Jun Young Kim

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Technical Skills

Software/Languages: Altium, LTspice, KiCAD, AutoCAD, C++, VHDL, SOLIDWORKS, Java, MATLAB
Hardware: PCB Assembly, Soldering, DMM, Oscilloscope, HV Supply, Hot Air Station, Crimping
Protocols: I2C, SPI, isoSPI, USB, UART, CAN

Work Experience

Electrical Engineering Intern *Oakville, ON*
Electrans Technologies Ltd. ↗ *May 2025 - Aug 2025*

- Designed a **CAN-controlled** 4-layer actuation PCB for trailer accessories with **16 independent 10A half-bridge outputs**, 100-pin NXP MCU, load-current sensing, and **24V transient/reverse protection**, integrating **250+ components** to deliver **45A total input** and meet automotive reliability standards
- Developed, and simulated in **LTspice**, a modular **Bed-of-Nails** pogo test PCB for USB-powered, **QA of CAN-receiver boards** (panel-test 10 units, R-Pi monitoring), enabling **QA throughput by 50%** through short detection and **CAN termination verification within 1%**
- Redesigned **CAN-bridge PCB architecture** for the trailer Auto Connect plug to safely link vehicle **J1939 CAN to trailer CAN**, optimizing schematic, PCB layout, and component selection for **70% faster** assembly for **5000+ units** and **reducing test failure rate from 20% to 0%**
- Established a **QA station** for Auto Connect plug harnesses, using an MCU with **50+ GPIO connections** and custom **C++** continuity verification firmware to provide real-time LED validation of wiring integrity
- Optimized PnP setup, standardized testing procedures, and reorganized Altium workspace, severely reducing production failures and establishing company-wide organizational standards

Electrical Engineering Intern/Leadership Member *Waterloo, ON*
Midnight Sun ↗ *Aug 2024 - Apr 2025*

- Redeveloped the **Battery Management System PCB** for the solar-powered car's **150V battery loop** with integrated **precharge protection**, electrical isolation, improved **OCP features**, and subsystem communication **via SPI, I2C, isoSPI,** and **CAN**
- Improved solar car's **wiring harness** with proper wire gauges, continuity verification, and structured cable management and crimping techniques to enhance electrical reliability
- Assembled and validated PCBs with **SMD soldering**, **DMMs, oscilloscopes, load testers, and function generators,** for **in-circuit testing** to ensure circuit functionality
- **Directed a team** in designing an **infotainment driver dashboard PCB** by leading stand-ups and overseeing schematic bring-up, Altium workflows, and member training

Projects

AC-DC Flyback Converter — *HV Design, Altium Designer* *Altium 365* ↗

- Designed an **80%-efficient** AC-DC flyback converter with TNY288DG IC, supporting **90-132 VAC input** and dual low-voltage outputs, including a custom transformer, RCD clamp, rectification, and filtering
- Developed a **PCBA** layout with high-voltage/low-voltage galvanic isolation and authored a detailed **design documentation** to share insights on switching-mode power supply design

Multimeter Business Card PCB — *Embedded Design, Altium Designer* *Altium 365* ↗

- Designed a compact **STM32 multimeter** with five measurement modes (current, voltage, inductance, capacitance, and resistance) and support for up to **4A current** and **-40V to +40V** voltage ranges
- Integrated fault-protected **LiPo battery with USB-C charging**, an **I2C**-controlled OLED display, and assembled using reflow soldering for SMD components and manual FPC display soldering

Education

University of Waterloo Waterloo, ON
Bachelor of Applied Science in Electrical Engineering, Co-op *2023 - 2028*

- **Relevant Coursework:** Signals and Systems, Semiconductor Physics and Devices, Electromechanical Energy Conversion, Electronic Circuits, Digital Circuits and Systems, Electricity and Magnetism
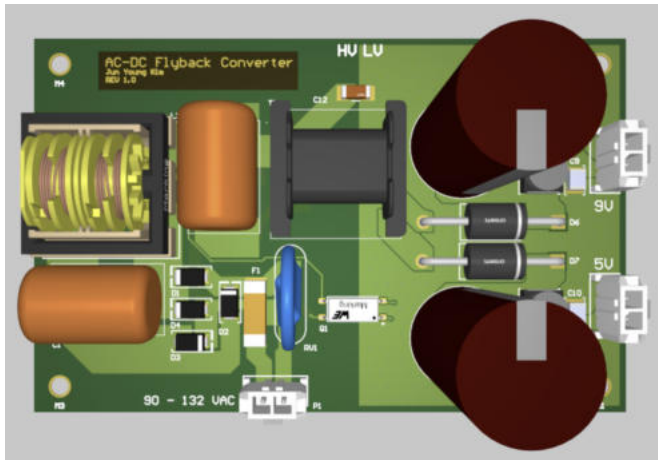
Portfolio

