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Empowering Tomorrow's Innovators through STEAM-TEAMS Challenge

Started at: 1/2/2025 11:09 AM - Finalized at: 1/2/2025 04:17 PM

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Program Title
Empowering Tomorrow's Innovators through STEAM-TEAMS Challenge

Organizational Unit (OU) Name (Use official IEEE designation)
IEEE Pikes Peak Section (IEEE Region 5)

OU Type
Section/Subsection

IEEE Region
Region 5

Country
United States

Program Type
Program, Event, Resource

Program/Event Category
Other

Program, Event & Resource Status
Starting a new program/event/resource

Engineering Program Focus
Electrical Engineering

Primary Contact Name

John M. Santiago, Jr.

Primary Contact Email Address

john.santiago@ieee.org

IEEE Member Number

04906707

Organizational Unit (OU) Role of Primary Contact

Region 5 Educational Activities Coordinator (Jan 2024-Present) and Past Chair Pikes Peak Section (Jan 2019 - Feb 2023),

Secondary Contact Name

David Bondurant

Secondary Contact Email

dbondurant@mac.com

IEEE STEM Champion

Yes

TryEngineering Social Media

Yes, No

TryEngineering Newsletter

Yes

Student Ages

Yes, No

Level of Funding Requested

Inspire Level - $1001-$2000 (at least 5 grants available)

Total Funding Requested (USD)

2000

Program Description

Important: The attached document has real-world & past photos & AI-generated multimedia content on future aspirations. The Table of Contents have hot links & the bold text in blue are URL links so if you are interested in visiting the website links you do not have to cut and paste.

The attached document shown show links for proof-of-work within the executive summary of key background (see https://r5.ieee.org/pikespeak/strategic-plan). The attached document includes both real photos of actual & past events on as well as AI-generated images of future aspirations.

The current IEEE Pikes Peak Section (PPS) Section Chair, David Bondurant during November 2024 asked Dr John Santiago to implement a Region 5 initiative on Squishy Circuits to re-vitalize the STEAM/STEM program based on Dr Santiago's experience as Faculty Advisor for the IEEE Colorado Technical University (CTU) Student Branch (2008-2019).

In addition, with the significant help from the IEEE team of colleagues, David Bondurant, Gene Freeman, John Reinert &Russ Bogardus, the PPS has started to be revitalized with Dr. John Santiago as past chair, Jan 2019 – Feb 2023 and who was nominated by the late John Meredith during 2018. The section is making significant progress with David Bondurant.

However, the key leadership positions is mostly Life Member Affinity Group (LMAG) and a mentorship and continuity program is needed in order for the PPS to be sustainable.

To provide some context based on this proposal, here are some key URLs links:

• List of IEEE Student Activities (https://r5.ieee.org/student-activities) at the IEEE PPS
• A short 6-minute video of achievements, 2018-2022 (https://r5.ieee.org/pikespeak/2023-section-history-and-achievements/) and 2023 achievements (https://r5.ieee.org/pikespeak/2023-section-history-and-achievements/) can be found at our website, including strategic goals, developed in 2020 & updated in 2022.
• Squishy Circuits (https://r5.ieee.org/pikespeak/squishy-circuits/) and other educational activities will be the spark & center-of-gravity for the STEAM/STEM activities based on the draft PPS strategic plan (https://r5.ieee.org/pikespeak/strategic-plan/).
• Budget: $2000 (see budget section). See Squishy Circuits mini-site for list of components worth $200.

Based on the above background, here is the overall strategic goal for this STEAM-TEAMS challenge:
"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."
The IEEE Pikes Peak Section proposes the "STEAM-TEAMS Challenge," as a dynamic program where STEAM stands for
S=Science, T=Technology, E=Engineering, A=Art and Science of delivering AI-assisted multimedia STEAM content, and M=Mathematics.

Note that TEAMS is a rearranged form of STEAM where S has been moved to the end and to emphasize a multi-disciplinary TEAMs approach.

