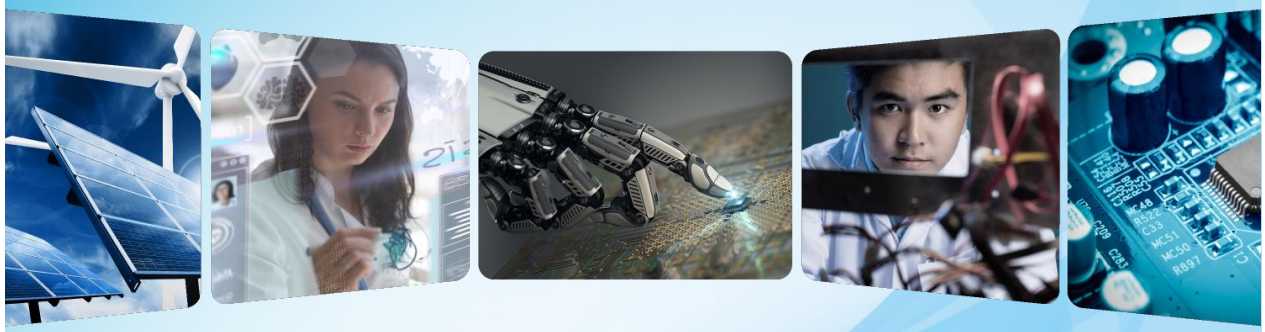

How to Start STEM Outreach in Your Section

Region 7 Training

Murray MacDonald 21-03-09

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How to Start STEM Outreach

IEEE Canada

- Welcome to the March event of the monthly Region 7 Training series – stay turned for more each month
- Attendees are joining with out audio or video to conserve bandwidth
- Please submit questions in the Chat (to Everyone) or the Q&A – both will be monitored. Formal Q&A periods are planned, but feel free to add questions and we will try to respond while on the topic
- Slides and a link to the recording will be added to Collabratec later

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How to Start STEM Outreach

IEEE Canada

- **Agenda**
- Welcome & Meeting Guidelines
- Intro to IEEE Pre-University Education Program
- Demonstration of TryEngineering Resource including the new Volunteer Portal
- Examples of R7 STEM Outreach Activities
- How to Start STEM Outreach Activities in Your Section
- Q&A Session
- Working Case: Hands on Activity – Tall Tower Challenge
- Q&A Session & Wrap Up

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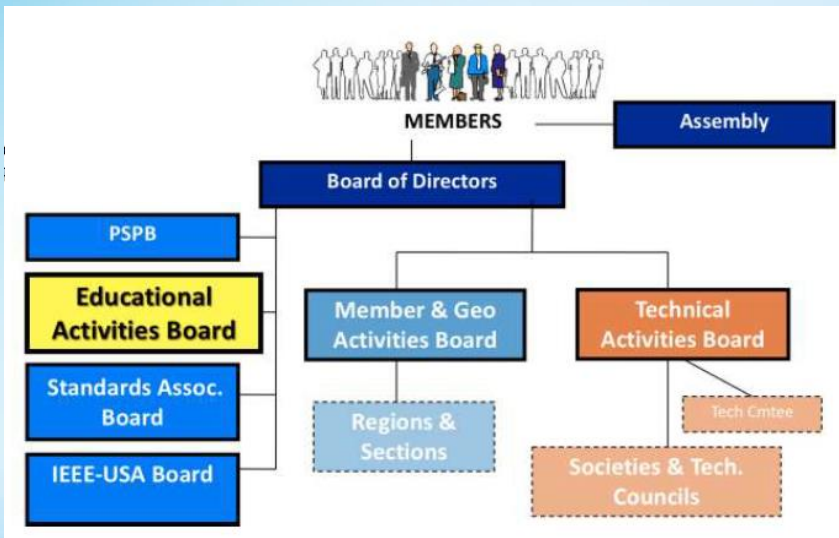
2

IEEE Governance Structure

IEEE Canada



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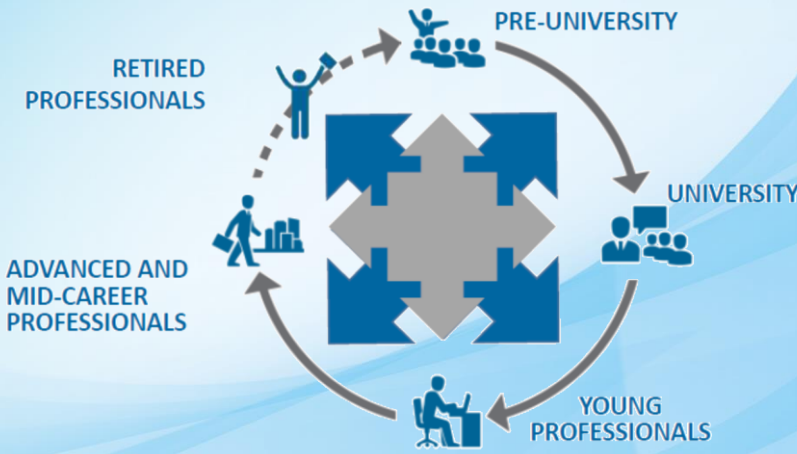
Educational Programs Designed to Connect Throughout an Individual's Life

