Project Branch Review – Fall 2025

Prepared by Kenny Madrigal, Project & Workshop Chair

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1. Introduction

This document serves as a comprehensive overview of the Projects & Workshops (P&W) Committee within IEEE@UH. It exists to formalize the systems, projects, and educational pipelines that have been developed over the past semesters and to outline a structure that future leaders can build upon. The purpose is simple: to make sure that innovation, collaboration, and student creativity have a clear home at the University of Houston.

The guiding philosophy behind everything in this document is **empowerment, not competition**. IEEE@UH does not exist to outdo Robotics@UH or any other organization—we exist to amplify what's already possible by giving students the tools, knowledge, and community they need to *create*. Our goal is to teach people how to build confidently, fail safely, and document what they learn so others can follow. Projects and workshops aren't just activities; they're the heartbeat of IEEE@UH's technical culture, where curiosity becomes skill, and skill becomes innovation.

Also… yeah I used AI. IT WRITES REALLY FAST and more clearly than I could ever hope to. I just wanted to share my ideas ASAP. Ofc I screened it after.

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2. Organizational Structure

2.1 Co-Chair

Starting Spring 2026, the Project Branch will be co-led by two chairs. The co-chair role is not meant to divide authority, but to **share stewardship**. This position exists so that leadership can scale without burning out, and so that every new idea has a second mind to test it, refine it, or run with it.

My vision for the co-chair is that they become a trusted right-hand collaborator, someone who can lead meetings, manage logistics, and develop their own initiatives within the P&W framework, while still working towards goals that have already been established.

The co-chair will have full freedom to propose new projects or reshape existing systems, provided that documentation and transparency remain intact.

2.2 Projects & Workshops (P&W) Committee

The P&W Committee is made of selected members that undergo the onboarding process to facilitate all of our technical endeavors. We **facilitate workshops**, **manage active projects**, and ensure every member has an accessible path from beginner to builder.

Starting next semester, we will host **weekly P&W committee meetings**. These are face-to-face, casual meetups for all IEEE members to work on personal or committee projects. The time for these meetings will be selected via the onboarding process.

Onboarding Process

Every semester, IEEE@UH will conduct a structured onboarding process for all members involved in the **Projects & Workshops Committee**. The purpose of this process is to organize teams efficiently, set clear expectations, and align meeting schedules across all active projects.

1. The onboarding process begins with a **semester kickoff form** distributed to both returning and new members. This form collects basic information such as **preferred meeting times, project interests, technical experience, and availability**. Using this data, the Project Chair and Co-Chair will determine consistent meeting times for each project team *and* for the general P&W Committee meetings.

2. For **new members**, the form doubles as a project-matching tool. Students who express interest in specific areas—such as robotics, embedded systems, or circuit design—will be directed toward projects that fit their goals and current skill levels. Returning members will have the opportunity to stay on their existing project teams or request reassignment if they want to explore something new.

This system creates a clean onboarding pipeline where no one “falls through the cracks,” and where every member is attached to a tangible project from the start of the semester. It also helps balance

team sizes, reduce scheduling conflicts, and ensure that new projects don’t begin without sufficient staffing.

Check out the form at this link.

Members’ Responsibilities

- **Communication:** All coordination happens casually in #pw-chat on Discord—if you start a task, just drop a quick message.
- **Documentation:** All P&W materials will be uploaded to a central GitHub repository after I initialize the folder structure. This ensures future officers and members can easily find, reuse, and improve past resources.

Workshop-Specific Responsibilities

- **Trial Runs:** Committee members attend rehearsal sessions to learn the material and practice troubleshooting.
- **Initiative:** Any P&W Member may propose their own workshops using committee resources. The Project Chairs help polish slides, prepare materials, and assist during delivery. To avoid fatigue, the committee emphasizes **quality over quantity**—a few well-run workshops per month are better than a cluttered schedule.
    - *Members may also assist with existing workshops—helping refine slides, update materials, or improve overall quality—provided they keep an active communication channel open with the project co-chairs. Authorization is quick and flexible; just ask before starting. Terms of approval are handled on a case-by-case basis.*

Subteam Breakdown and Responsibilities

- **Workshop Team:** Act as **on-site program assistants** for technical workshops, and maintains both the presentation slides and shared BOM + reimbursement sheets. All workshop materials will be uploaded to a central GitHub repository after I initialize the folder structure. This ensures future officers and members can easily find, reuse, and improve past resources. For more on workshops, see *Section 4*.
- **Collaborative and Continuous Project Teams:** Oversee the success of collaborative and continuous projects, contribute to documentation on GitHub, and act as mentors for newer members. These include our Chili Cook-off Initiative (CCO), Circuit Speed Dating (CSD), and Energy Techathon (ET). More information on these projects, including timelines, is detailed in *Section 3.1 | Project Categories*. Note that a committee member can only be in one P&W Project Team at a time. *Information on sub-team expectations, onboarding, and leadership can be found in Section 3.2 | Project Expectations.*

2.3 Relationship Between IEEE@UH and Robotics@UH

IEEE@UH and Robotics@UH share overlapping interests but approach engineering from different angles.

Robotics@UH focuses on **mechanical integration** and **interdisciplinary builds**, employing a broad range of toolsets from kits to high-level system assembly that emphasize mechanical design and control structure. Their project deliverables prioritize getting functional systems up and running.

IEEE@UH, on the other hand, specializes in the **electrical and embedded foundations**. Our projects exist to help students understand the electronics behind robotics: how to select components, design circuits, debug signals, and bridge theory with practical implementation.

Both organizations benefit from staying connected—sharing lab space, documentation practices, and cross-promotion—but IEEE@UH's identity will remain rooted in **circuits, embedded systems, and electronic design education**. This distinction ensures that students can move fluidly between both orgs: learning the fundamentals of electronics with IEEE@UH before applying that knowledge in Robotics@UH's larger mechanical or competition-based projects. The long-term goal is to present ourselves as two arms of the same body: distinct, but mutually reinforcing.

It is here that I want to include a note about **Battlebots**. I propose that, under IEEE@UH, Combat Robotics takes on a project structure similar to *Micromouse*. That is, members would benefit from our recorded resources (*Section 5.2)* detailing electronics fundamentals and selection, and design PCBs and communication protocols between the robot and the controller. For the continuation of this document, I will refer to Battlebots as a proposed project under IEEE@UH.

