

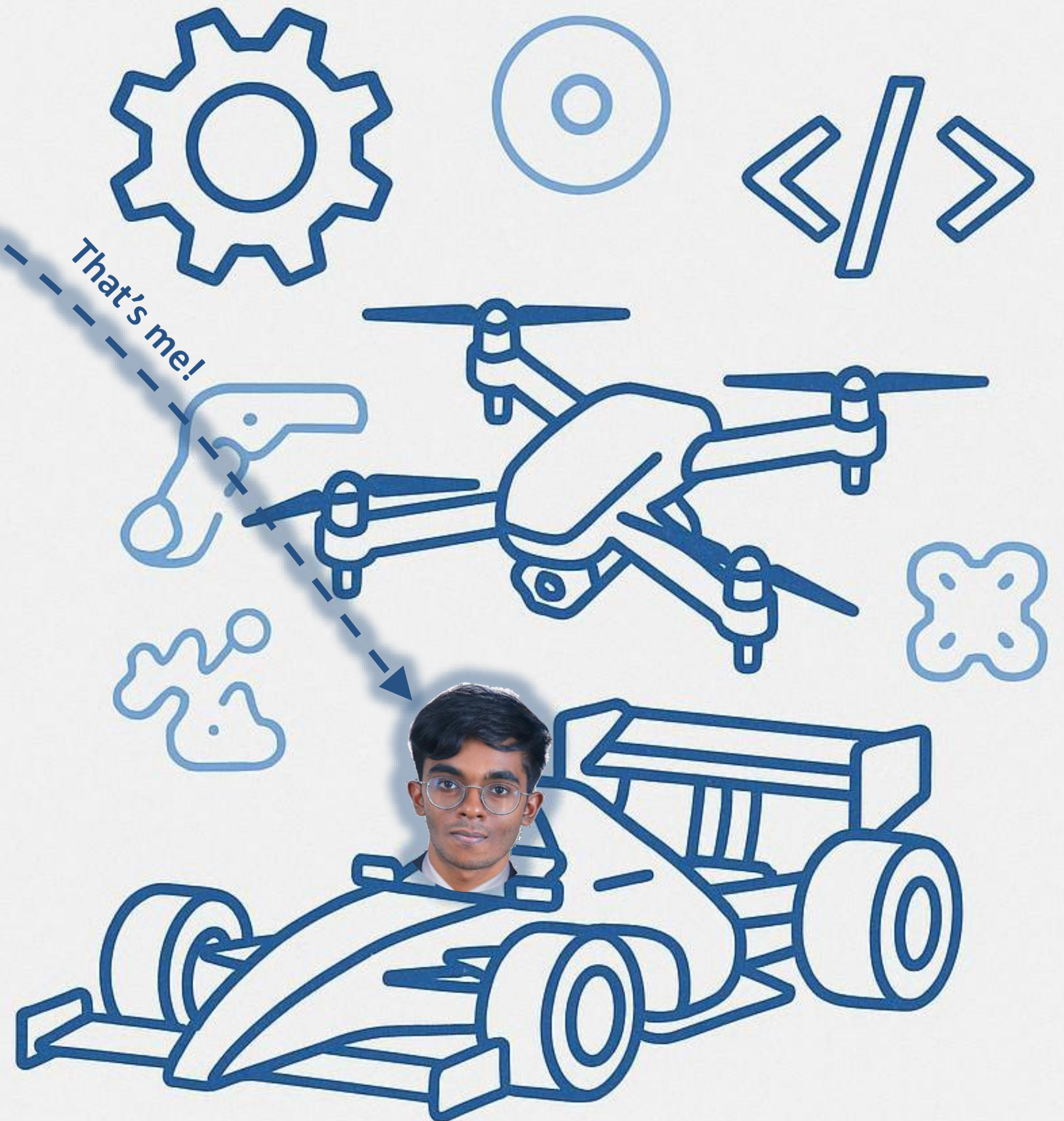
Srivisweswara
Mohan Santhi

PORTFOLIO OF PROJECTS AND ACHIEVEMENTS

Engineer | Innovator | Developer

vichu26092003@gmail.com

<https://www.linkedin.com/in/srivisweswara-mohan-santhi-2a2461233/>



Overview

- **Purpose of this deck:**

- I am highly passionate about Electric Vehicles and Embedded Systems. During my studies, I have been a technical lead for several teams that have won national level competitions and received acclaim from various organizations in India.
- **This deck serves to highlight my technical accomplishments.**

