

**SECEDHA 2020 Fall Meeting
October 30, 2020 virtual
meeting**

1. SECEDHA President Hulya Kirkici (U. South Alabama) called the meeting to order at 8:30 am CDT. (The list of attendees and their affiliations is attached as an appendix.)
2. Lynne Chronister (VP of Research and Economic Development, Univ. of South Alabama), John Janowiak (ECEDHA), and Tony Waldrop (President, Univ. of South Alabama) welcomed meeting participants.

ECEDHA will not have an annual meeting in spring 2021. Instead, ECEDHA will have a series of quarterly summits with the first in December 2020.

3. A panel on online labs and online “hands-on” experience for students (COVID impact) was facilitated by Jerry Trahan (LSU). Panelists were Ryan Beasley (Undergraduate Lab Coordinator, Purdue), Fred Beyette (Chair, U. Georgia), Leslie Birch (Lab Coordinator, U. Pennsylvania), Casey Smith (Assistant Director of Instructional Support, U. Illinois Urbana-Champaign). Key points included: the importance of communication among instructors, teaching assistants, and students in a new lab environment; the use of web-based user interfaces for students to take measurements with real instruments; the benefits to student confidence of being able to practice remotely; the necessity of thinking carefully of what components go into a kit, of what knowledge students are to gain in a lab; and the challenges of logistics to acquire and deliver items for students to engage remotely in lab work.
4. A presentation on senior design experience in virtual teaching (teamwork and design projects) was facilitated by Mark Nelms (Auburn). John Peeples (Citadel) described adaptations for an online environment, particularly focusing on planning and structuring the interaction among team members and faculty in regular meetings.
5. A presentation on tools and community support for online teaching was facilitated by Mike Johnson (U. Kentucky). Dan Stancil (North Carolina State) provided an overview of the RECET (Facilitating Remote Electrical & Computer Engineering Teaching) project. The project aims to identify and disseminate materials, strategies, and best practices for online teaching in ECE. The starting point is introductory (sophomore) analog and digital circuits courses. A pilot website contains some initial materials.

6. Andrea Kent (Interim Provost and Senior VP, Univ. of South Alabama) welcomed meeting participants.
7. Melissa Baumann (Provost and Chief Academic Officer, Xavier U) introduced the topic of diversity and engineering education. She described her experience as a woman faculty member in engineering, and she described opportunities she has had for outreach and opportunities as an administrator for bringing about change. A data-driven viewpoint can highlight benefits of diversity.
8. Julie Martin (Associate Professor of Engineering Education, Ohio State) gave a presentation on diversity and engineering education. She focused on moving away from deficit thinking, a “fix the student” mentality that sees deficits in students, to asset-based thinking, an approach that identifies and cultivates supports for student success. She identified a four frames model for creating an inclusive organization: equip the individual; create equal opportunity; value difference; and manage culture.
9. John Usher (Dean of Engineering, Univ. of South Alabama) welcomed meeting participants. Hulya Kirkici conducted a virtual tour of Mobile, the University of South Alabama, the College of Engineering, and the ECE department.
10. Zhihua Qu (U. Central Florida) reported on ECEDHA. The ECEDHA Board is negotiation with PEI toward renewing their contract, which expires at the end of the year. ECEDHA has purchased 20% ownership of the ECE Expo from PEI, so future ECEDHA income from the ECE Expo will be 20% (as before) plus 20% of the remaining 80% (because of ownership). The ECEDHA Board has decided to keep membership dues unchanged.
11. John Harris (U. Florida) made the following motion (seconded by Zhihua Qu): Freeze officers for one year.

Discussion included the following points. The COVID-19 pandemic has disrupted the year with no ECEDHA meeting in the spring and this SECEDHA meeting being virtual-only. Extending the terms of the officers for one year would allow for a more normal year and a visit to the University of South Alabama, though there would not be a chance for a new person to become an officer this time. The current officers were agreeable, and current president Hulya Kirkici stated that, even if next fall’s meeting was virtual-only, officer terms should not be further extended. The motion passed unanimously. Hulya Kirkici, Mike Johnson and Jerry Trahan will continue in their current respective roles in 2021.

12. ABET feedback from visited programs

Citadel (Bob Barsanti) – With ABET evaluations being done remotely this year, evaluators had 60 days to review materials and ask questions, so the process was much longer than normal. Evaluators looked closely at PEOs and wanted documentation of the involvement of all constituencies in revision of PEOs. Evaluators wanted documentation that all design constraints were considered.

Tennessee Tech (Allen McKenzie) – The visit is scheduled for mid-November. They have uploaded videos of all labs. Evaluators are focusing on lab safety.

13. Mike Johnson conducted the annual SECEDHA statistical survey.

14. The meeting adjourned at 2:32 pm CDT.

See minutes of previous meetings at: <http://secedha.org/meetings/>

Minutes submitted by Jerry Trahan, SECEDHA Secretary.

Southeastern Electrical and Computer Engineering Department Heads Association (SECEDHA)

**Annual Meeting – Virtual
Friday, October 30 2020**

**Zoom Link: <https://southalabama.zoom.us/j/92532491665>
All times Local (Central Time Zone)**

**University of South Alabama
Mobile Alabama**

| Time | Activity | Lead |
|-----------------|--|---------------|
| 8:30 – 9:00 am | Welcome Remarks: Ms. Lynne Chronister, Vice President for Research and Economic Development, Univ. of South Alabama SECEDHA Member Introduction | Hulya Kirkici |
| 9:00 am | Welcome Remarks: Dr. Tony Waldrop, President, University of South Alabama | Hulya Kirkici |
| 9:05 – 9:50 am | Online labs and online “hands-on” experience for students (COVID Impact) <i>Panelists:</i> Ryan Beasley, Undergraduate Lab Coordinator, Purdue University Fred Beyette, Chair, University of Georgia Leslie Birch, Lab Coordinator, Detkin Lab., University of Pennsylvania Casey Smith, Assistant Director of Instructional Support, University of Illinois Urbana-Champaign | Jerry Trahan |
| 9:50 – 10:35 am | Senior Design experience in virtual teaching (team work and design projects) – Round table discussion. <i>Panelist:</i> John Peebles from The Citadel | Mark Nelms |

| | | |
|------------------|--|--|
| 10:35– 10:45 am | Break | All |
| 10:45 – 11:30 am | Tools and community support for online teaching – Round table discussion <i>Panelist:</i> Dan Stancil, North Carolina State University - <i>Overview of RECET project</i> | Mike Johnson |
| 11:30 – 12:30 pm | Welcome Remarks Dr. Andrea (Andi) M. Kent, Interim Provost and Senior Vice President, Univ. of South Alabama Presentation: Topic: Diversity and Engineering Education Introduction by: Melissa Baumann, Provost and Chief Academic Officer, Xavier University Guest Speaker: Julie P. Martin, Ph.D., F. ASEE Associate Professor of Engineering Education The Ohio State University | Hulya Kirkici Melissa Baumann And Julie P. Martin |
| 12:30 – 1:00 pm | Lunch break | All |
| 1:00 – 1:30 pm | Welcome from Dr. John Usher, Dean of Engineering, University of South Alabama Virtual tour of the college and department labs and facilities | Hulya Kirkici |
| 1:30 – 2:30 pm | SECEDHA Business Meeting <ul style="list-style-type: none"> • ECEDHA and the dues increase – update from ECEDHA Board member(s) or the subcommittee? • ABET Visit • SECEDHA Survey | Hulya Kirkici Zhihua Qu Mike Johnson |
| 2:30 – 2:45 pm | New and Old Business Meeting Adjourn | Hulya Kirkici All |

