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Virtual Reality/ Augmented Reality (VR/AR)

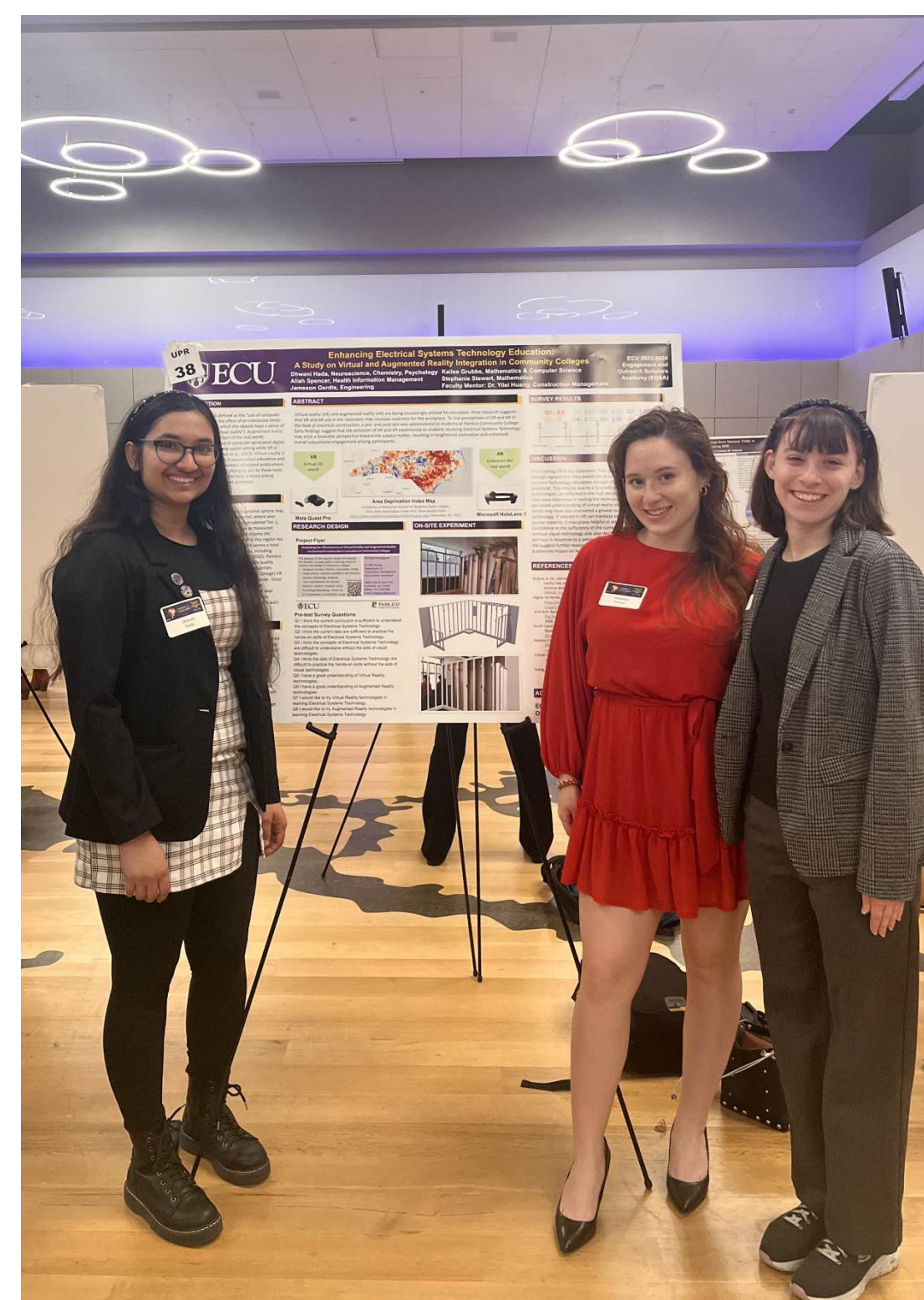### VR Presentation of Student Design Projects

- CMGT 3010 Construction Modeling & Information Technology
- Semester projects of five student groups
- Five Quest 2 VR headsets
- IrisVR Prospect software
- Students' design of a BIM model based on required building specifications
- Design inspection in VR
- Final presentation demonstrating the design inside & outside of model

AR Visualization of Electrical Construction Lab

- Pamlico Community College (PCC) Electrical Systems Technology lab
- HoloLens 2 AR headsets
- Trimble Connect MR software for HoloLens 2
- ECU students created BIM model of lab space
- PCC students overlaid AR model in the lab
- Helps visualize the installation locations for electrical systems