- **About Me**

- 2025 B.E. Electrical and Electronics Engineering from Sri Krishna College of Engineering and Technology.
- Work mainly with ARM-based processors and focus on building and programming hardware.
- Proficient in Embedded C, C++, Java, and Data Structures & Algorithms.
- Hands-on knowledge drone and EV building, PID tuning and integrating ML models into projects
- Lead technical projects and working with teams to turn ideas into real, working systems.
- 2024 & 2025 National level EV competition (EKVC) Champions
- 2023 SIH winner for national level hackathon for design and build of a drone

- **Projects highlighted in this slide deck**

- Electric Go-Kart
- Drone
- Websites



Electric Go-Kart – Gandiva Racing

- **2022-2023: Chief Electrical Officer and Innovation Lead**
 - **Summary:** 1st season. Failed technical inspection. Finished last. Lots of learning.
 - Founding member of team to participate in national level EV competition to build 6 kW electric go-kart with 60V 150Ah NMC battery
 - Introduced F1 style steering wheel with custom instrument cluster
- **2023-2024: Chief Electrical Officer and Innovation Lead**
 - **Summary:** iterative improvements. Budget constrained. Solid technical progress.
 - Improved harness, reduced weight, reached 80km/hr.
 - Won EKVC 2024 championship
- **2024-2025: Promoted to Vice captain**
 - **Summary:** Our crowning achievement. My technical masterpiece 😊
 - Simplify complexity, Reduced weight to <120kg, Aerodynamic design, 104km/hr, custom 72V 40Ah HV battery pack with Molicel cells.
 - Won EKVC 2025 championship and placed All-India #3 at GKDC 2025

- **My specific contributions and technical details:**

- **Electrical:**

- Designed complete EV schematics in ACAD electrical. Designed and built a single integrated wiring harness
 - Used 25mm² silicone cables for high-current (up to 125 A at 72 V, peak 8.5 kW). 0.5 mm² for control lines, 0.25 mm² for signal-level electronics
 - Used 90-series waterproof connectors and automotive-grade insulation tape

- **Control Systems and PCB design:**

- **PCB Design:** Altium Designer. Created a custom steering wheel PCB for control and feedback
 - **Microcontroller:** STM32F446RE. Developed embedded firmware using STM32CubeIDE
 - **Protocols Used:**
 - **CAN 2.0B:** For inter-module communication (BMS, display, logger)
 - Wrote firmware to manage request/response format (BMS) and continuous broadcast (MCU)
 - Used TJA1050 CAN transceiver
 - **SPI:** For WS182b LED strip control and SD card data logging
 - **UART:** For communication with the DWIN TFT display

- **Firmware**

- Managed CAN message optimization to multiplex BMS + MCU data
 - Programmed speed-responsive LED animations for the WS182b strip
 - Wrote SPI and UART drivers for modular communication
 - Designed GUI and boot animation using DWIN software tools

- **Battery Pack Engineering**

- Battery Configuration: 72V, 40Ah (Molicel cells)
 - Designed the pack architecture and validated sizing with MATLAB
 - Protection Devices:
 - 125 A MCCB (C-Rated) for HV safety
 - 250 A contactor for ignition and high-voltage line control
 - Simulation & Validation

- **MATLAB Simulink:**

- Ran simulations using the Gandiva Drive Cycle to determine Wh/km and total Ah requirement

- **SolidWorks Flow Simulation:**

- Validated aerodynamic CAD model. Verified airflow around body panels and cooling efficiency for motor and battery
 - Informed drag reduction and optimal component placement

