EMBS

EMB IEEE Engineering in Medicine and Biology Society

Attendance

Welcome to EMBS!

Overview

Who are we?

IEEE EMBS

ENGINEERING IN MEDICINE & BIOLOGY SOCIETY

The world's largest international society of biomedical engineers interested in advancing medical/biological technology.

"EMBS provides its members with access to the people, practices, information, ideas and opinions that are shaping one of the fastest growing fields in science."

What we do.

Focus Areas

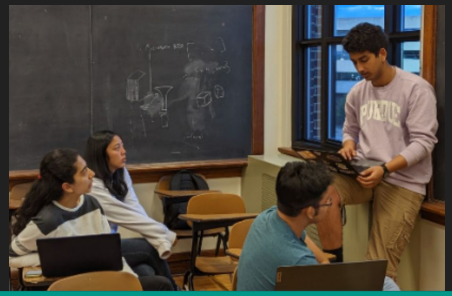
- Research in medicine and biology
- Software and machine learning development
- Hardware design
- Novel device creation

Activities

- Projects & workshops
- Tours of labs and facilities
- Hands-on experience in mechanical, electrical, biomedical, computer, and software engineering

Opportunities

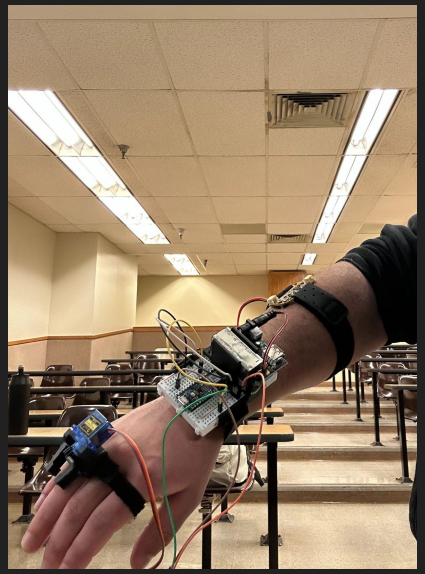
- Alumni connections & networking
- Guest talks from professors
- Conferences
- Social events

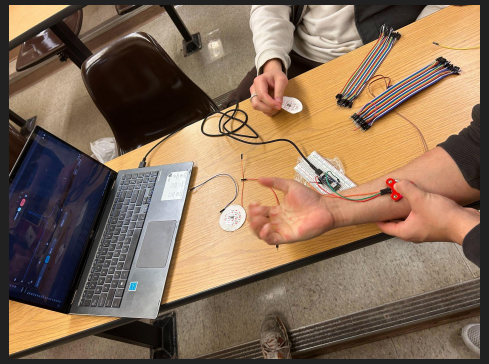


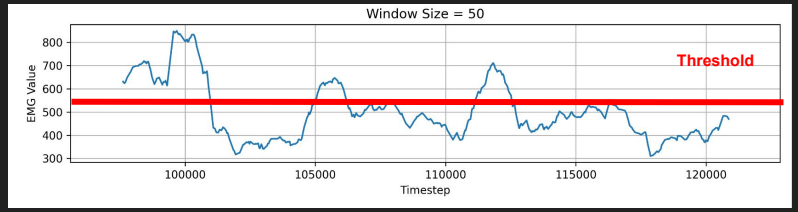
Past Events & Highlights

Last Semester: EMG Prosthetic Workshop

Workshop: We used myoelectric EMG signals to drive a servo motor to control a prosthetic claw wirelessly.





