

JERRY FU | PROJECT PORTFOLIO

CUSTOM MECHANICAL KEYBOARD PCB

KICAD

CIRCUIT DESIGN

PCB DESIGN

FIRMWARE

DFM

Goal

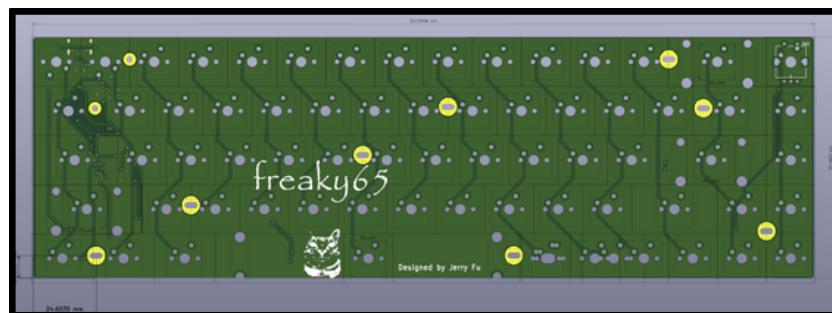
- Design and fabricate keyboard PCBs
- Integrate custom functions such as RGB lighting, volume control, custom key mapping
- Optimize BOM and manufacturing to undercut market price PCBs

Process

- Designed a switch matrix for keyswitch inputs
- Calibrated mechanical alignment for keyswitch layout and case mounting holes to ensure DFM compliance
- Programmed STM32 firmware using QMK

Results

- PCBs fully functional
- Overall finished product was 2.5x cheaper than other PCBs
- Plan to integrate wireless and 3D modeled case for V2



3D MODEL



FABRICATED PCB



FINISHED KEYBOARDS

2 DEGREE OF FREEDOM LASER PROJECTOR

TEAMWORK

SOLIDWORKS

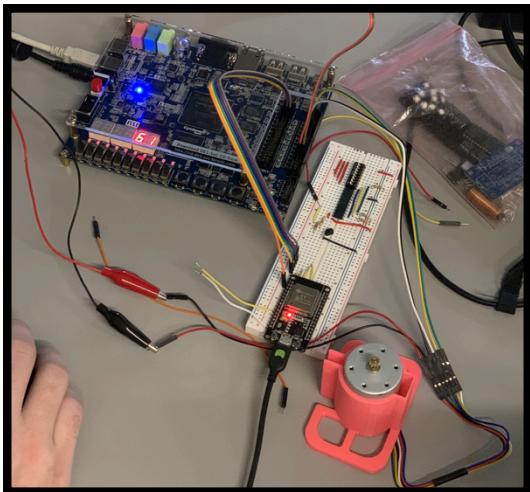
PCB DESIGN

RT CONTROL

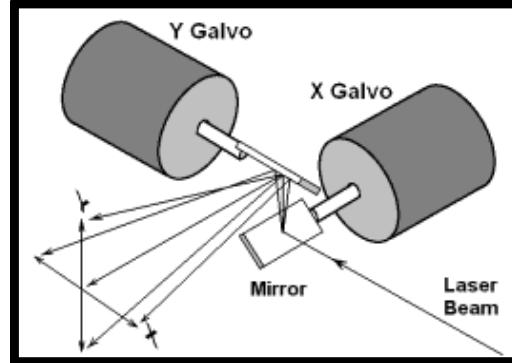
PROTOTYPING

Goal

- Collaborated in a team of 4 to design a motor controlled laser projector
- Complete the project within an **\$800 budget**
- Established Requirements, Constraints, and Goals (RCGs) to guide the project