VR/AR Effectiveness on Student Learning

- Five undergraduates
  - ✓ Engineering, Mathematics
  - ✓ Computer Science, Neuroscience
  - ✓ Health Information Management
- Developed BIM model for VR/AR visualization
- Oral & poster presentation
- 2024 RCAW Poster Award

Scholar-Teaching

Teaching

- CMGT 2950 Construction Surveying
  - ✓ 2023-2024 ECU Teaching Grant
- CMGT 3010 Construction Modeling & IT
  - ✓ 2022 ECU Course Innovation Grant
- CMGT 6630 Advanced Scheduling
  - ✓ 2024 ECU CourseFIT
  - ✓ QM Online Course Certification
- CMGT 6664 Advanced Cost Estimating
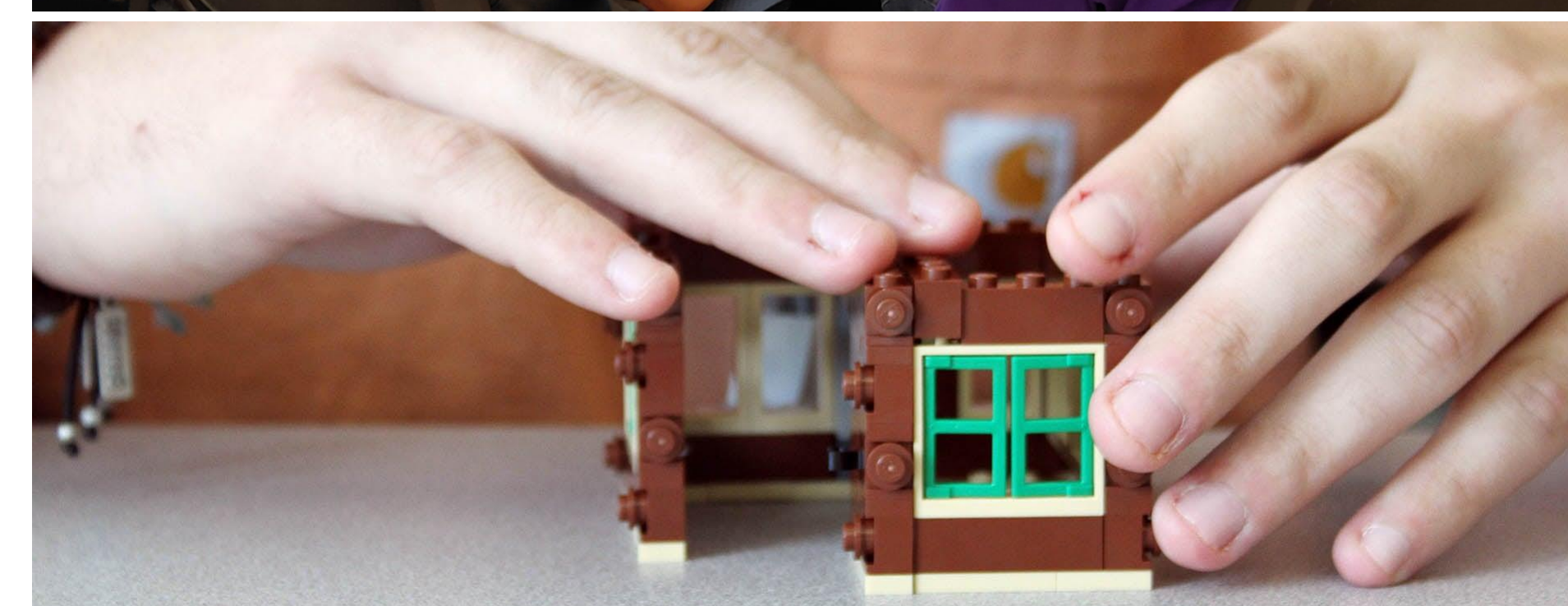 - ✓ 2024 Associated Schools of Construction Estimating Bootcamp