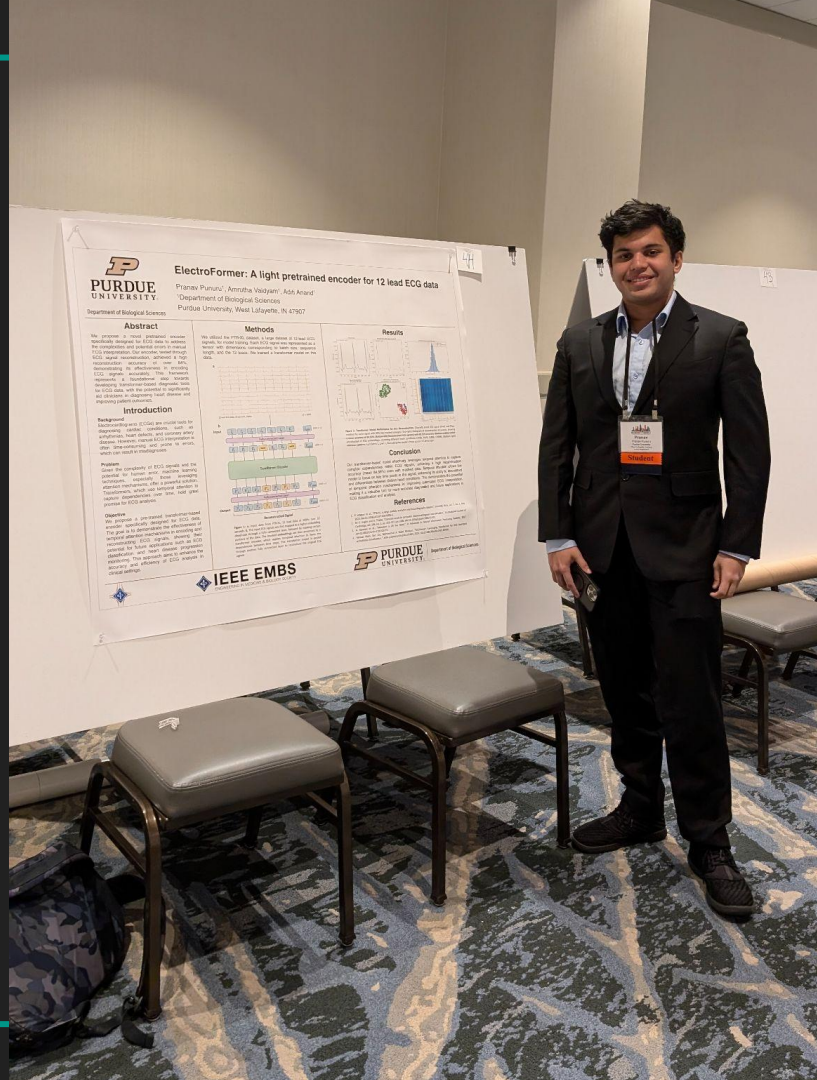


Last Semester: Cook Biotech Tour

- Personal tour around COOK Biotech center.
- Roundtable with Purdue alumni and other employees at COOK.
- Went over the process to build medical devices from organic material.
- Learned about ways to orient, layer, and stitch tissues together for varying medical device implementations.
- Hands-on analysis of different tissues for varying functions.

Research Opportunities

- This is Pranav the ex-chair and current PhD candidate!
- Presented research in Chicago research convention on a proposed lightweight pretrained encoder for 12-lead ECG data
- We support members in developing and proposing research topics
- We will assess feasibility and guide through next steps
- Opportunities to present at conferences and connect with field experts



Fall 2023: Data Competition

Data Competition: Integrating Artificial Intelligence (AI) methods and tools with Biomedical and Health Informatics (BHI) to combat Pandemics.
Deadline: September 29th

Bioinformatics Drug Target Challenge:

The goal of this challenge is to build effective ML/AI-based surrogate models that can accurately predict the docking scores of candidate drug molecules on SARS-CoV-2 protein targets.

- Click here to access the data sets.
- Nafiz Abeer (nafiz.abeer@tamu.edu), Byung-Jun Yoon (bjyoon@tamu.edu)

Public Health Informatics Challenge

The goal of this data challenge is to predict the 7-day average of new COVID-19 cases and the positivity rate based on historical public health data. Accurate prediction of such epidemiological trends can provide useful insights for the public, helping them make informed decisions regarding protection/mitigation measures, travel planning, and more.

- Click here to access the data sets.
- Pei-Hung Chung (chung95191@tamu.edu), Byung-Jun Yoon (bjyoon@tamu.edu)

We won (1st place for public health informatics challenge, 2nd place for bioinformatics drug target challenge)**!!!!**

Past Speakers

Dr. Nick Sansone

ER Physician, CEO of INScribe

Provided Insight regarding patient care and diagnostic procedures in the Emergency Room for Congestive Heart Failure

Dr. Subarna Sinha

Director of Data and ML Engineering at 23andMe

Insight on how 23andMe uses genetic and non-genetic data to generate personalized health and ancestry insights and presents an end-to-end machine learning system for scaling the deployment of these models