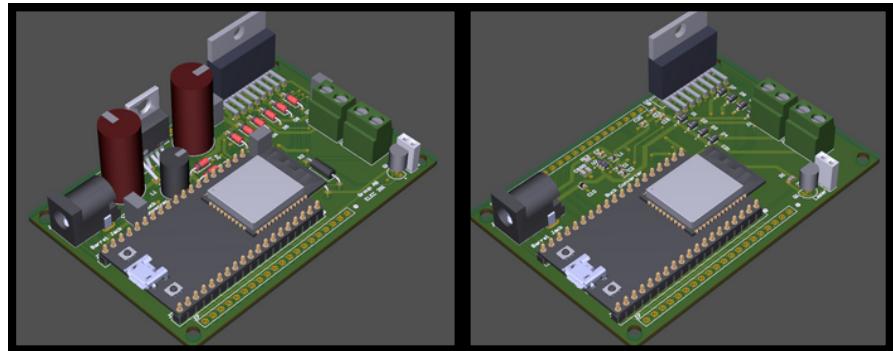
INITIAL
PLANNED
DESIGN



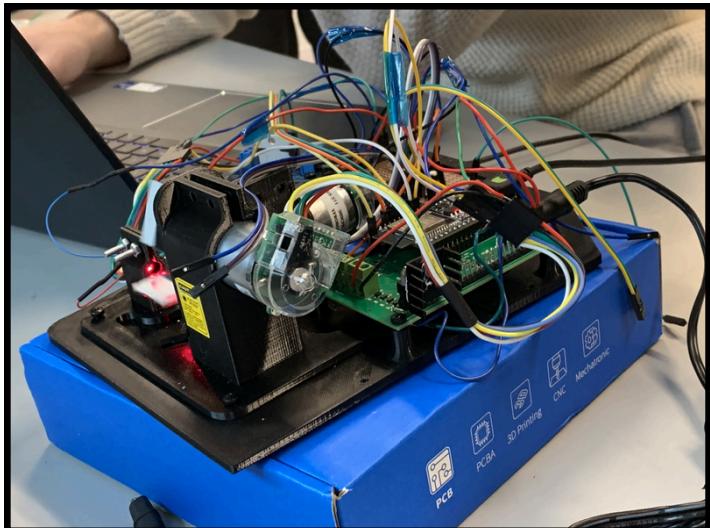
BREADBOARDED
CIRCUIT

Process

- Used mirrors and **PID tuning** to accurately control motor movements for animations.



DIFFERENT PCB DESIGNS



COMPLETED PROTOTYPE

Results

- Successfully drew shape animations
- Completed the project **\$300 under budget**
- Understood how to navigate **open-ended** design challenges
- Gained practical experience in **teamwork** and **prototyping**



GPS BREAKOUT BOARD (UBC AERODESIGN)

ALTIUM

PCB DESIGN

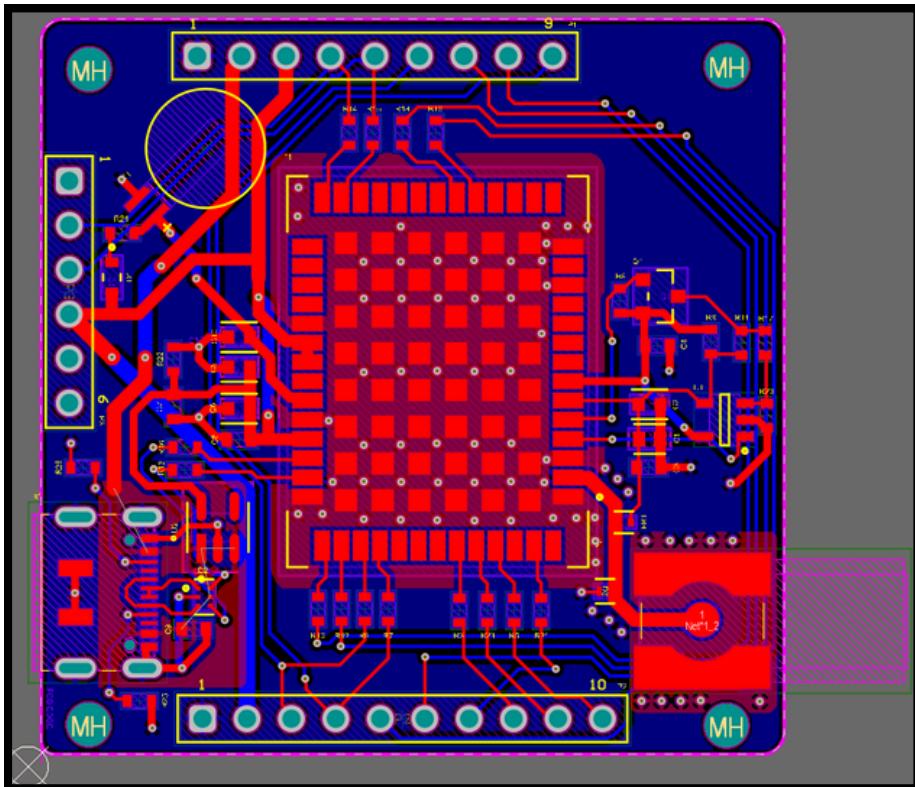
RF CIRCUITRY

DOCUMENTATION

PROTOTYPING

Goal

- Design a **custom PCB** for **GPS** navigation in an autonomous aircraft payload delivery system
- Ensure all **SAE Aerodesign rules and constraints** followed