2.4 Collaboration Framework with Other Orgs

Beyond Robotics@UH, IEEE@UH will actively collaborate with other technical and cultural student organizations such as **ASME, IEEE-NSM, AIAA, Energy Coalition, MAES, SHPE, NSBE, SWE, SASE,** and many more. The intent is not to compete with these groups, but to invite them into our ecosystem. We will encourage these organizations to **host or collaborate on workshops or committee meetings jointly with us**, providing their members with hands-on technical experiences while giving IEEE@UH broader exposure and stronger attendance at our events. In exchange, their members gain access to advanced technical content, and we gain visibility and credibility as the campus hub for engineering skill-building.

While some of these orgs occasionally host technical sessions themselves, IEEE@UH focuses on building strong electrical foundations, taught by and for students who want to learn how things truly work. But we also believe collaboration beats rivalry. When these orgs succeed technically, the entire UH engineering community rises with them.

Organizations can submit a collaboration/cohost request form at this link.

“Hosting With” vs. “Collaborating”

To clarify:

- **Hosting With** IEEE@UH means the partner organization’s name appears on promotional materials and their officers are present during the event, often as **program assistants or co-facilitators**. The workshop or project meeting is primarily organized and led by IEEE@UH, but the partnering org is encouraged to contribute in any way they can—such as **booking rooms, providing refreshments, designing flyers, or helping manage attendance**. Specific logistics will always be coordinated directly between the respective officers of each org.
- **Collaborating** with IEEE@UH, on the other hand, means a **true technical co-development** of the event. In this case, the respective technical officers from both organizations work together to design and execute a brand-new workshop or initiative from the ground up—combining resources, knowledge, and creative direction.

This distinction ensures clarity and balance: “hosting with” expands reach and engagement, while “collaborating” deepens technical relationships and creates shared ownership of new ideas. Both formats strengthen IEEE@UH’s network without diluting its mission or identity.

For more information on workshop criteria, please see *Section 4.2 | Workshop Criteria.*

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3. Project Framework

Individual projects focus on personal technical growth through self-directed building, **collaborative projects** emphasize teamwork and shared engineering outcomes across subteams, and **continuous projects** maintain long-term engagement through recurring, community-centered initiatives that sustain IEEE@UH's technical culture year-round.

3.1 Project Categories

Individual Projects

Individual projects are designed to build technical confidence and creative independence. Each member or small team takes ownership of a complete build, from design to debugging, so the project reflects their personal interests and growth. These projects act as a low-pressure entry point into engineering, giving students the freedom to experiment, make mistakes, and develop hands-on intuition before moving into larger collaborative teams.

Note:

Both IEEE@UH and Robotics@UH run hands-on project meetings. I noticed two natural subtypes: ***Autonomous Projects*** *(robots that drive themselves) and* ***Controls Projects*** *(piloted robots).*
To make our efforts cohesive, I recommend using ***flexible, case-by-case pairings*** *between related projects when their timelines or topics naturally overlap*
For example, early sessions for ***Micromouse****,* ***Line Follower****, and* ***Battlebots*** *could share space to cover common fundamentals such as motors or power systems before diverging into their respective* ***Autonomous*** *and* ***Controls*** *sessions. Similarly, when* ***Drones*** *and* ***Battlebots*** *both cover brushless motors, piloting, or safety, joint sessions could make sense there too.*
This flexible pairing structure keeps projects moving at a similar pace, reduces stagnation, and improves overall cohesiveness,making it easier to onboard new members, explain how our projects relate, and plan ***joint workshops*** *when shared concepts arise.*
Suggestions from Robotics@UH officers to realistically manage this idea are encouraged.

Note 2:

Project Chairs need to design an Individual Project Supplies Reimbursement Form for IEEE@UH Individual Projects. Co-chair, please ask me about this.

Micromouse - IEEE@UH | Autonomous

Started Fall 2023, inspired by Veritasium. Small teams (2-4) design a Micromouse—a maze-solving autonomous robot using sensors and algorithms to find the shortest path.
Meetings: Fridays 4-6 PM in the communal ENGR lounge.
Format: brief circuit overview → breadboarding/debugging/programming.

Line Follower - Robotics@UH | Autonomous

Started Fall 2025. Teams (3-4) build a sensor-driven robot that follows a line smoothly.
Meetings: Wednesdays at Roy G. Cullen Building.

Drones - Robotics@UH | Controls

Started Fall 2025. Focus on assembling drone kits and earning pilot certification.
Meetings: Cougar Village 1.

Battlebots - IEEE@UH | Controls

Currently paused (Fall 2025) with plans to relaunch Fall 2026.
Goal: Design and assemble circuits, weapons, and a chassis for 1–3 lb battlebots.

Collaborative Projects

Collaborative projects are large-scale, interdisciplinary builds that bring together members from both IEEE@UH and Robotics@UH under a unified objective. Each project is led by a team lead, often supported by subteam leads who oversee specific technical domains such as mechanical design, embedded systems, or control logic. These projects demand coordination across multiple disciplines, so clear documentation, leadership continuity, and weekly progress syncs are essential. Unlike individual projects, collaborative projects emphasize teamwork, long-term planning, and alignment with external competition or showcase deadlines.

University Rover Challenge (URC) | *Robotics@UH*

URC is a long-term, competition-based project where students design and construct a semi-autonomous rover capable of navigating simulated Martian terrain. The team includes subgroups for mechanical design, drive systems, embedded control, and software development. This project emphasizes project management, interdisciplinary teamwork, and system integration at a near-professional level.

Robot Arm Project | *Robotics@UH*

The Robot Arm project focuses on developing a functional robotic manipulator from scratch, combining mechanical design, kinematics, motor control, and embedded systems. Members learn how to synchronize hardware and firmware for smooth actuation. The project's modular nature makes it an ideal training ground for new members interested in robotics and automation.

Chili Cookoff Initiative | *IEEE@UH Project & Workshop Committee*

Every March, IEEE@UH hosts the annual Chili Cook-off. This year, we want to begin a tradition of **showcasing a technical initiative** at the event. Every year, a new Chili Cook-off Initiative should merges technical creativity with cultural engagement and highlight how IEEE@UH blends innovation with community spirit, encouraging members to design projects that people can physically experience. **In other words, we want to demonstrate engineering in a social and entertaining context.**

This year, we want to design and assemble **a touch-sensitive, music-reactive, modular dancefloor.** Project Chairs are always responsible for deciding the project and project timeline.

