Minh Nguyen

I build battery-powered sensor products end to end: the circuit board, the firmware that runs on it, and the path through certification into production.

Selected work, 2021 to 2026

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Projects in this deck

1 **KayO**
Purdue, ECE 477 senior design, 2024

2 **EVident Battery: EVB-01 Pro firmware**
EVident Battery, Associate Engineering Manager, 2026

3 **EVident Battery: EVB-01 vibration sensor**
EVident Battery, Electrical Engineer, then Associate Engineering Manager, 2025

4 **Milwaukee Tool: capacitor disconnect for a cordless tool**
Milwaukee Tool, electrical engineering intern, 2024

5 **ROV X16 electrical stack**
Purdue IEEE ROV, 2024

6 **ECE 270 FPGA breakout**
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7 **ECELabs software**
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9 **SoCET AFTx05 test board**
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12 **ECELabs FPGA carrier, v1**
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13 **SoCET CAN-bus shield**
Purdue, SoCET VIP team, 2023

14 **ROV X14 power conversion board**
Purdue IEEE ROV, 2022

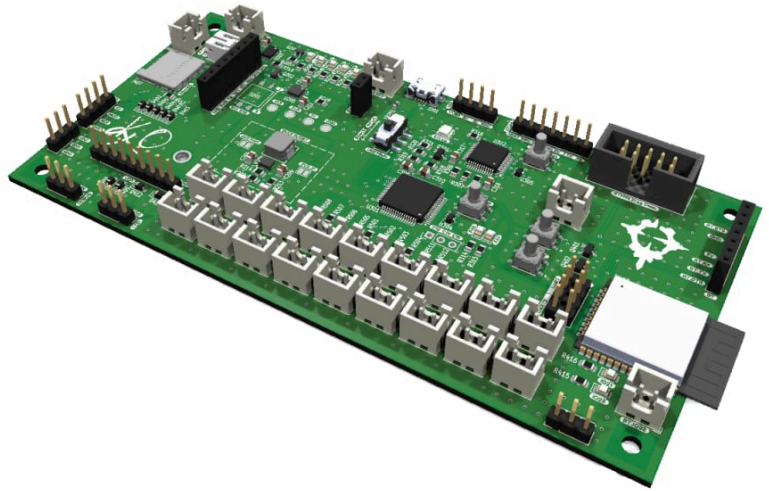
15 **RFID projects, 2021**
Before Purdue, 2021

Purdue, ECE 477 senior design

KayO

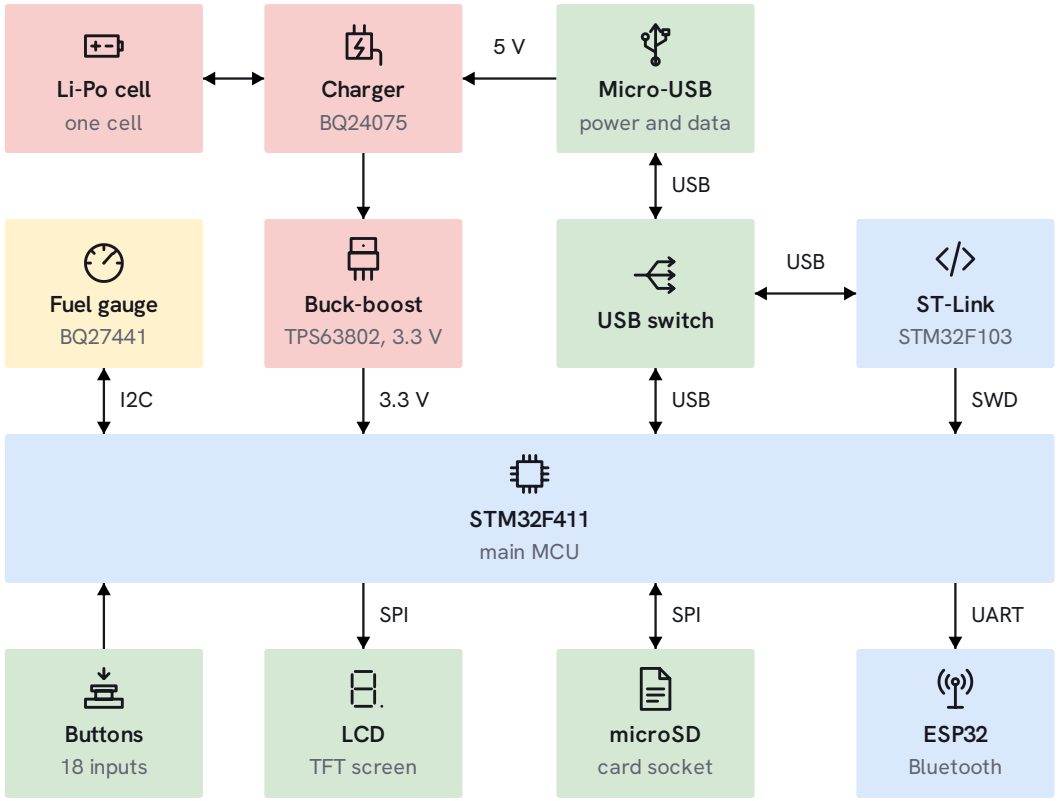
Spring 2024 · I designed the PCB in a team of four

The main board of a fight-stick game controller that runs from a Li-Po cell or USB. The built board passed every check at the course demo.



140 × 70 mm · 2 copper layers · 213 footprints · 209 nets · 569 vias · Fabricated March 2024

KayO main board, block by block

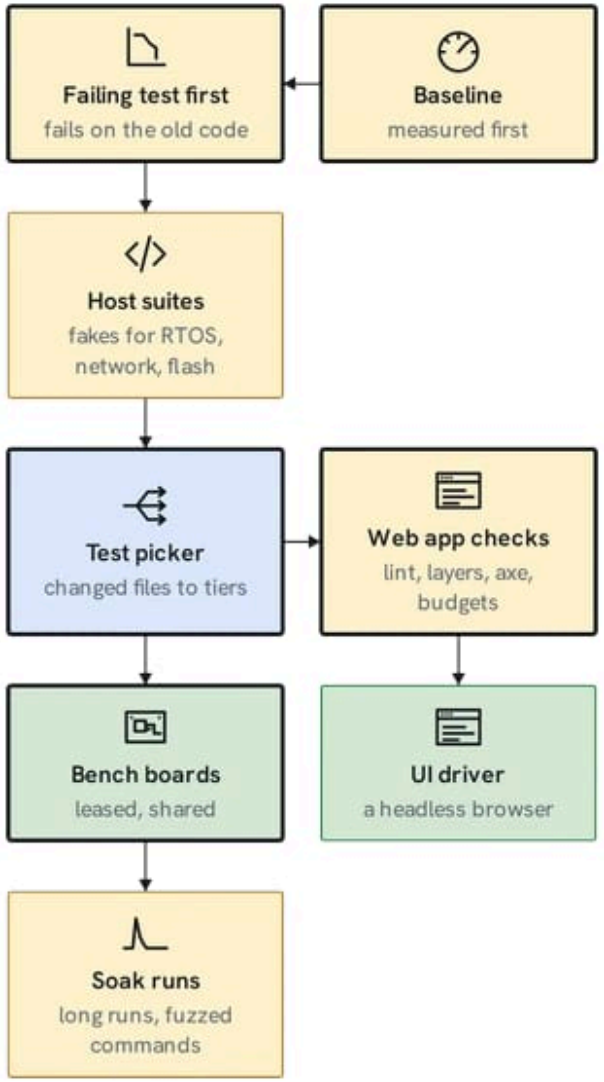


EVident Battery, Associate Engineering Manager

EVident Battery: EVB-01 Pro firmware

Oct to Nov 2026 · I led the Pro firmware program

The Pro runs on EVB-01's board with its own ESP-IDF firmware. I led the program that took it to production, and designed the test bench and AI workflow behind it.