Research

- Building Information Modeling (BIM)
  - ✓ Building Predictive Maintenance, Phase I & II, CMI2, $1.06M, co-PI
- Virtual Reality/ Augmented Reality
  - ✓ 2023 ECU EOSA Scholar
  - ✓ CET Digital Lounge VR/AR Lab
- Reality Capture Technologies
  - ✓ 2023 ECU SPARC Award
  - ✓ 2024 ECU I-Corps
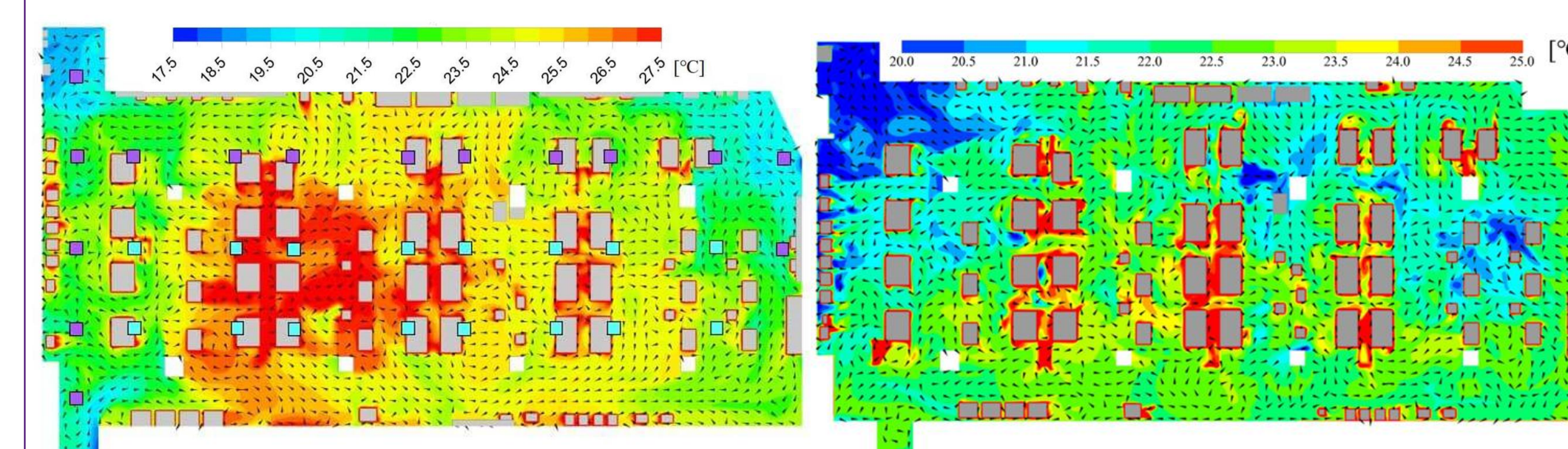 - ✓ 2024-2025 ECU Innovation Academy

Building Information Modeling (BIM)

See, Build, Play: Build a Lego House with Building Information Modeling

- CMGT 3010 Construction Modeling & Information Technology
- Two-hour hands-on group activity
- Build a Lego house with BIM model
- Each student completes a building component like a subcontractor
- The group then coordinates to complete the entire building

- CET Engineering and Technology Symposium
- K-12 educators across Eastern NC
- Building components preassembled to allow easier assembly for school kids

HVAC Design, Logistics, and Installation with Building Information Modeling

- MSCM student Richard Liu

- Apply BIM in HVAC for
  - ✓ Design verification/ optimization
  - ✓ Material logistics system
  - ✓ Equip transportation/ installation

- One journal article
- Three conference proceedings
- Five oral and poster presentations

- Employed as BIM Coordinator
  - ✓ Bell, a leading MEP contractor

Reality Capture Technologies (Drone/ Lidar Scan)

Surveying Drone Classroom Demonstration

- CMGT 2950 Construction Surveying
- DJI Matrice 300 RTK enterprise-level drone
- P1 full-frame camera
- L1 aerial lidar sensor
- Drone & dual payload setup demonstration
- Photogrammetry and point cloud lab practice
- DJI Terra Pro software
- DroneDeploy Aerial cloud processing

Lidar Scan with Construction Robotics

- Pamlico Community College Electrical Systems Tech lab
- Unitree Go2 Pro Quadruped Robot Dog
- Insta360 ONE RS 360 Camera
- Realsee Galois 3D Lidar Camera

- Remote controlled to walk thru space
- Capture lidar scans and 360° photos
- Create point cloud & photogrammetry models for VR/AR

Drone for Construction Inspection and Verification

- MSCM student Andres Acero Molina
  - ✓ FAA Certified Remote Pilot
  - ✓ Aerial photogrammetric & lidar point cloud models
- Three publications, Six presentations
  - ✓ NCDOT Research Summit
  - ✓ Washington, NC Drone Show
- SICE, an infra tech corp.