IEEE R5 Robotics Competition (Planned) | *IEEE@UH Competitions Chair*

The IEEE Region 5 Robotics Competition will be introduced as a future collaborative initiative between IEEE@UH and Robotics@UH. The goal is to form a unified team to represent UH in regional IEEE events, fostering technical excellence and recognition at the professional level. This project will allow members to apply their skills to a standardized competition format and gain exposure beyond campus. **I recommend that the Competitions Chair begins recruiting promising members come Spring 2026**, in preparation for the R5 Conference in Spring 2027**.** This effort will involve identifying promising members from individual and collaborative projects who demonstrate leadership, creativity, and resilience under deadlines. Additionally, I recommend the Competitions Chair builds a foundation and proposes a project timeline this year so that by next fall, the R5 Robotics Team is fully formed, trained, and competition-ready.

Continuous Projects

Continuous projects are recurring initiatives that keep IEEE@UH active between major competition cycles. They focus on sustained member engagement, technical outreach, and organizational growth rather than one-time builds. Each program has leads responsible for maintaining documentation, organizing events, and onboarding new contributors each semester to ensure long-term continuity. These projects form the backbone of the chapter's year-round activity, where experimentation, event hosting, and mentorship all intersect.

Energy Techathon Team

As of November 2025, the Energy Techathon team will have **three to four months** to design and execute a prototype-centered hackathon that bridges the gap between ideation and engineering.

The team should host **one to two preparatory workshops** focused on rapid prototyping skills such as circuit design, embedded systems, or renewable energy modules. The workshops should prepare participants for the full Techathon event in the spring.

The team will also be responsible for **reaching out to the Energy Coalition** to discuss the hackathon proposal and ensure that the event maintains a clear technical identity distinct from EC's concept-based hackathon.

If the Energy Coalition raises concerns or technical questions, the team lead should either 1) ask a Project Co-Chair for additional clarification before they respond or 2) prompt either of the Project Co-Chairs to continue the conversation directly with any EC representatives.

Additionally, the Energy Techathon subteam will prepare an internal IEEE team to compete in EC's own hackathon, ensuring representation and outreach continuity.

Ideally, the Energy Techathon will be a 1-to-3 day event where participants will learn of a proposed environmental/energy challenge and prototype a solution that applies electrical engineering.

Circuit Speed Dating

Circuit Speed Dating is an interactive, fast-paced learning series where members rotate between short circuit-building challenges. It's designed to help team members and participants alike to quickly build familiarity with **components, analog circuits, and debugging under pressure**, while making the learning process fun and social. Each event highlights a different circuit concept, encouraging team members to learn collaboratively and test their problem-solving skills in real time. This project has rapidly grown into one of IEEE@UH's most engaging recurring activities, providing a consistent entry point for new members throughout the semester. Future actionable items include:

1. Encouraging existing CSD members to **design PCBs** for circuits they've already built or showcased. These designs will be compiled into a **"Circuit Date Bank"** for reuse for showcasing circuit demos in future events.
2. **Recruiting more CSD members**, with more than one person taking ownership of one circuit. This distributes responsibility, encourages collaboration, and makes event-day facilitation smoother and more engaging.
3. Long-term, CSD will evolve beyond isolated demos; it will showcase how multiple simple circuits can be combined to create complex, expressive systems.

3.2 Project Expectations

Semester Timeline and Deliverables

Each project category—Individual, Collaborative, and Continuous—should maintain its own semester timeline to keep progress measurable and visible. These timelines include milestones for design, prototyping, testing, and final showcase or competition readiness.
Individual project leads will draft their own flexible schedules, while collaborative and continuous project leads will coordinate shared calendars with subteams to avoid overlap and missed deadlines. By the end of each semester, every project should have something *tangible* to present—whether that's a functioning prototype, a recorded demo, or a documented postmortem explaining lessons learned. For each project's timeline, see *Section 3.3*.

Onboarding

Individual

Onboarding for individual projects will vary at the discretion of each project lead, but all new members should first be directed to the **fundamentals and project-specific video resources** described in *Section 5.2*. These videos are intended to accelerate ramp-up so members can reach a first working design or prototype as early in the semester as possible, leaving in-person meetings focused on debugging, refinement, and deeper questions rather than reteaching the basics.

Collaborative and Continuous

I recommend that onboarding for all collaborative and continuous projects, including Robotics@UH projects, follow an onboarding process similar to the one for P&W Committee. Additionally, new members should be introduced to the **project timeline** and the **project hero video** (if applicable) or something adjacent (*See Section 5.2)*.

Recap of P&W Committee Onboarding Process:

1. The onboarding process begins with a **semester kickoff form** distributed to both returning and new members. This form collects basic information such as **preferred meeting times, project interests, technical experience, and availability**. Using this data, the Project Chair and Co-Chair will determine consistent meeting times for each project team *and* for the general P&W Committee meetings.

2. For **new members**, the form doubles as a project-matching tool. Students who express interest in specific areas—such as robotics, embedded systems, or circuit design—will be directed toward projects that fit their goals and current skill levels. Returning members will have the opportunity to stay on their existing project teams or request reassignment if they want to explore something new.

Note:
I recommend that all members starting a project, whether IEEE@UH or Robotics@UH, fill out the P&W Onboarding Form, so that we can set our P&W Meeting Schedule to align with almost everyone's availability.

Documentation

Proper documentation ensures continuity between semesters and prevents knowledge loss.

- **Individual Projects:** Documentation is encouraged but informal—project logs, schematics, or videos that can be shared for inspiration.
- **Collaborative & Continuous Projects:** I recommend all code, schematics, CAD files, and media should be uploaded to **GitHub** under a linked repository. Each subteam should maintain its own README outlining purpose, progress, and pending tasks.

Subteam Leadership

Leadership is structured to balance autonomy with accountability.

- **Robotics@UH Projects:** Leadership roles and officer assignments are delegated internally by Robotics@UH.
- **Individual Projects:** Each project lead acts as a mentor for their group, guiding others through design, troubleshooting, and documentation.
- **Collaborative and Continuous Projects:** Team leads are responsible for maintaining forward momentum across subteams and **have authority to make executive decisions if progress stalls. If no input is being provided, leads are expected to act rather than wait.** For continuous projects, leads carry out existing initiatives while proposing new ones for

future semesters. They should ensure continuity, delegate tasks early, and mentor replacements to avoid burnout.