**SCEEE Meeting
Same Zoom Meeting Link**

<https://southalabama.zoom.us/j/92532491665>

| | | |
|-------------------|---|--------------------------|
| 2:45 pm – 3:15 pm | SCEEE General Meeting <ul style="list-style-type: none">• Registering SCEEE board as a not-for-profit• Other matters | Mark Nelms and Zhihua Qu |
| 3:15 pm – 3:45 pm | SCEEE Directors Meeting (All welcomed to stay and observe) | Mark Nelms and Zhihua Qu |
| 3:15 pm – 4:00 pm | Meeting Adjourned | All |

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Invited Presentation

Creating Systemic Change by Dismantling Deficit Thinking for Underrepresented Students in Electrical and Computer Engineering

Julie P. Martin, Ph.D., F. ASEE

Electrical and computer engineering professionals have significant roles to play in solving 21st Century engineering challenges. We know that diverse teams create better solutions, and yet four decades of diversity efforts in higher education have failed to produce the diversity of talent needed to address today’s complex challenges. One reason for this is the deficit-minded thinking that underlies much educational research and practice. Deficit thinking is person centered, and what we colloquially might call a “fix-the-student” mentality. Deficit thinking blames students, their families, communities, and/or their culture for their underperformance while holding educational institutions, faculty, inequitable policies and practices faultless. Most recruitment and retention programs for underrepresented engineering students are inadvertently deficit-oriented, focusing on individual students and interventions to “fix” their perceived deficits through activities such as tutoring, advising, or mentoring. The problem with this approach is that it implies that when we simply support individual students, the issue underlying their underrepresentation will be solved. In fact, when we assist individual students, the inequitable structures that necessitate their support remain uncontested.

Likewise, the vast majority of published research on underrepresentation in engineering education is either explicitly or implicitly deficit-based. Research often focuses on why underrepresented students underperform or leave the field. We know less about why underrepresented students succeed in the field.

Systemic change is necessary to tackle the complexity of recruiting and retaining electrical and computer engineering students who have been marginalized by the education system. In this talk, Dr. Martin calls for research and interventions that purposefully employ asset-based approaches and recognize the multiple domains of students' lives. Research and interventions that address systemic inequities—rather than focus on perceived deficits of students—are necessary in order to achieve lasting outcomes. The shift to asset-based perspective will not be easy as it necessitates deconstructing practices, beliefs, and policies.

In this seminar, we will: (1) explore the idea of deficit thinking in education (2) learn about asset-based frameworks such as community cultural wealth (3) think about how we can begin to transform our educational systems through asset-based approaches to student success and a focus on institutional change.

Biography:



Julie P. Martin is an associate professor of Engineering and Science Education at The Ohio State University. She is a Fellow of the American Society for Engineering Education (ASEE) and the new editor-in-chief of the *Journal of Women and Minorities in Science and Engineering* and Dr. Martin's research agenda focuses on diversity, equity, and inclusion in engineering education.

Prior to joining the faculty at OSU in 2019, Dr. Martin was a program director of Engineering Education and Centers Division (Directorate for Engineering) at NSF. While at NSF, she managed the Engineering Education portfolio which includes \$2M Revolutionizing Engineering Department (RED) grants supporting teams that serve as national exemplars of organizational culture change. In 2018, she worked on an interagency group headed by the White House Office of Science and Technology Policy to write the 5-Year STEM Education Strategic Plan for the federal government. She has held faculty appointments at Clemson University, Virginia Tech, and University of Houston, where she was the Director of Recruitment and Retention for the Cullen College of Engineering.

Over the last 15 years, Dr. Martin has held a variety of national leadership positions in ASEE and Women in Engineering ProActive Network (WEPAN), including national president of WEPAN. She has been recognized by both organizations for her distinguished service. She holds a BS in Materials Science and Engineering from North Carolina State University and a PhD in the same field from Virginia Tech.

| Timestamp | Your name | Your Title | Your Department | Your University / Organization |
|----------------|-------------------------|---|--|---|
| 10/30/20 8:35 | Mark Nelms | Chair and Professor | Electrical & Computer Engineering | Auburn University |
| 10/30/20 8:35 | Roger Dougal | Professor and Chair | Electrical Engineering | University of South Carolina |
| 10/30/20 8:35 | Dan Stancil | Alcoa Distinguished Professor and Department Head | Electrical and Computer Engineering | NC State University |
| 10/30/20 8:35 | Greg Peterson | Professor and Head | Electrical Engineering and Computer Science | University of Tennessee, Knoxville |
| 10/30/20 8:35 | Eric Welch | ECE Professor and Department Chair | Electrical and Computer Engineering | Christian Brothers University |
| 10/30/20 8:35 | Tim Wilson | Chair, Professor of ECE | Electrical Engineering and Computer Science | Embry-Riddle Aeronautical University – Daytona Beach |
| 10/30/20 8:35 | Yuzhong Shen | Professor and Chair | Computational Modeling and Simulation Engineering | Old Dominion University |
| 10/30/20 8:36 | Md Sakib Hasan | Assistant Professor | Electrical and Computer Engineering | University of Mississippi |
| 10/30/20 8:36 | John Harris | Chair | ECE | University of Florida |
| 10/30/20 8:36 | Hai Xiao | S.L. Bell Distinguished Professor and Interim Chair | Holcombe Department of Electrical and Computer Engineering | Clemson University |
| 10/30/20 8:36 | Fred Beyette | Chair of Electrical & Computer Engineering | School of ECE | University of Georgia |
| 10/30/20 8:37 | Zhijia Qu | Professor & Chair | ECE | University of Central Florida |
| 10/30/20 8:38 | Oscar Gonzalez | Professor and Chair | Electrical and Computer Engineering | Old Dominion University |
| 10/30/20 8:38 | Jerry Trahan | Chair | Electrical & Computer Engineering | Louisiana State University |
| 10/30/20 8:39 | Ryan Beasley | Undergraduate Laboratory Coordinator | Electrical and Computer Engineering | Purdue University |
| 10/30/20 8:39 | Robert Barsanti | ECE DH | ECE | The Citadel |
| 10/30/20 8:40 | Chrysanthe Preza | Kanuri Professor and Chair | Electrical and Computer Engineering | The University of Memphis |
| 10/30/20 8:43 | Mike Johnson | Professor and Chair | Electrical and Computer Engineering | University of Kentucky |
| 10/30/20 8:43 | Monson Hayes | Professor and Chair | Electrical and Computer Engineering | George Mason University |
| 10/30/20 8:43 | Allen B. MacKenzie | Chairperson and Professor | Electrical and Computer Engineering | Tennessee Tech |
| 10/30/20 8:51 | Barry Muldrey | Assistant Professor | Elect. and Computer Eng. | University of Mississippi |
| 10/30/20 8:51 | Asis Nasipuri | Professor and Chair of ECE | Electrical and Computer Engineering | University of North Carolina at Charlotte (UNC Charlotte) |
| 10/30/20 9:13 | Tom Gilbar | Chair | Electrical and Computer Engineering | University of West Florida |
| 10/30/20 9:13 | Hulya Kirkici | Profesor and Chair | ECE | Univ of South Alabama |
| 10/30/20 9:15 | Casey Smith | Assistant Director of Instructional Support | ECE | University of Illinois at Urbana-Champaign |
| 10/30/20 9:16 | John R Janowiak | Executive Director | ECEDHA | ECEDHA |
| 10/30/20 9:19 | Samee U. Khan | Head and James W. Bagley Chair Professor | Electrical and Computer Engineering | Mississippi State University |
| 10/30/20 10:02 | Dr.Bhuvana Ramachandran | Associate Professor and Chair | ECE | University of West Florida |
| 10/30/20 12:09 | Demetris Geddis | Associate Professor and Chair | Electrical and Computer Engineering | Hampton University |



