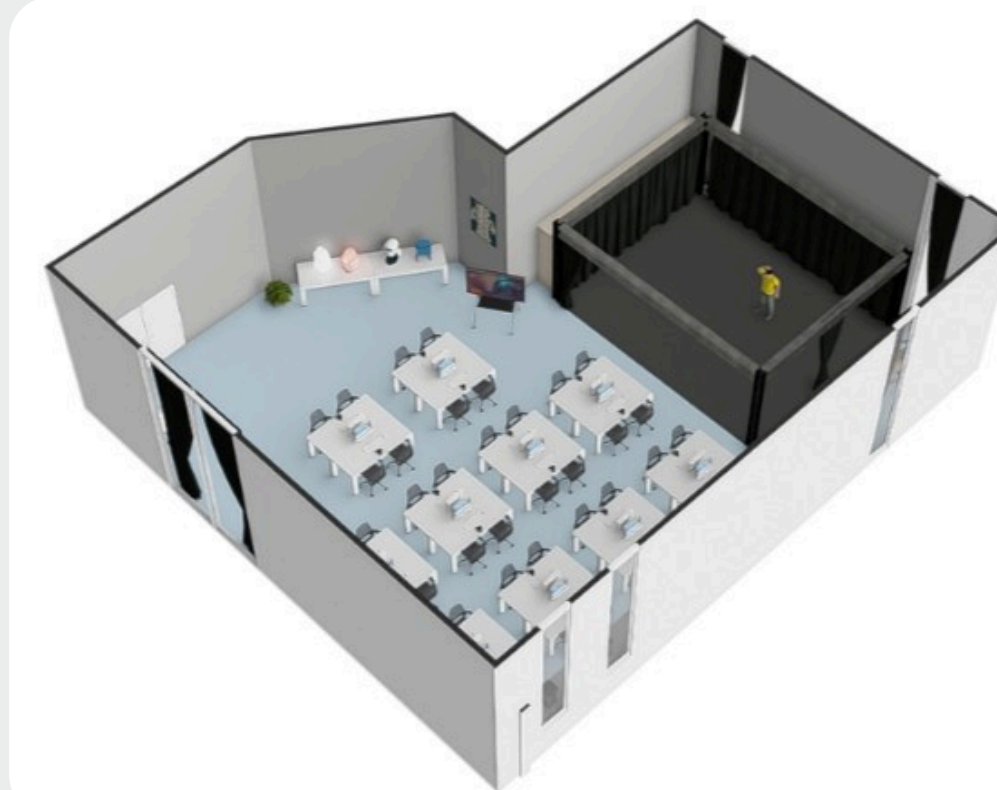
Classroom-focused medium alternative:
- Balances technical needs and cost limitations
- Prioritizes multipurpose and classroom integration based on use case analyses
- Highlights:
  - Optitrack 16-camera motion capture system
  - RO1 robot manipulator units
  - Siemens Digital Twin and VR-bridging

Impact

- Provides cutting-edge capability for potential industry partnerships
- Modernizing and adding capabilities to match peer universities
- Revolutionizes student learning using tech to enhance engagement

Future

- Expansion into high-tier designs
- Dedicated space for VR
- Corporate partnerships
- "Living feedback lab"