

# Jun Young Kim

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## Education

**Bachelor of Applied Science in Electrical Engineering, Honors, Co-op**  
University of Waterloo

Expected Graduation 2028  
Waterloo, ON

## Skills

**Software/Languages** Altium, LTspice, MATLAB, AutoCAD, SOLIDWORKS, C++ , Verilog, HTML, Java

**Technical:** PCB Assembly, Soldering, DMM, Oscilloscope, HV Supply, Hot Air Station, Crimping

**Protocols:** I2C, SPI, isoSPI, USB, UART, CAN

## Experience

**Hardware Engineer Intern**, Midnight Sun – Waterloo, ON

Sept 2024 – December 2024

- Redesigned Battery Management System board for the MSXV solar car using Altium Designer, ensuring robust isolation, improved safety features, and seamless subsystem communication via SPI, I2C, and isoSPI protocols.
- Managed a hardware team in developing the center console PCB for the solar car's display dashboard, optimizing driver display ergonomics, conducting PCB/schematic reviews, and training teammates on Altium Designer and advanced PCB workflows.
- Assembled many high-level PCBs, meticulously soldering and validating with DMMs, oscilloscopes, and other precision testing equipment, performing continuity testing and in-circuit testing to ensure circuit functionality.
- Redeveloped solar car's wiring harness to enhance reliability, ensuring proper wire gauges, verifying continuity, and implementing systematic cable management and crimping techniques for robust electrical connections.

**Microsoft Azure AI Project Intern**, University of Waterloo – Waterloo, ON

January 2024 – April 2024

- Engineered an AI healthcare chatbot pipeline using Microsoft Azure, facilitated team alignment through clear communication, and identified sustainable revenue models like subscriptions, licensing, and partnerships.

## Projects

**AC-DC Flyback Converter**

[Altium 365 Link](#)

- Designed an 80%-efficient AC-DC flyback converter with TNY288DG IC, supporting 90-132 VAC input and dual low-voltage outputs (5V and 9V at 1A), including a custom transformer, RCD clamp, rectification, and filtering.
- Developed a PCB layout with high-voltage/low-voltage galvanic isolation and authored detailed design documentation to share insights on switching-mode power supply design.

**Multimeter Business Card PCB**

[Altium 365 Link](#)

- Designed a compact STM32F042-powered 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.

**MSXV Battery Management System Carrier**

[Altium 365 Link](#)

- Redesigned the battery management system carrier PCB for the Midnight Sun Solar Race Car, ensuring robust high-voltage/low-voltage galvanic isolation, seamless communication between subsystems (SPI, I2C, isoSPI, CAN), and integration with motor controllers and external cell balancing PCB boards.
- Designed a precharge protection system using a low-side shunt resistor in the 150V battery loop, with a comparator monitoring voltage drop and a firmware/hardware toggle to safely activate the main motor relay only after capacitive charging reaches steady-state zero current condition.

**Bionic EVO: Prosthetic Arm**

[Github Link](#)

- Leveraging electromyography sensors to capture muscle movement and utilizing two years of SOLIDWORKS experience, created an intuitive and affordable prosthetic hand design.

