NTX - Student Club Competition(s)

1. **DIY Competition (student only)**

Build your own electrophysiological signal (aka biosignals) board. (EEG, EMG, EOG, EEC)

2. **Consumer Competition (student only)**

Make a project using consumer technology.

3. **NTX Online Competition**

This is the general & annual NeuroTechX competition. This is not only for student club.

- The participating student club must be “registered” in NeuroTechX.
- Can have Masters/PhDs/Profs involved, but not during the presentation.
- The work can be “challenged” on the spot and people must be able to answer questions.
- Student Clubs doesn’t have to be “officially approved” by the school, but need to have the clearance from the school to use “their university name”.

- Student Clubs have to display NeuroTechX logo on their website and sponsor material (t-shirt, banner, etc.) as a global sponsor (highest level of sponsorship package).
- Resources can be found here: https://github.com/NeuroTechX/Resource-Kit

1. DIY Competition

Build your own electrophysiological signal (aka biosignals) board. (EEG, EMG, EOG, ECG)

Objectives

- The real value of student clubs is in “engineering”.
- Learning / Understanding the full pipeline.
- Show the very multidisciplinary aspect of neurotech.
- School will see the value of these clubs. (Better wording for “internal value”)
- Industry / Internships / Opportunities. (Professional experience)

Rough Ideas

- Budget Limit (~500$, the value of the final board with its components.)
- 1st competition, you can use TGAM / ADS1299
  (less points than custom circuits of course!)

  Choosing one of the following:

- EEG (Brain activity) : (Difficulty bonus: 1)
  - worth more points (way harder)
  - can you get a good alpha? (peak alpha)
- ECG (Heart activity) : (Difficulty bonus: 1)
  - Can you show a clean signal (SNR)
  - Can you get the heartrate? (can we compare with a real device?)
  - Can you show the PQRST curve?
- EOG (Eye activity) : (Difficulty bonus: 2)
  - Can you show a clean signal (SNR)
  - Can you detect eye blinks?
  - Can you detect left/right eye movement?
  - (bonus points, go beyond)
- EMG (Muscle activity) : (Difficulty bonus: none)
  - Can you show a clean signal (SNR)
  - *Can you detect contraction?*
  - *Can you establish a Force gradient in %?*
  - (bonus points, go beyond)

Evaluation

- Live Demo in front of judges (during conference) - with an evaluation grid.
- Technical Document (electrical schematics, algorithm details, etc.)
- Oral Presentation (+Q&A)
  - Points given for presentation, and answering questions**
  - 2 questions per judges

2. Consumer Competition

Make a project using consumer technology.

Objectives

- Inspire people (we all watch video on youtube and dream of hacking ‘em)
- Have “fun”
- Explore Bio-Input consumer tech (BioSignals, Eye-Tracking in VR)
- Work closer with these companies. (visibility, possibility for internship)

Rough Ideas

- Budget limit (~1500$ worth of tech - to avoid $$ to be the determining factor)
- Evaluation Grid (see model later in this document)
- You do whatever you want, there is no specific “goal”.
- Innovative -> Points ++
- Nice UX -> Points ++
- Useful -> Points ++
- Hard -> Points ++
- Subjective average of the judges (min 2 judges)

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Table 1. Grid Example - preliminary evaluation matrix

Category	Sub-category	Elements	Score
Hardware	Signal quality	Amplification Noise	/10
	Viability	Form factor Ease of installation Price	/10
Software	Robustness	Artifact detection and correction Works for multiple users	/15
	Computing load	Responsiveness Introduced delay Necessary computing power	/10
User experience	Usability	Induced fatigue Ease of use Required training Design	/10
Challenge-specific task completion	EEG / ECG / EMG / EOG / … (Live Demo)	Time taken to complete the path Accuracy in completing the path	/10
Written technical report and oral presentation	Technical content	Technical accuracy Depth, width and clarity of description	/20
	Presentation	Professional and clear language Engaging the audience and readers	/15
Total			/100