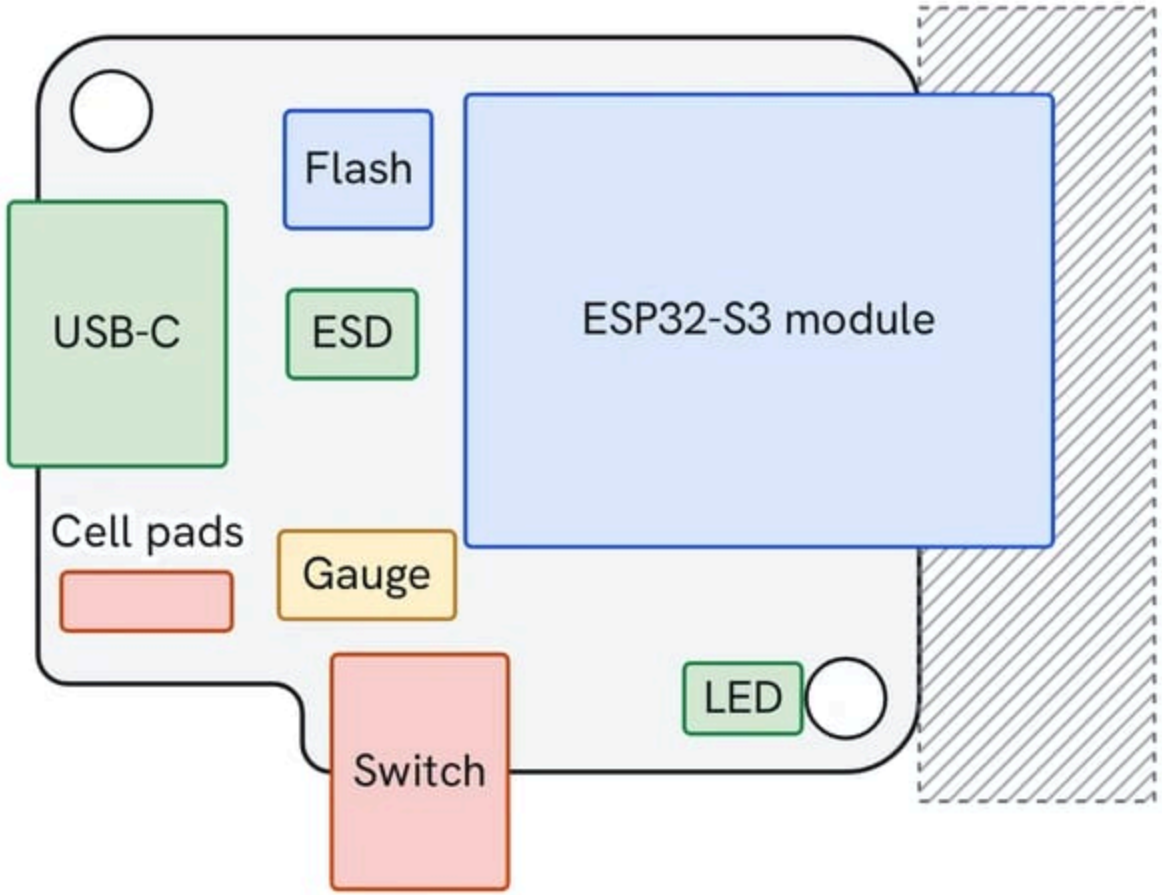


EVident Battery, Electrical Engineer, then Associate Engineering Manager

EVident Battery: EVB-01 vibration sensor

Mar 2025 to Oct 2026 · I designed the board and wrote the production firmware

A Wi-Fi vibration sensor, EVident Battery's first product. I designed its board and wrote its production firmware.

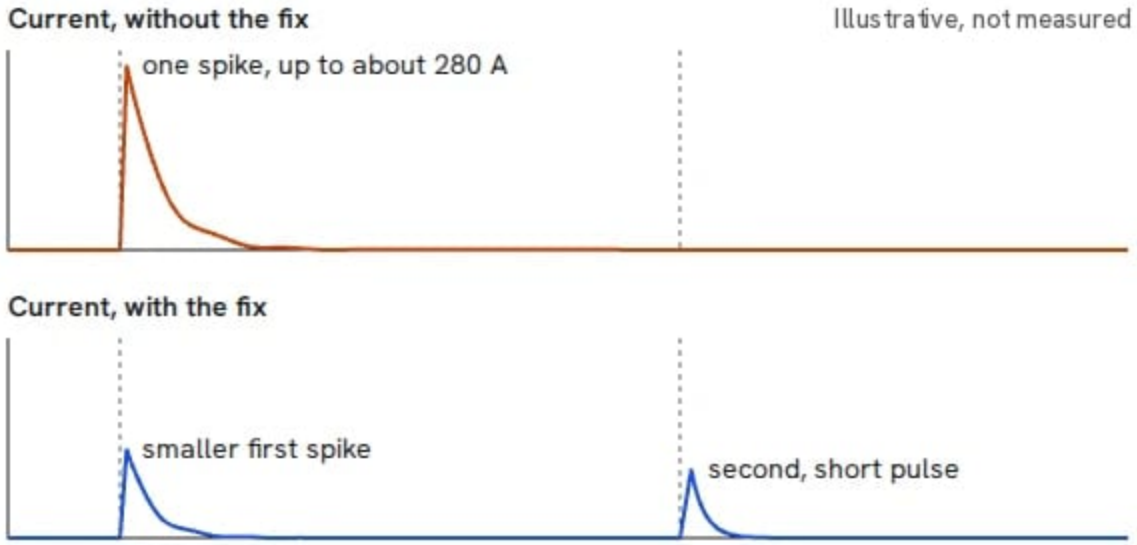


Milwaukee Tool, electrical engineering intern

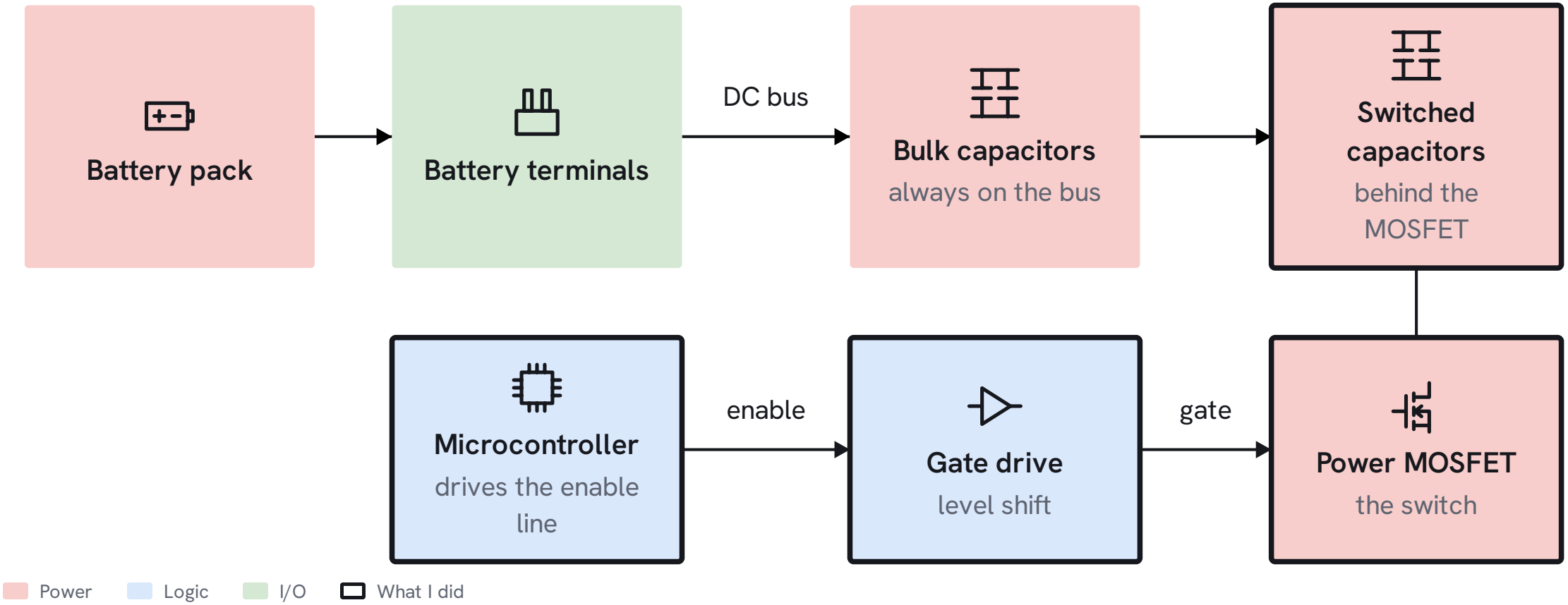
Milwaukee Tool: capacitor disconnect for a cordless tool

Jun to Aug 2024 · I designed and tested the circuit

A MOSFET switch that charges part of a tool's bulk capacitance after the battery is seated, to cut the inrush at insertion.



