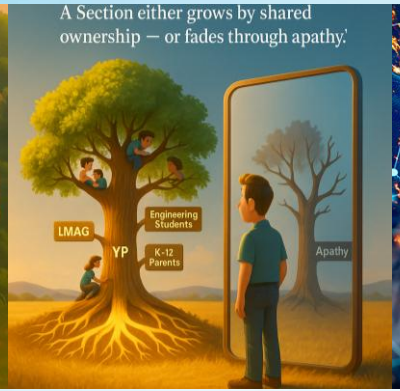


STEM Events & Greentech, 7 Dec 2025

Dr John Santiago, Region 5 Educational Activities Chair
Region 5 Section Education Outreach Committee (SEOC) Member
Past PPS Chair (Jan 2019 – Feb 2023), Current PPS Webmaster

IEEE
Advancing Technology for Humanity

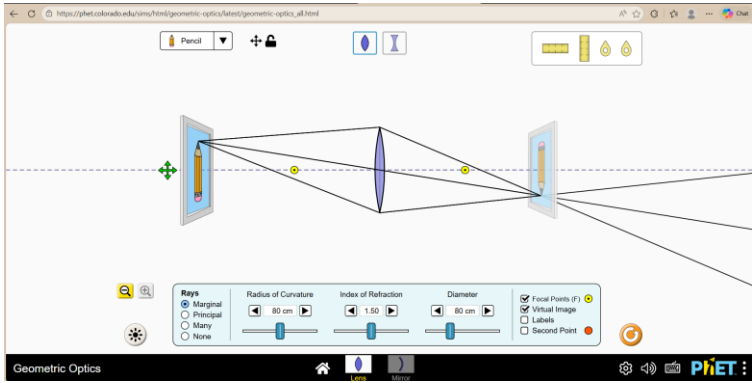
Long-Term – TryEngineering Proposals

Biomimicry: Engineering emulating nature's processes

$50x10=500

References – Complementary Mini Website Sandboxes for Discussion

- Industry STEM Pathways | IEEE Pikes Peak Section (How)
  - Middle School is target audience
  - Denver WIE or Other Sections for potential collaboration
- Future Tech Workforce | IEEE Pikes Peak Section
  - High School is target audience
  - Houston Section or Other Sections for potential collaboration
- PhET-SNAP Demos on Photonics | IEEE Pikes Peak Section
  - Photonics as Anchor Technology (6-week cohort course)
  - 6-week, 2-hour sessions
  - 1-2 Snap Circuits Lights, Virtual Simulation, Leaderhship
  - Low Cost and Portable
  - Deliver in Jul – Sep for one or two cohort groups



Over 100 Phet interactive and Simulations (free)