I recommend that every team and subteam has a minimum of 2 leads to share the workload, meanwhile Project Chairs and the corresponding Robotics@UH Officers provide the timeline.

A note about GirlIEEEs Chair:

Please assess female students' participation and retention rates in our projects and collaborate with us, the Project Chairs, improve them.

3.3 Project Timelines

*Note: With these structured timelines and the **additional P&W Committee Meetings** set by the onboarding process, I am confident we can succeed!*

Individual Projects

Week	Micromouse	Battlebots	Line Follower	Drones
1	Basics of Micromouse and rules	Basics of Battlebots: strategies, rules. Also: Materials and Timeline.		
2	Boost converters, motor drivers, switches, and diodes	Boost converters, motor drivers and drivetrain assembly		
3	Sensors: IMU, encoder reading, IR sensors	Brushless motors, weapon types and assembly + Robot Design Session		
4	PCB 1 – Schematic	Robot Design Session		
5	PCB 2 – routing, gnd plane, design review	CAD Debugging Session and Marathon* + Continued Robot Design		
6	CAD Debugging Session	CAD Debugging Session and Marathon* and **STL Deadline.** Assembly may begin.		
7	PCB Fabrication Deadline 1	Wireless Comms Protocol Info**, then Begin PCB and Order Electronic Parts,		
8	Soldering: PCB Assembly	Continue PCB. Leads will continue testing Wireless Comms		
9	Firmware: Encoder feedback & IMU	PCB Fabrication Deadline, Continue mechanical		

	Correction	assembly.		
10	Motor PID	Robot Controller*** + Programming		
11	Path Planning Algorithms	PCB Assembly + Programming		
12	Iterative Sessions	Programming + Manufacturing Deadline 2		
13	Competition Readiness Check	Iterative Sessions		
14	Final Iterations and Backup Firmware Check	Competition Readiness Check		
15	Project Showcase?	Project Showcase?	Project Showcase?	Project Showcase?

Battlebots
*Members should watch CAD tutorials and begin *some* of their Robot CAD. The meeting serves to aid members with their concerns on a case-by-case basis. Finally, the Battlebots leads are responsible for hosting a Discord VC Marathon session after the Battlebot meeting to ensure progress.
**Now, Battlebot leads should focus their efforts on making sure wireless communication implemenation occurs smoothly.
***Robot Controller session should coincide to be around the same time as the RC Car Workshop (*See Section 4.5).* Also, Battlebot leads are responsible for designing the same controller PCB and STL for everybody. Components should be completed and collected by then. Seek guidance from Project Chairs.

Collaborative Projects (2025-2026)

Week	Chili Cook-off Initiative	Robotic Arm	URC	IEEE R5
1	Decide on a design and initialize git repo. Start part hunting and BOM			TBD
2	Delegate tasks and begin working on them. These tasks will include assembly (mechanical and wiring*) design, piezoelectric interface, firmware, and more as needed.			
3				
4				
5	Prototype Tile File Deadline			

6				
7				
8	Prototype Tile Assembly Deadline			
9				
10				
11				
12				
13				
14				
15				

Chili Cook-off Initiative

Will be updated as needed
*wiring assembly as in “how will tiles encase the wiring”

Continuous Projects

Week	Circuit Speed Dating	Energy Techathon
1	Prepare circuits bank and PCBs	Introduction to Energy Techathon
2	Prepare circuits bank and PCBs	Start Drafting 3-Day Techathon Agenda
3	Order PCBs and Prepare for CSD	Select Energy Challenges
4	CSD	Exercise: Prototype solutions to Energy Challenges
5	Design PCBs and Prepare for CSD	Write a guide to participation, using existing techathons as a reference.
6	CSD	Prepare 1-2 Workshops*
7	… and so on.	Prepare 1-2 Workshops*
8	Subject to change as needed	Workshop 1
9		Robust documentation on Energy Techathon Scope
10		Proposal to Energy Coalition and commence Logistics with Events related Chairs
11		Exercise: Prototype solutions to Energy Challenges
12		Workshop 2
13		Subject to change as needed

14		Homework Purge and Techathon
15		IEEE Project Showcase

3.4 Project Events

Competitions

IEEE@UH participates in and prepares for multiple competitions across project categories. Each competition provides an external benchmark for the technical and organizational growth of our members.

- **University Rover Challenge (URC):**
  The University Rover Challenge is managed by **Robotics@UH**, with preparation and team structure determined by that project's lead. IEEE@UH maintains an advisory and support role, providing electronics guidance, documentation templates, and cross-promotion opportunities where appropriate, but does not directly oversee the build or competition logistics.
- **IEEE Region 5 (R5) Robotics Competition:**
  TBD By Competitions Chair.
- **IEEE Region 5 (R5) Circuits Competition:**
  If IEEE@UH participates in the Region 5 Circuits Competition, members of the **Circuit Speed Dating** and **Energy Techathon** subteams will receive first consideration for team selection, in that order. These members' experience aligns closely with the competition.
- **Energy Hackathon**
  See *Section 3.1 | Energy Hackathon*.

IEEE Project Showcase

Starting next semester, IEEE@UH will host a **Project Showcase every semester**.
The Showcase provides recurring milestones for members to demonstrate progress, celebrate creativity, and set goals for the following term.

- **Purpose:** To promote project completion within a single semester and encourage iterative learning. For example, a student could feasibly build a **Micromouse in one semester** and a **Battlebot the next**, gaining two major design experiences within their first year.
- **Format:**
  - *Individual Projects* (Micromouse, Line Follower, Drones, Battlebots) compete in short trials or demos.
  - *Collaborative Projects* (Chili Cook-off Initiative, URC, Robot Arm) present large builds and explain development progress.
  - *Continuous Projects* (Energy Techathon, Circuit Speed Dating) exhibit documentation, PCBs, breadboards, and ongoing initiatives.

- **Recording & Continuity:** All project presentations will be recorded and archived so future members can learn from prior work rather than start from scratch.

Note on Personal Projects

For individual projects that are **personal builds**—such as small robots or custom devices—I do **not believe in mandatory project meetings**. These are passion-driven endeavors and should stay flexible.

Instead, members working on personal projects are encouraged to attend **weekly P&W Committee meetings**. These meetings are **member-exclusive spaces** where individuals can:

- Work on committee initiatives or their own personal projects.
- Ask for feedback, design help, or troubleshooting support.
- Learn from others working on similar challenges.