The capacitor disconnect, block by block

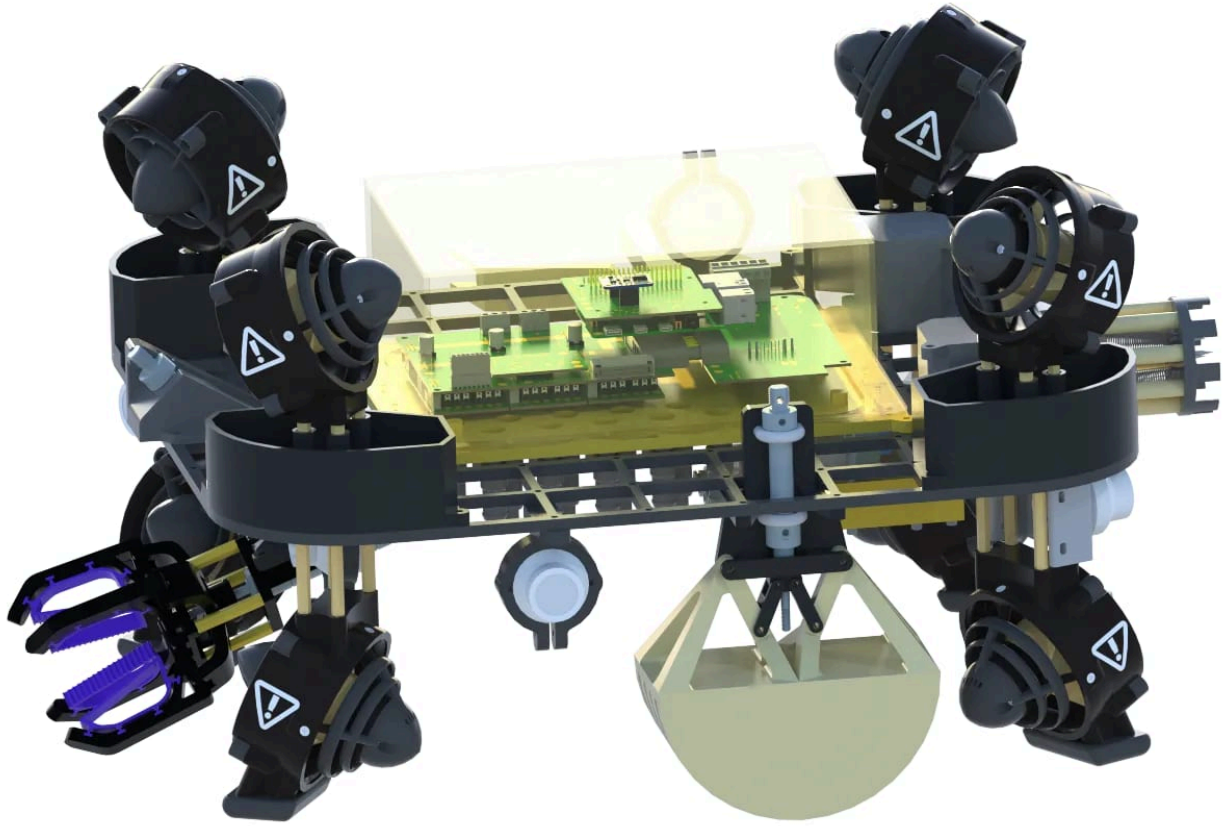


Purdue IEEE ROV

ROV X16 electrical stack

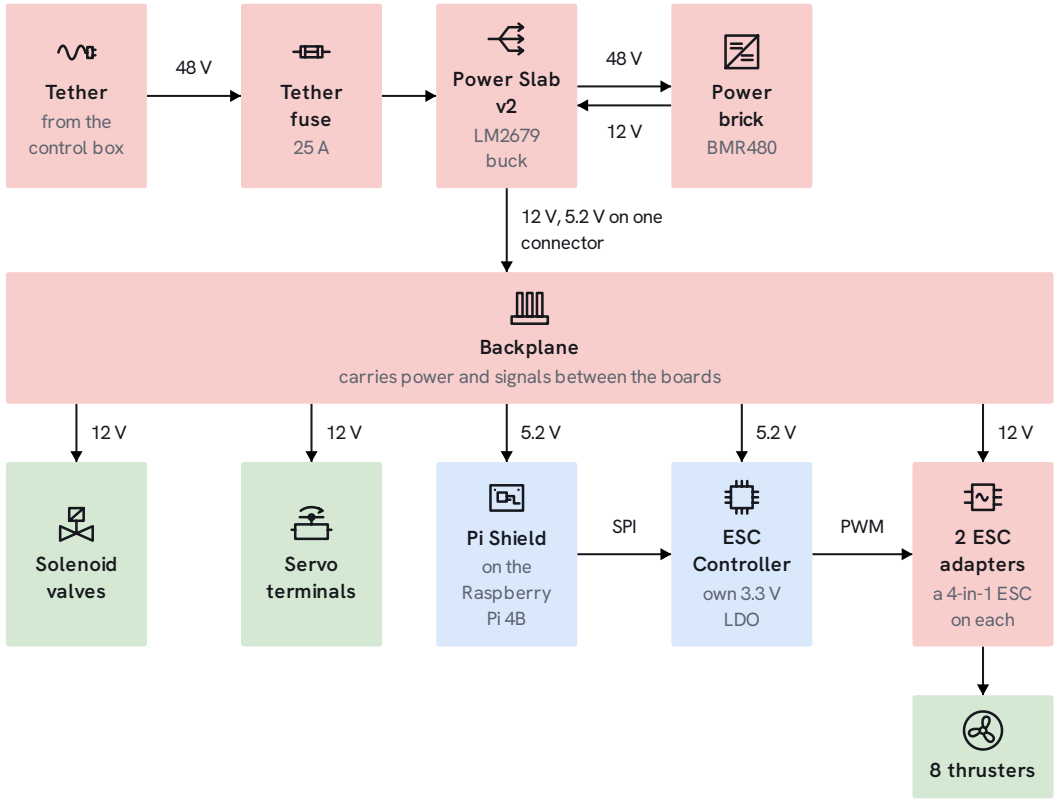
2023 to 2024 · Electrical architecture and team lead, with my co-lead Raghav Kumar; teammates drew the boards

The electrical stack of the team's 2023-24 vehicle: five boards, down from seven. The team won the Explorer class Technical Documentation Award at the 2024 World Championship.



ROV X16 electrical stack

The X16 stack, board by board



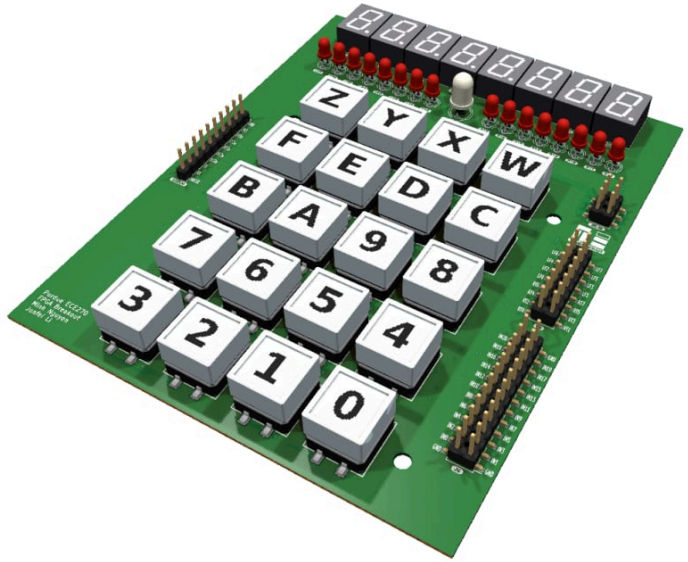
Power Logic I/O

ECELabs, Purdue ECE teaching labs

ECE 270 FPGA breakout

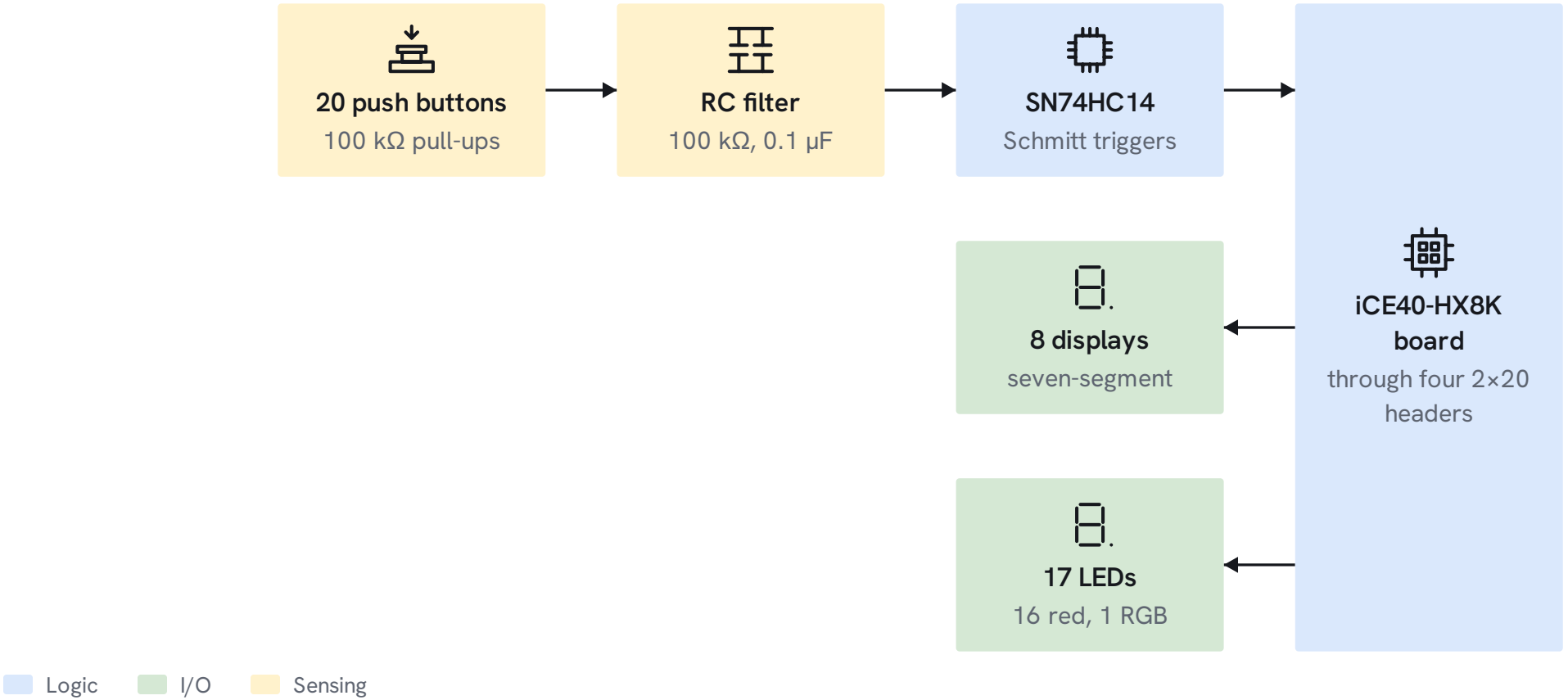
Mar to May 2024 · I designed it

A push-button and display shield for the iCE40-HX8K evaluation board, on four layers. I designed two revisions and built both rounds of boards in spring 2024.