Aditya Vaidyam

Former IEEE President, EMBS Co-founder

Dr. Hayley Chan, MD

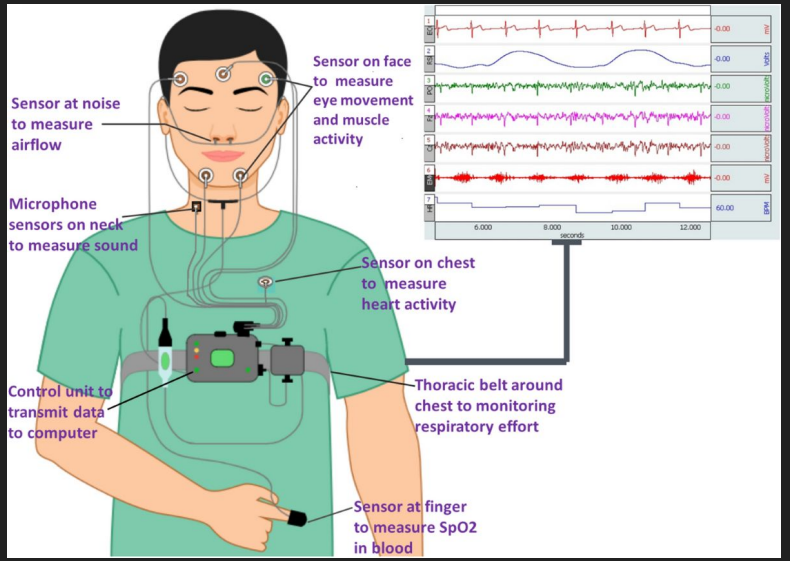
Former EMBS Chair, Vice-Chair, and Secretary

Explores the synergy between engineering and medicine, featuring a lecture that connects engineering concepts to clinical diagnosis through real medical cases and devices.

This Semester

This Semester: **Sleep Apnea Detector**

This semester we will be moving into the **system integration** and **data acquisition** stage for our **non-invasive sleep apnea detector.**



This Semester: Project Proposals

Aim: improve accessibility to disease diagnosis via novel devices and AI

Chronic Kidney Disease

Photo Urine Analyzer + Sweat Patch

Measuring Creatinine, Albumine, Glucose through the analyzer and skin patch

Glaucoma

Handheld Tonometer

Measure pressure in eye and take picture with phone by converting it to fundus camera with attachment

Alzheimer's Parkinsons

Tri-Modal Home Kit

1. Wrist/ankle band for tremor/gait;
2. IR eye-tracking visor
3. Voice box

Lung Cancer

Breath VOC analyzer

Volatile Organic Compounds exhaled VOCs distinguish lung cancer

Fall Workshop: Early Disease Diagnosis with ML

We are going to use **machine learning** to diagnose diseases where **early detection** could make a **major** impact.

1. Pick a track: CKD, PCOS, or ILPD.
2. Open the matching notebook:
   - `ckd_workshop_corrected.ipynb`
   - `pcos_workshop_corrected.ipynb`
   - `liver_workshop_corrected.ipynb`

Disease	Dataset
CKD	UCI CKD
COPD	COPD Gene
PCOS	Kaggle PCOS
Liver Disease	UCI ILPD
MCI/Alzheimer's	ADNI
Diabetic Ulcers	Medetec

Inside EMBS

Medical Device Design Process

Research & Design
Identify clinical needs, review existing technologies, and design prototypes that solve real healthcare problems.

Electronics & Hardware
Build and test circuits, sensors, and boards that collect and process physiological signals safely and reliably.

Software & Firmware
Develop embedded code, signal processing, and user interfaces to make the device functional and easy to use.

Data & Algorithms
Analyze sensor data, apply machine learning or statistical models, and ensure accurate and meaningful outputs.

Testing & Validation
Run experiments to verify performance, reliability, and safety while meeting regulatory requirements.

Regulatory & Human Factors
Understand FDA/ISO standards, usability, and ergonomics to ensure the device is safe, compliant, and comfortable for patients.

How *You* Benefit by Joining EMBS

Global Recognition → IEEE is an internationally recognized organization which looks amazing on a resume and LinkedIn.

Leadership Opportunities → Take on roles (officer or project lead) that give you real experience managing teams.

Faculty Support → We can connect you with professors who will sign onto your research (this is great for conferences, grad school, or publishing.)

Apply Class Knowledge → use your ECE/biology/CS/Mech skills in real medical tech projects.

Alumni & Networking → Access IEEE's huge alumni network, mentors, and career resources.

Conference Access → Opportunities to present at IEEE EMBS conferences and competitions.

Executive Positions

Vice Chair – Supports the chair and helps manage projects and meetings.

Treasurer – Handles club finances, budgets, and reimbursements.

Secretary – Keeps records, notes, and ensures smooth communication.

Outreach & Events Coordinator – Plans events, collaborations, and builds external connections.

Marketing & Engagement Chair – Promotes the club through social media, flyers, and member engagement.

Meetings Thursdays at 7:00pm!

First Meeting: Onboarding

September 18,
7:00 PM in BHEE 170

purdueieee.org/embs
IG: purdueembs

Join the Discord

Fill out Interest Form

Apply for Leadership