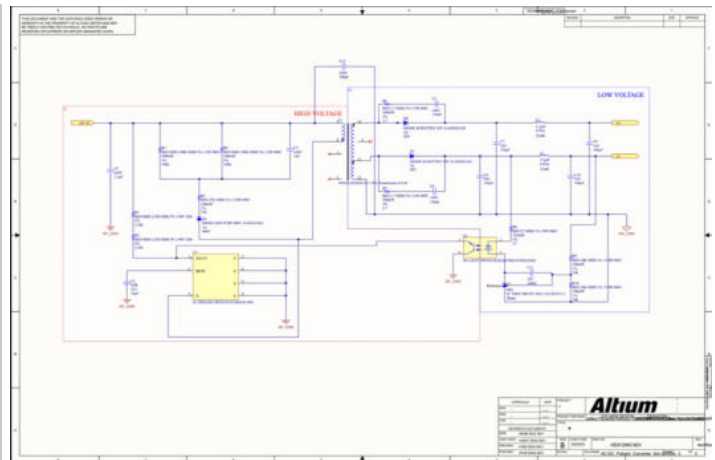## AC-DC Flyback Converter   October 2024

Skills: Altium, Schematic Design, PCB Design, HV Design


AC-DC Flyback Converter

Main Flyback Schematic

- Designed an **AC-DC flyback topology converter** utilizing the TNY288DG switching IC, achieving **80% power efficiency.**
- Rated for input voltages of **90 VAC to 132 VAC**, with a nominal input of **120 VAC at 60 Hz**, aligning with the standard line voltage ranges in the United States and Canada. Outputs were stepped down to provide two low-voltage channels: **5V 1A and 9V 1A.**
- Engineered a custom **transformer** with optimized primary and secondary windings to ensure stable and precise 5V and 9V outputs.
- Designed the **PCB layout** with dedicated high-voltage and low-voltage sections to maintain proper isolation and adhere to safety standards.
- Compiled a comprehensive design document to facilitate knowledge sharing on switching-mode power supplies and to provide detailed justifications for design decisions.
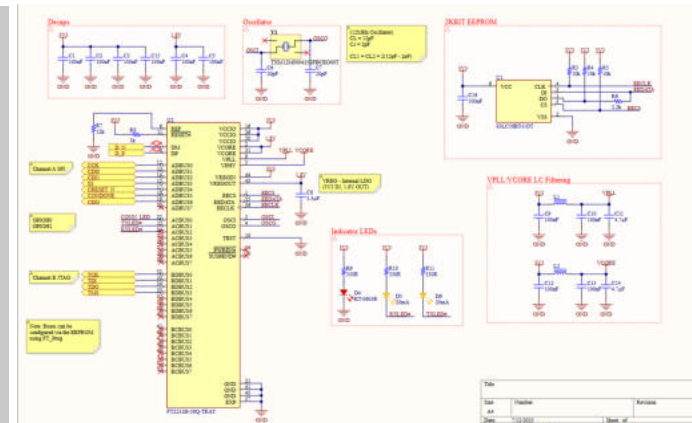
Drawbridge (FT2232H B2B Connected FPGA Debugger)   July 2025

Skills: Altium, Schematic Design, PCB Design, Embedded Design
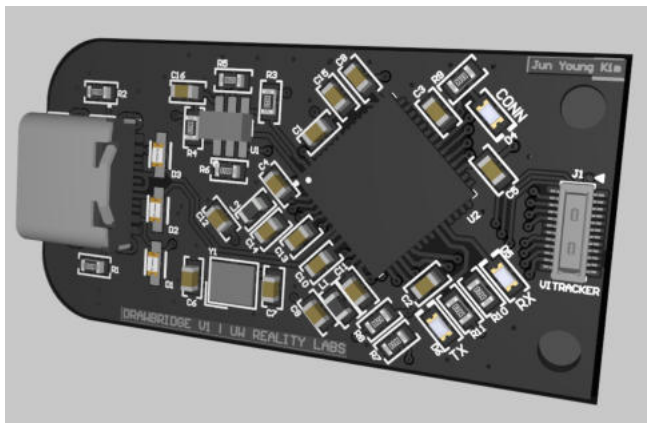

