Vahin Pichairaj

vahin.pichairaj@gmail.com ❖ (765) 767-2267 ❖ West Lafayette, In

Purdue University CGPA – 3.96/4.00 Major - Mechanical Engineering Graduation Date – May 2028

MECHANICAL DESIGN EXPERIENCE

- As part of the NASA Mission Concept Academy worked as a mechanical engineer with a team of 12 peers. Developed CAD (SolidWorks) models and technical documents. Completed and presented preliminary design review for Aerobot mission to Venus to panel of judges.
- Manufacturing Intern at Big Bang Boom Solutions (drone-defense startup). Shadowed UAS engineer and supported R&D and assembly. Gained hands-on experience in drone builds and instrumentation.
- Designing bio-inspired origami wings as part of a research lab—translating patterns in biology into deploy/retract mechanisms using CAD (SolidWorks) and 3D printing. Outcome will be reliable, repeatable deployment and streamlined fabrication steps.
- Built a camera-enabled drone**.** Selected and wired FC/ESC/motor stack, integrated FPV/HD camera + VTX, tuned in Betaflight, and validated stable video capture via bench checks and flight tests.
- Modeled a mini-Blazer engine from schematic into a fully parametric parts/assembly set in NX, using design intent, top-down refs, proper mates, and functionality. Created a ready to manufacture model of engine
- Machined a hammer from aluminum stock: executed milling, turning, drilling, knurling, chamfering, and deburring. Planned toolpaths/speeds-feeds and verified dimensions with calipers while accounting for tolerances (design for manufacturability).
- Built line-following robotic car and Bluetooth controlled robotic car. Arduino hardware and software was used. The car was used in a car-robot soccer tournament.
- Researching drone subsystem as part of ASME aero team for C-UASC competition.

PROGRAMMING PROJETS

- Built a full-stack research app (Next.js + Python Flask) on AWS to study social-media news consumption using Next.js UI + Flask API with JWT and MongoDB Atlas. It ingests reels/posts, tracks metrics like shares, likes & comments. AWS Lambda + API Gateway for backend deployment. S3 + CloudFront for frontend.
- Created a Lunar Lander in System Verilog using integrated clocking, input sync/debounce, thrust control, state & control logic, physics updates, land/crash checks, and seven-segment/LED output. Synthesized on FPGA and bench tested.
- Built a website called Secret Locker (HTML, Python, SQL): simple app for logging household items and locations with tags, search, and basic auth. Created a clean, responsive UI for quicker item retrieval and fewer items lost in house storage.

SKILLS

- **Electronics:** Raspberry Pi, Arduino, SpeedyBee micro-controller
- **Programming:** C, Python, Java, MATLAB
- **CAD & Design:** Siemens NX (Certified Design Associate), SolidWorks, Aras Innovator (PDM), ECO workflows

CLUBS

- ASME – Aero sub team (drone system engineer)
- ALDPES – Publicity officer (Attending ALDPES conference in Oklahoma City)
- Purdue Chess Club – Represented Purdue in Collegiate Chess League (Hosted by Chess.com)
- Indian Basketball Association – Referee for tournament games

Activities & Involvement

WORK EXPERIENCE

Big Bang Boom Solutions **June 2025 – July 2025**
Intern India, Chennai

- A defense-tech startup developing UAVs, counter-drone systems, and AI-based surveillance technologies.
- Assisted in manufacturing drones.
- Performed R&D on UAVs and its role in national defense.

NASA **January 2025 – April 2025**
Intern USA, Indiana / Remote

- Mechanical Engineer, NASA L'SPACE Mission Concept Academy.
- Designed mechanical subsystems for a NASA-aligned Venus mission.
- Planned and reduced budget by 12% to fit into mission constraints.

Bhoomika Trust **January 2022 – June 2022**
Intern India, Chennai / Remote

- Taught mathematics to underserved students whose school had shut down due to covid restrictions.
- Developed 25+ custom lesson plans covering linear equations and problem-solving skills.
- Engaged with students from diverse backgrounds, tailoring teaching strategies to individual learning needs.

EDUCATION

Purdue University **Aug, 2024 - Present**
Bachelor Of Science in Mechanical Engineering West Lafayette, In

- Minors: Biology, Mathematics, Physics, Chemistry, Electric and Computer Engineering
- Study Abroad:
  - Singapore, Summer 2025 — Bioinspired Structures program; collaborated with NTU on bistable material research.
  - Greece, Spring 2025 — Archaeological exploration; visited and studied many ancient sites including Delphi and Olympia.
- Planning semiconductor research in South Korea as part of Semiconductor Certificate program.

Undergraduate Research

- **Programmable Structures Lab (Dr. Andres Arrieta)** **Aug 2025 – Present**
  - Bioinspired origami aerial robotics and designing origami wings.
  - New wing design and response actuation characterization
- **MCT Biomechanics Lab (Dr. Taeyoon Kim)** **Aug 2025 - Present**
  - Analyzing mechanical properties of cytoskeleton, cells, and tissues via computational models.
  - Computer simulations to find out the impact of structural properties of myosin II filaments on force generation.
- **CAP Lab (Dr. Edward Bartlett)** **Aug 2025 - Present**
  - Supporting research in hearing circuits function in normal and pathological conditions (aging, noise, blast). Also, in the representation of sound at various levels from the whole brain to cellular and subcellular changes to discover mechanisms determining functional changes.
- **SERENO Laboratory (Dr. Anne Sereno)** **Aug 2025 - Present**
  - Investigating how the brain represents word size
  - Hands-on experience in fMRI data analysis
  - Secondary operator of fMRI machine

- **POLITE Lab (Dr. Jessica Collier)** **June, 2025 – Present**
    - Developing a social media simulation platform using Next.js, Flask, and MongoDB to analyze political content's effect on user behavior.
    - Optimized API calls to reduce cost by over 99%.
    - Deployed in AWS using Lambda, S3, CloudFront; Configured AWS IAM for organization

CERTIFICATES

- Purdue Dean's List & Semester Honors – Fall 2024, Spring 2025
- Siemens NX Design Associate Certificate (3D modeling, assemblies, drawings)
- NASA L'SPACE MCA (skills in Teaming, Risk Management, Systems, Heat Transfer, Siemens NX CAD)
- AP Scholar with Distinction | Top 0.1% Physics ISC Board India
- Intercultural Communications Partner, Purdue OEP Program
- QPR Certified

PROJECTS & EXTRACURRICULAR ACTIVITIES

- **Recycling Initiative** — Launched program in a 600+ family residential complex, diverting ~1 ton of waste from landfill.
- **Robotics, IIT Madras** — Gained hands-on experience in engineering and automation.
- **Co-founder, Restaurant** — Served residents within the apartment complex after identifying a local market need.
- **Environmental Volunteering** — Planted and maintained trees in school gardens.