Hail-Met!

An all-in-one multi-purpose helmet for the modern commuter.

Intro

Besides protecting your head from direct contact with hard surfaces, traditional bike helmets don't offer many benefits to consumers. Advanced communication, entertainment, and night-time safety features come standard with every new car, but don't yet exist for cyclists.

Problem

Advanced communication, entertainment, and night-time safety features come standard with every new car, but don't yet exist for cyclists.

More modular solutions (like stand-alone detachable bike head lights) do exist but are easily stolen if they are not detached when the bike is in public.

Bicycle helmets are exposed to the elements (moisture, dust, etc.), so embedding electronic devices into a helmet is no easy feat.

Solution

Our group designed a smart bike helmet. It extends the functionality of traditional bike helmets by adding safety and productivity features like headlights and taillights, turn signals and Bluetooth communication.
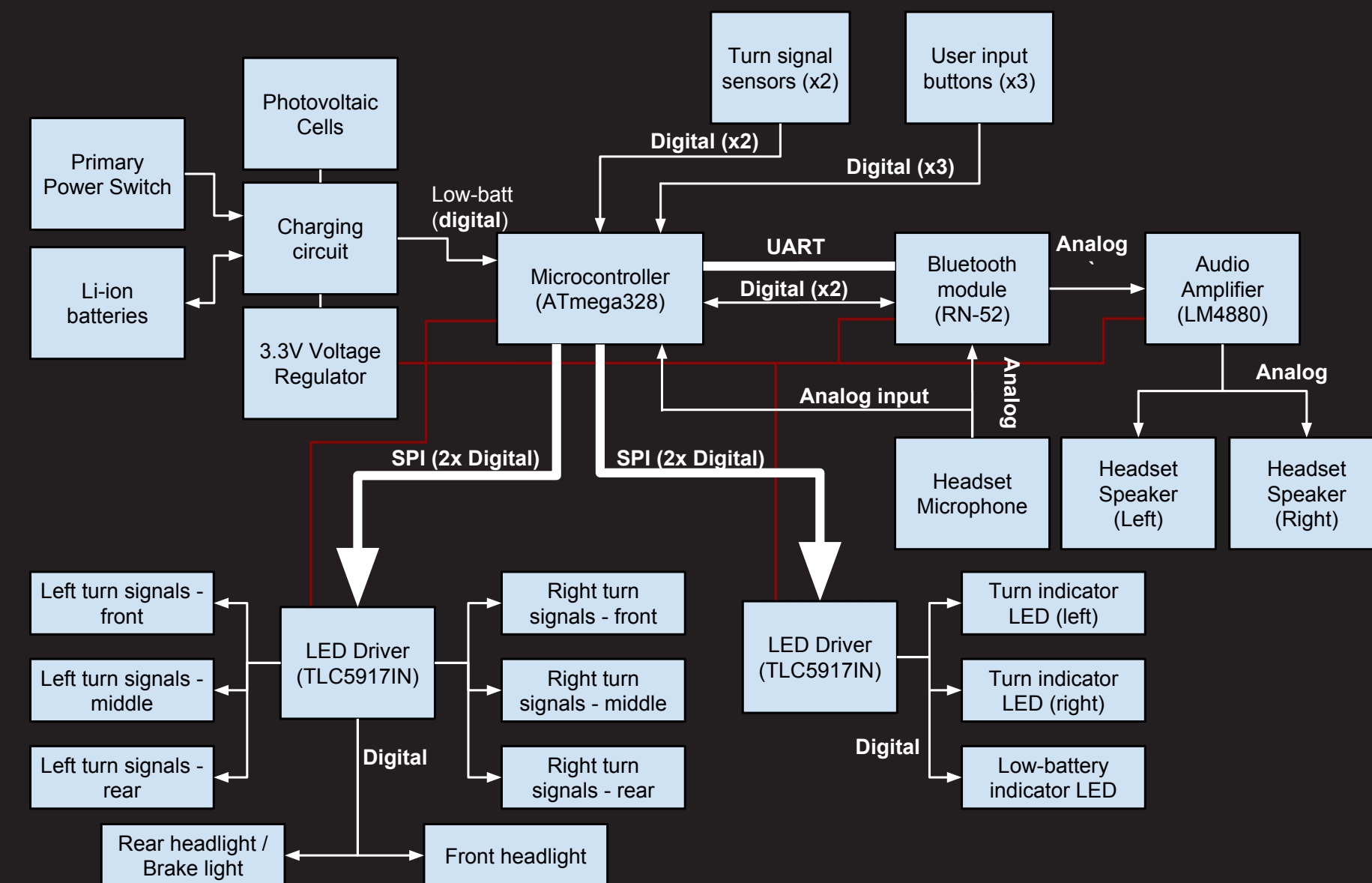