V1 – 2022-2023



V2 – 2023-2024

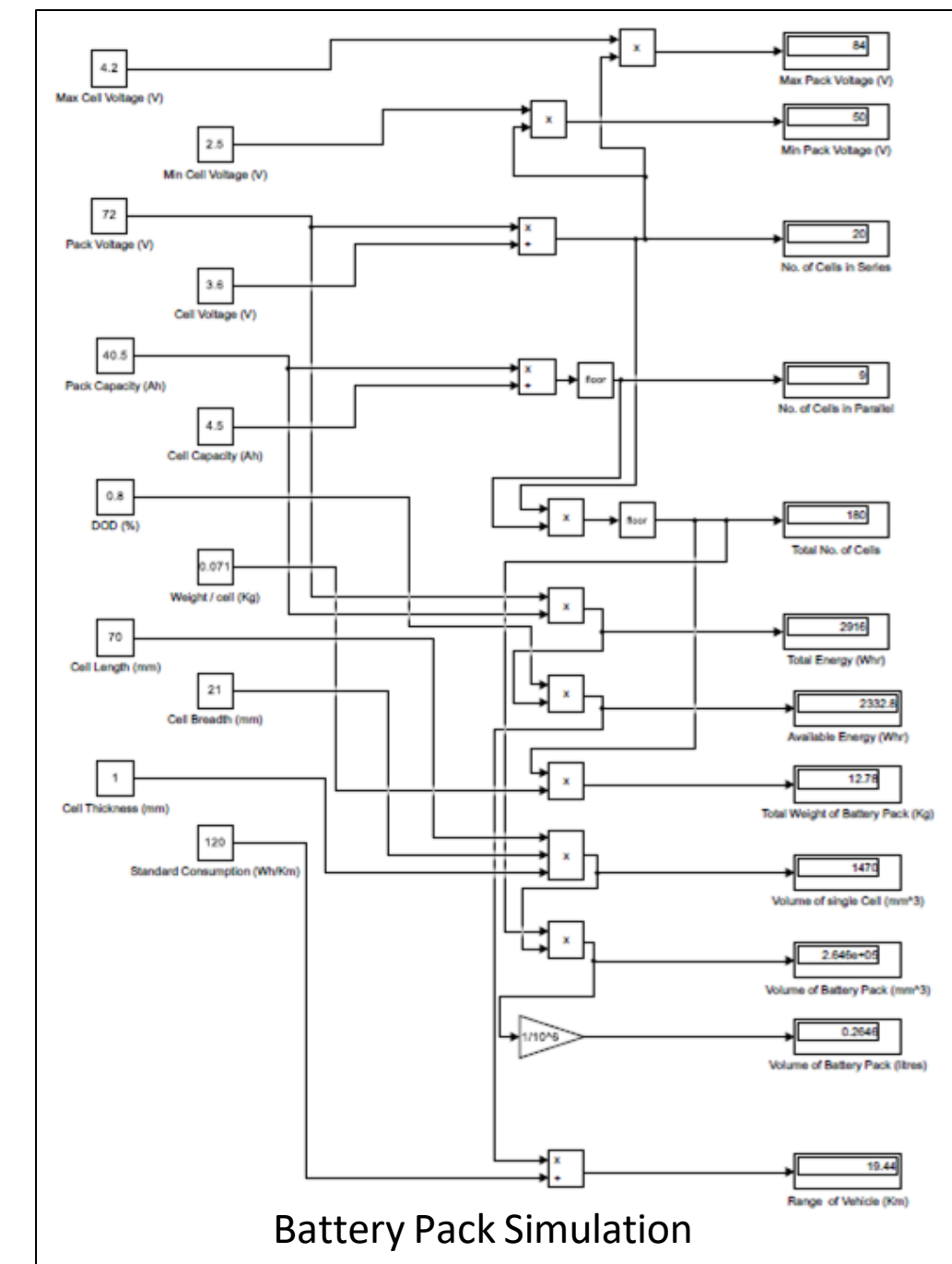
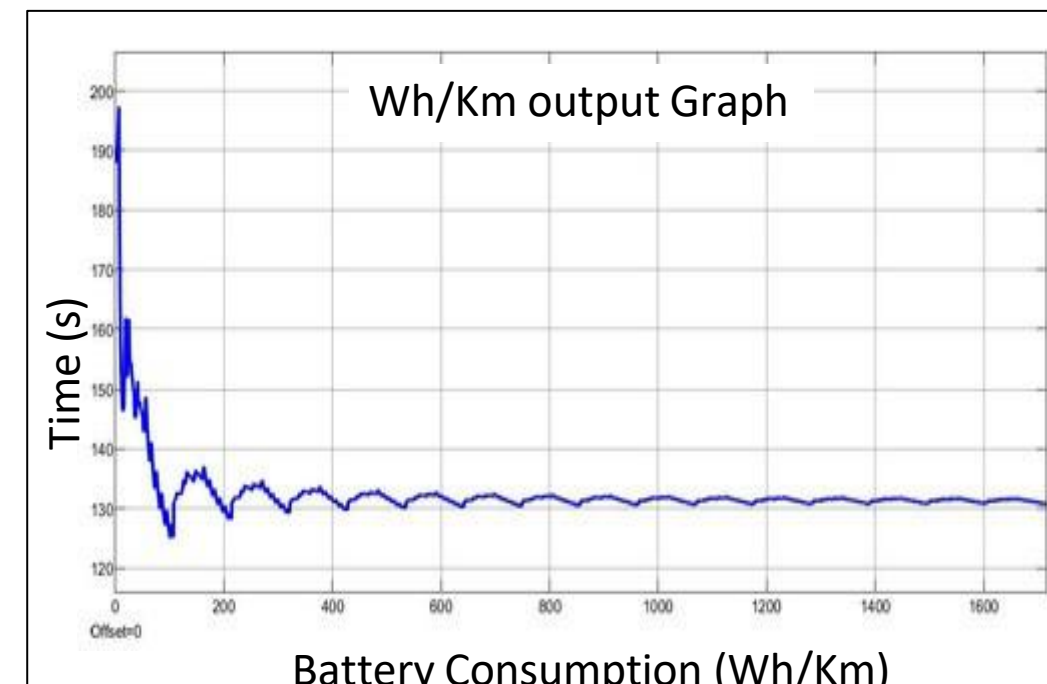