**UNIVERSITY OF
GEORGIA**

Chartered by the state of Georgia in 1785, the University of Georgia is the birthplace of public higher education in America — launching our nation’s great tradition of world-class public education. What began as a commitment to inspire the next generation grows stronger today through global research, hands-on learning and extensive outreach. A top value in public higher education, Georgia’s flagship university thrives in a community that combines a culture-rich college town with a strong economic center.

SECEDHA Fall Meeting

Online Labs and Hands-on Experience Panel Discussion

Dr. Fred R. Beyette Jr. Chair, School of ECE



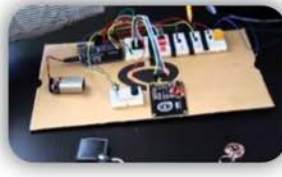
UNIVERSITY OF
GEORGIA

Different Lab Experiences in Engineering

f-2-f
labs



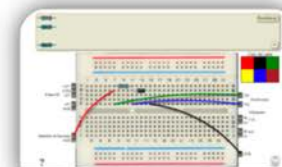
take-home
lab kits



augmented
reality labs



remote
labs



virtual
labs

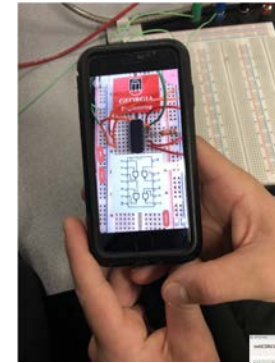


————— level of digitalization and reality —————>

Led by Dr. Dominik May, UGA's College of Engineering has been investing in the development of online remote/virtual lab activities that have been transformational to the the way we support hands-on experiences for Engineering Students

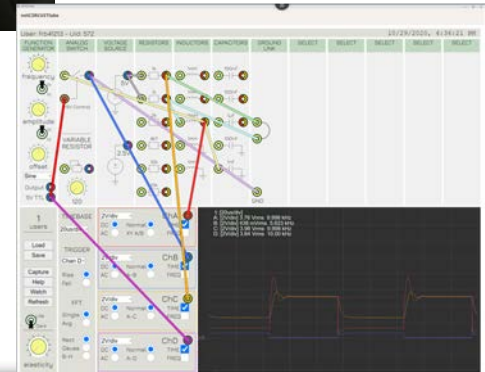
Cross-Reality (XR) Virtual Labs

- Cross-Reality (XR) is a technology agnostic term that encompasses all forms of reality (virtual, augmented, merged, remote).
- Approx. 20 UGA faculty involved across all Engineering disciplines
- Most projects are not supported by extramural funding
- Dr. May and I are part of a team funded by NSF to investigate how the rapid increase in use of XR virtual labs has impacted students and faculty.



Augment Reality Breadboard App

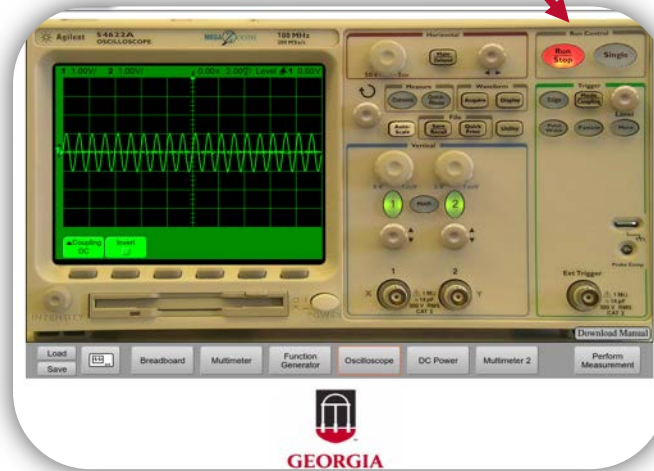
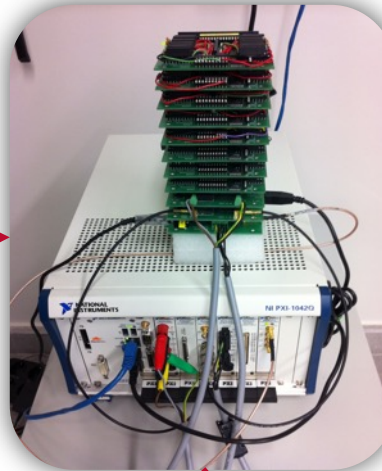
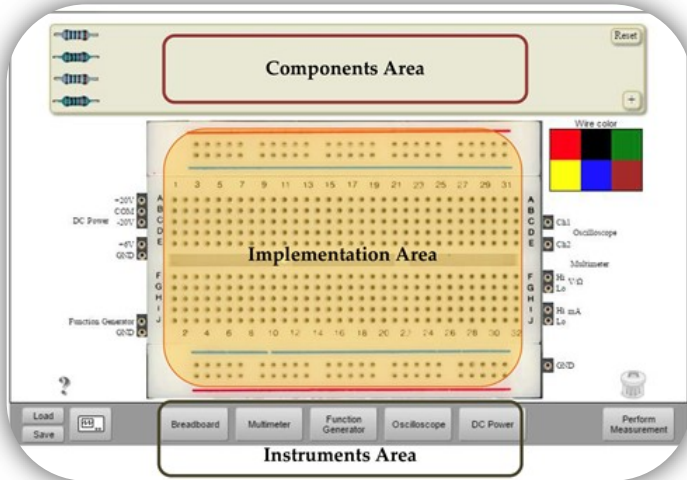
Virtual Remote Circuits Lab