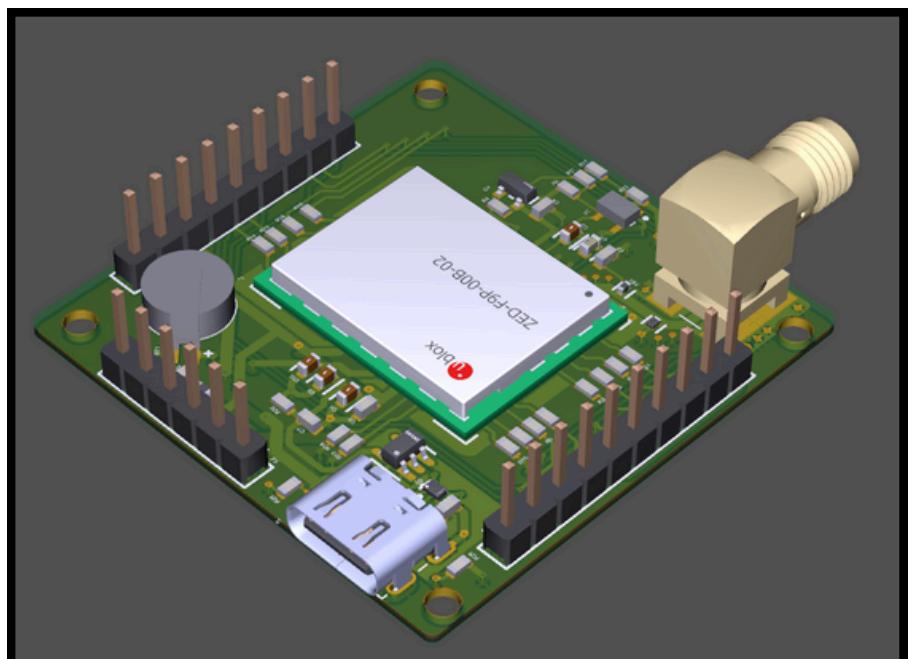


PCB LAYOUT

Process

- Designed antenna **RF circuitry** to ensure optimal signal feed
- **Minimized** current draw and **integrated** backup battery for power system compatibility
- **Optimized** PCB design to meet spatial constraints and mounting specification
- Conducted **design reviews** with senior members to validate design choices

3D MODEL



Results

- **Understood** how to design RF circuitry
- **Integrated** a design into a complex aircraft system, ensuring **compatibility**

MAGNETIC FIELD CONTROLLED CAR | [VIDEO](#)

PROGRAMMING (C)

CIRCUIT DESIGN

DOCUMENTATION

CIRCUIT ANALYSIS

TEAMWORK

Goal

- Design and build a transmitter and receiver circuit for a vehicle with 2 modes
- Tracking:
 - Vehicle maintains a 50 cm distance from the transmitter
- Command:
 - Decode movement instructions from the receiver

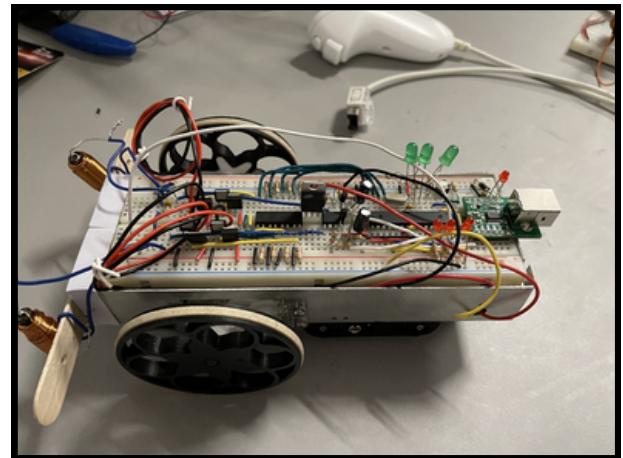
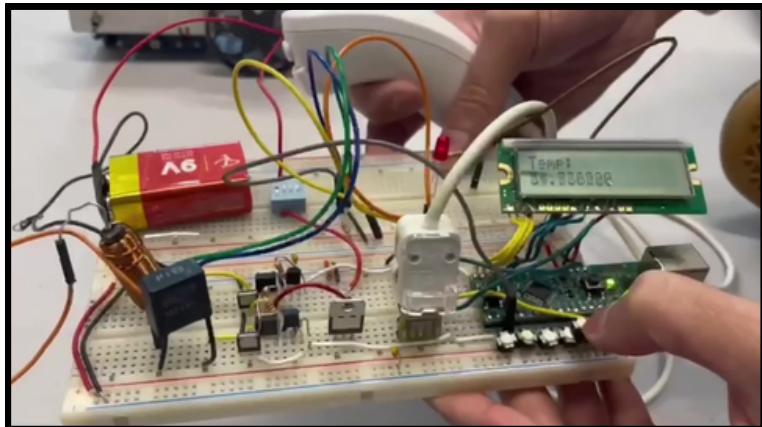
Process