4. Workshops Overview

4.1 Purpose of Workshops in IEEE@UH

Workshops are how IEEE@UH keeps its members learning between major projects.
They provide **hands-on, low-stakes spaces** where students can build technical confidence, explore tools, and immediately apply concepts to ongoing projects.
Each workshop is designed around three core values:

1. **Accessibility** – new members should feel welcome regardless of prior experience.
2. **Relevance** – topics must tie directly into our projects or member interests.
3. **Documentation** – everything taught should be recorded or archived so future members can reuse it.

Together, these workshops form the backbone of our internal education system and ensure that every member has an on-ramp into engineering practice.

4.2 Workshop Criteria

“Is This a Good Fit for IEEE?”

When deciding if a topic belongs under IEEE@UH, ask three questions:

1. **Technical Depth:** Does it teach a hardware, software, or design skill that complements our ongoing projects?
2. **Transferability:** Can members use what they learn on other builds or personal projects?
3. **Sustainability:** Can the material be documented or reused in the future?
   If a proposed idea checks at least two of these boxes, it’s a good fit for IEEE.
   Otherwise, it might be better suited as a short recorded video or a collaboration with another organization.

When to Make a Video vs Host a Workshop

- **Video tutorials** are best for **foundational or repeat topics**—for example, basic PCB workflow, installing KiCad, or Git setup. Recording these once prevents burnout from reteaching the same material.
- **Workshops** are for **hands-on, collaborative, or experimental sessions**—anything where live troubleshooting, peer feedback, or physical tools are required.
  The long-term goal is to build a **hybrid learning model**: members learn the basics asynchronously through videos, then attend workshops to apply those skills in real time.

Collaboration Criteria for Joint Workshops

IEEE@UH encourages collaboration when it strengthens content or builds inter-org relationships, but not every topic needs a partner.
A collab is a good idea when:

- Another org brings **domain expertise** we lack (e.g., IEEE-NSM for scientific programming).
- There's a **shared technical goal** (e.g., ASME for 3D Slicing).
- The event provides **cross-disciplinary value** that reaches beyond electrical engineering.

Before confirming a collaboration, evaluate logistics, ensure shared responsibilities, and verify that the partnership genuinely adds learning value. Workshops led with other orgs should fall into two categories: "hosted with" or "collaborated on" (see Section 2). Hosted workshops expand audience reach; collaborative ones develop shared technical content. In both cases, coordination and documentation standards remain consistent with IEEE@UH's internal expectations.

Another note about GirlIEEEs Chair:

Please reach out to SWE, Phi Sigma Rho, and similar engineering women's empowerment orgs to invite them to co-host workshops or project sessions with IEEE@UH.

4.4 Fall 2025 Workshops

Intro to PCBs | Sept 26

Topics: Reading and writing schematics (+ breadboard basics), Schematics & PCBs in EasyEDA and KiCad, Symbols and footprints in KiCad, Exporting Gerber files
Notes: Used a NE555 blinker circuit as example. Could've used more assistant interaction; recordings available under #recorded-resources.

Intro to Python w/ IEEE-NSM | Oct 1

Covered variables, data types, indexing, control flow, functions, and libraries.

KiCad Plugins | Oct 10

Covered plugin installation from GitHub and Plugin Manager.
Categories: automation, fabrication, documentation.
Plugins tested: freerouting, round tracks, KiCad DRC templates, gerber_to_order, Interactive HTML BOM, board2pdf.
Future add-ons: KiCost, Git for KiCad, FreeCAD integration, panelization, ngspice, RF tools, coils.

Intro to Git & Linux | Oct 14

Topics: GNU/Linux overview, Git basics, Git vs GitHub, environment setup, SSH into server, CLI practice.

Circuit Speed Dating | Oct 15, Oct 29, Nov 12

See *Continuous Project > Circuit Speed Dating* under *Section 3.1 | Project Categories.*

Soldering Workshop w/ AIAA | Nov 18

Topics: Soldering header pins to breakout boards, soldering connections on different types of perforated boards, desoldering pins, soldering wires, crimping wire connectors.

Arduino Display Workshop | Nov (?)

Topics: (Pending)

4.5 Spring 2026 Workshops

3D Slicing Workshop w/ ASME | Jan-Feb

Topics: Understanding slicing parameters, infill density, layer height, and print tolerances; setting up and maintaining 3D printers; optimizing prints for mechanical or aesthetic performance.

Soldering Workshop | Feb

Topics: Soldering header pins to breakout boards, soldering connections on different types of perforated boards, desoldering pins, soldering wires, crimping wire connectors.

Wireless Transceiver / RC Car Project | Early March

Topics: Using wireless transceiver modules (nRF24L01, HC-12, etc.); establishing communication between a transmitter and receiver; controlling DC motors via remote signals; integrating motor drivers and power systems; testing and debugging wireless control systems.

Intro to PCBs: Redux | Late March

Topics: Schematic and documentation best practices in KiCad; footprint and symbol management; routing techniques; generating and verifying Gerber files; preparing for PCB fabrication and ordering.

Simulation Software w/ IEEE-NSM | Mid-April

Topics: Introduction to circuit and field simulation tools (ngspice, FEMM, MATLAB); basic setup and parameter configuration; simulating electronic and electromagnetic systems; interpreting simulation data for practical design improvements.

Workshop Wishlist

HAM Radio w/ AIAA

I'd like to co-host with AIAA on one of their HAM Radio occurances that introduces IEEE@UH members to RF and wireless engineering. After I go to one HAM Radio or two, then I can brainstorm and discuss with them about a one-time HAM Radio occurance that IEEE can collab or host with (maybe we could put a little twist on the event!).
This initiative would expand our curriculum into high-frequency domains and encourage students to pursue amateur radio licensing and RF project development.

Outreach Workshops (K–12 and External Programs)

IEEE@UH's Outreach Committee focuses on community engagement—connecting UH engineering students with local schools and youth organizations through STEM-focused events. While Outreach leads the communication, scheduling, and coordination with external institutions, the **Projects & Workshops Committee** provides the **technical backbone** for these activities.

Specifically, the **Workshop Subteam** within P&W will assist in developing **age-appropriate workshop materials, simplified circuits, and guided activities** that align with K–12 audiences. They will also prepare documentation, supply checklists, and provide **program assistants** (IEEE members trained to facilitate interactive demos safely and effectively).