The program is an expanded definition of the letter 'A' in STEAM to represent Art + AI, emphasizing AI-assisted multimedia content as delivery tool for engaging experiences.

Anticipated # of Participants

The attached document has real-world and past photos and AI-generated multimedia content on future aspirations. The first 11 pages is the actual proposal and the rest is supporting appendices.

Based on the draft strategic plan of the IEEE Pikes Peak Section given at https://r5.ieee.org/pikespeak/strategic-plan/.

The attached document has real-world and past photos and AI-generated multimedia content on future aspirations.

A minimum of 100 students ,16 teachers/mentors/mentee ,60 parents (including some active members) during the first year and we expect to increase each year based on word-of-mouth and online marketing activities using ai-assisted multimedia content generation. Leverage online video teleconferencing and then face-to-face workshops, based on the flipped classroom approach.

- The STEAM-TEAMS Challenge aims to:
- Engage 50+ students in interactive STEM activities.
- Conduct 10 weekly workshops featuring hands-on projects.
- Facilitate mentorship through IEEE Young Professionals (YP).
- Showcase student projects at the annual What IF… Festival.
- Inspire creativity and innovation using AI-powered tools and multimedia content.

Goals and Objectives

Based on the draft strategic plan of the IEEE Pikes Peak Section given at https://r5.ieee.org/pikespeak/strategic-plan/.

The attached document has real-world and past photos and AI-generated multimedia content on future aspirations.

Based on the draft strategic plan of the IEEE Pikes Peak Section given at https://r5.ieee.org/pikespeak/strategic-plan/, the
Strategic program goal is to have:

"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."
The above STEAM-TEAMS Challenge aims to:
• For the first year, we'll engage 50 or more students and PPS section members in interactive STEM activities. We anticipate the following years will double each year based on the above strategic goal and other follow-on activities such as Cool Science, Space Foundation, Summer of Discover, 21st Century Pike Peak Library District , and future What-If Festival Events. See past student activities at https://r5.ieee.org/pikespeak/student-activities
• Conduct monthly workshops feature hands-on training and education for the 20 active IEEE members of the Pikes Peak Section, Young Professionals, and IEEE student members for the first half of the year 2025. The second half of the year will be in preparation for the annual 'What-If' Festival in September 2025 in Colorado Springs, CO.
Facilitate mentorship through IEEE Young Professionals (YP). Ideally, Life Member Affinity Group (LMAG) members mentors YP members, YP mentors IEEE student members and all members educate the public on what IEEE is all about.
Showcase IEEE section and student projects at the annual What IF… Festival.
Inspire creativity and innovation using AI-powered tools and multimedia content.

Milestones and Schedule

Member Activity Log Form will be used to develop a comprehensive set of awards in terms of self-leadership, team leadership and organizational leadership. The member activity form (work-in-progress) can be found here:
https://docs.google.com/forms/d/1c8p9azwAR424_8nnD8ID14wWsnX-mZ4fWPoiMQBjZPQ/

The purpose of this form is to help you keep track of your progress in your activities as part of the incentives program found in the strategic plan.

One-Year Milestones and Schedule (Feb–Oct 2025)
• February 2025: Program Kickoff Meeting, Recruitment of Mentors and Participants
• March–April 2025: Conduct Weekly Workshops (1–4), Squishy Circuits Introduction
• May–June 2025: Conduct Weekly Workshops (5–8), Focus on Robotics Challenges
• July 2025: Mid-Year Evaluation and Adjustments
• August 2025: Conduct Weekly Workshops (9–10), Renewable Energy Projects
• September 2025: Final Project Showcase Preparations
• October 2025: Participation in What IF… Festival, Project Presentations, and Community Engagement Event
• November 2025: Program Review, Feedback Collection, and Reporting

Achieving Over 20 STEAM-TEAMS and 150 Members
The SMART goal's cascading nature ensures exponential growth:

Growth in Membership:
Starting with 20 active members, each member recruits 1 person annually:
Year 1: 20 active members recruit 20 new members → Total: 40 members.
Year 2: 40 members recruit 40 new members → Total: 80 members.
Year 3: 80 members recruit 80 new members → Total: 160 members.
By Year 4, the section exceeds 150 active and engaged members.
Formation of STEAM-TEAMS:
Membership growth allows for the formation of 20 STEAM-TEAMS, each with 8 members:
These teams are small enough to foster trust and collaboration (aligning with Dunbar's Number) yet large enough to drive impactful projects.
STEAM-TEAMS focus on interdisciplinary initiatives, mentorship, and outreach, reinforcing the section's mission and strategic goals.

Budget

- Item Cost (USD) Description

Workshop Supplies: $800 Materials for more Squishy Circuits and simple motor projects for (see detailed https://r5.ieee.org/pikespeak/squishy-circuits)

• 4 STEAM-TEAMS of 4-5 active members ($200 per team) assumes 20% success rate out of ideal 20 ideal STEAM-TEAMS
• Simple-hand-made motors for students to take home (consisting of one AA-battery, neodymium magnets, and a thick coil of wire)
- Mentorship Resources $500: Training materials and STEM kits for demos (e.g. robotic gyroscope, simple hand-made motors, magnetic levitation, 3D printed material Aristotle's greedy cup)

Event Participation $500 Booth setup and materials for the festival.
Promotional Materials $200 Flyers, banners, and online advertising. See sample on-line marketing and advertising videos. Sample multimedia content…
• YP minisite (https://
• IEEE PPS Video Playlist

Currently, the investment is to duplicate Dr Santiago's private purchases or projects while as IEEE Student Faculty Advisor. (See past student activities, STEAM demos, and e-learning widgets

Evaluation and Sustainability Plan

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https://docs.google.com/forms/d/1c8p9azwAR424_8nnD8ID14wWsnX-mZ4fWPoiMQBjZPQ/

The purpose of this form is to help you keep track of your progress in your activities as part of the incentives program found in the strategic plan.

Effectiveness Measurement:
• Pre- and Post-Program Surveys: Assess student knowledge, skills, and perceptions at the start and end of the program.
• Facilitator Feedback Forms: Collect insights from mentors on student engagement and program effectiveness.
• Project Outcomes: Evaluate completed student projects for technical quality and creativity.
• Festival Engagement Metrics: Track attendee participation and feedback at the What IF… Festival.
• Skill and Knowledge Evaluation:
• Conduct skill assessments at the end of key workshops.
• Host reflective debriefing sessions with students and mentors.

Sustainability Plan:
• Develop an annual review process to refine the program based on participant and mentor feedback.
• Establish partnerships with local schools and STEM organizations (work-in-progress).
• Create a repository of reusable learning materials for future cohorts (work-in-progress).

Other Considerations:
• Reusable Materials: Durable equipment for ongoing use in future workshops.
• Mentorship Pipeline: Continued mentorship involving IEEE members and student alumni as given by strategic planning activities (https://r5.ieee.org/pikespeak/strategic-plan/)
• Community Partnerships: Collaboration with local schools and organizations for long-term sustainability.
• Industry Engagement in Pikes Peak Region and surrounding areas (https://r5.ieee.org/pikespeak/industry-engagement-outreach/)
• Community Outreach in Pikes Peak Region and surrounding areas (https://r5.ieee.org/pikespeak/community-outreach/)
• Scholarship of Teaching and Learning • United States Air Force Academy (https://www.usafa.edu/research/research-centers/scholarship-learning-teaching/)
and IEEE Section Meeting Notes on SoTL (https://r5.ieee.org/pikespeak/section-meeting-minutes/)
• Kern Entrepreneurial Engineering Network (KEEN) (https://engineeringunleashed.com/)
• American Society of Engineering Education (ASEE) (https://www.asee.org/)

Attachments

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Additional Attachments

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TERMS and CONDITIONS

John Santiago

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