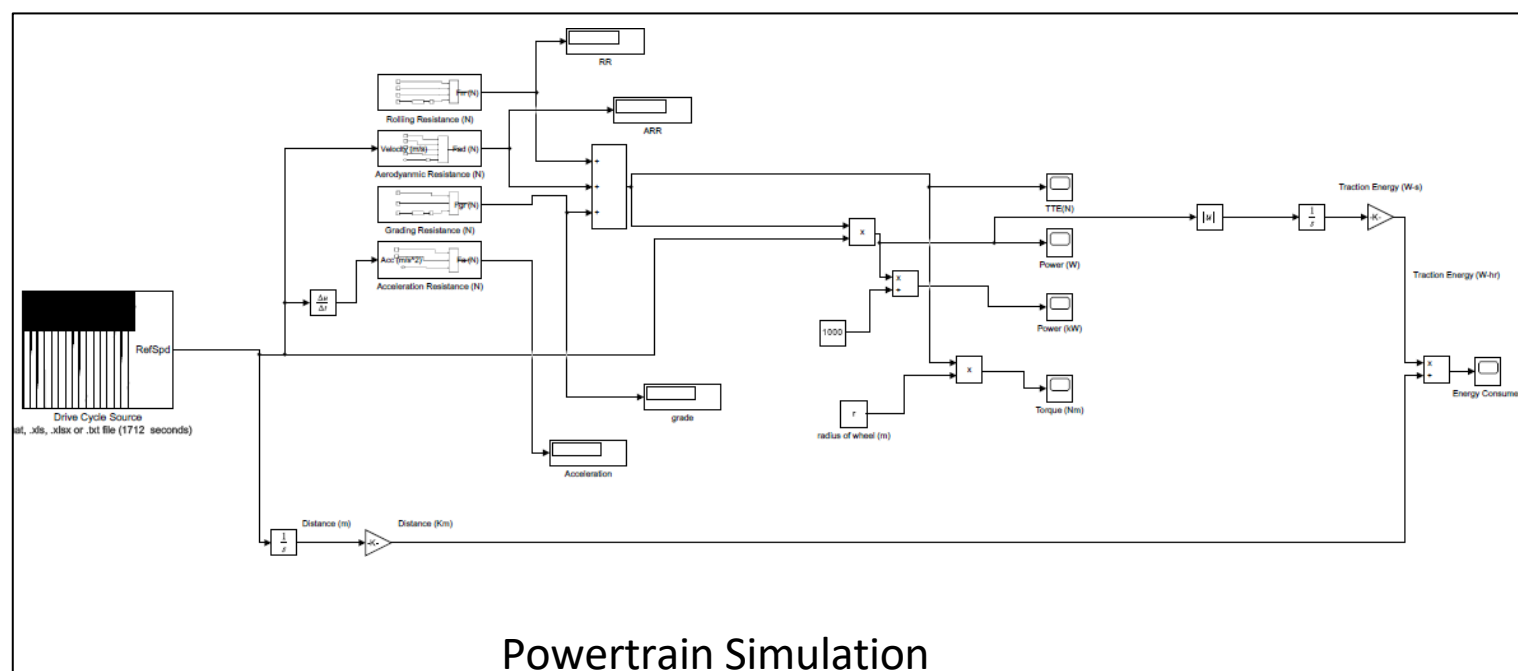
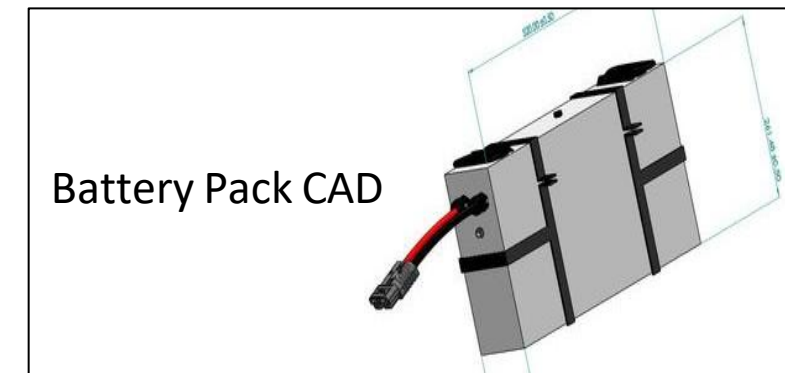