99 × 124 mm · 4 copper layers · 247 footprints · 302 nets · 321 vias · 4 SN74HC14 chips

ECE 270 FPGA breakout, block by block



ECELabs, Purdue ECE teaching labs

ECELabs software

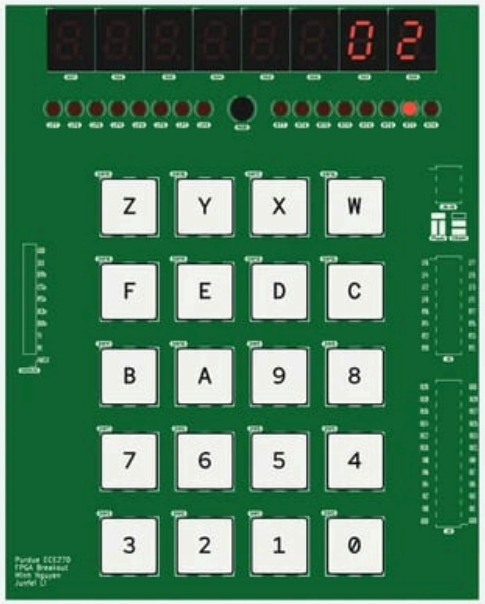
2023 to 2024 · I wrote the I2C driver layer

A Python driver that lets a Raspberry Pi set and read an FPGA's pins through eight I2C expanders. The lab's station web apps run on top of it.

seconds.sv — 60 lines

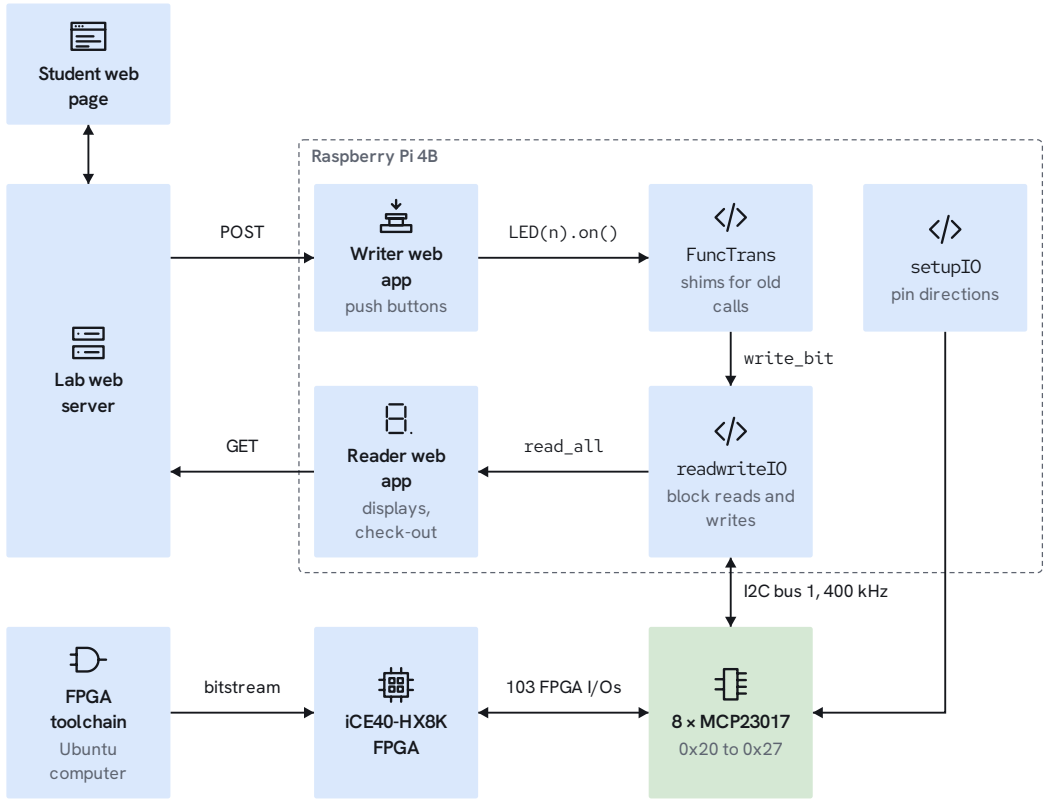
```
// Count seconds. A divider turns the
// 100 Hz clock into one tick a second.
// The count shows in hex on two displays
// and in binary on the right LEDs.
// Hold X to pause; W resets.
module top (
  input  logic        CLK100,
  input  logic [19:0] PB,
  output logic [7:0]  RIGHT, SS1, SS0
);
  logic [6:0] ticks;  // 0 to 99
  logic [7:0] count;

  always_ff @(posedge CLK100) begin
    if (PB[16]) begin             // W
      ticks <= 7'd0;
      count <= 8'd0;
```



Stop the clock | Hold buttons

One lab station, block by block

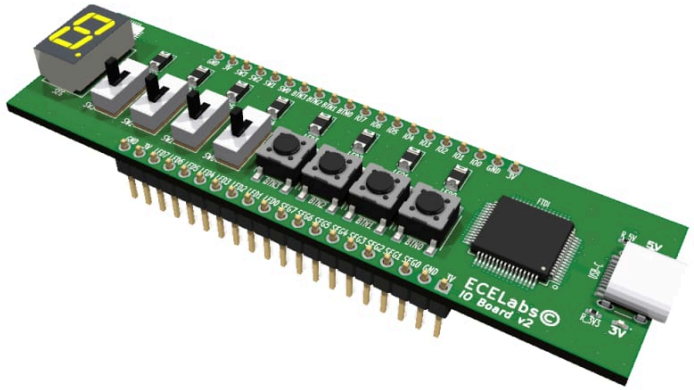


ECELabs, Purdue ECE teaching labs

ECELabs GPIO board

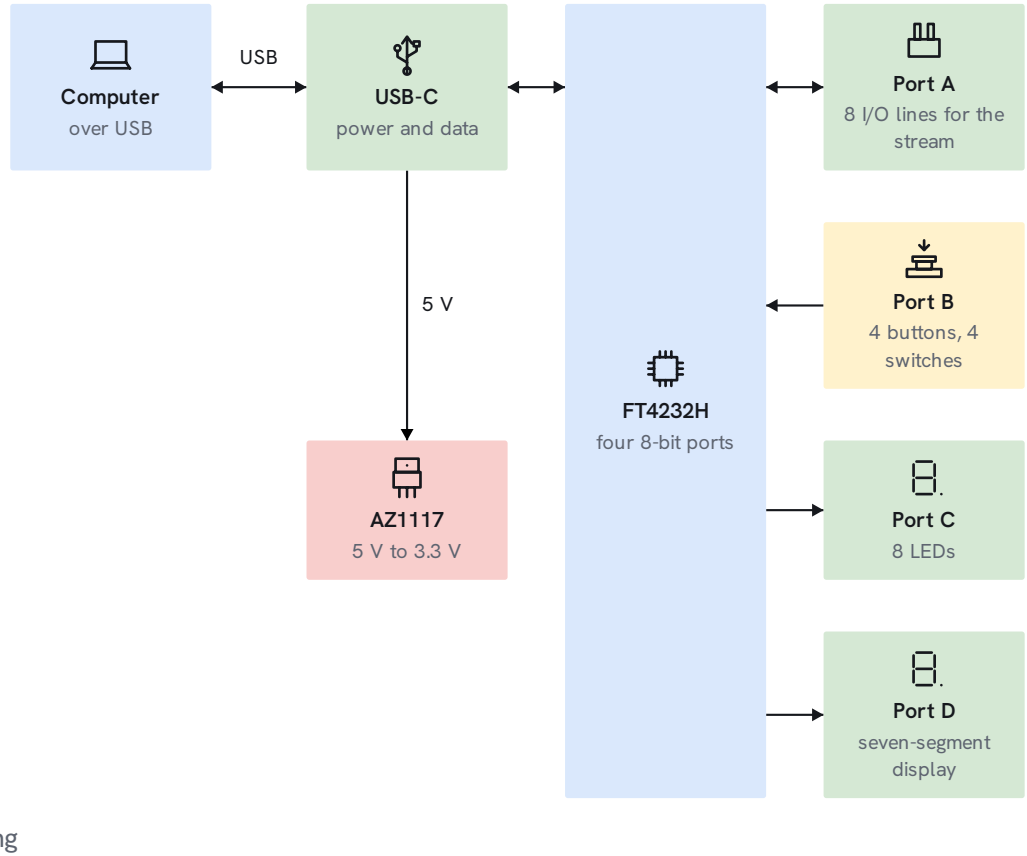
Sep to Nov 2023 · I designed it

A narrow four-layer I/O board: one FT4232H puts a seven-segment display, LEDs, switches and push buttons behind a USB port. 25 were ordered assembled.