Short Term – Greentech Panel Discussions on STEAM

Structured Brainstorming

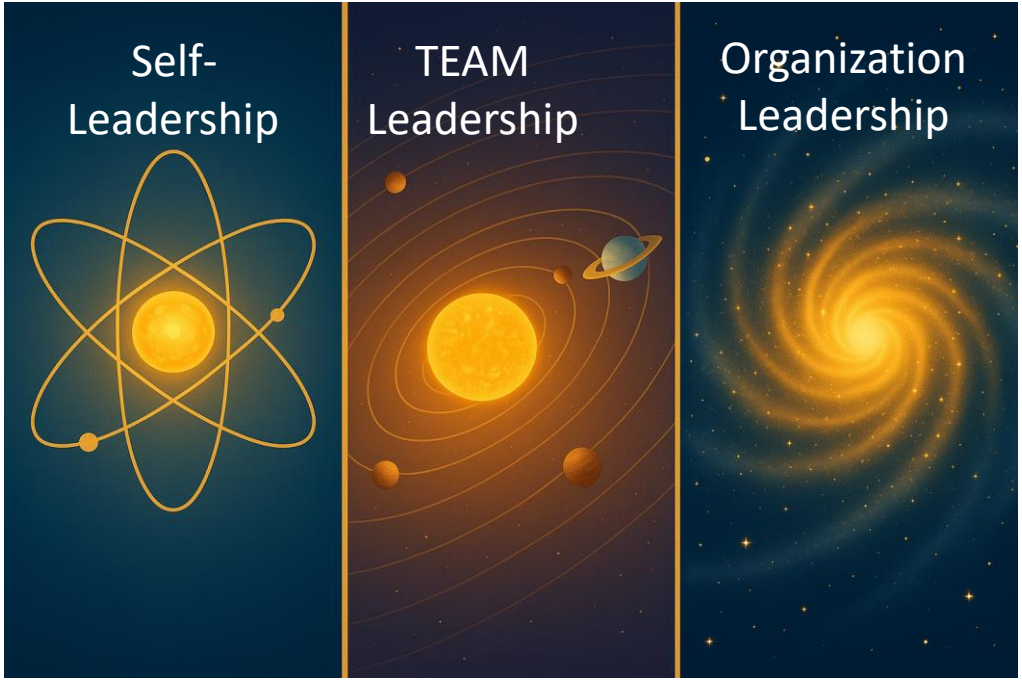
- Use of ChatGPT, Google Gemini, Notebook LM or other
- Example Sample Questions
  - Strategic STEM Prompts | IEEE Pikes Peak Section
- Sample Questions below:
  1. In IEEE do we need more members, or do we need more leaders based on our approximate 500,000 members?
  2. In terms of volunteer development: IEEE runs largely on volunteers. The organization needs robust programs to identify, train, and mentor future leaders for boards, committees, and working groups. This includes teaching essential soft skills like communication, team building, and strategic management. Would a centralized or decentralized approach be appropriate in terms of volunteer development?
  3. Is this a form of the military approach of centralized control and decentralized execution and is it applicable to a peacetime volunteer organization such as IEEE?
  4. Can you research the strategic plan and see if it aligns with previous responses at the following urls to get started: https://r5.ieee.org/pikespeak/strategic-plan; https://r5.ieee.org/pikespeak/pyramid; https://r5.ieee.org/pikespeak/carnival-day; https://r5.ieee.org/pikespeak/2025-ieee-grant-report; https://r5.ieee.org/pikespeak/steam-teams-notes
  5. Based on this conversation, do you believe that the STEAM activities is the center of gravity in touching and meeting the three priorities of Region 5

Backup Slides

Pattern Recognition

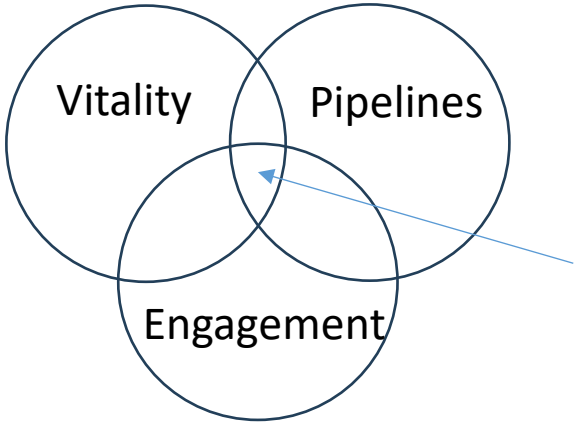
Biomimicry: Engineering emulating nature's processes

- Metaphor for scalability, systems thinking, and universal laws
- What works at the smallest scale of self works at the largest scale of organizations and civilizations



STEM Center of Gravity (or Nucleus)