V3 – 2024-2025



Electric Go-Kart – Gandiva Racing – Project details

- **LED light strip:** Designed an F1 style light strip on top of the steering wheel
 - Problem statement: During races, kart drivers could not easily read instrument cluster, leading to poor speed awareness.
 - Solution: I am very proud that this is my personal innovation, using a WS182b LED strip at the top of the steering wheel. LED lighting was controllable per track speed limits. Got good driver feedback!
- **Steering instrument cluster:**
 - Introduced first-of-its kind instrument cluster in the league. Drivers got live status updates like battery temp, SOC percentage, controller temps, motor temps, RPMs, Speed, error codes, etc.
- **Kart Aerodynamics:** Reach a top speed of **104 km/h using just 5.5 kW**
 - Reduced the **drag coefficient (Cd)** and **frontal area (Af)** of the kart using light weight full-body shell and aero elements in CAD, keeping airflow and packaging in mind.
 - Methodically optimized parameters like **Cd** (Co – Efficient of Drag), **μrr** (Co – Efficient of Rolling Resistance) and many others by testing & **SolidWorks Flow Simulation** to simulate different designs for aero elements. This helped us identify drag-heavy zones and improve the design.
 - Very proud that I taught myself aerodynamic concepts to contribute to optimally solve these problems
- **Light weighting:**
 - Using aerodynamics simulations, retrieved the wh/km, and used it in a battery pack simulation to optimize and build a **very light weight battery pack**.