Drawbridge Debugger

FT2232H Schematic

- Designed **USB-to-FPGA debugger** using **FT2232H dual-channel USB-to-serial converter** for programming **T120 FPGA**
- Implemented B2B connector interface integrating with VITracker FPGA hand tracking device for seamless debugging
- Integrated **2KBIT EEPROM** storing FT2232H configuration data and USB descriptors for automatic driver loading and device identification
- Implemented **MPSSE** controller enabling flexible **SPI, I2C, and JTAG protocol** support at 120MHz operation
- Designed compact **4-layer PCB layout** optimizing **signal integrity** in small form factor
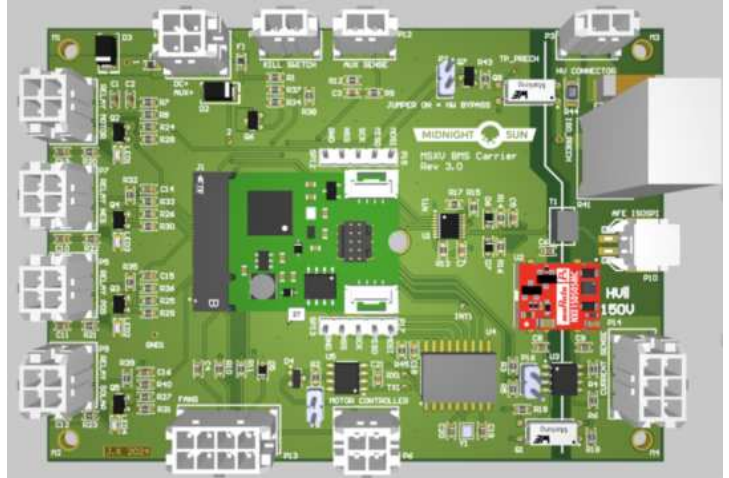
MSXV Battery Management System Carrier

October 2024 – December 2024

Skills: Altium, Schematic Design, PCB Design, PCB Assembly, Reflow Oven, Soldering, PCB Testing
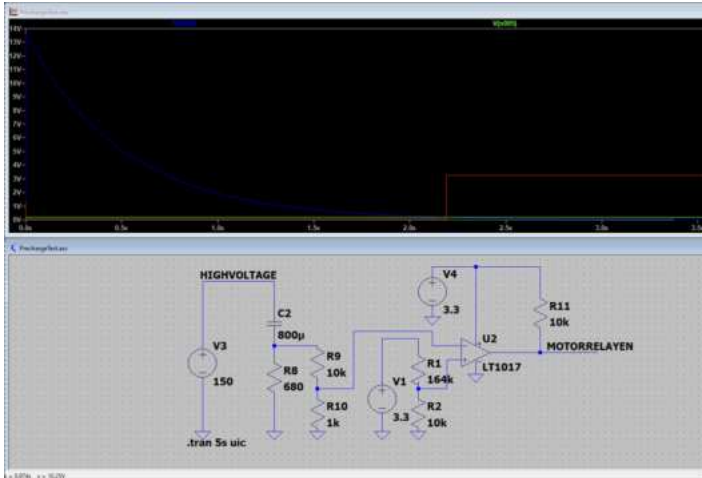