# Jun Young Kim

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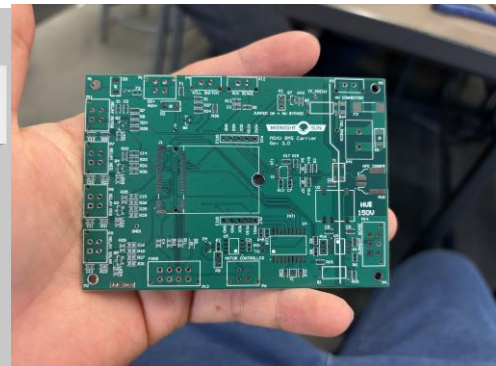
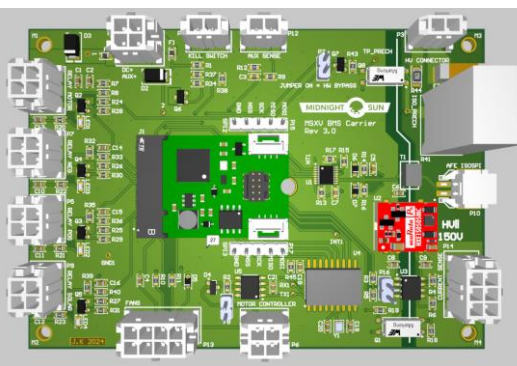
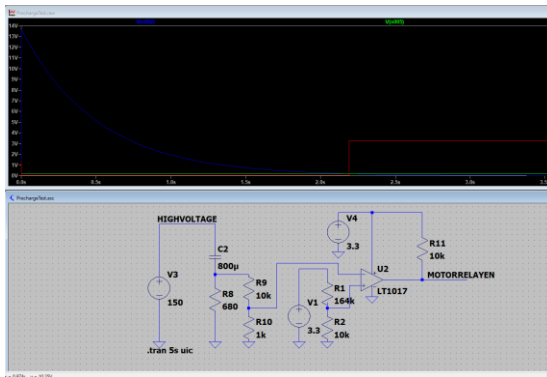
## MSXV BATTERY MANAGEMENT SYSTEM CARRIER

October 2024 - December 2024

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

### Purpose:

- 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.



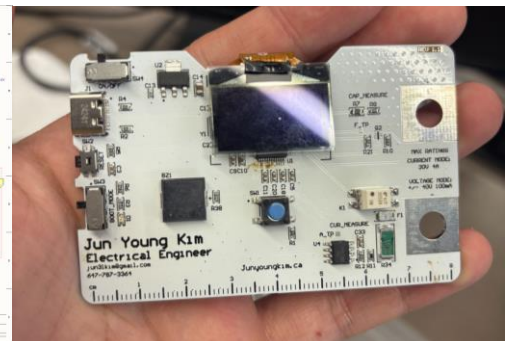
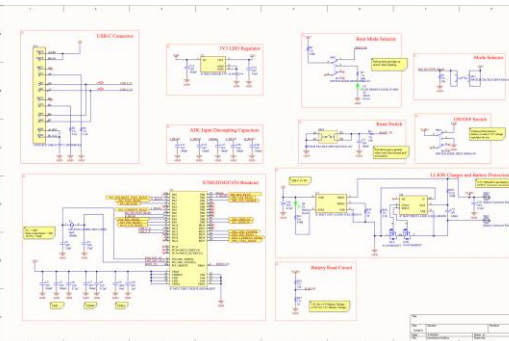
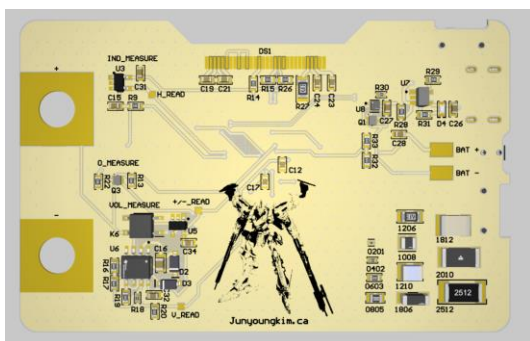
## MULTIMETER BUSINESS CARD

October 2024 - December 2024

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

### Purpose:

- 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 measure 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 a I2C specced and controlled OLED display.
- Used a reflow oven to solder SMD components, and manually soldered FPC display.