Region 5 Priorities



Pilot Program

52/8760 = 0.5% of mentorship

Skillset x Mindset = Success

Workforce Multiplier

IEEE

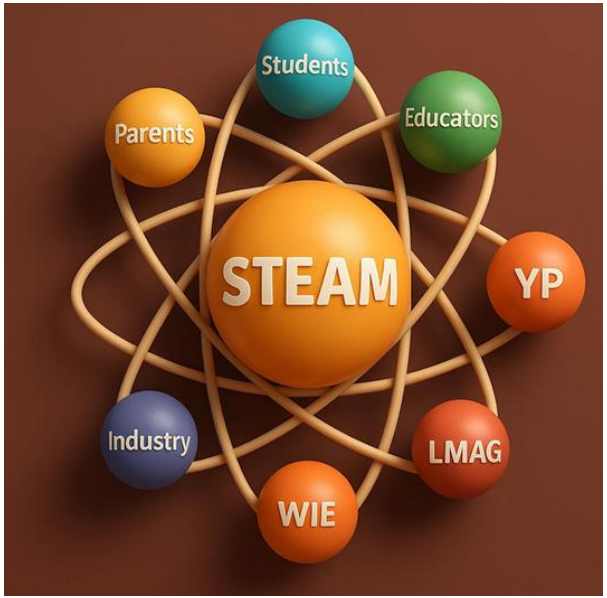
STEM Center of Gravity (or Nucleus)

One mentee/year

"For each year, each of the current active and engaged members, recruit one IEEE member and mentor the recruit to be an active and engaged member of the IEEE Pikes Peak Section. By your leadership example, have your recruit who is now an active and engaged member do the same as you did by recruiting one member."

52/8760 = 0.6% of volunteer mentorship

Atomic Model:
Skillset x Mindset = Success



Backup Slides: Separate Topic – Funding Mindsets Based on Air Force Experience

Innovative R&D Teaching: Air Force Systems Command

Day-to-Day O&M Operations: Air Force Logistics Command

IEEE Funding Cultures: Why TryEngineering Grants Feel Like R&D, and MGA Feels Like O&M

- **Two IEEE Funding Cultures**
- **TryEngineering = R&D**
- **MGA = O&M Operations**
- This explains:
- different documentation expectations
- different risk tolerances
- different mindsets

O&M Procedures and R&D Funding

Two Wings

O&M Procedures (AFLC)

- Section funds behave like **AFLC-style sustainment budgets**:
- Itemized receipts
- Line-item accountability
- Clear audit trail
- Supplier/vendor documentation
- Emphasis on cost control and fiscal defensibility
- “What exactly was purchased?”
- This is natural for someone from **consulting, engineering, or service-industry backgrounds**, where verification and traceability protect clients and organizations.
- **It is a sustainment mindset**

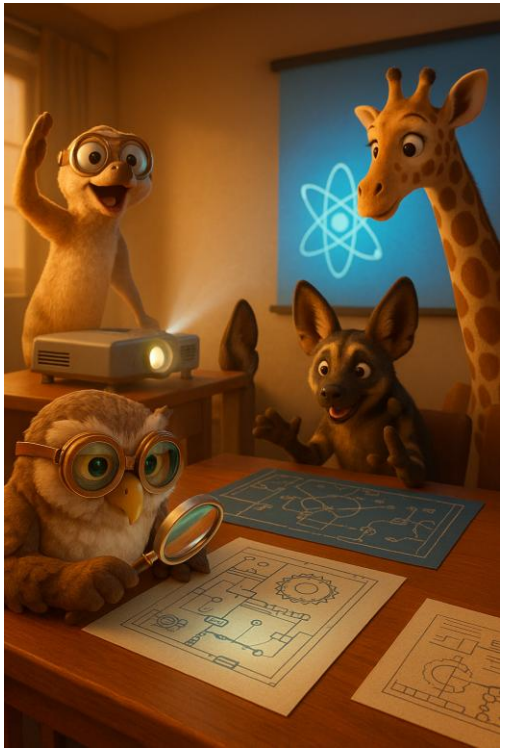
Try Engineering STEM grants operate like **AFSC-style R&D funding**:

- Mission-driven outcomes
- Summaries and deliverables—not itemized line items
- Flexibility to adapt
- Spend-by-objective
- Proof-of-work, not receipts
- Measured by results, not reimbursement
- This is how R&D centers operate because innovation requires agility:
- *“Did the prototype or outreach succeed?” is the audit, not “Show every receipt.”*

O&M Procedures and R&D Funding

R&D vs O&M Analogy (Air Force Style)

- **TryEngineering → Cost-Plus R&D Contracts**
- Flexible
- Innovative
- Impact-driven (not itemized)
- “Show outcomes, not receipts”
- **MGA → Fixed-Price O&M**
- Predictable
- Governed by policy
- Receipt-based
- “Show receipts, not prototypes”

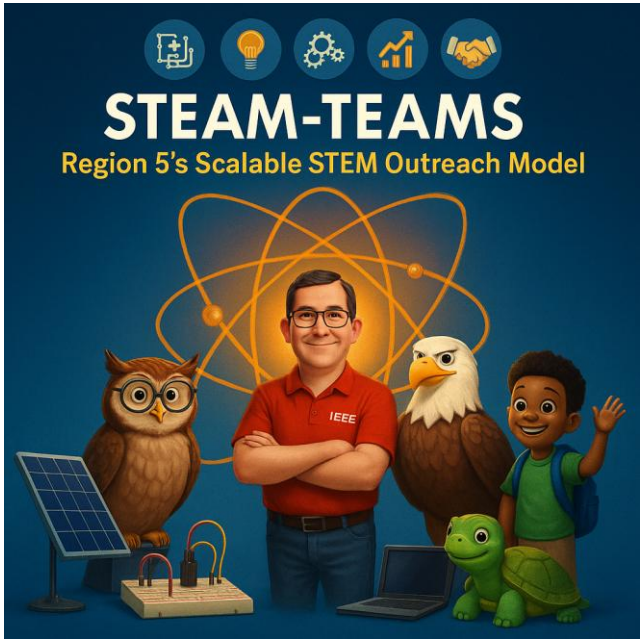


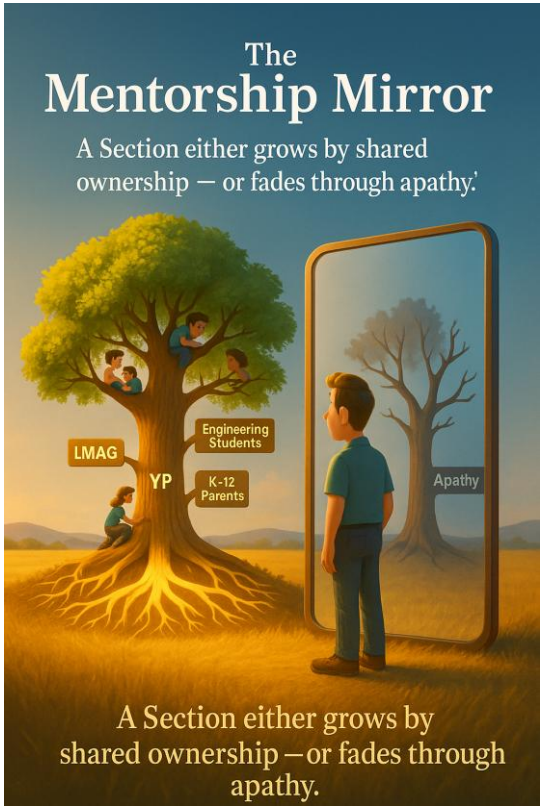
O&M Procedures and R&D Funding

- **R&D (STEM Grants) Build the Future**
  - New outreach models
  - New volunteers
  - New leadership pipelines
  - High-impact community engagement
- **O&M (MGA) Sustains the Present**
  - Meetings
  - Elections
  - Continuity
  - Governance
- **Both are essential to Section vitality**.