GCAN – CAN Analyzer and Data Logger

Tech Stack

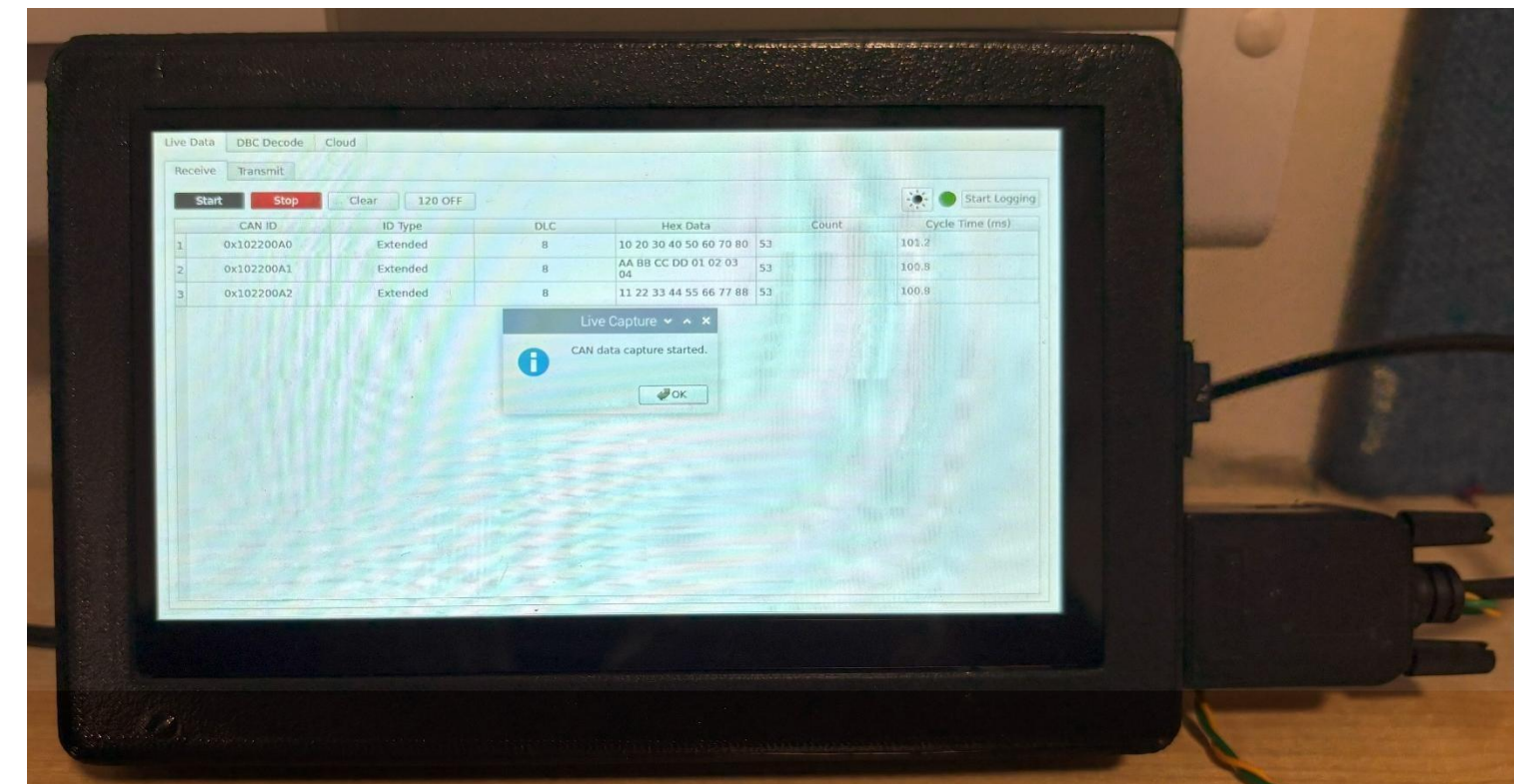
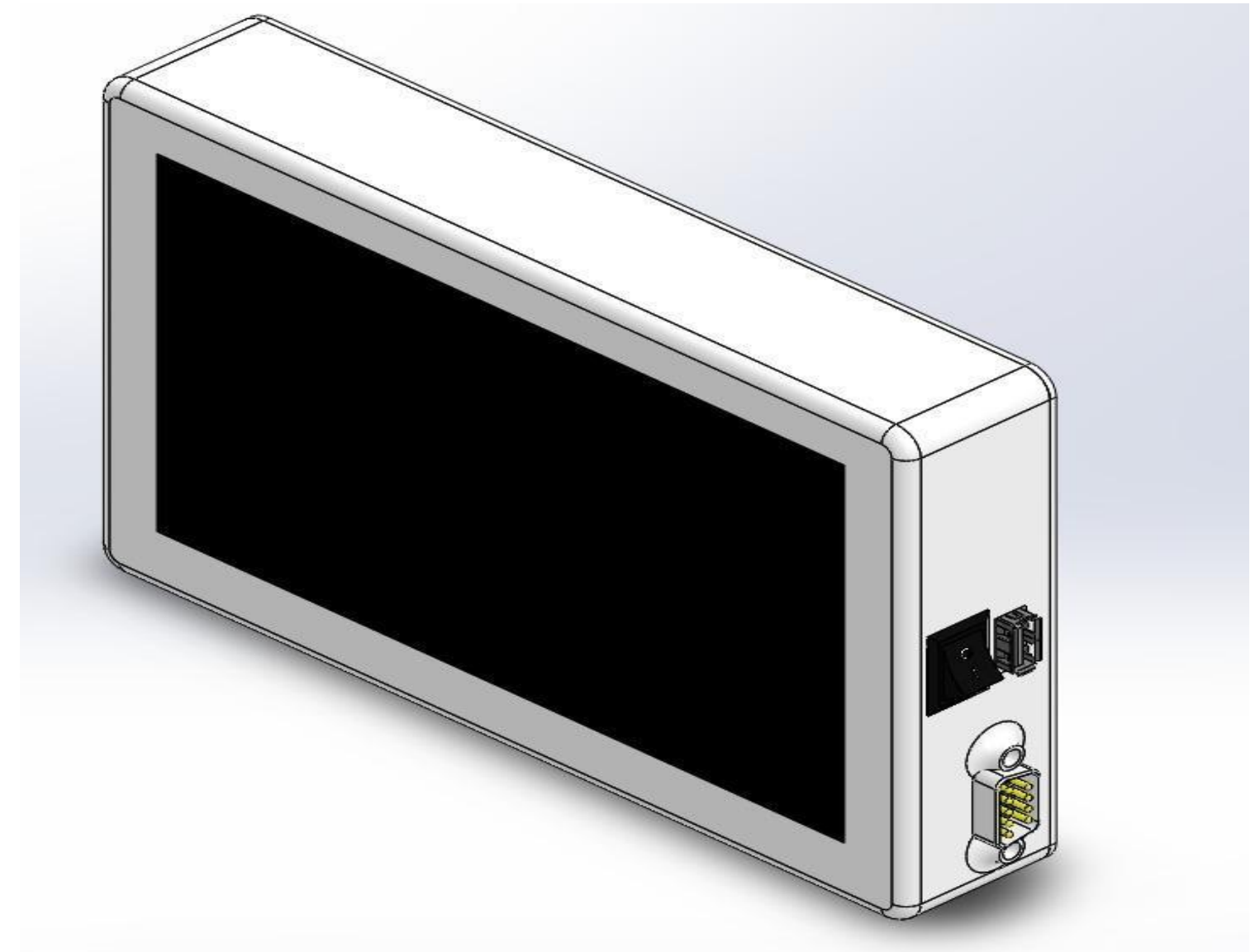
- **Hardware:** Raspberry Pi, STM32, MCP2515 CAN, Waveshare HDMI
- **Software:** Python, PySide6, SocketCAN, Linux
- **Protocols:** CAN Bus, SPI

Overview

- Built a **real-time CAN bus data logger** using Raspberry Pi with a custom **Python GUI** for monitoring, decoding, and storing CAN data.