VR Land Surveying lab



The VISIR Remote Circuits Lab



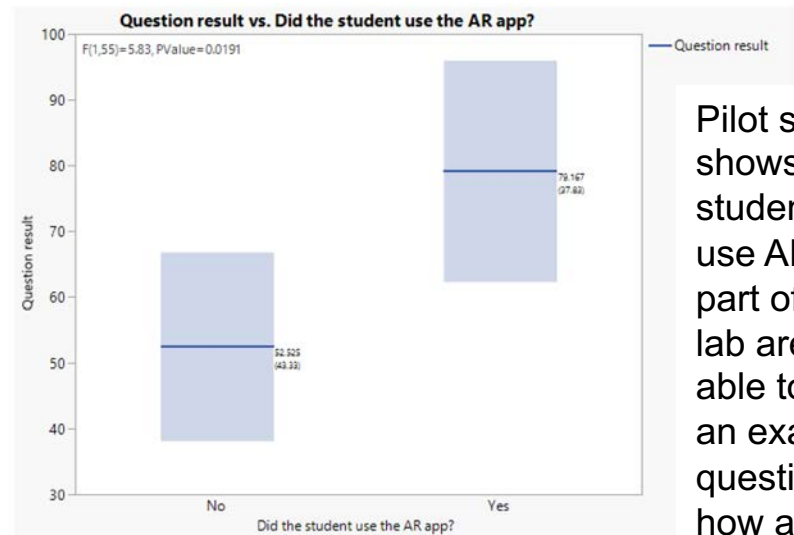
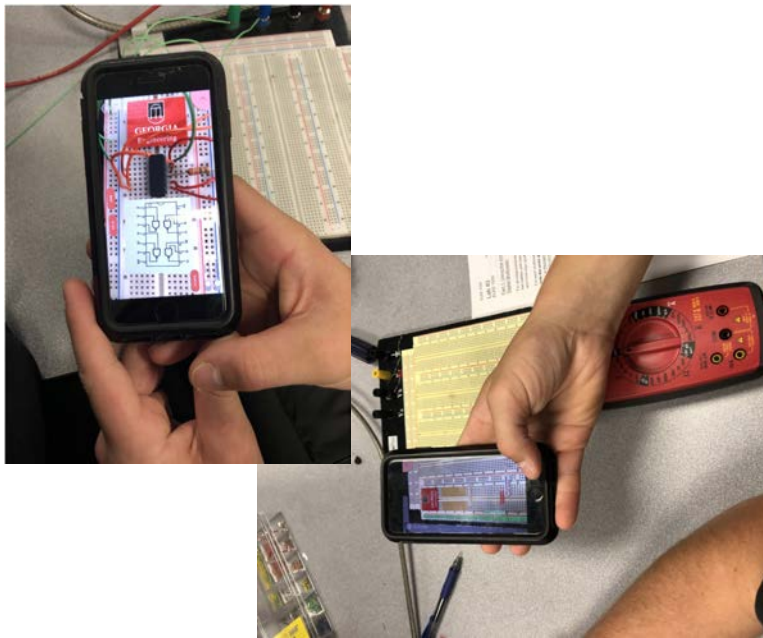
See video:

<https://www.youtube.com/watch?v=nVWU-wCpMRc>



Augmented Reality Mobile App (ARMA)

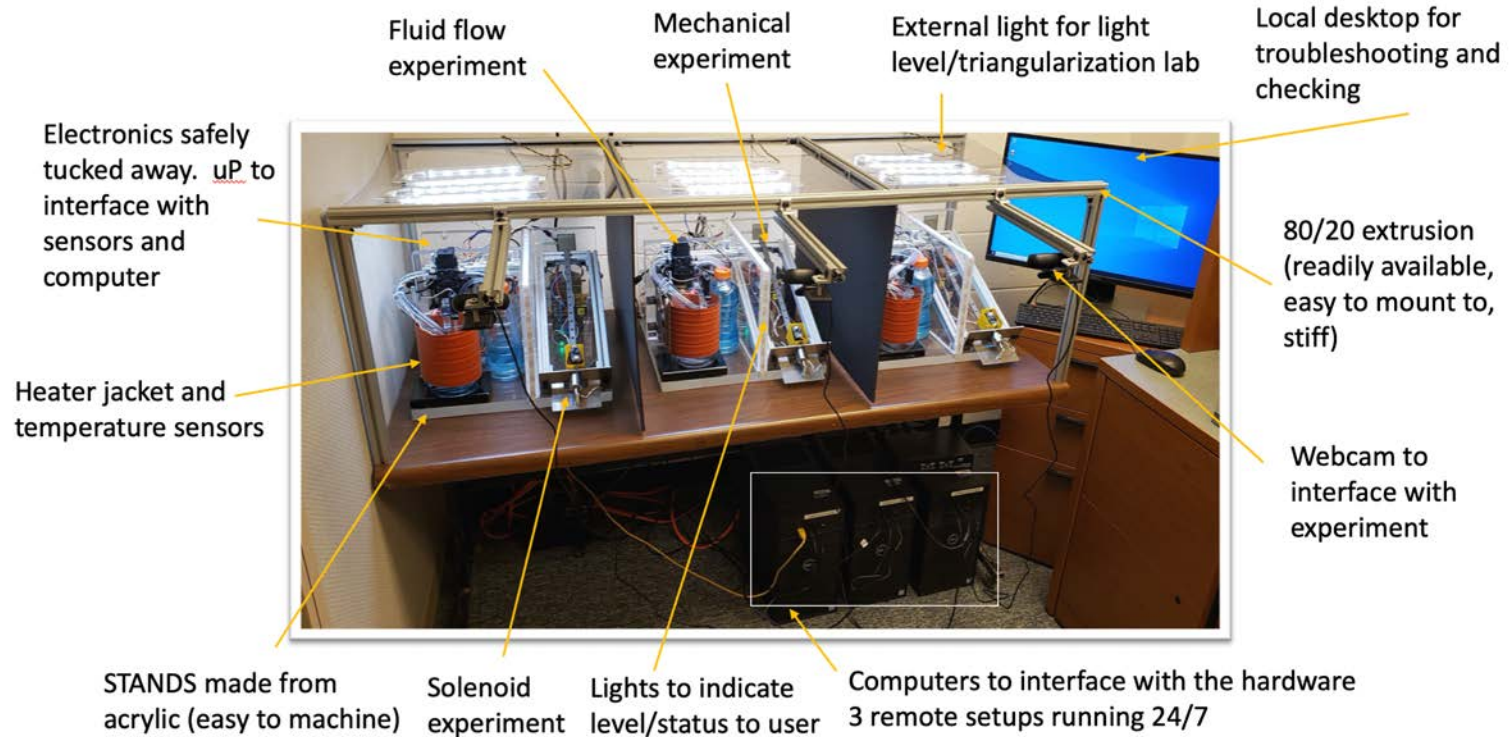
- Provides AR interpretation/guidance of breadboard use
- ARMA developed for the iOS and Android platform.
- Two forms of digital information:
 - 3D objects, such as resistors.
 - Animation to illustrate how to build the circuit step by step.