STEAM-TEAMS Challenge

Empowering Tomorrow's Innovator through the…





52/8760 = 0.5% of mentorship

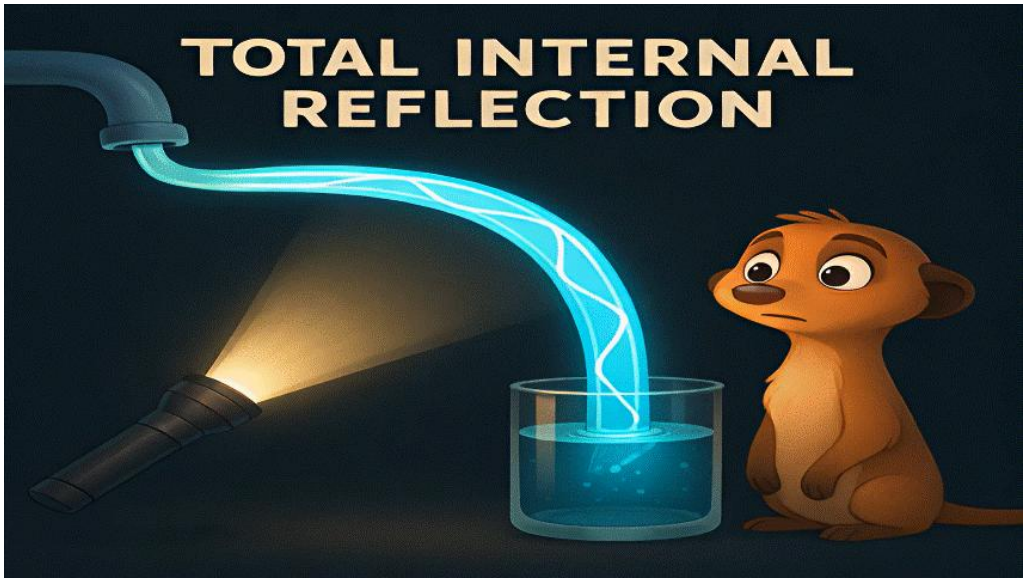
Scaling STEAM-TEAMS approach to Other Sections

- New Region 5 Director Christopher Sanderson
  - Requested to work with other sections on STEM/STEAM
  - Developing IEEE 2026 STEM Proposals
- WIE, Denver Section, Challenge Coin & Makerspace
  - Support Cool Science
  - Help with WIE at PPS

Scaling STEAM-TEAMS approach to Other Sections

Increase Industry Engagement

- Photonics
  - Denver Section for Industry Engagement
  - Industry STEM Pathways
  - Future Tech Workforce



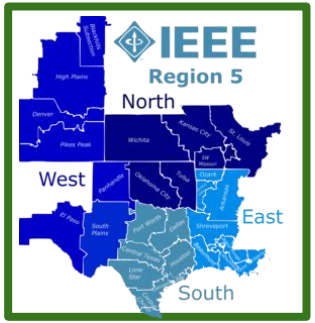
Pikes Peak Section EXCOM, 4 Dec 2025

Backup Slides

IEEE Region 5

2025 Education Highlights

- **2025 STEM Grant Title: Empowering Tomorrow's Innovators through STEAM-TEAMS Challenge**
  - **Monthly Hands-on K-12 demos** (squishy circuits, homopolar motors, robotics) + TryEngineering content+ Online PheT simulations: family-friendly, low-cost DIY kits and events
  - **Developed Animal Pyramid of Success for storytelling about technical leadership to middle schoolers**
  - **Pixar-style animals** → featured leadership virtue for developing mindset at early age due to high dropout rate in STEAM/STEM fields
  - **https:r5.ieee.org/pikespeak/pyramid** for ANIMATED Version
  - 8000 visitors, 100+ booths at Cool Science Carnival Day, about 400+ FACSC (picnic & coronation ball),
    - **https://r5.ieee.org/pikespeak/facsc**
- **IEEE Region 5 STEM Summit and Interactive booth: 50 % conversion rate** (33 leads/65 unique visitors at booth) with AI-assisted multimedia and Pixar-style animation/video content plus 3 more leads visiting link at **https://r5.ieee.org/pikespeak/pyramid (similar booth mockup)**