Co-host Instances of Project Workshops Across Campus

For example, I know SHPE did a musical keyboard session this semester. We could ask to co-host an instance of these Project Workshops. That way, we expand our reach.

Certification Trainings

Soldering, MATLAB (with ASME?), etc.

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5. Educational Resources & Outreach

IEEE@UH will continue posting workshop photos and project updates across social platforms to highlight member accomplishments and attract new participants. By maintaining a strong online and campus presence, we position IEEE@UH not just as a student organization, but as a recognizable community of innovators. Ultimately, this design and content strategy is about recognition, unity, and legacy.

I hope that the Marketing Committee and Project & Workshop Committee can collaborate on the goals I've outlined below:

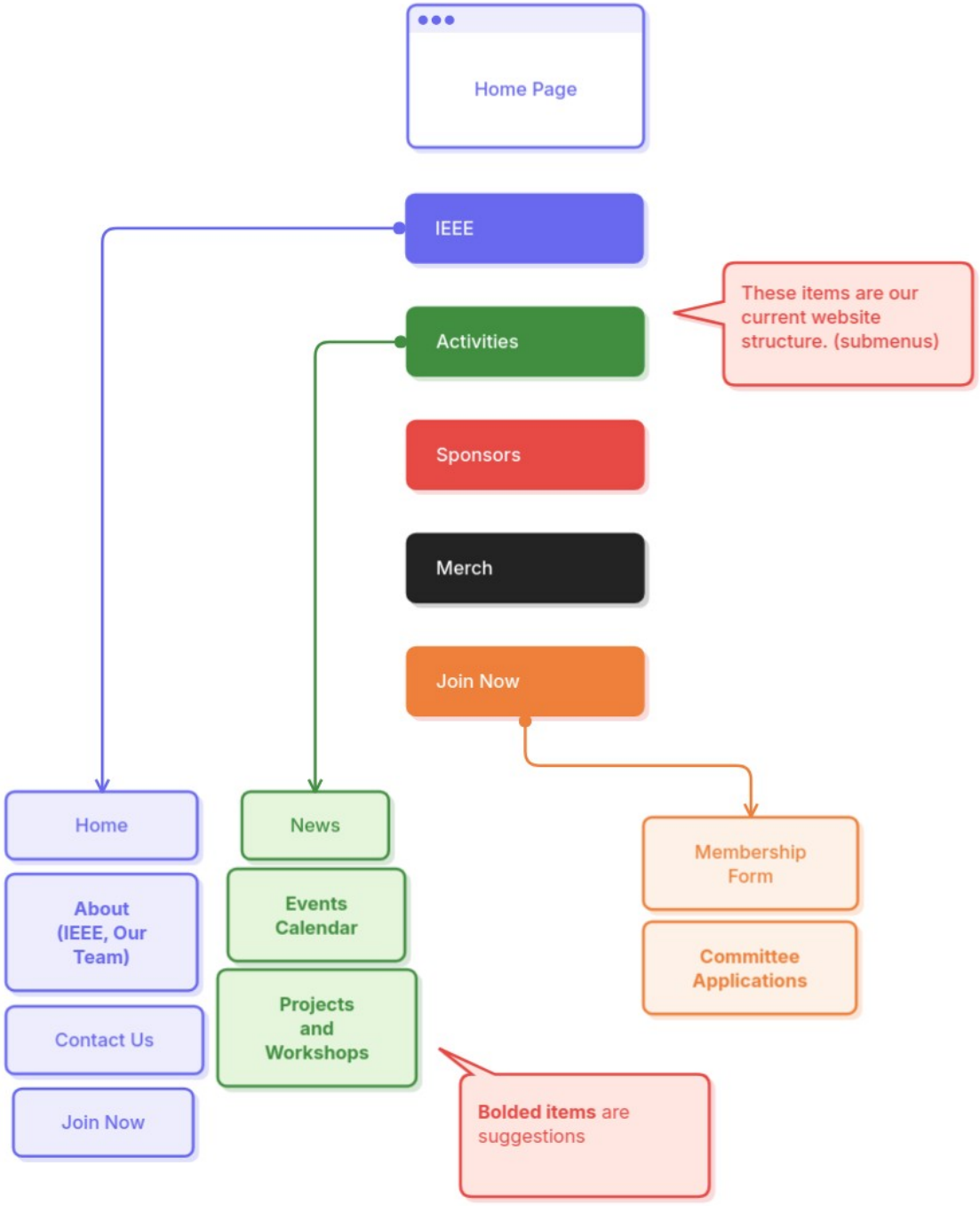
Page on IEEE@UH Website

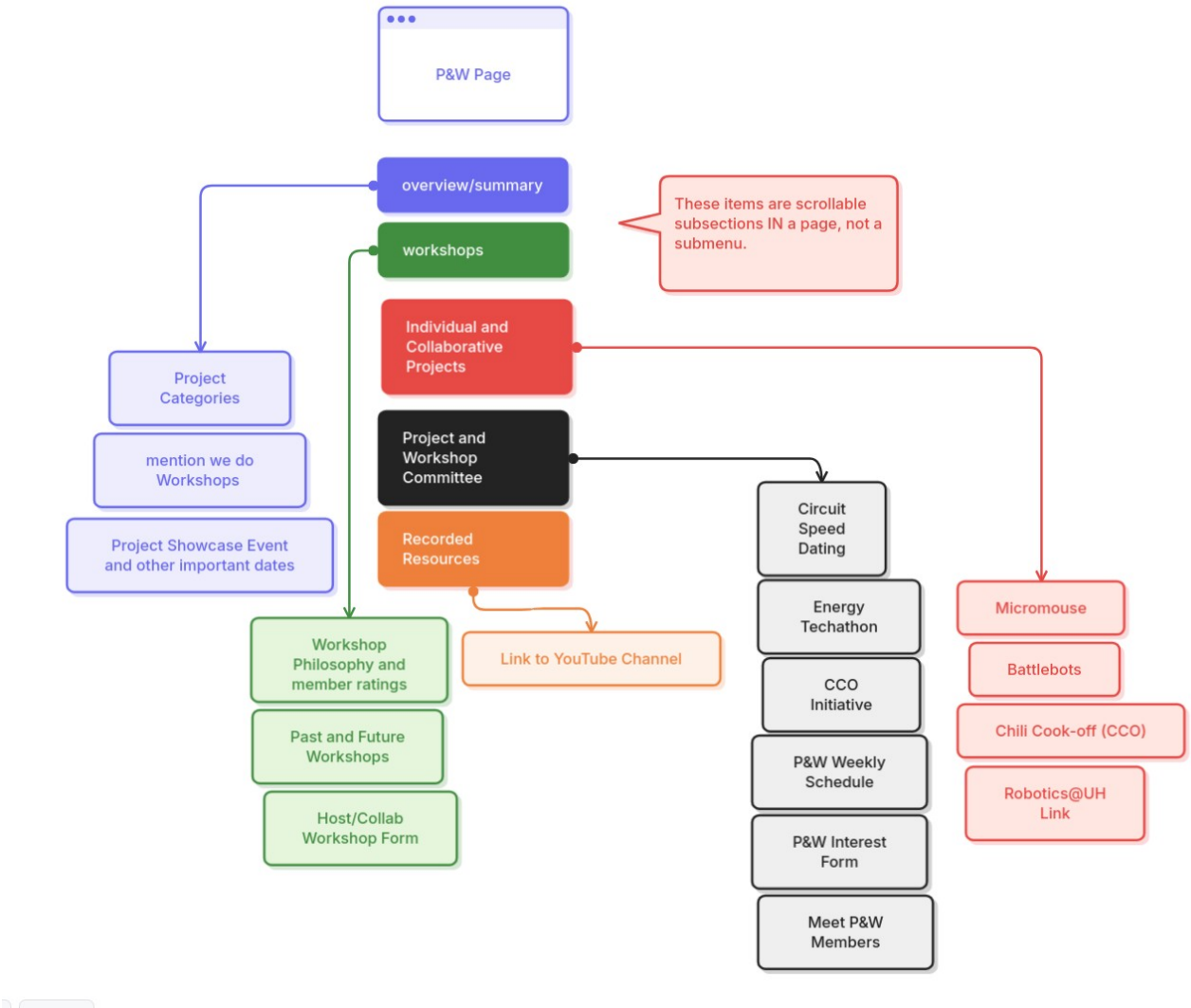
The **P&W Page** will act as the public interface of the Projects & Workshops Committee—both a digital archive and a recruitment tool. Each active project (individual, collaborative, and continuous) will have its own page featuring:

- A project overview and photos of current prototypes
- Links to GitHub repositories and documentation
- The names and LinkedIn profiles of **team and subteam leads**, so members know exactly whom to contact (and for our hardworking members get recognition!)

This structure will make the IEEE@UH website a living portfolio instead of a static club page, and it will help preserve continuity between generations of project teams. That is, instead of replacing old content with each update, the P&W page should archive progress over time—using a toggle or timeline-style menu to showcase each project's development across semesters and years.

The following pages are a recommended UX flow (mocked on moqups.com).


Home Page
IEEE
Activities
Sponsors
Merch
Join Now
These items are our current website structure. (submenus)
Home
About (IEEE, Our Team)
Contact Us
Join Now
News
Events Calendar
Projects and Workshops
Membership Form
Committee Applications
Bolded items are suggestions



Video Content

By combining asynchronous and in-person learning, we make engineering education more flexible and scalable. Each video will be archived alongside written documentation so that project leads can easily assign them as prerequisites or refreshers before builds begin.

To **encourage engagement**, we plan to implement small incentives—quizzes, sticker rewards, and recognition on the IEEE website or social media. While minor, these systems reinforce consistent participation and create positive feedback loops for members who show initiative. The goal isn't gamification for its own sake, but to celebrate curiosity and reward self-driven learning.

Workshop Recordings

These are uncut or lightly edited recordings of live workshops hosted by IEEE@UH. They document student questions and live debugging. Workshop recordings also help members who missed sessions catch up and give future leads a reference for how to host their own workshops.

