SKANDHAN KARTHIKEYAN

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Embedded Systems & Controls Engineer passionate about developing firmware and real-time software for autonomous systems. Experienced in mechatronic design, system integration, and feedback control.

TECHNICAL SKILLS & COURSES

- **Software:** MATLAB, Python, C/C++, PyTorch, Simulink, SQL, Unity, Fusion 360, ROS2, Git, Linux, HTML
- **Hardware & Embedded:** FreeRTOS, PCB Design (EasyEDA), Communication Protocols(I2C, SPI), Bluetooth
- **Coursework:** Design of Mechatronic Systems, Artificial Intelligence in Manufacturing, Process Optimization, Probability Theory, Instrumentation & Control, Data Structures & Algorithms, Bio-inspired Engineering

ACADEMIC QUALIFICATION

University of Pennsylvania (Penn), Philadelphia, USA *(Expected) May 2027*
Master of Science in Mechanical Engineering & Applied Mechanics (Mechatronics and Robotics Systems)

Indian Institute of Technology Madras (IITM), Chennai, India *Jul 2025*
Bachelor of Technology in Mechanical Engineering (GPA 3.89/4.00)

COURSE PROJECTS

Stack-X : Autonomous Pick and Place Challenge *Aug 2025 - Nov 2025*

- Engineered a pick-and-place pipeline integrating perception, planning, and control. Implemented closed-loop feedback control combining vision and force sensors to correct for object shift and placement misalignment.

Battlebots : WiFi-controlled RC Car Challenge *Aug 2025 - Nov 2025*

- Implemented encoder-based feedback for position control and optimized PID gains for consistent traversal.

RESEARCH EXPERIENCES

LiDAR- and Camera-based Navigation for Lane-Keeping on Semi-structured Roads *Nov 2024 - May 2025*

- Developed a classical ML-based lightweight decision system for safety-first vehicles, subject to uneven terrain and adverse weather. Benchmarked sensing and perception limits of the system on the CARLA simulator.

Delay Compensation in Networked Robotic Systems *Sep 2024 - Feb 2025*

- Devised observer-based mechanism for minimizing cohesion loss of mobile robots in Delayed Self Reinforcement.

Interparticle Force Analysis (Research Internship - North Carolina State University) *Jun 2024 - Aug 2024*

- Established a non-invasive technique for inter-particle friction evaluation. Optimized computation and temporal efficiency of PeGS by 50% and 35%, respectively. NSF ID: 2104986 titled Mechanics of Granular Materials.

Digital Twin Development, IITM-Accenture Collaboration *Jan 2024 - May 2024*

- Modeled a Unity-based digital twin simulating heat transfer effects on extruded material in a custom 3D printer.

Controls Engineer, Electronics Club, IITM *Apr 2022 - Apr 2024*

- Led the development of “VersaGrip”, a fine-motor grip assistive device for paraplegic users with R2D2, IITM.
- Designed custom ESP32-C3 boards with CP2102 USB and buck-regulated power for actuator–sensor integration.

INDUSTRIAL EXPERIENCES

Embedded Systems Intern - Blooming Mill, *JSW Steel, Salem, India* *Jun 2023 - Jul 2023*

- Built a microcontroller-based diagnostic unit for the blooming mill to capture high-frequency deformation data.

COURSE ASSISTANTSHIP

TinyML, ESE3600, Penn *Aug 2025 - Nov 2025*

- Transitioned workflows from Arduino IDE to PlatformIO (Espressif IDF), adapting codebases for Seeed Studio XIAO ESP32S3 Sense microcontrollers and reimplementing lab assignments optimized for inference latency.

ACHIEVEMENTS

- **Best Presentation**, *Young Investigator Workshop*, International Soft Matter Conference (2024)