Dr. John Santiago
REAC, 2025 STEM Champion

IEEE Region 5

2025 Education Highlights

Please visit mini website at
https://r5.ieee.org/pikespeak/pyramid

Mentoring:
Photos
to
Pixar

World' Simplest & DIY Motor
(Homopolar Motor) for Outreach

Green Screen & Pixar
Animation for Mid-Schoolers

Leadership
Virtues from:
Animal
Pyramid
of
Success

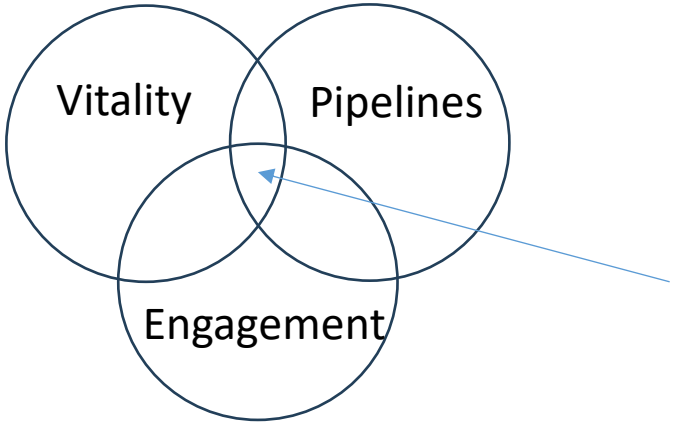
Example: Sustaining Industry Engagement

AI-Assisted STEAM Content

IEEE

TryEngineeering STEM Grants and MGA O& M Operations

Two Wings of One Mission & Region 5 Priorities



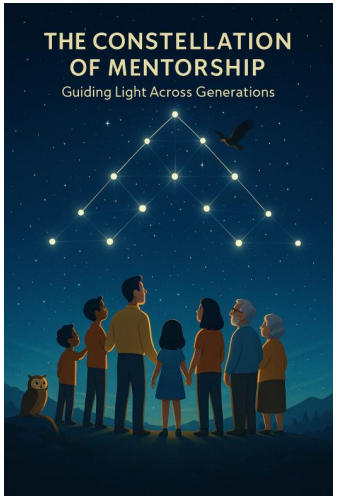
Pilot Program

- Leadership = Innovative STEM Direction
- Management = Stable Day-to-Day Operations
- Together = Sustainability
- Both are essential to IEEE's mission

Examples of Learning Modules and Playlists

- Playlists
  - 2025 STEM Summit: Magnets, Motor, Microcontrollers and Monster Magic – YouTube
  - Why AI Storytelling Matters in Engineering Education
  - IEEE Pikes Peak Section | Innovation & Technology For Humanity
- Student Activities | IEEE Pikes Peak Section
  - STEM Demos
  - H5P Demos
  - PhET Demos
  - PhET Demos – Math
  - Algodoo Demos
  - TinkerCAD

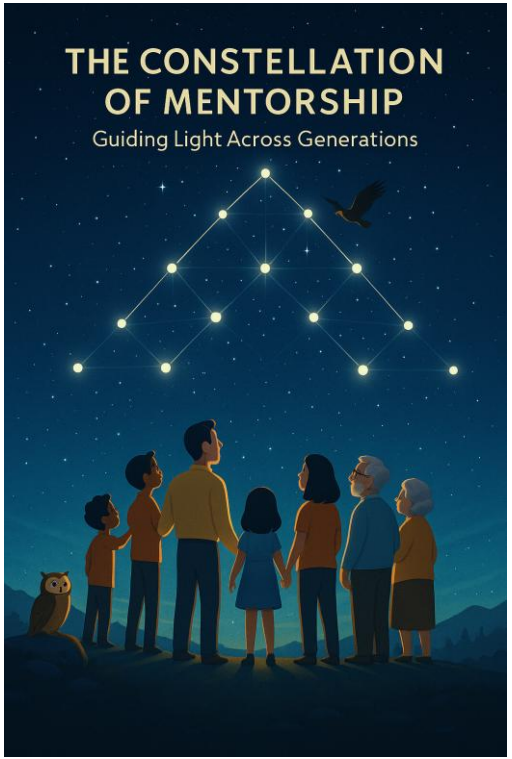
Playlists, Leadership, and Interactive Modules from the IEEE Region 5, Pikes Peak Section