Formal Tutorials

Short, polished instructional videos that teach specific technical tools or workflows. Topics include (but are not limited to:) **EasyEDA schematic design, Arduino IDE setup, PCB manufacturing workflow, component sourcing, and basic embedded code structure.** Unlike workshops, these are more concise and modular—made for repeat viewing.

Note: KiCad workshops will continue in-person, since they make excellent entry points for new members to experience IEEE culture firsthand.

Fundamentals Video Series (“Fundamentals + Project Modules”)

The *core video curriculum* (see previous section) teaching fundamentals like **input/output logic, analog vs digital signals, sensors, and motor control**, followed by project-specific videos (Micromouse, Battlebot, Line Follower, etc.). These form the backbone of our asynchronous learning program and act as the official introduction for new project members.

Tentative Agenda:

1. Installing Arduino IDE
2. First Arduino IDE Programs
3. DC and Stepper Motors. (+ PID Extension)
4. Buck and Boost Converters
5. Sensors: Encoders, Infrared, IMU
6. Components: Diodes, Transistors, Switches
7. Line Follower: Assembling a Line Follower Robot
8. Micromouse: Assembling a Micromouse
9. Brushless Motors
10. Battlebot: Remote Controller with Wireless Transciever Module

Project Identity “Hero” Videos

Every project under the IEEE@UH umbrella should ultimately have **its own signature video**—something that lives for a year or two before being refreshed. These videos are meant to be immersive snapshots of what it feels like to be part of that project.

The **Circuit Speed Dating** video might be a first-person vlog following a new member through the event, showing what it’s like to rotate through tables and build circuits. The **Micromouse** video could follow a team from concept to competition, showing the maze trials and debugging process. The **Battlebot** video could show prototypes evolving, testing footage, and commentary from the builders themselves.

Each project should choose the **format that best captures its personality**—whether that’s cinematic, tutorial-based, or documentary-style—and update it every couple of years. This gives

IEEE@UH a timeless visual library that future members can watch to instantly understand our culture, workflow, and sense of play.

Inspo Posts (“Build With Me” Videos)

In addition to the official IEEE@UH videos, **individual member content** will be featured as part of our storytelling ecosystem. For example, I’ll be posting videos on my personal YouTube channel that document my own builds—such as a vlog-style series tracking the design, philosophy, and iteration behind my battlebot. These videos, while hosted personally, will be linked on the IEEE@UH site as official content when relevant, giving projects a human, authentic narrative.

Branding

The P&W Committee and every subteam will have its own **logo, merchandise, color palette, and typography style** that fits within the larger IEEE@UH identity. The goal is for each subteam to feel like its own micro-brand, while still being clearly part of the IEEE@UH family.