92 × 25.5 mm · 4 copper layers · 85 footprints · 83 nets · 199 vias

ECELabs GPIO board v2, block by block



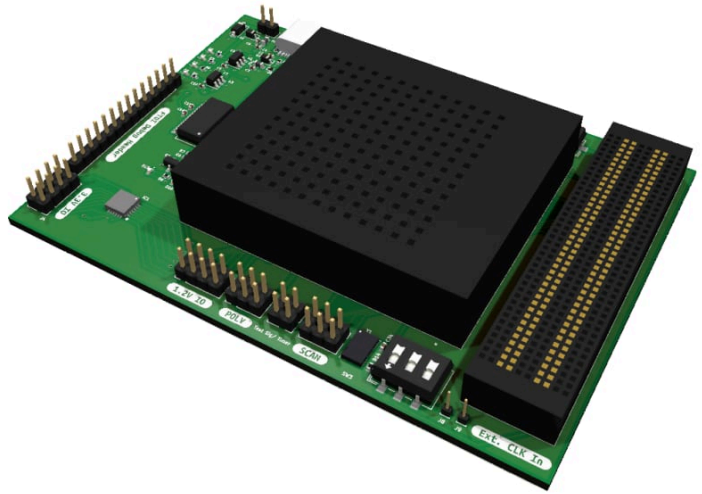
Purdue, SoCET VIP team

SoCET AFTx05 test board

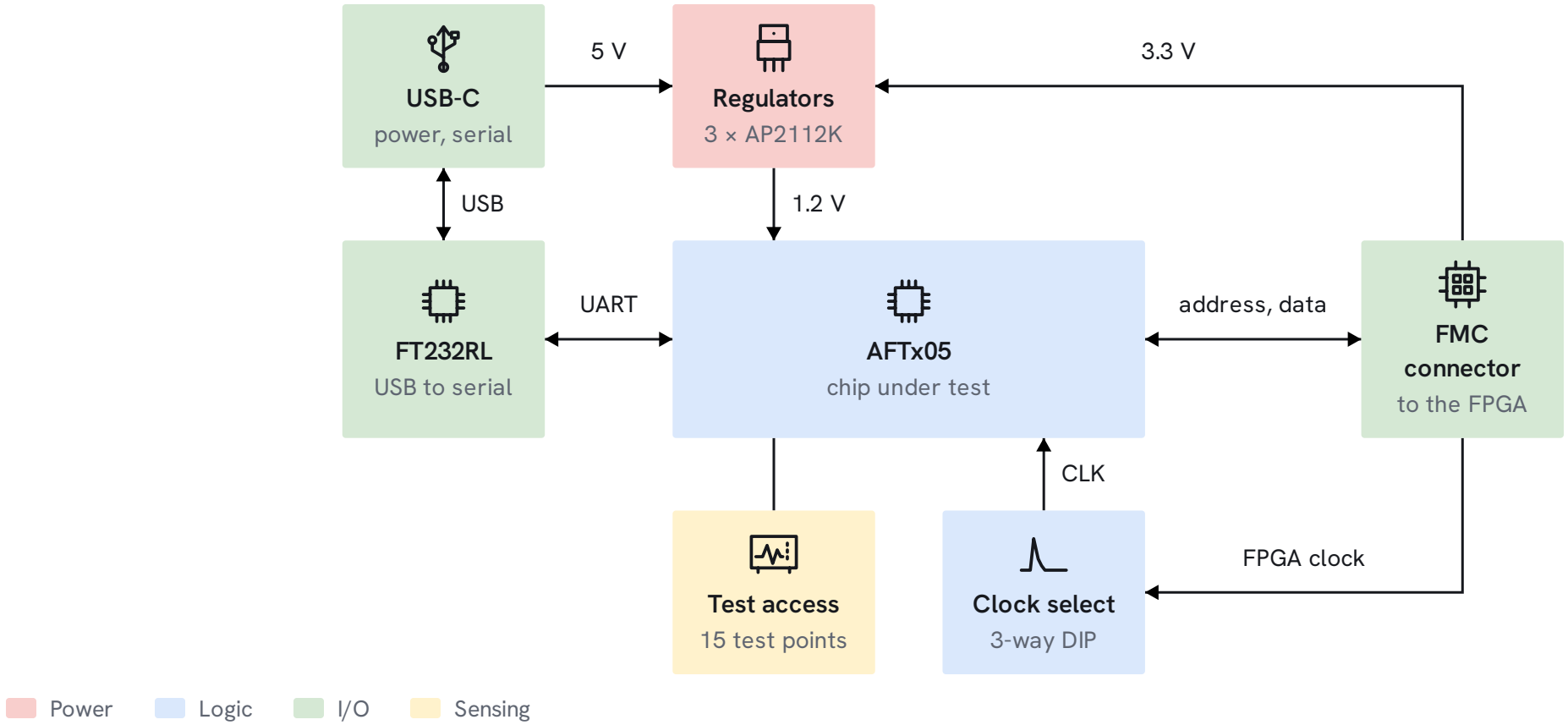
Mar to Sep 2023 · I designed it

A four-layer test board that joins Purdue SoCET's AFTx05 chip to an FPGA board. It was fabricated, and not fully tested.

90.9 × 64.7 mm · 4 copper layers · 105 footprints · 180 nets · 199 vias · 15 test points



AFTx05 test board, block by block

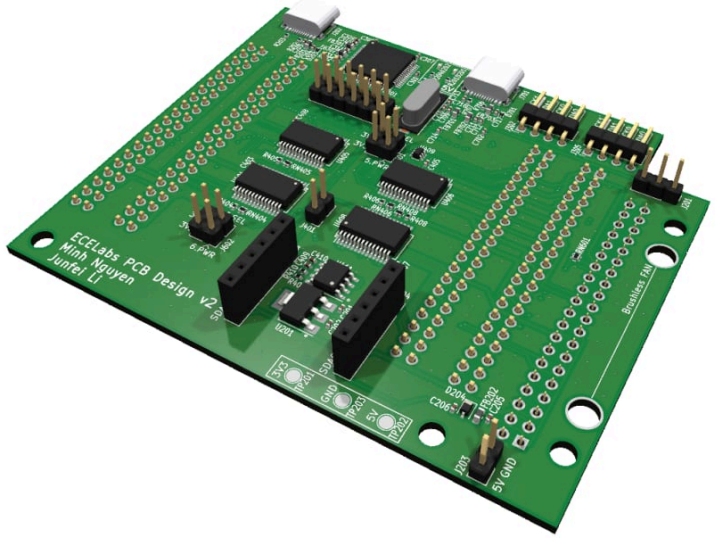


ECELabs, Purdue ECE teaching labs

ECELabs I2C carrier, v2

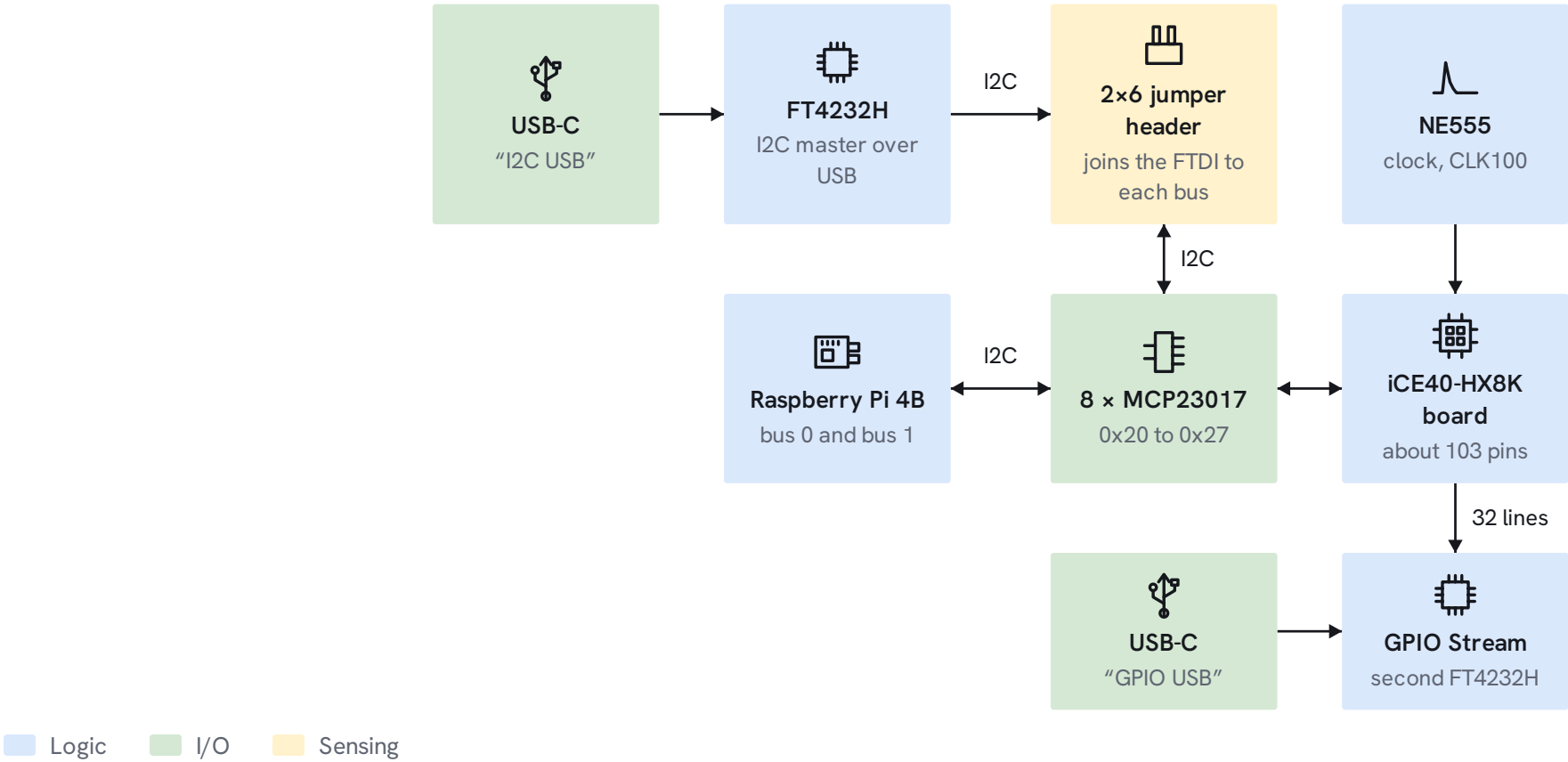
Jun to Aug 2023 · I designed it

A four-layer carrier: a Raspberry Pi drives an iCE40 FPGA's pins through eight I2C expanders, at about half the first board's area. It went into the lab's stations.