IEEE Canada

Moving from Open-Loop Education to Closed-Loop



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EAB Committee Structure

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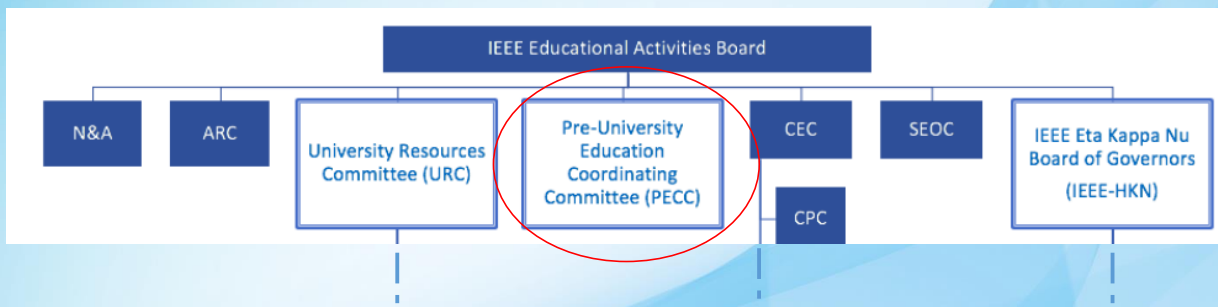

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Pre-University Education Coordinating Committee (PECC)

IEEE Canada

Mission

- Promote and enhance the level of technological literacy of pre-university educators and students,
- Be the primary source of resources, curricula and pedagogical practices for pre-university educators
- Encourage students to aspire to IEEE related careers

Powered by IEEE TRYEngineering

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6

TryEngineering Resource

IEEE Canada

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7

Region 7 STEM Outreach Committee

IEEE Canada

- IEEE Canada “Pre-University Education” Program
- Renamed from Teacher in Service (TISP) in Jan 2021
- Committee of active section volunteers (~10)
- Monthly conference video call to share updates/news
- Relatively low activity in 2020 due to Covid-19 restrictions
- STEM Outreach website
  - needs maintenance (resurrection)

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Region 7 STEM Outreach Activities

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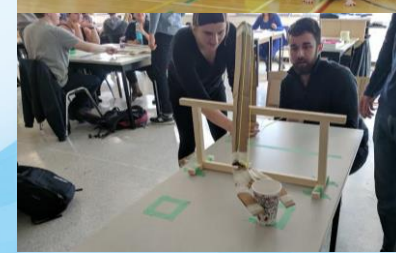
- Class room visits in numerous sections - leading an activity
- Presentation and activity with teachers-in-training



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Region 7 STEM Outreach Activities

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- Judging and awards at local science fairs

- Workshops with teachers

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Region 7 STEM Outreach Activities

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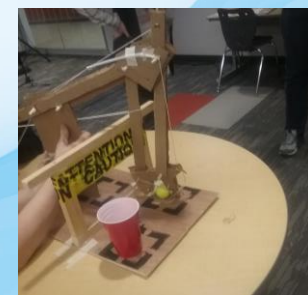
- Exhibiting at Science Teachers' Association of Ontario (STAO)

- Organizing day long events and design competitions



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How to Start STEM Outreach in Your Section

- Consider the need for a virtual event
- Identify a partner(s) and volunteers
- Agree on a plan and activity
- Prepare the presentation and activity
- Deliver
- Reflect on the event (what to do differently)
- Report (in vTools)
- Repeat

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Start STEM Outreach – Identify Partner

- Who will help reach your audience?
  - Classroom teacher and a class visit (virtual?)
  - School board PD and teachers
  - School board wide enrichment event and enrichment students
  - College of education and pre-service teachers
  - Local Science Fairs
  - Child focussed organizations (e.g. Scouts)
- Who do you know or have contacts with?
- How many volunteers do you need (can you find)?

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Start STEM Outreach – Planning

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- Working with your partner
  - Determine duration and scheduling – class time? -event time?
  - How does the activity fit curriculum or requirement
  - What platform is used if virtual
  - What protocols do you need to follow
    - Sign-in, addressing children, background checks, etc.
  - Other logistics
  - Is there promotional material to introduce or "tease"
  - Have partner review details
  - Have you review "working with children"

https://www.ieee.org/about/volunteers/risk-insurance/ieee-activities-with-children.html

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Start STEM Outreach – Preparing

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- Prepare presentation
  - Power Point? Videos?.....
- Prepare activity
  - instructions/worksheet
  - materials
  - dry run for timing
- Training other volunteers
- Sharing with partner and reviewing
  - Get partner's input on the "audience"

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Start STEM Outreach – Delivering

- Be early – in-person or on-line
- Allow time for set-up
- Introduce yourself and your experience
- Attempt to engage students – ask questions/opinions
- Remain enthusiastic (and smiling and calm)
- Offer praise or constructive comments
- Do not centre out individuals
- Be professional – dress, language, ….
- Clean up after!

