Adil Mohammed K
Indian Institute of Technology Madras (India)

+91-7593071697 • ✉ adilmohammed2000@outlook.com
linkedin.com/in/adilmohammedk

Education

Program	Institution/Board	%/CGPA	Year
B.Tech (Engineering Design) & M.Tech. (Automotive Engineering)	Indian Institute of Technology Madras Chennai, Tamil Nadu	**8.19/10**	2019-2024

Professional Experience

1. *MITACS Globalink Research Intern - Carleton University, Ottawa, Canada*   **May'23 - Aug'23**
Novel IoT cybersecurity methods using Trust and FL models - Guide: Prof. Mohammed Ibnkahla, Cisco Chair, IoT

- Designed a custom IoT framework for a **novel Trust Management Module** to calculate attack score of IoT devices
- Generated IoT network dataset for Federated Learning-based Intrusion Detection System for edge computing use cases
- Optimised **attack detection** for low powered devices and **Single Board Computers**. Submitting to **IEEE WCNC '23**

2. *Product Management Intern - Ather Energy Pvt.Ltd, Bengaluru, India*   **Dec'22 - May'23**
Ather Energy is an Indian EV manufacturer known for its innovative electric scooters and smart mobility solution

- Developed **Proof of Concept** which **reduced BoM cost** of the new **450X dashboard and OTA** components by **600%**
- **Data based deep insights into user behaviour** and persona to refine product portfolio and future strategies
- Analysed **scooter mode loyalty** for product fine tuning. Obtained **five personas** to tune scooter performance
- Researched and **benchmarked new B2B models** for ecosystem; Predicted revenue of **Rs 5 Million per year**

3. *Lead Electrical Engineer - Team Abhiyaan - Centre For Innovation, IIT Madras Chennai India*   **Mar'20 - Aug'23**
Building an SAE Level two autonomous EV Institute shuttle and to participate in IGVC Self Drive Challenge

- **Golf Cart Control Systems** - Implemented a novel **AnYa** based **control algorithm**, "**Self-Evolving Parameter Free Rule-Based Controller**" in the **Drive-By-Wire system** of the **autonomous vehicle**, which requires no tuning of the parameters and no input parameters regarding the plant. The observed MSE was drastically lower compared to traditional PID
- Transformed a simple Electric Golf Cart by implementing custom Drive-by-Wire and feedback systems
- Designed **PCBs** for embedded systems like **Battery Monitoring Systems**, **Voltage Regulator** and **Xbee communication**
- **Vehicle Model** - Developed a linear **dynamic bicycle model** for the localisation of vehicle using **custom encoder design**
- Analyzed the transfer function for braking; Used the PID controller for the actuator to achieve optimal braking. **Novel Steering** and **braking assembly design** which concealed the mechanism for a **truly driverless experience**

3. *Electronics Developer - Team BLINK - Nirmaan startup, IIT Madras Chennai India*   **Dec'19 - Jul'21**
Designing refreshable Braille Display and accessible website generator for the blind and physically handicapped

- Ideated and designed the **control systems** as well as inputs for **Refreshable Braille Displays (*BLINKER* and *CUBE*)** . Integrated **openCV** functionalities in the system
- Created a web portal *Sulabh* that **integrates accessibility features** such as **head tracking**, **image captioning**, **voice control**, and **Text-to-Speech**, to existing websites

Publications

1. ***Improved Four Wheel Steering System : NVSD-2023-0473*** *Under Review
2. ***Novel Federated Learning based Network Intrusion Detection System*** *Submitting to IEEE WCNC 2023

Projects

1. *Control of Soft Pneumatic Robotic Arms - Masters Thesis**
Prof. Asokan T

- Researching mechanics of different configurations of **soft pneumatic actuators**, used for Medical and industrial purposes
- Benchmarking **PID** and **novel fuzzy based** control algorithms, using manual and Computer Vision methods
- Manufactured a basic prototype of **rotary pneumatic actuator**.