91.4 × 76.2 mm · 4 copper layers · 139 footprints · 258 nets · 432 vias · 8 MCP23017 expanders

ECELabs I2C carrier v2, block by block

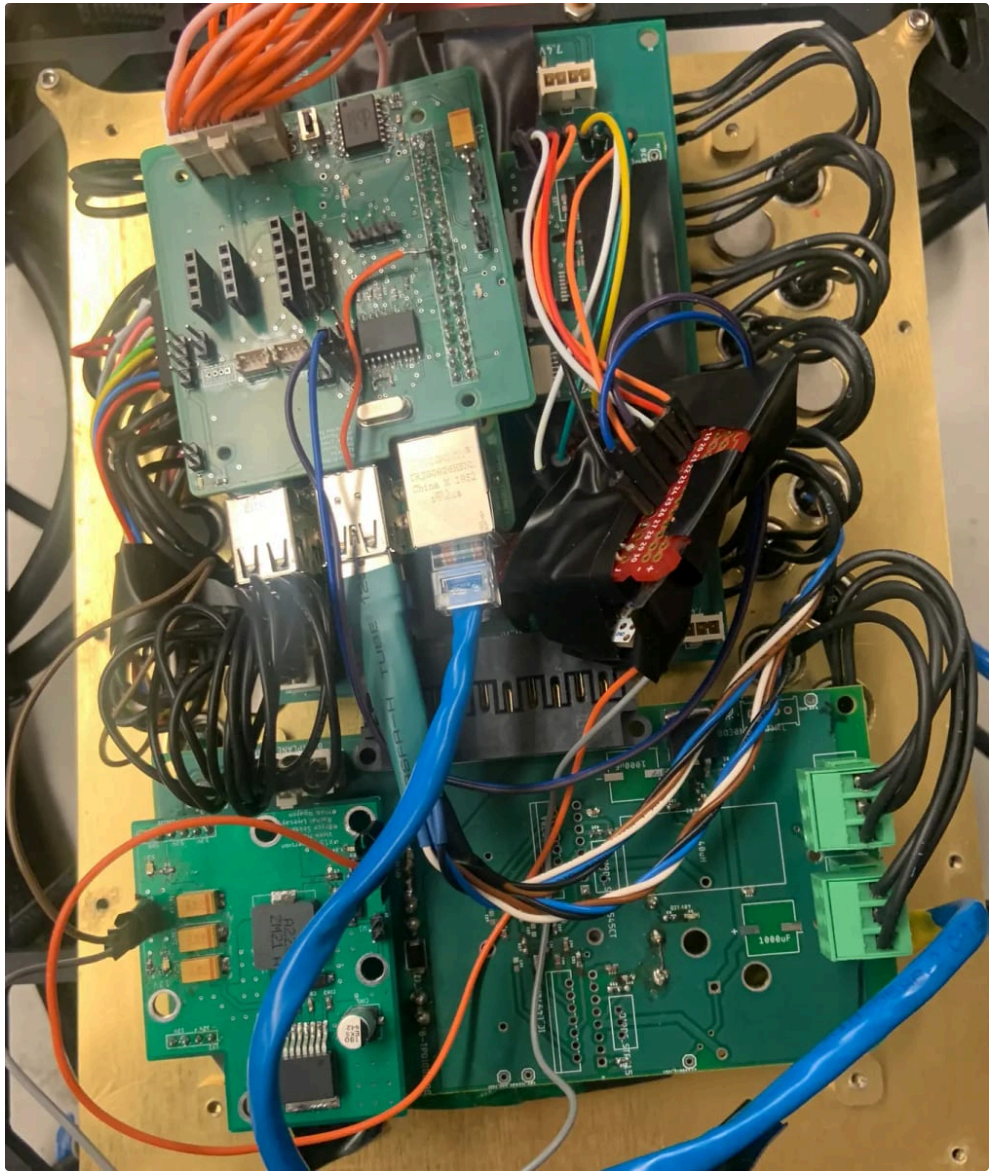


Purdue IEEE ROV

ROV X15 electrical stack

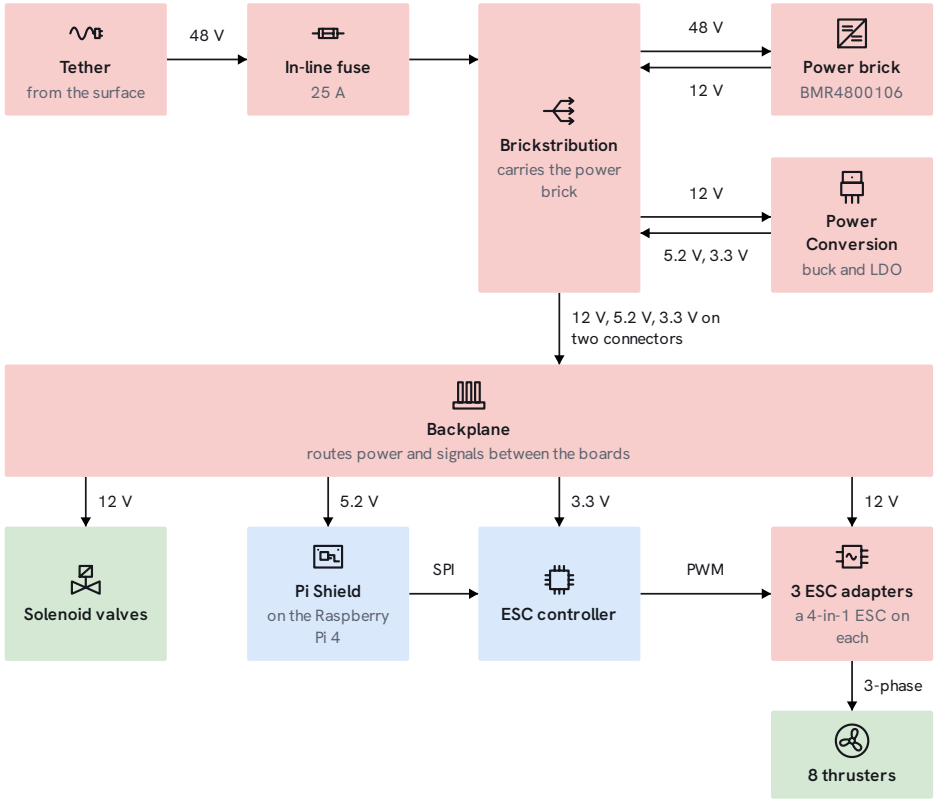
2022 to 2023 · Electrical architecture and team lead; teammates drew the boards

The electrical stack of the team's 2022-23 underwater vehicle, planned at seven boards where the last vehicle had twelve. The vehicle placed 6th of 23 at the 2023 MATE World Championship.