IEEE

Sustainable Ecosystem: Not a One-Off Event

- https://r5.ieee.org/pikespeak/2025-ieee-grant-report/
- https://r5.ieee.org/pikespeak/pyramid/
- https://r5.ieee.org/pikespeak/steam-teams-notes/
- https://r5.ieee.org/pikespeak/carnival-day/
- https://r5.ieee.org/pikespeak/facsc/
- https://r5.ieee.org/pikespeak/csu-pueblo/
- https://r5.ieee.org/pikespeak/wie-2/
- https://r5.ieee.org/pikespeak/community-outreach/
- https://r5.ieee.org/pikespeak/young-professional/
- https://r5.ieee.org/pikespeak/stories-of-lmag-members/
- https://r5.ieee.org/news

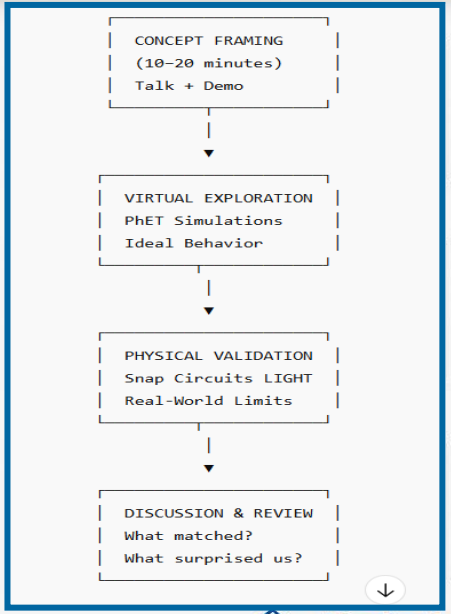


IEEE

The Photonics Learning Loop:
Concept → Simulation → Build → Review

Summary Table

Week	Virtual (PhcT/ Demo)	Hands-On (Snap Circuits / Robot)	Big Takeaway
1	Bending Light	LED attachments	Light travels predictably
2	Color Vision	RGB filters	Color carries information
3	Sensor concepts	Phototransistor	Light encodes messages
4	Timing & waves	Morse code with LEDs	Time encodes decisions
6	Internal refiection	Fiber optic link	Light transmits info



IEEE

TREASURER
APPROVED

The Photonics Learning Loop:
Concept → Simulation → Build → Review

Virtual (PhET/ Demo)

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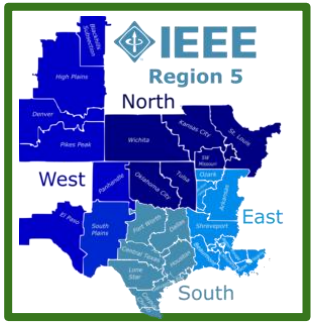
- Photonic Denver Section for Industry Engagement

IEEE Region 5

2025 Education Highlights

- **Pioneered AI-enabled educational pre-university STEAM content,** mobile DIY-STEAM kits for outreach.
- **Established strategic and replicable mentorship pipeline:** Region 5's *mentorship-as-multiplication* model could serve as a **template for all Regions** seeking volunteer sustainability.
  - **Skillset x Mindset = Exponential Success**: Self-Leadership → TEAMS leadership → Organization Leadership (Leveraging STEM activities as a center-of-gravity for leadership development)
  - **Remote mentoring** → weekly virtual mentoring
    - **Example:** New IEEE member active member to active engaged member: Reviewed 74 SM applications, recruited 175+ reviewers for IEEE Industry Content Platform (ICP) within 12 months, received letters of recognition