Pilot study shows that students who use ARMA as part of a circuits lab are better able to answer an exam question about how a Breadboard works



Remote Sensors (Instrumentation) Lab

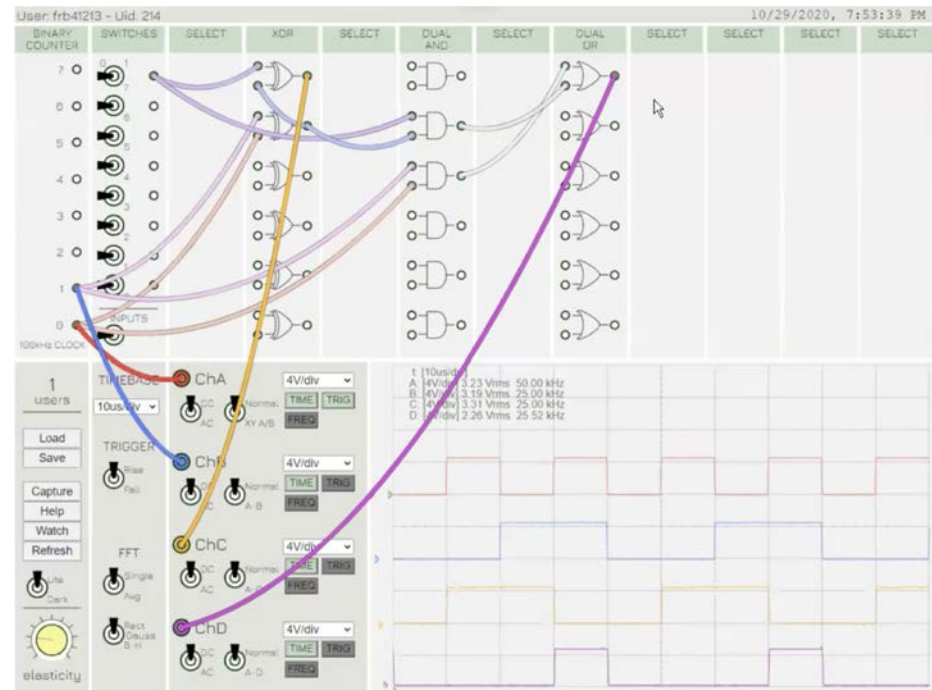


- Experiments in fluid flow, solenoid actuation, temperature control, etc.
- Web cam allows user to see experiments in process.
- Used for both classroom demonstration and student experimentation



Anecdotal Observations

- Virtual remote labs are real hardware therefore students see real hardware issues!
- Students learn to use remote labs very quickly.
- Students have the same kinds of problems that they have with in person labs
- The remote/virtual nature makes them easy to teach and easy to trouble shoot virtually (i.e. in a zoom session with students)
- Anecdotally, I see a lower activation energy for student use of these platforms.
- Students can and do use them when they are on their own (i.e. away from peer pressure)
- Thus, students don't seem to have the same performance anxiety as they do in the lab with their peers or the instructor watching.
- Although I haven't tested it yet, I suspect the lower activation energy will lead to more confidence with real hardware in a face-to-face lab.
- I would like to see if the inherent leveling of the playing field associated with being able to play/experiment in private leads to more confidence when working on in person labs for women and BIPOC students who tend to sit back and watch their lab partners work when executing face-to-face labs



Useful Resources

VISR Remote Lab:

The VISR Remote Lab is available from LabsLand (<https://labsland.com/en>)

Digital Remote Lab:

The visual remote lab shown on the anecdotal observation slide is part of a suite of remote labs provided by EMONA Instruments (<https://www.emona-tims.com>). UGA is current using the EMONA netCIRCUITlabs (<https://netcircuitlabs.com>) which includes the digital lab shown in the presentation. The EMONA netCIRCUITlabs system also includes labs in circuit theory, analog electronics, and op-amps as well as a “Build-Your-Own” option that allows instructors to develop custom lab solutions on a large breadboard that interfaces with the EMONA system interface.

ARMA App:

The ARMA App which was developed by a UGA faculty member is currently only publicly available for Android. You can request access to the download at:
<https://drive.google.com/file/d/1IR9VoHDdNPiG4z-mehcb3Q9wmBTInXhg/view?usp=sharing>

Once you have downloaded the app, you must print the UGA logo on the next page and place on the breadboard. This allows the app to calibrate to the phones camera.

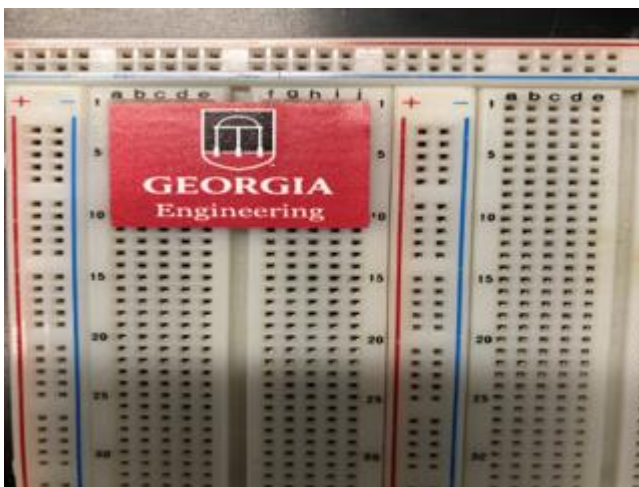
All other labs featured in the presentation are custom developments done by UGA faculty. If you have interest in how these labs work or how you can develop something similar please reach out to Fred.Beyette@uga.edu





“Sticker Image” Should be printed so image is 2.5 cm x 3.0 cm

“Sticker” should be placed on the breadboard as shown below so that the ARMA App can use the sticker to calibrate the camera aspect ratio etc.



Concluding the Design Year Remotely

John Peebles
Electrical and Computer Engineering
The Citadel



RECORDED WITH
SCREENCAST

Electrical and Computer Engineering
Class of 2020

THE CITADEL
THE CITADEL

Situation

Citadel Spring Break, March 13-19, 2020

- The US Educational Response to COVID-19 is peaking
- Students leave campus unsure of return plan

March 11, 2020 - New capstone team assignment – Contingency planning

- By and for each team
- By instructor and advisors

Developed geographic “maps” for each team

- Coast to coast but clustered in SC

The GOOD News - Only 5 teams

COVID-19 Institutional Response

Rapid Continuation of Instruction (COI) Information and Technology Rollout

- Professional Zoom License for all faculty and staff
- Cameras and Microphones
- Massive online and limited-contact training, Screencast, Zoom, Blackboard, etc.
- Emphasis on use of Blackboard, the existing LMS

Preliminary Student contact and participation tracking plan

- Requests for faculty follow through
- Course by course COI published to students

Synchronous and/or Asynchronous Instruction Allowed

Email and/or Blackboard Assessment Allowed

The Basics

Today, I will schedule Zoom sessions for each team during tomorrow's (Monday, March 23, 2020) normal class hours. We will keep this first meeting to 30 minutes per team. Invites will be sent to each team, the team advisor, Dr. Barsanti and Mr. Knapp. Invitees are encouraged to join by voice, with video optional, and can dial in if not close to a voice-capable computer.