ROV X15 electrical stack

The X15 stack, board by board



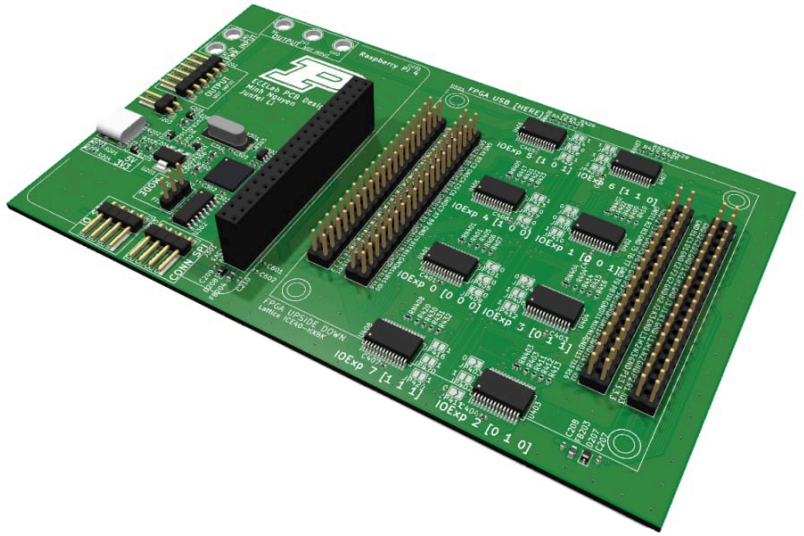
Power Logic I/O

ECELabs, Purdue ECE teaching labs

ECELabs FPGA carrier, v1

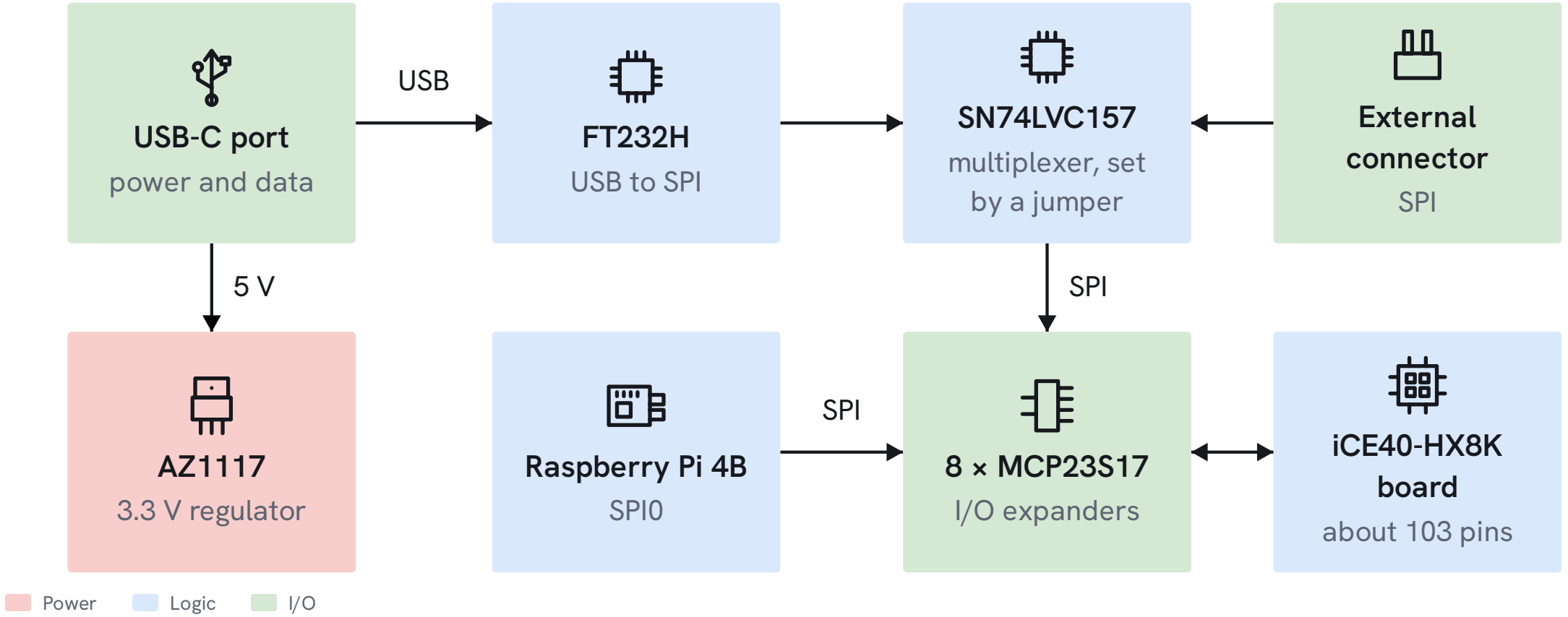
May 2023 · I designed it

A first carrier that replaces jumper wires with eight I/O expanders between a Raspberry Pi 4B and an iCE40-HX8K FPGA. Its I2C line, reworked as v1.2 and v1.3, went into the lab.



147.5 × 89.3 mm · 2 copper layers · 141 footprints · 265 nets · 434 vias · 24 solder jumpers

ECELabs FPGA carrier v1, block by block

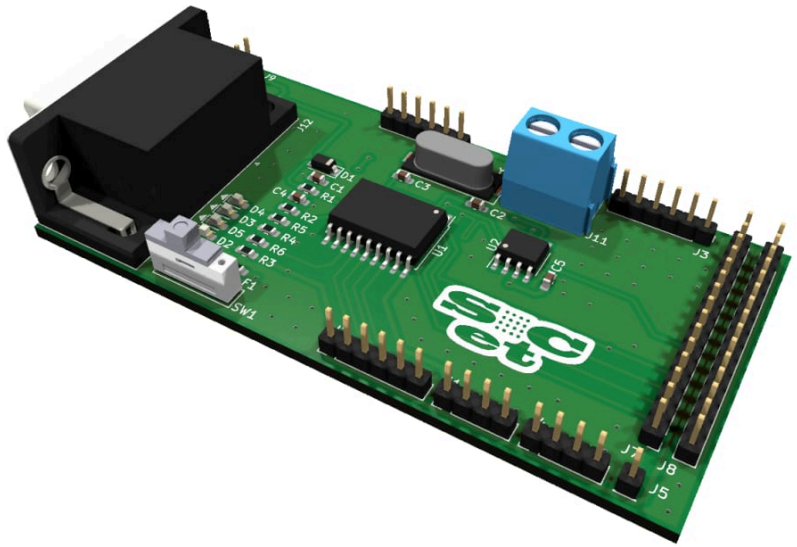


Purdue, SoCET VIP team

SoCET CAN-bus shield

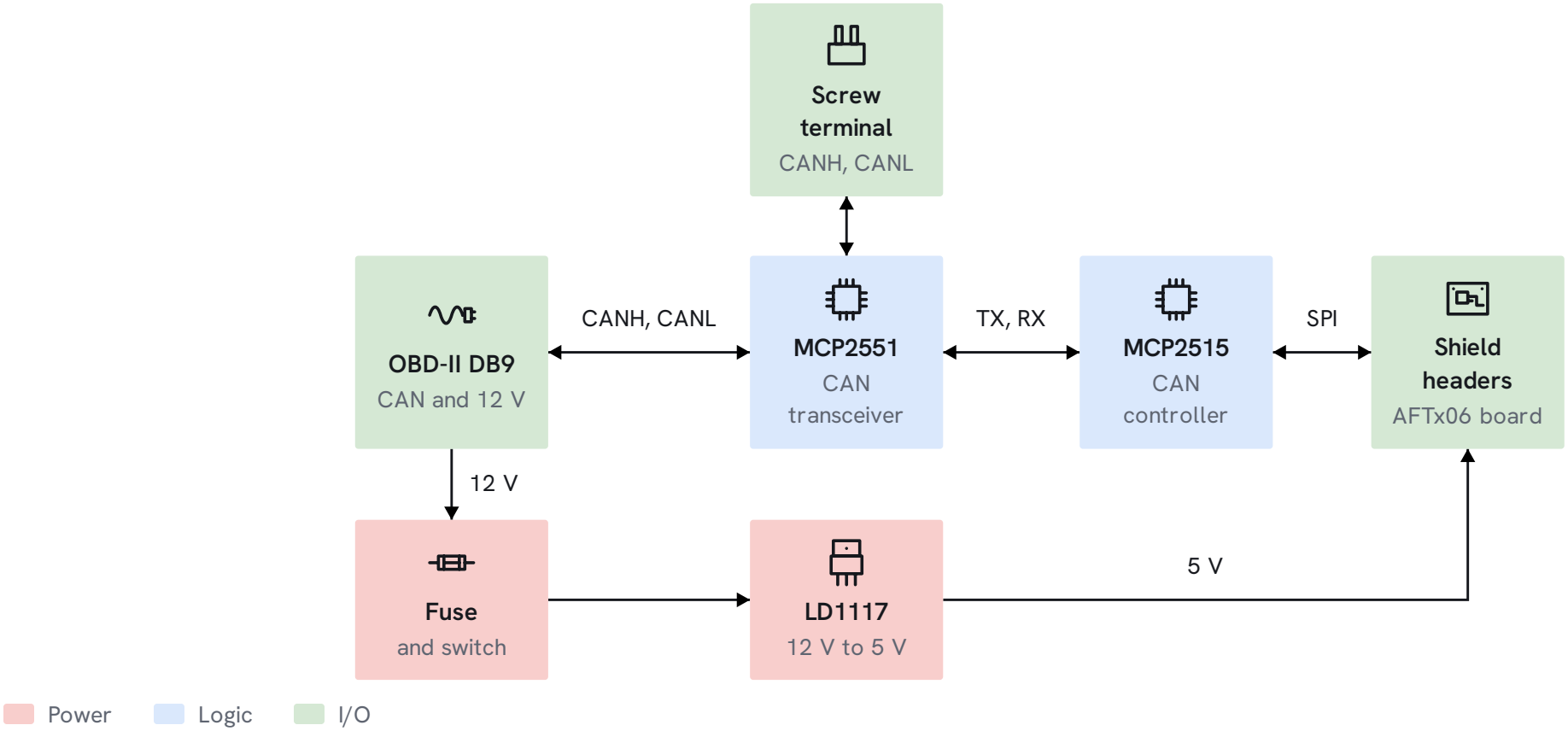
Jan to Mar 2023 · I designed it

A two-layer shield that gives the AFTx06 chip's board a CAN bus port. It was graded 100/100, and I used it to teach new members board design.