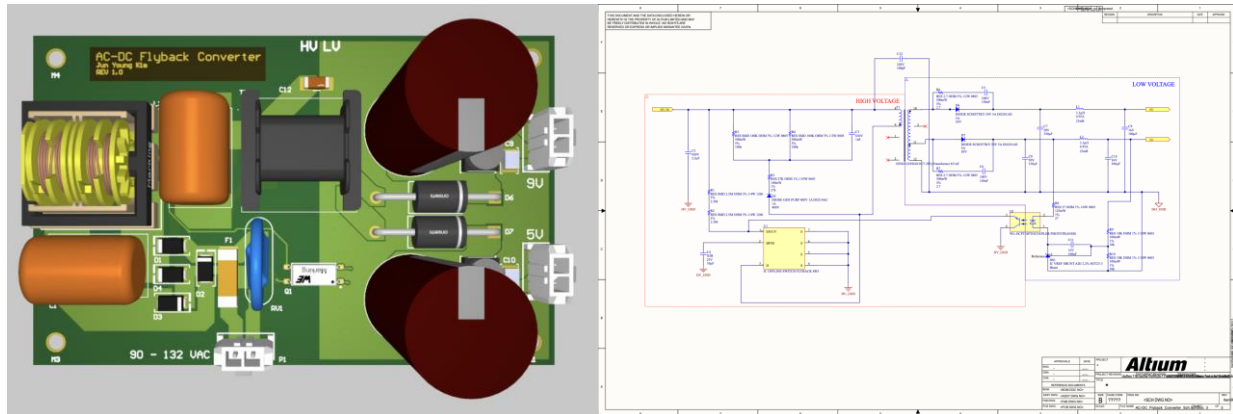
Full Portfolio:

[www.junyoungkim.ca](http://www.junyoungkim.ca)

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

**Purpose:**

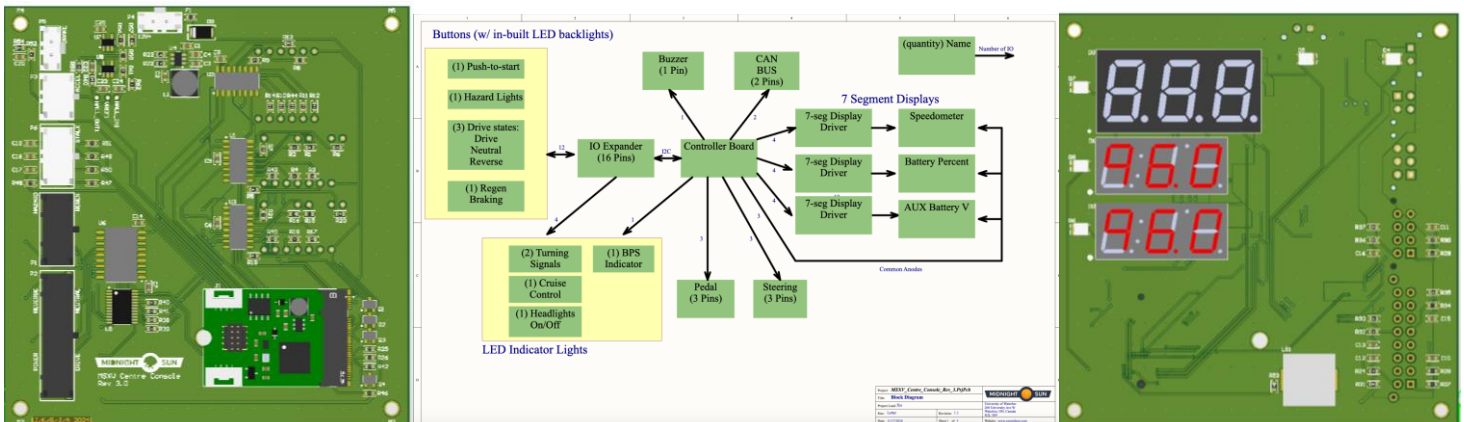
- Designed an AC-DC flyback topology converter utilizing the TNY288DG switching IC, achieving an 80% power efficiency.
- Rated for input voltages of 90 VAC to 132 VAC, with a nominal input of 120 VAC at 60 Hz, aligning with the standard line voltage ranges in the United States and Canada. Outputs were 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.



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

**Purpose:**

- 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 significantly improve driver visibility and ergonomic accessibility.
- 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.
- Conducted rigorous PCB reviews to validate circuit integrity, verify compliance with team standards.
- Led the hands-on assembly process, introducing advanced soldering techniques, overseeing the precise operation of reflow ovens, and demonstrating effective ultrasonic cleaning methods to ensure optimal functionality of the PCB.



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

**Purpose:**

- 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 STM32 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.



**Skills:** Crimping, High Voltage Harnessing, Harnessing

**Purpose:**

- 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.