The agenda for tomorrow's meeting:

1. Status from team leader. Keep it short, schedule, budget and feature/function.
2. Review of Contingency Plans submitted after our March 11, 2020 class. Modify as needed.
3. Establish preferred schedule and mode for future meetings.
4. Raise and discuss issues and concerns.
 - a. Parts
 - b. Equipment
 - c. Access
5. Roundtable

We will know an AWFUL LOT more about the path forward after tomorrow's meetings. I know there will be absences from persons not seeing this email, or otherwise not being available. I also expect less than seamless performance of our meeting technology but believe these shortfalls will get better with time.

Team Leaders: If you receive this, please reply so I can have some feel of what to expect.

To boldly go where no Capstone has gone before.

THE CITADEL

Actions

One Guest Lecture by IP Attorney Cancelled.

- IP material previously covered
- The cancelled guest is an ECE grad/Patent Attorney

Supplemental Work Submitted Remotely

- “Henry’s Daughters” Ethics Assignment
- Technical Poster Presentations*
- Citadel Electrical Engineering Design Symposium (CEEDS) Technical Papers**
- Final Project Specifications
- Final Reports

Technical Poster Presentations included in Virtual Student Excellence Day Conference on 2020 CEEDS Proceedings electronically published and widely distributed

- To interested parties including our Advisory Board, Provost and President.

50 synchronous team meetings between 23rd of March and 22nd of April.

5 Successful Project Demonstrations week of April 20th through 27th.

Results

Best Capstone Ever!

Maybe not.

Better Remote Result than Expected.

By a long shot!

Keys to Success

Luck

- Smallest senior class in decades kept things manageable.
- Pandemic timing at end of the third quarter.

Department Technician Deemed Essential Employee

- Focused on capstone procurement and delivery.

“Virtually” 100% attendance/participation

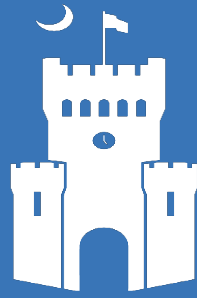
- 50 team meetings (2 per week per team) with instructor, advisor and technician.

Additional Team Collaboration via Google tools and Zoom.

Student, Faculty and Staff flexibility.

Drinks?

[Team "Afternoon Delight" Drink Mixer - Youtube](#)



THE CITADEL



Project RECET

Facilitating **R**emote **E**lectrical and **C**omputer **E**ngineering **T**eaching: Seizing the Moment

John Booske (UW), Greg Byrd (NC State), Ken Connor (RPI), Mike Devetsikiotis (UNM), Robin Getz (ADI), Kathy Gullie (Gullie Consultant Services), John Janowiak (ECEDHA), Doug Mercer (ADI), Dean Spaulding (Educational Consultant), Dan Stancil (NC State), and Barry Sullivan (ECEDHA)

The Opportunity

- Online and online compatible techniques for teaching ECE have been researched for years
 - But were still not widely used
- Same thing for Discipline Based Education Research
- Pandemic forced virtually every university online, and this will likely continue at some level through the spring and beyond
- Some ECE Departments found this transition more challenging than others
 - There is now an urgent need for all programs to develop & expand this capability
- We propose to take advantage of this opportunity to help identify and disseminate materials, strategies, & best practices
- An NSF proposal has been submitted by ECEDHA to support this project



ECEDHA

Project Scope & Role of Industrial Participation

- Ideally, this should be done for the entire ECE curriculum
- We propose to start with a single topic: introductory (e.g., sophomore level) analog and digital circuits
 - Key driver: availability of inexpensive hardware
- A key goal is to integrate industry input to help make ECE graduates better prepared by using these techniques
- Analog Devices, Inc. is active participant in pilot project
- Hope to expand to include ECEDHA's corporate members



ECEDHA

Example Student-owned Hardware

Measurement Platforms

- Digilent/National Instrument's Analog Discovery 2
- Digilent/National Instrument's Open Scope
- Analog Devices' ADALM1000 (M1K)
- Analog Devices' ADALM2000 (M2K)
- Red Pitaya's Red Pitaya
- Pico's PicoScope 2000
- Rigol's 1000Z
- Seed Studio's Nano v3

And parts kits:

- Analog Device's ADALP2000
- Texas Instruments myParts Kit



Key Project Tasks

- Topics inventory for analog and digital circuits
- Collect and review existing materials and best practices
- Create new exercises/experiments based on best practices
- Review available student-owned measurement platforms
 - Idea of a Lab 0 to serve as a “Rosetta Stone” so that exercises can be used with any platform
- Make materials readily available to the community
- Provide instruction and training on use of materials
- Assessment



ECEDHA

Shared repositories like this have been created before, and weren't used

- *What's different about now?*
 - Intense interest driven by urgent need
 - Timing is right in that hardware is available at reasonable cost
 - Sponsored by ECEDHA—a respected “neutral” party
 - Key philosophies:
 - Creative Commons licensing (for materials hosted on website)
 - Minimal branding of materials
 - Goal is to obtain contributed material broadly from the community
 - May lead to alternative respected publication venue
- But we shall see!



ECEDHA

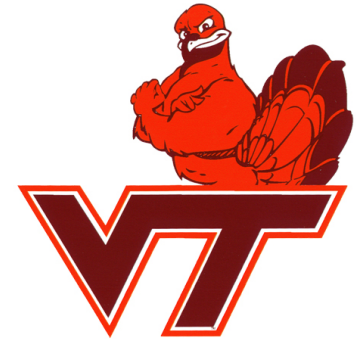
Project RECET Pilot Website

- Remember: this is a “minimum viable product”
- Hope to expand considerably if NSF program is funded
- <https://www.ecedha.org/ECE-Resources/Project-RECET>