76 × 38.3 mm · 2 copper layers · 40 footprints · 67 nets · 87 vias

CAN-bus shield, block by block

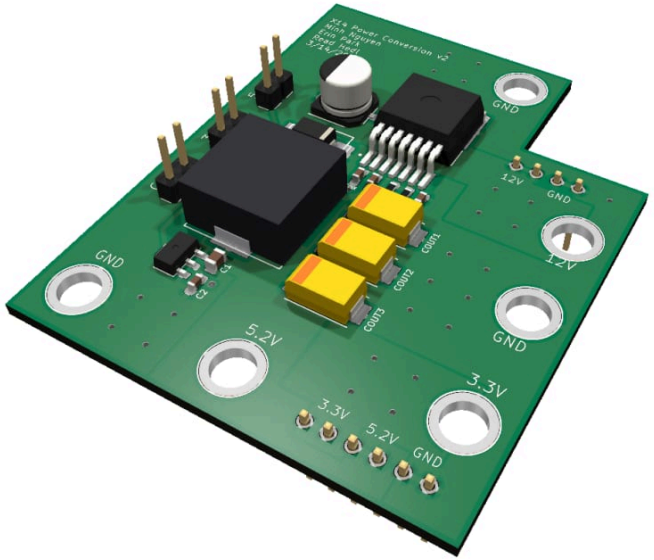


Purdue IEEE ROV

ROV X14 power conversion board

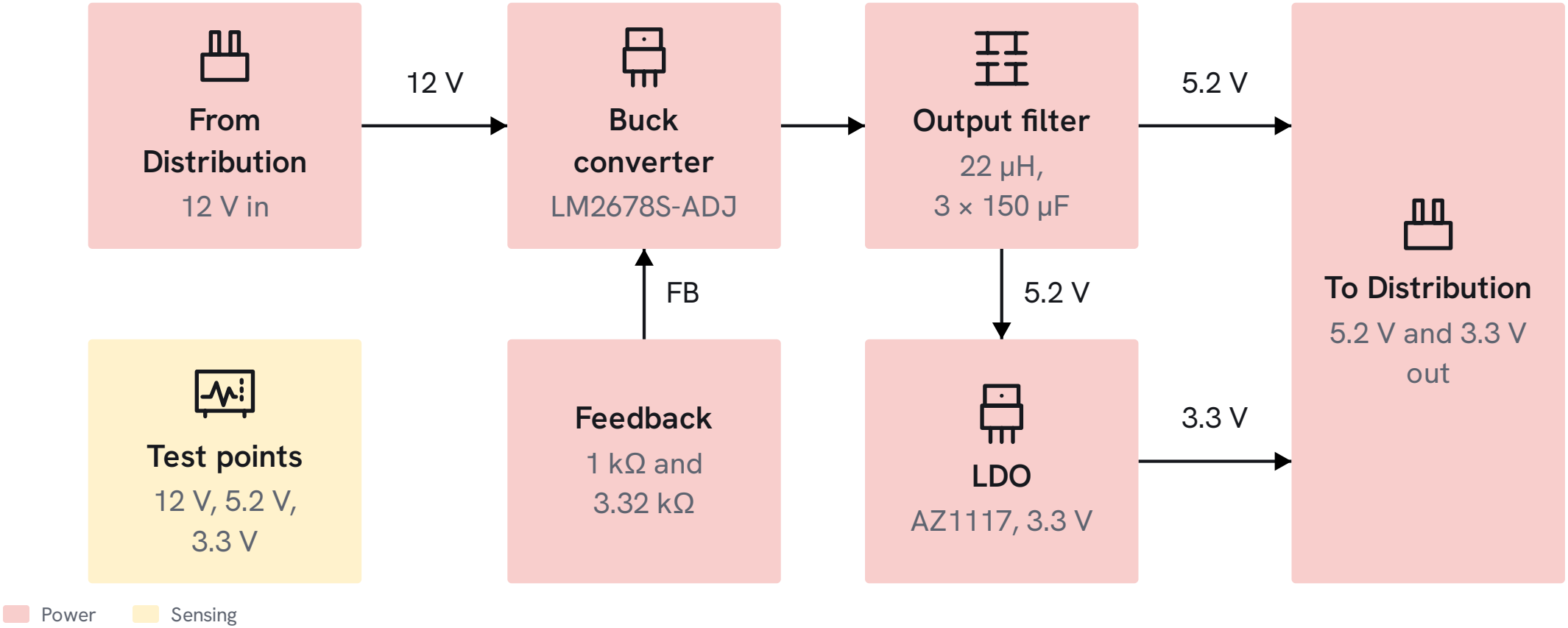
2021 to 2022 · I designed it

A step-down board that made the 2021-22 ROV's 5.2 V and 3.3 V rails from 12 V. Its second revision steadied the 5.2 V rail.



50.8 × 62.9 mm · 2 copper layers · 25 footprints · 7 nets

X14 Conversion board, block by block

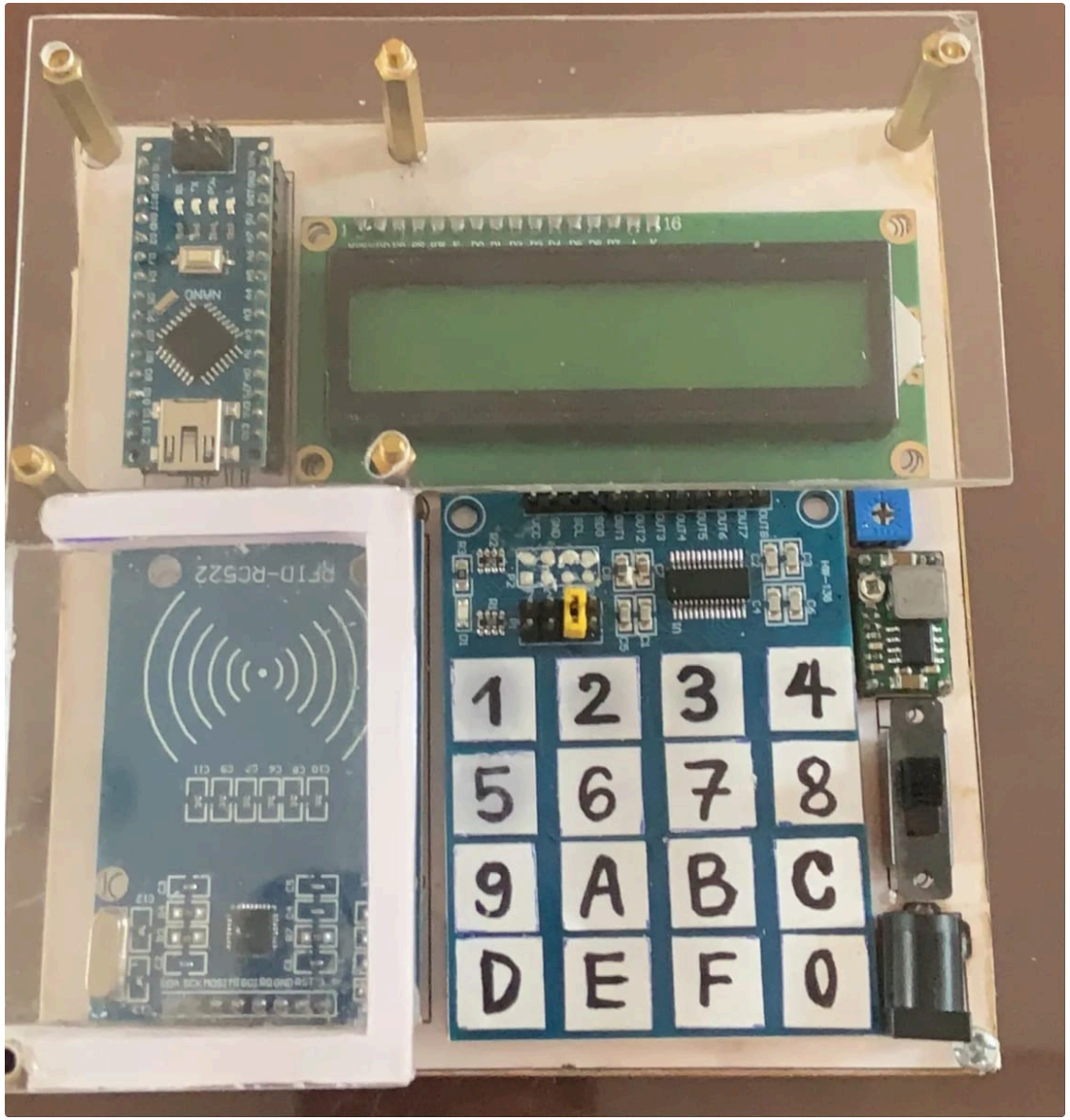


Before Purdue

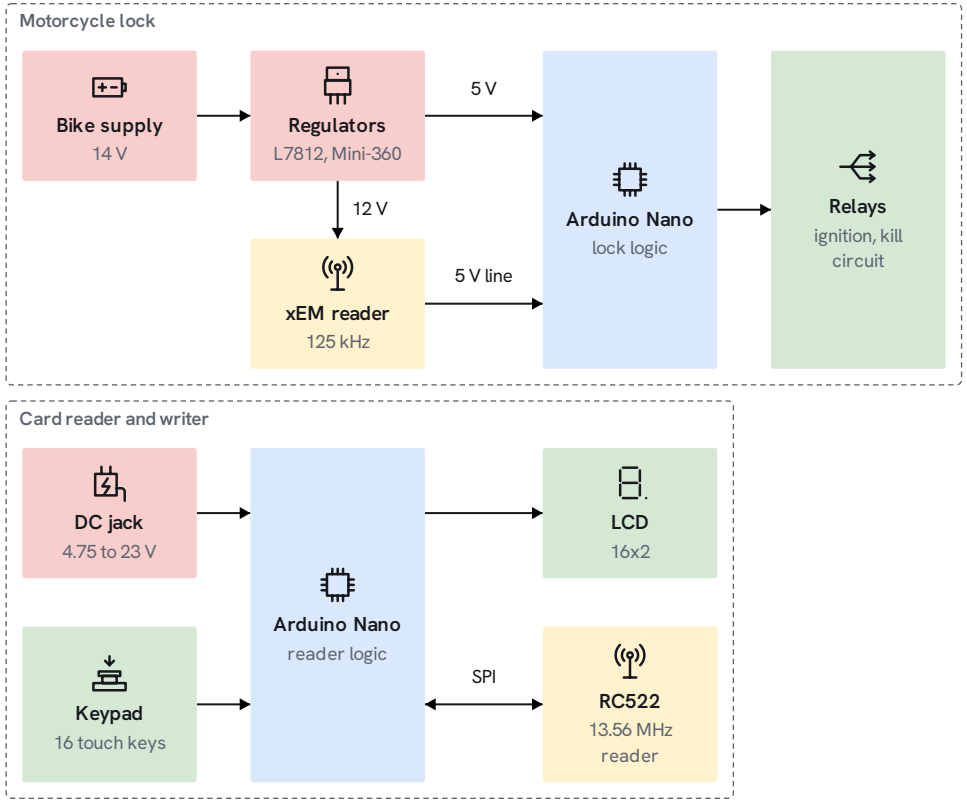
RFID projects, 2021

Jan to Jul 2021 · I designed and built both

A motorcycle lock that opens for an RFID chip implanted in its owner's hand, and a 13.56 MHz card reader and writer. At least seven prototypes got the lock onto the motorcycle.



The two devices, block by block



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