Dr. John Santiago
REAC, 2025 STEM Champion

IEEE Region 5

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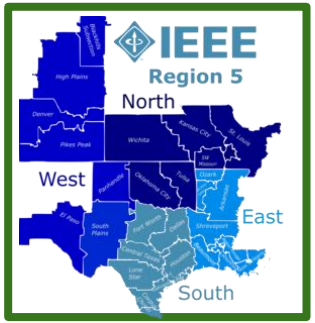
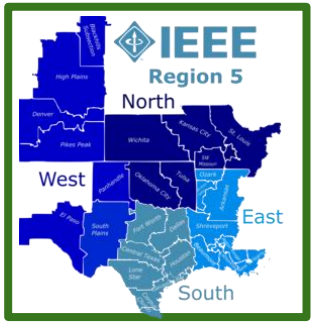


Dr. John Santiago
REAC, 2025 STEM Champion

IEEE Region 5

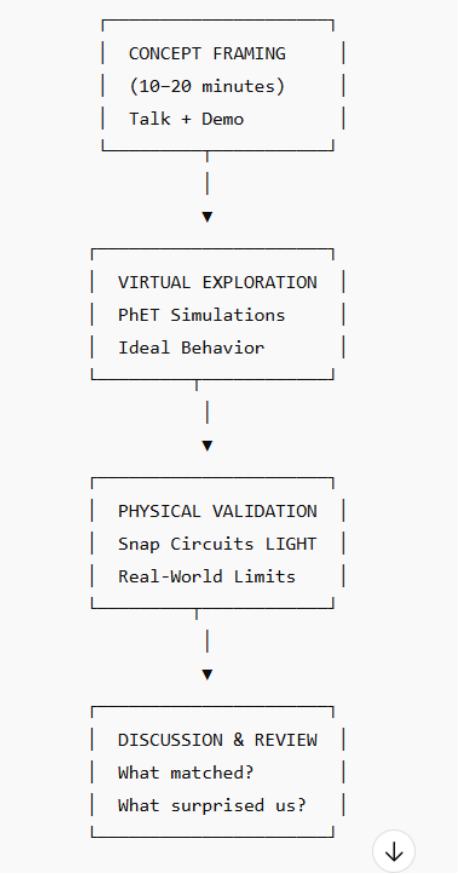
2025 Education Highlights

- **Increase public and global awareness** about IEEE at local community in underserved communities (Filipino-American Community of Southern Colorado – FACSC) and home-school communities (Cool Science)
  - 18 Jun 2025: IEEE booth at Filipino Independence Day Picnic (***200+ attendees***),
  - 23 Aug 2025: Guest Speaker for Miss Fil-AM Coronation (High-Tech x High Touch = Higher Purpose), ***178+ attendees***
  - **STEAM x TEAMS = Bayanihan=Exponential Success:** Bayanihan is lifting others where no one can do alone FACSC President like this relationship
  - **FACSC Keynote Speech: Soften IEEE tagline** due to cultural sensitivity: "Technology for humanity…but Technology without Humanity is empty"
  - **Invited by Sri Lanka IEEE Student Branch for IEEE Day to deliver IEEE History and my Air Force IEEE storied journey on 13 Oct 2025, delivered AI-assisted multi-media content**
- **University of Colorado, Colorado Springs (UCCS) Executive Leadership Council (ELC)** for increased industry engagement and review of student resumes.



Dr. John Santiago
REAC, 2025 STEM Champion

“A High-Impact IEEE Photonics Program: Evidence-Based Learning Through Simulation and Hands-On Engineering”

✅ Summary Table (Grant-Friendly)

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