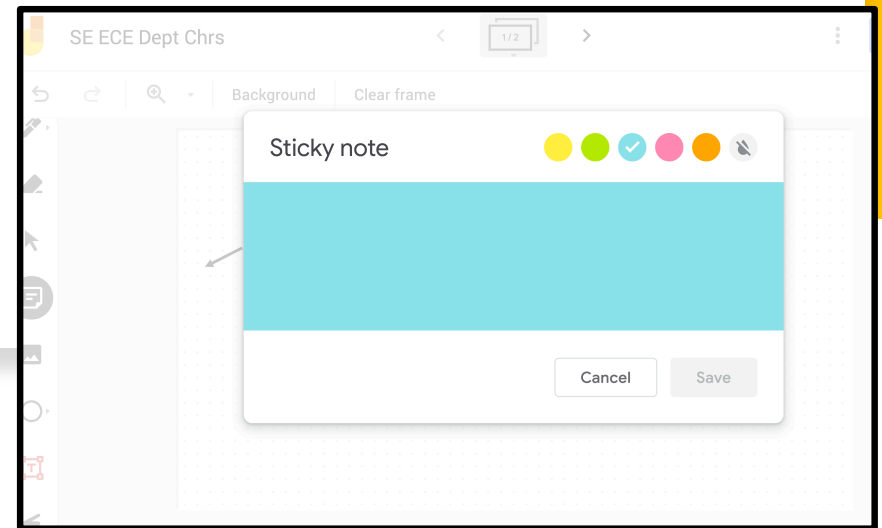
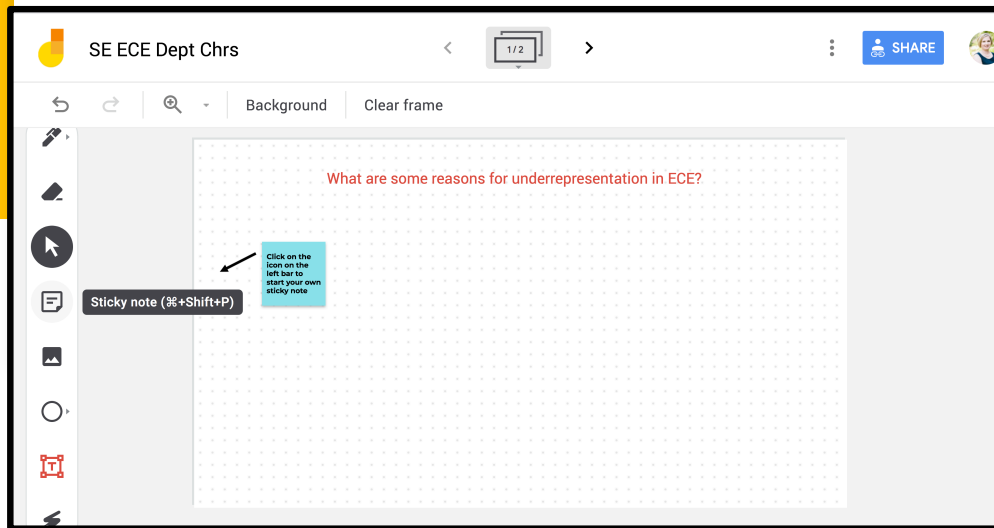


Dismantling Deficit Thinking for Underrepresented Students in Electrical and Computer Engineering

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Minorities in Science and Engineering



What are some reasons for underrepresentation in electrical and computer engineering?



What are some reasons for underrepresentation in ECE?

nobody wants them there and they feel that

Click on the icon on the left bar to start your own sticky note

Traditional thoughts that certain groups either aren't good at math/science or shouldn't be interested at math/science.

lack of engineering identity

Not having exposure

Critical mass

lack of inclusive culture

We are not proactively recruiting them in High School

lack of advising

Lack of role models

Less prepared due to K-12 schooling

poor high school backgrounds

no warmth or respect for their culture

no URM faculty

uncertain chances for success

No exposure to it when growing up

Men act like jerks to women

Lack of meaningful outreach

no peer group

lack of self-confidence that they can be great!

Parents do not encourage

Environments in engineering orgs and engineering education orgs aren't designed to promote success by marginalized populations

Deficit thinking

(Valencia, 1997)

“Fix-the-student” mentality

Person-centered: internal deficits or deficiencies

The students need to change; the system works and is equitable

Blames students, families, communities, culture for their underperformance

Deficit
thinking
ignores

(Garcia & Guerra, 2004)

Educational institutions, faculty,
inequitable policies and
practices

Systemic factors that
perpetuate deficit thinking and
reproduce educational
inequality

Deficit thinking in engineering education research

Vast majority of published research on underrepresentation in engineering is explicitly or implicitly deficit-based

Focuses on why UR students either underperform or leave engineering entirely

Know much less about why UR students succeed in engineering

What we find depends on what we look for!

Anti-deficit
(asset)
research
questions

(Harper, 2010)

Why do so few students of color pursue engineering majors?

What stimulates and sustains students' interest in attaining degrees in engineering fields?

Anti-deficit
(asset)
research
questions

(Harper, 2010)

Why are students of color so under-prepared for college-level math and science courses?

How do STEM achievers from low-resourced high schools transcend academic under-preparedness and previous economic disadvantage?

Anti-deficit
(asset)
research
questions

(Harper, 2010)

Why are African American students' grades and other indicators of academic achievement disproportionately lower than their White and Asian counterparts?

What enables students of color in engineering to make the dean's list, compete for prestigious research opportunities, and earn high GPAs?

Rewriting deficit-minded research questions

- Why do so few students of color continue on to graduate degree programs in computer engineering?
- Why are there so few women who are EE full professors at research universities?
- What are the demographic factors that predict failure in introductory circuits courses?
- What skills are lacking in students who are weeded out of engineering in their first year?

Rewriting deficit-minded research questions (jamboard p.2)

- **Last name A-H:** Why do so few students of color continue on to graduate degree programs in computer engineering?
- **Last name I-M:** Why are there so few women who are EE full professors at research universities?
- **Last name N-R:** What are the demographic factors that predict failure in introductory circuits courses?
- **Last name S-Z:** What skills are lacking in students who are weeded out of engineering in their first year?

What could we do to attract students of color to graduate degree programs in computer engineering?

What factors make students excited about continuing on to graduate studies in computer engineering?

A-H: What are we doing to mentor and recruit our undergraduate minorities to continue to graduate school?

What factors encourage individuals from underrepresented groups to continue on to graduate education?

What factors inspire student engagement in CE graduate programs?

What can the institutions do to improve tenure and promotion process?

How can institutions change to provide a more inclusive and supportive culture?

What are the skill sets needed to be successful in introductory circuits courses?

Based on lessons learned how can we best support all students succeed in introductory circuits course?

Are there demographic factors that correlate with success in electrical circuit courses?

What skills do students bring into college that enable them to succeed in their first year of engineering?

How can we help students acquire any necessary missing skills to enable them to be successful in their first year of engineering?

How can we ensure that engineering students have essential skills to succeed their first year?

Deficit thinking in engineering education practice (recruitment & retention programs)(Castro, 2014)

Origins and justification
come from complex
history of oppression
and exclusion

Focus on individual
students and
interventions to “fix”
perceived deficits
(tutoring, advising, or
mentoring)

Implication (myth): when
we simply support the
individual student, we
solve underlying
underrepresentation
issue

Reality: when we assist
individual students, the
inequitable structures
that necessitate their
support remain
unchallenged

Recruitment & retention program discourse analysis (Castro, 2014)

- Language of “repairment”
- “At risk” construes the student as the problem
- Why isn’t the department (major, university) “at risk” for failing the student or for causing the student to exit the program?