Highlights

- **GUI:** Multi-tab PySide6 interface with start/stop logging, error handling, and CSV export.
- **CAN Integration:** Configured MCP2515 + SocketCAN.
- **Data Handling:** Real-time logging to CSV/SQLite with tabular & list views.
- **Enhancements:** Display brightness control, modular design for future cloud/analytics features.



Drone Project

- HAWK v1.0
 - Problem statement: Geo-tagging of plantation in the catchment area of hydro project:
- As part of **Smart India Hackathon 2023**, our team built an autonomous drone system for the problem statement: *"Geo-tagging of plantation in the catchment area of hydro project"*, given by the Ministry of Power. The goal was to track plantation growth and detect early signs of plant stress or disease using aerial monitoring.
- The drone platform included a **Jetson Nano**, which ran a machine learning model in Microsoft Azure to detect crop disease in real time using data from **RGB and NIR cameras**. The system also collected **GPS-tagged images**, enabling us to map the plantation area and analyze vegetation health using **NDVI and EVI** indices.
- I was responsible for assembling the drone, tuning the **PID controllers** in Betaflight for stable flight, and programming the drone's firmware. I also worked on integrating the ML model with the Jetson Nano, and helped sync image data with the GPS module for accurate geo-tagging.
- After flight missions, we used **ArcGIS Pro** to process and visualize the data. Our solution was declared the winner at SIH 2023, and we were awarded a **₹1,00,000 cash prize** by the Ministry of Power for building a practical, field-ready system.



Website Development

- E-Kart Club Website
 - Built for our college's **Electric Kart Club** to showcase team updates, projects, and events
 - Collaborated with a teammate; focused on frontend development and GUI styling
 - **Tech Stack Used:**
 - React
 - Tailwind CSS
 - Firebase (hosting & backend)
 - My Contributions:
 - Wrote and styled the entire **frontend interface** using Tailwind CSS
 - Designed the **GUI layout** and component structure
 - Maintained and deployed updates to Firebase
 - Ensured full responsiveness and performance optimization
- Garden Website – Freelance Project :
 - Designed for a **local garden services business** to create an online presence
 - Focused on simplicity, fast loading, and mobile responsiveness
 - **Tech Stack Used:**
 - HTML
 - CSS
 - Firebase (for hosting)
 - My Contributions:
 - Developed the full static site from scratch
 - Handled all **layout, styling, and deployment**
 - Worked closely with the client to reflect their brand and services



Link : [E-Kart](#)



Link : [Garden](#)

The value I bring to the table

The Value I Bring to the table

- **Strong hands-on background in embedded hardware and systems integration:** Designed AutoCAD electrical schematics, custom PCBs (STM32F446RE), and integrated complex CAN/SPI/UART communication setups for real-world EV and drone systems—perfectly aligned with Leeds’ emphasis on practical, applications-led modules.
- **Firmware development expertise:** Proficient in STM32CubeIDE with C/C++ real-time system design, with experience in sensor integration, LED feedback systems, CAN bus multiplexing, and GUI implementation (e.g. DWIN display), which mirrors the practical embedded programming skills taught at Leeds.
- **Simulation-driven engineering approach:** Utilized MATLAB Simulink and SolidWorks flow simulation to optimize aerodynamics and battery sizing in vehicle dynamics — an invaluable skill set for the program’s data communications, medical electronics, and robotics modules.
- **Multidisciplinary and collaborative experience:** Led teams in EV and drone development, integrating mechanical, electrical, and software elements — matching the School’s collaborative, small-group teaching and real-world research ethos .