Precharge LTSpice Simulation

Altium 3D View

- Redefined the **battery management carrier PCB layout and schematic** for the 15th **Midnight Sun Solar Race Car** to optimize functionality and integration.
- Ensured robust **high–voltage and low–voltage isolation** for critical systems, including the motor controller interface, precharge circuits, AFE isoSPI interface, and the isolated I2C current sensing interface.
- Designed a **precharge check mechanism** to mitigate inrush current, improving the safety and reliability of high–voltage systems.
- Established communication with three AFE boards responsible for managing **cell balancing** across nine battery modules in the car's battery pack.
- Assembled and **rigorously tested** the board to ensure seamless integration with the vehicle's broader electrical systems.
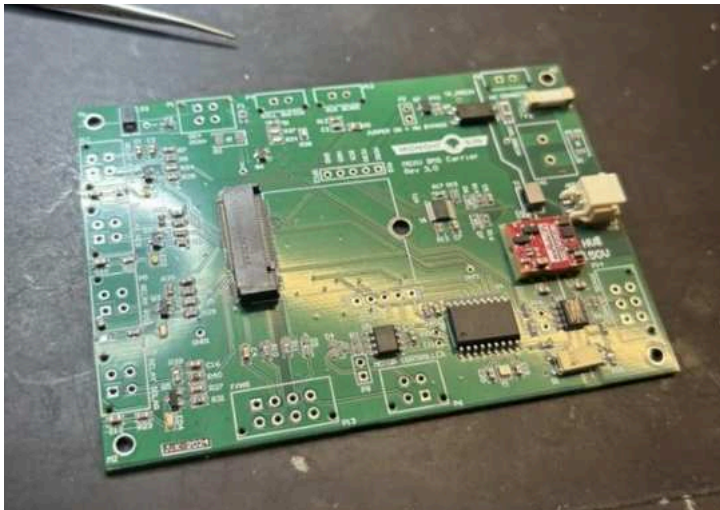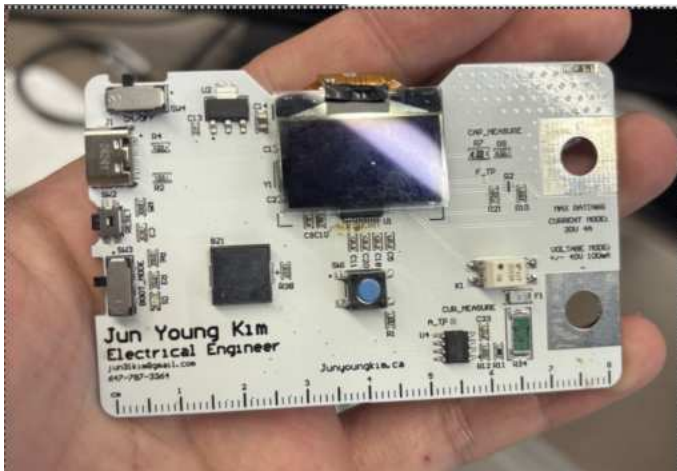

BMS Carrier PCB Assembly
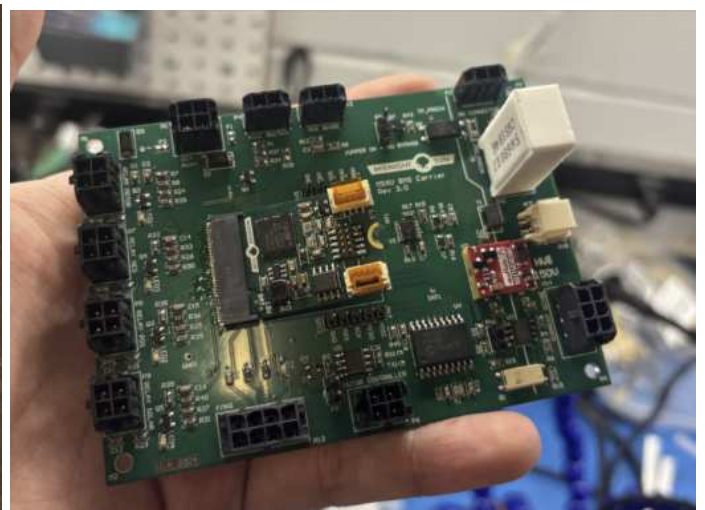
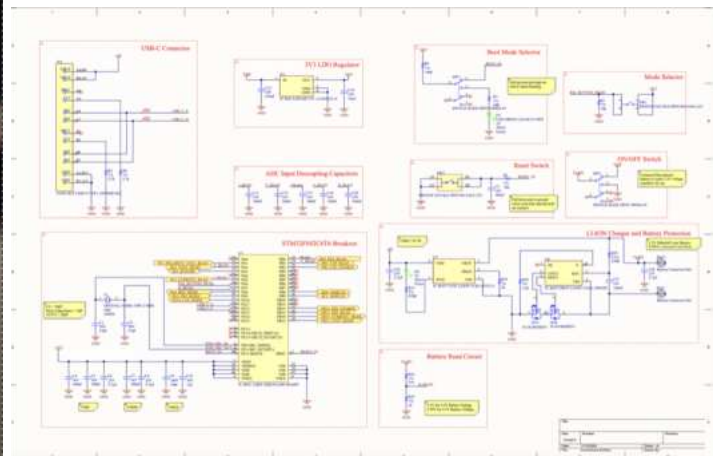*BMS Carrier*

Multimeter Business Card   October 2024 – December 2024

Skills: Altium, Schematic Design, PCB Design, PCB Assembly, Reflow Oven, Soldering, PCB Testing, Embedded Design