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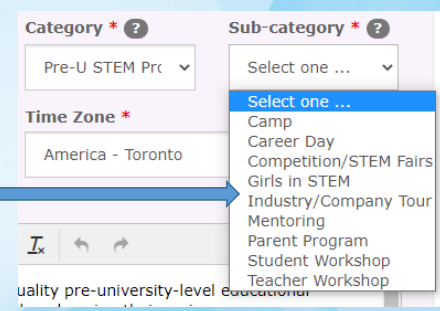
Start STEM Outreach – Reporting

- In vTools or Volunteer Portal

- In Vtools – create an event to report
  - Category "Pre-University", sub category
  - Include any details you wish and report the attendance
  - Complete the survey that is at the end when reporting



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Start STEM Outreach – Reflecting

- Review how the event went (possible survey of teacher)
- What would you change to improve the event?
- Can you repeat the event with new partners?
  - Leveraging your partner's contacts
  - Using the first as a promo
- Can you scale this up to a series of events or train other volunteers to deliver (while you work on a new activity)?
- What is the next activity or event?

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Start STEM Outreach – Next Steps

- Working with other section volunteers (or alone)
  - Who are potential partner(s) or how to find them?
  - What activities do you want to do or are comfortable with?
  - Do you need help or training?
    - Email murraymacdonald@ieee.org

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How to Start STEM Outreach in Your Section

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- Questions?

Please type into Chat (to Everyone) or in to Q&A

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Tall Tower Challenge Activity

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- Taken from https://tryengineering.org/teacher/tall-tower-challenge/
- Customized a bit from my experience
- Focus on the engineering design process and a bit on structures (if this matches their curriculum)
- Can be adapted for K through elementary to 12+

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Tall Tower Challenge Activity

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- In a typical class visit, we would talk about Engineering using an example to segue to the activity
- In this case, the CN Tower
- Then introduce the challenge
- Usually in groups (engineering is a team sport!), but difficult as virtual

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Tall Tower Challenge Activity

IEEE Canada

- Design and build the **tallest tower**
  - With 25 paper straws and tape
- Create a design record
- Build and evaluate
  - Test to hold golf ball
  - Measure height
- Discuss “lessons learned”

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Tall Tower Challenge Activity

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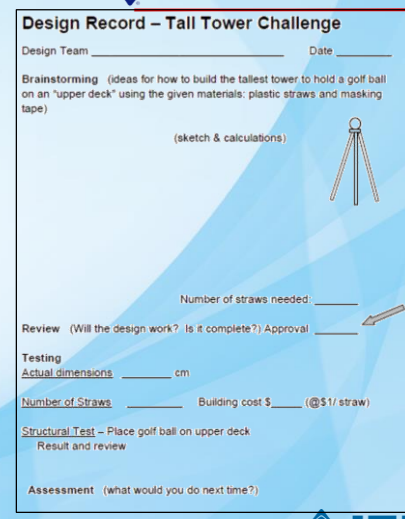
- Design Record
  - Solution development
  - Sketch of tower design
  - Review sign-off
  - Function test result
    - Supporting golf ball
  - Lessons learned



Design Record – Tall Tower Challenge

Design Team _____ Date _____

Brainstorming (ideas for how to build the tallest tower to hold a golf ball on an "upper deck" using the given materials: plastic straws and masking tape)

(sketch & calculations)

Number of straws needed: _____

Review (Will the design work? Is it complete?) Approval _____

Testing

Actual dimensions _____ cm

Number of Straws _____ Building cost $_____ (@$1/ straw)

Structural Test – Place golf ball on upper deck
Result and review

Assessment (what would you do next time?)

https://events.vtools.ieee.org/m/261976

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Tall Tower Challenge Activity

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- Some Rules
  - Height measurement will be from the top of the golf ball to the support surface (desk)
  - Golf ball cannot be taped in place
  - Tower cannot be taped to surface (table)
  - Tools such as ruler, pencil, scissors, and roll of tape can not be used for construction
  - Design is limited to the 25 straws provided, but not all need to be used

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Tall Tower Challenge Activity

IEEE Canada

- Design and build the **tallest tower**
  - With 25 paper straws and tape
- Create a design record
- Build and evaluate
  - Test to hold golf ball
  - Measure height
- Discuss "lessons learned"

QUESTIONS?

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Lessons Learned?

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- Who passed the golf ball test?
- Who has the tallest tower?
- Explain how the force of the golf ball is transmitted to the base?
- What were the strengths and weaknesses of your design?
- What would you do differently next time?
- Thoughts on doing this with a class?

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How to Start STEM Outreach in Your Section

IEEE Canada

- Questions?

Please type into Chat (to Everyone) or in to Q&A

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Region 7 Monthly Training Plan

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- Planning a monthly event – for all R7 members
- What training would you like to see?

Please email murraymacdonald@ieee.org
or Rossitza Marinova marinova@ieee.org

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Thank you!
Stay safe and be kind!
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