2. *Improved Four-Wheel Steering System*
Prof. R Jayaganthan

- Conceived a new mechanism for use in four-wheel steering which can be **independently controlled** and is **cost-effective**. Under patent process

- Tested various methods to study effects on **steering maneuvers** at various speeds.
- **Reduced the turning radius by 40%** and **increased lane change stability and control by 60%**

3. *Control system for heading angle and brakes*
Prof. Srikanthan Sridharan

- Designed a **P controller** and **PI controller** for the **Electro-Pneumatic Regulator** of the **brake chamber** in Matlab **Simulink**
- Implemented the **Smith Predictor** technique to address time delay, resulting in improved performance specifications. This method effectively controlled overshoot and steady-state error within predefined limits.
- Designed **unity negative feedback controller** for heading angle control based on **bicycle model** as reference

4. *Control system for active suspension system*
Prof. Srikanthan Sridharan

- Modeled **half car suspension** and **full car suspension** dynamics with MATLAB **Simulink**
- Analysed performance of open loop and closed loop system for **active suspension**
- Benchmarked **Linear Quadratic Regulator** (LQR) with closed loop active suspension system
- Obtained optimised parameters for best handling and comfort of the vehicle

Technical Skills

- Programming Language: C/C++, Python, MATLAB, JavaScript
- Tools: ROS, Pandas, Scikit-learn, ReactJS, NodeJS, Docker, MQTT
- Framework: Simulink, SimScape, Fusion 360, AUTOCAD, Altium Designer, EagleCAD, ESP-IDF

Course works

- Fundamentals of Operations Research
- Control of Automotive Systems
- Power Electronics and Motor Drives for EV
- Control Systems
- Microprocessor in Automation
- Geometric Modelling and CAD
- Differential Equations
- Digital Signal Processing for Engineering Design
- Mechatronics System Design
- Fundamentals of Automotive Systems
- Energy Storage Devices and Systems
- Electromagnetic Compatibility for Product Design
- Data Science: Theory and Practice
- Design of Mechanical Systems
- Computational Methods in Design
- Form and Aesthetics in Design

Achievements/Awards

- Spearheaded Team Abhiyaan which achieved **Global rank of Three** in **Intelligent Ground Vehicle Competition '23**
- Led Team Abhiyaan's incredible victory, earning the ground-breaking distinction of being the **first Indian team** to win the coveted **first place** in the prestigious **International Design and Cyber Challenge** held in Michigan, United States
- Triumphantly demonstrated a remarkable **500-meter autonomous course** at IIT Madras of a **fully driverless EV shuttle**.
- **National Runner Up** in **James Dyson Design Awards 2020** out of 60,000 global applicants : Developed a smartphone refreshable **Braille Display** accessory **CUBE** with onboard camera and devised business plans for the product
- **First Prize** in **MTX Shaastra Hackolympics 2022**: Obtaining an efficiency of **95%** during training and for developing a robust UI based on **ReactJS**, **NodeJS** for inference on **basketball scoring detection** from video
- **National Grand Finale** in **Smart India Hackathon 2022** out of 20,000 applicants: Created a web portal Sulabh for accessible technologies
- **Bosch Traffic Sign Challenge** at **Inter IIT Tech Meet 2021**: Developed UI that allows users to upload batch images to train the model or augment with weather elements and visualize inference results of a test image.
- Secured the coveted **First prize** in the **Ather Product Nexus**, a case study specifically focusing on **advancing the stability** and **comfort features** of **EV bikes** during **TechSoc 2023**, the interhostel technical competitions of **IIT Madras**. This remarkable achievement was attained among **25 finalists**.

Positions of Responsibility

- ***Core Member*** of **Team Abhiyaan**, Student-run competition team at IIT Madras, managing over 40+ interdisciplinary students, managed budget and recruitment (May'22 - Aug'23)
- ***Technical Affairs Secretary, Brahmaputra Hostel*** - Selected and managed 40+ member Tech team for TechSoc (Inter Hostel Tech competitions). Proposed and implemented budgets of Rs 2L+ (Sep'19 - Jun'20)
- ***Electronics Lead*** of **Team Abhiyaan**, Managed team of 10+ members in Electronics module in developing electrical subsystems for IGVC AutoNav, SelfDrive challenges and Institute Shuttle (Jun'21 - May'22)
- ***Coordinator*** of **Tensors**, organised JEE Advanced mock test for IIT aspirants (Nov'19 - Apr'20)

Volunteering

- *Volunteered* in **NSS**, and took part in project **BloodConnect**, **directed blood donation awareness video**; Showcased at IIT Madras Open Air Theatre in 2020
- Content creator and **counselor** at SQIL - Student-run organization for promoting scientific temper among youth in 2021