Each subteam’s merch (T-shirts, hoodies, stickers, patches, etc.) will use these logos to create a sense of belonging and pride. This consistent branding also extends to slides, videos, and posters, giving IEEE@UH a polished and cohesive public image.

I’ll include examples of my **past design work as a freelance artist** and some visual inspiration collected online, but I recommend that we **hire or collaborate with a freelance designer** who can help us refine and expand this style. Ideally, we’ll create a design toolkit—vector templates, fonts, and guidelines—so future committees can continue the tradition without losing the look and feel we establish now.

6. Reflection & Lessons Learned

The Fall 2025 semester marked a major step forward for IEEE@UH’s Projects & Workshops Committee. We successfully established our core project framework, piloted a recurring workshop cycle, and began documenting every process to make replication easier. However, as with all new systems, there were growing pains worth reflecting on.

One major takeaway was the importance of **clear pacing and realistic scheduling**. Several workshops tried to cover too much material in a single session, which diluted engagement and made it harder for newcomers to follow. Future iterations will focus on smaller, more digestible modules with clear takeaways.

Members appreciated hands-on activities but often needed more structured checkpoints—so we’ll integrate short “apply this now” segments mid-workshop to maintain momentum.

Communication within the committee improved through Discord coordination, but **task accountability** still needs refinement. The casual tone works, but we’ll start implementing a lightweight tracking system to make progress visible without feeling bureaucratic (e.g. pinned updates, short weekly summaries).

Lastly, we learned that members thrive when they see tangible outcomes. Whether it’s a finished PCB, a blinking LED, or a GitHub repo with their name on it, **visible progress** directly translates into motivation. This insight will guide how we plan next semester’s workshop cadence and project documentation efforts.

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7. Recommendations

The coming semester will focus on **integration, sustainability, and expansion.** Each project and workshop should build upon the previous one, forming a continuous educational arc from recruitment to mastery. Additionally, emphasis will be placed on fostering a more cohesive identity and communication channel between **IEEE@UH** and **Robotics@UH**, ensuring both organizations operate in sync while maintaining distinct strengths.

Integration of Workshops into the Project Pipeline

Workshops will directly support ongoing projects instead of existing as stand-alone events. For example, a KiCad session might coincide with Micromouse PCB design week, or Git and Linux sessions may prepare members for collaborative documentation. By linking sessions to real builds, we reinforce both technical learning and project completion rates.

Expanding Project Domains

IEEE@UH is evolving beyond classical circuits. Future initiatives will dive into **RF and wireless communication, high-frequency design, IoT systems,** and **electrochemical energy projects.** These emerging areas align with student curiosity and future industry demand. The goal is to make IEEE@UH a space where students can explore advanced topics while staying grounded in hands-on prototyping.

Cross-Org Cohesion and Communication

A more cohesive structure between IEEE@UH and Robotics@UH will reduce redundancy, improve scheduling, and present both as two complementary pillars of UH's engineering community. I will personally begin attending Robotics@UH meetings—even if just to listen or study—to stay informed on project timelines and progress. Maintaining visibility and open communication will ensure that both orgs can align goals, share resources, and celebrate collective success.

Infrastructure Chair and Branch

To sustain long-term efficiency, I recommend establishing an **Infrastructure Chair** position and a dedicated **Infrastructure Branch**. This branch would attract members with **systems engineering or CIS backgrounds** to design and automate IEEE@UH's internal workflows, including but not limited to: inventory management, documentation pipelines, website integration, membership and attendance tracking, Discord organization, and calendar automation.

As of November 2025, a major operational goal is to build a **semi-automated inventory tracker** with Google Sheets. This system will log component and material quantities, allowing us to quickly check stock before submitting BOMs, budgets, or reimbursements. Furthermore, since he is already working on a more sophisticated inventory tracker for IEEE@UH of his own accord, I nominate **Sergio Hernandez** for the position of Infrastructure Chair.

As a whole, the **IEEE Lounge** should undergo organization efforts to make it more functional and inviting. **The existing Lounge Wishlist spreadsheet outlines furniture and storage upgrades.** A

decluttered, modular workspace will make it easier to store materials, host workshops, and maintain a consistent project environment.

Future goals may include creating an **IEEE@UH web app** for member RSVPs and event calendars, or at minimum, streamlining access to .ics calendar links and Discord announcements. This branch would serve as the technical backbone of operations, bridging the gap between engineering and administration.

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8. Closing Remarks and Immediate Next Steps

The IEEE@UH Projects & Workshops Committee exists to make engineering *doable*—turning interest into initiative and initiative into real hardware. Our goal is a self-sustaining ecosystem of learning, building, and mentorship centered on electrical and embedded design.

Starting Spring 2026, **weekly P&W meetings** will serve as our home base. These are casual sessions where members work on projects, ask for help, and share progress. These meetings, scheduled through onboarding, keep our community active, collaborative, and creative.

Our structure is simple but effective: the **Workshop Team** runs sessions and manages resources, the **Project Teams** lead builds and documentation, and **Operations & Logistics** keeps our lounge and materials organized. Together, they form a pipeline from idea to prototype to showcase.

IEEE@UH's projects complement **Robotics@UH**. Robotics emphasizes interdisciplinary systems and competitions, while IEEE@UH focuses on the electrical foundations—circuits, components, and embedded systems. Both thrive through shared labs, mentorship, and a common goal of advancing UH's engineering community.

Workshops connect theory to practice through accessibility, relevance, and documentation. They ensure every skill ties into our projects and that knowledge stays reusable for future members. Educational outreach and video resources extend that mission by teaching the next generation while reinforcing IEEE@UH's culture of creativity and technical excellence.

Through structured meetings, open workshops, and collaborative projects, we're building a lasting community of engineers who learn, teach, and bring ideas to life.

Immediate Next Steps

1. Launch the inventory tracker and standardize BOM templates. (P&W Committee) Later merge and debrief the Infrastructure Branch (if it gets formed).
2. Preparations for CSD, Micromouse (and any other project that feels ready to opt in, both IEEE or Robotics) Hero Videos (*Section 5.2*) (Marketing Committee)
3. Conduct recruitment for CSD, ET, and CCO Teams, as well as establish a strong foundation for ET and CCO.
4. Onboard returning P&W Committee members.
5. Define Project Timelines for IEEE@UH and Robotics@UH.