Implication [myth]:
when we support the individual student, we solve underlying issue

Reality: when we assist individual students, the inequitable structures remain unchallenged

Alternatives
to deficit
thinking

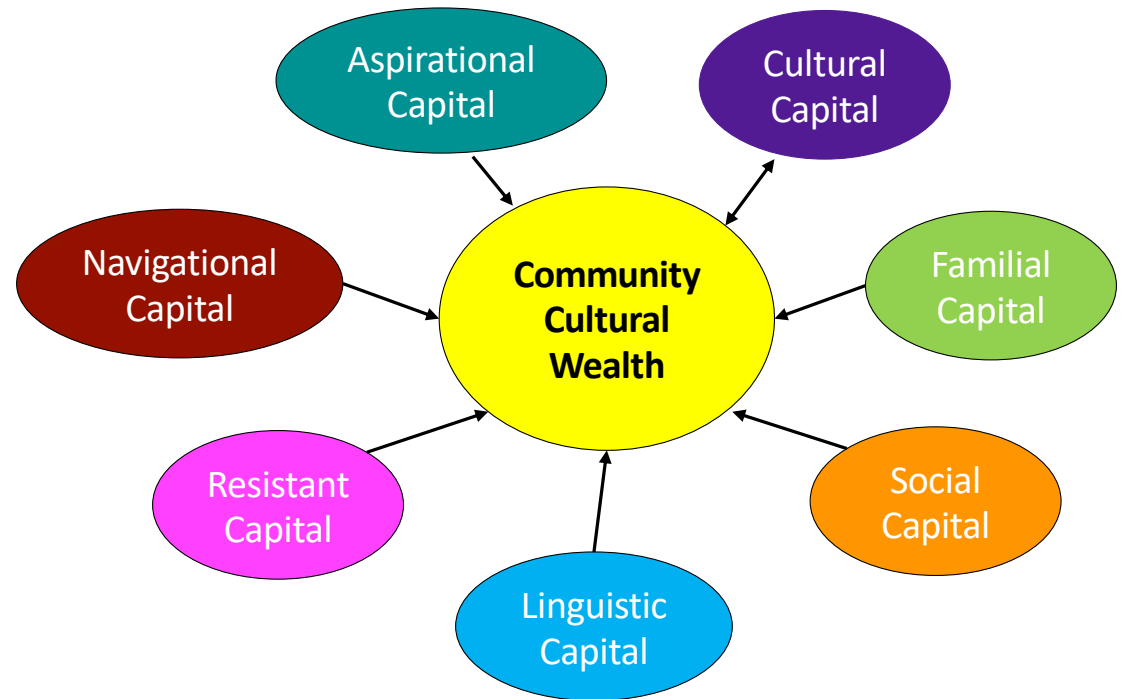
Asset-based thinking

Systemic thinking

Asset-based thinking (Yosso, 2005)

Income:
\$

Wealth:
the total extent of
accumulated
assets & resources
(not necessarily
monetary)



Systemic Thinking

- Treats underrepresentation as structural phenomenon
- Instead of fixing students → transforms structures and systems

Asks questions like:
To what extent is the department designed to serve UR students?
What is the institutional responsibility for student success?

Four Frames Model for Creating Inclusive Organizations

- WIE or MEP programs
- Supplemental instruction
- Women's executive leadership programs

- Systemic factors!
- System/org is inherently gendered/raced
 - Reward systems promote desired behavior

Equip the Individual

1

Create Equal Opportunity

2

Manage Culture

4

Value Difference

3

- Admissions
- Hiring
- Evaluation
- T&P
- Sexual harassment guidelines

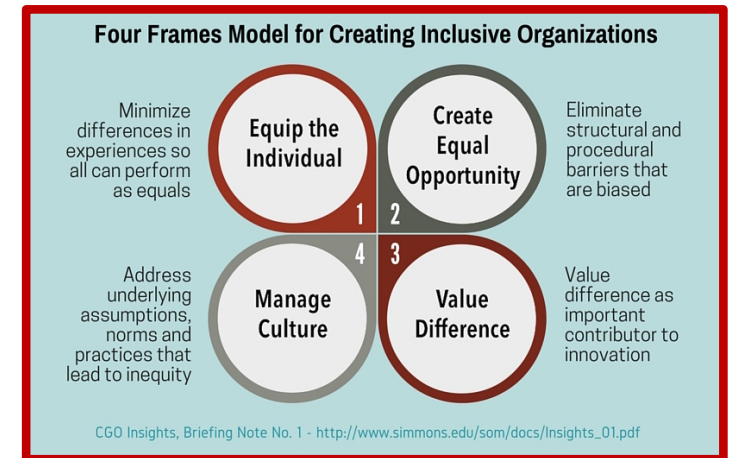
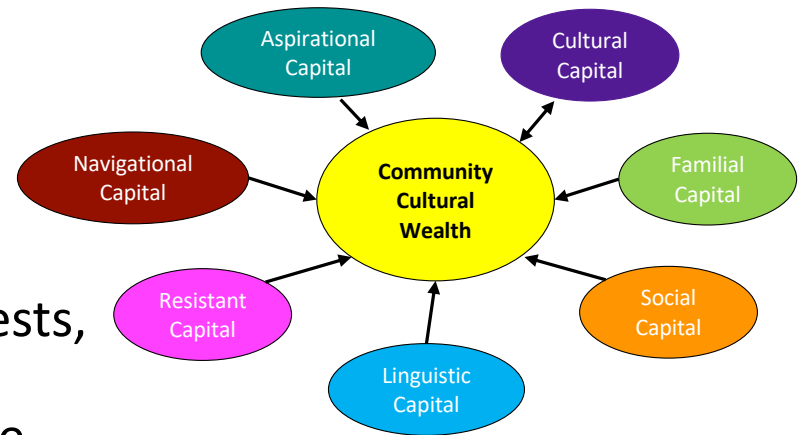
- Eliminating difference
→ Valuing difference
- SAFE zone training
 - Implicit
 - Bias training
 - Team building expectations for students

CGO Insights, Briefing Note No. 1 - http://www.simmons.edu/som/docs/Insights_01.pdf

What **you** can do?

[jamboard p.3]

- Graduate admissions committee
- Major program requirements (placement tests, GREs)
- Department tenure & promotion committee
- Hiring committees
- Recruit research group members
- Council of graduate students
- Attend or arrange for implicit bias training
- Organize a conference/symposium?
- Participate in race and gender dialogues
- Teach class that does group work



What can YOU do?

brain storming session with students and faculty together to identify deficit and make actionable plans together.

faculty hiring - Toward having a diverse pool of candidates, target advertising toward and actively recruit individuals who are underrepresented on the faculty.

Foster and promote a departmental culture that is respectful to everyone and values different perspectives

Have discussion sessions with our best students (from underrepresented groups) so they are aware of the opportunities and challenges.

Implement curricular interventions that promote research-based active learning that is inclusive and accessible to all students. A great example is the Vertically Integrated Projects (VIP)

Seek out excellent individuals to hire

Designate an advocate for underrepresented individuals in search committees. The advocate would need additional training. But, where else to post the ads?

Lead department conversation on replacing score based admissions practices/guideline with a more holistic application review process.

Find faculty to lead efforts to educate on differences and biases.

Incorporate the ideas within the department mission statement

Additional reading:

Martin, J.P. & Garza, C. (2020). Centering the marginalized student's voice through autoethnography: Implications for engineering education research, *Studies in Engineering Education* 1(1), p.1-19. DOI: <http://doi.org/10.21061/see.1>

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Yosso, T. J. (2005). Whose culture has capital? A critical race theory discussion of community cultural wealth. *Race ethnicity and education*, 8(1), 69-91.

Castro, E. L. (2014). "Underprepared" and "at-risk": Disrupting deficit discourses in undergraduate STEM recruitment and retention programming. *Journal of Student Affairs Research and Practice*, 51(4), 407-419.



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