Multimeter Business Card

STM32 Schematic

- Designed **STM32F042** series powered multimeter on a small business card form factor.
- Integrated 5 measurement modes, able to measure **current, voltage, inductance, capacitance and resistance** each with its own circuitry for measurement.
- Able to measure rated current up to **4A** and a rated voltage from -**40V to +40V at 100mA.**
- **3.7V 300mAh** lipo battery powered with proper **OVP, UVP, OCC, OCD, and SCP** fault detection, and usb-c for charging.
- Uses an **I2C**-configured and controlled OLED display.
- Used **a reflow oven to solder SMD** components, and manually soldered the FPC display.
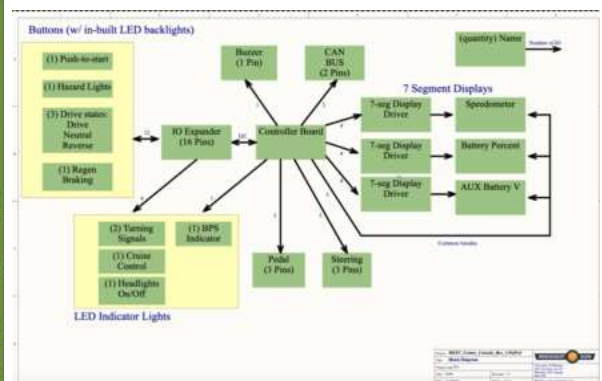
MSXV Centre Console   October 2024 – December 2024

Skills: Altium, Schematic Design, PCB Design, Project Management
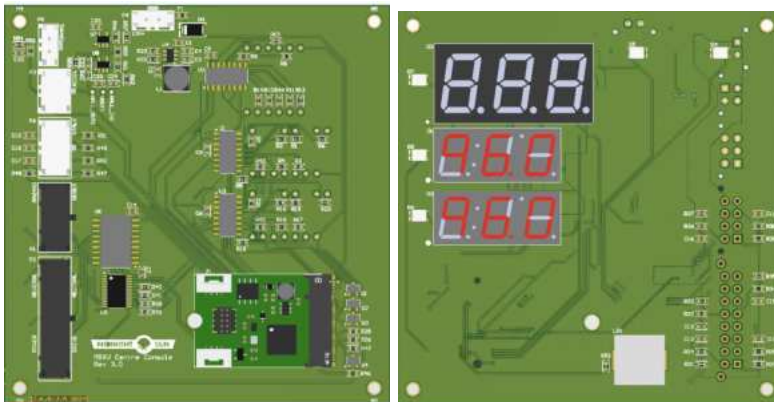
Centre Console

Block Diagram

- Directed the **end-to-end development** of the center console PCB for the 15th **Midnight Sun solar race car.**
- Optimized the design and placement of dashboard **digital displays** to **improve driver visibility significantly.**
- Delivered in-depth **training sessions** to team members on **Altium Designer,** covering advanced topics such as component selection based on electrical characteristics, **multilayer PCB layout optimization,** and design rule checks.

Bionic EVO: Prosthetic Arm   September 2022 – December 2023

Skills: C++, SOLIDWORKS, LaTeX, 3D Printing, STM32 CUBE IDE

Prosthetic Arm Photos

- Designed and implemented an advanced **prosthetic arm** to help amputees regain functionality.
- Aimed to mimic the capabilities of a real human arm for performing daily activities.
- Utilized S**TM32 Microcontroller**, 5 servo motors, and **EMG sensor** for muscle-controlled movement.
- Developed an efficient control system using **75+ months of C++** programming and circuitry design expertise.
- Created a functional 3D design in **SOLIDWORKS** based on human anatomy measurements.

MSXV Harnessing   November 2024 – December 2024

Skills: C++, SOLIDWORKS, LaTeX, 3D Printing, STM32 CUBE IDE

Harnessing Process Photos

- Redesigned the **internal wiring harness** for the **MSXV Solar Race Car**, optimizing the layout to enhance efficiency and reliability
- Documented **all vehicle connections in detail using Excel,** including connection types, wire colors, and gauges, to create a comprehensive and accessible reference for the team.
- Selected appropriate **wire gauges** to accommodate varying amperage requirements, ensuring **safe and efficient high- and low-current connections.**
- Implemented meticulous **cable management practices**, maintaining a clean and organized harness design with precise labeling and color-coding for **power, ground, signal, isoSPI, CAN,** and other connection types to streamline diagnostics and maintenance.
- Applied advanced **crimping techniques for Molex** and other connector types, ensuring robust and stable connections capable of withstanding vibrations and dynamic stresses during race conditions.
- Verified **electrical continuity** and **integrity** through rigorous testing to eliminate potential points of failure, ensuring the **car operated seamlessly without disconnections or electrical faults.**