- Analyzed IC datasheets and designed circuits for motor control and signal transmission.
- Programmed microcontrollers in C
- Debugged using multimeter and oscilloscope to ensure correct ADC and DAC readings

Results

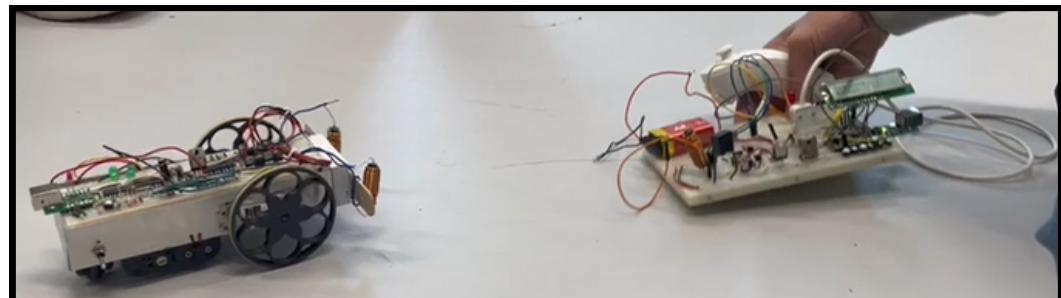
- Successfully fit specifications
- Additional features included:
 - Wii Nunchuck for command mode
 - Dance mode
 - Temperature Sensor

RECEIVER
CIRCUIT



TRANSMITTER
CIRCUIT

TRACKING
MODE



REFLOW OVEN CONTROLLER | VIDEO

PROGRAMMING (8051 ASSEMBLY)

DOCUMENTATION

SOLDERING

CIRCUIT DESIGN

Goal

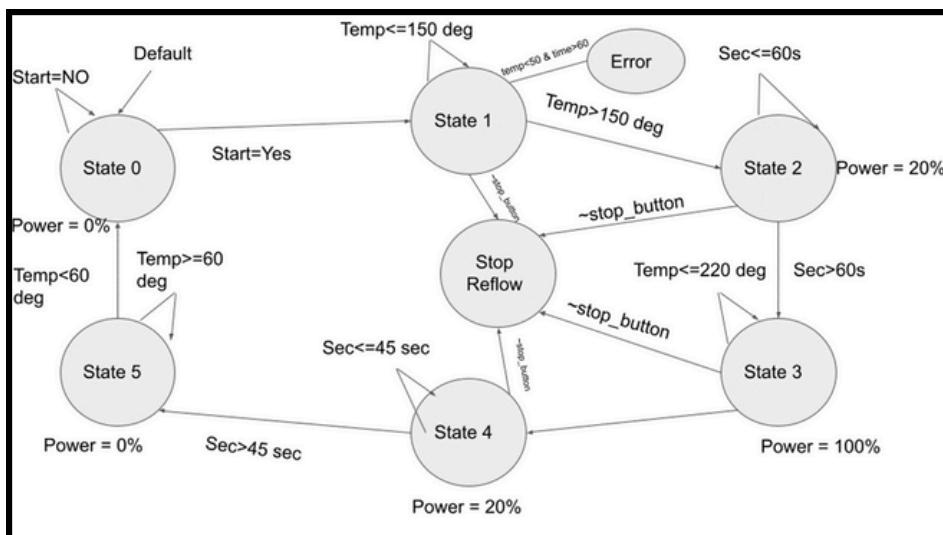
- Design and build a controller for reflow soldering
- Understand how to interface with peripherals such as SSRs
- Fabricate a working PCB with SMT components

Process

- Drew state machine diagrams to develop a framework
- Analyze and process data from inputs such as ICs and pushbuttons
- Display current state on a 8-bit LCD

Results

- Successfully reflow soldered two PCBs
- Implemented failsafes to prevent oven overheating



STATE MACHINE
DIAGRAM



CONTROLLER
CIRCUIT