Users will be able to stream music to their helmet while they commute as well as answer incoming phone calls, all over Bluetooth. Rider visibility will be increased due to the remarkably bright LED headlight and the LED turn signals. To top it all off, the helmet will be completely powered by solar panels and a small battery. The user can charge the helmet's battery through any standard USB port, and the solar panels will also charge the battery during your ride!
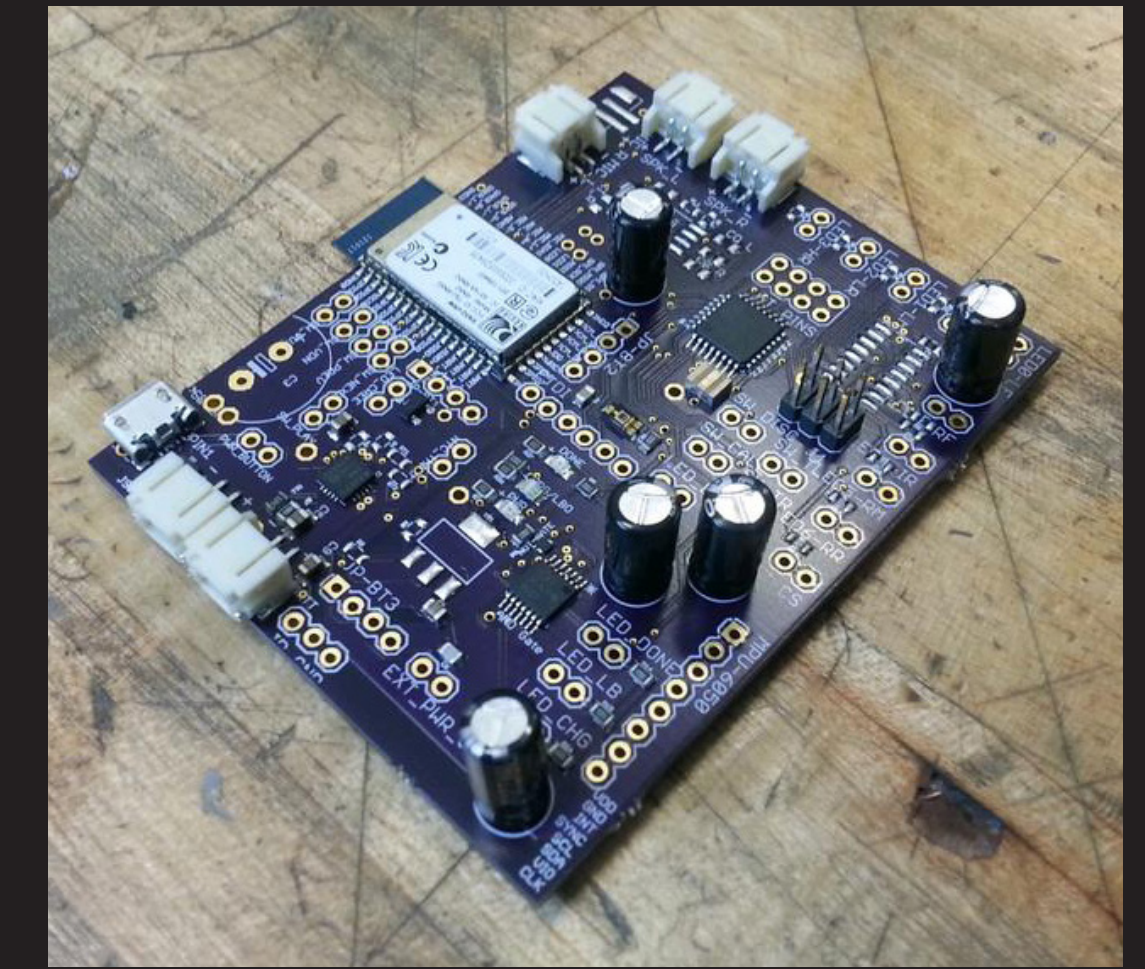
Hardware

PCB with Bluetooth, LiPo Battery, Charging, and LED Driver

Turn Signals, Headlight and Taillight

Solar panels

Speakers

Heads up display (HUD)

Custom PCB

Interfacing & Software Design

The Hail-met runs on an ATMega328 processor that we developed on using the Arduino IDE. We developed our own libraries for each component so that we could more easily write software to interface with them. The software is responsible for monitoring each button and sensor input, and activating each respective component in response.
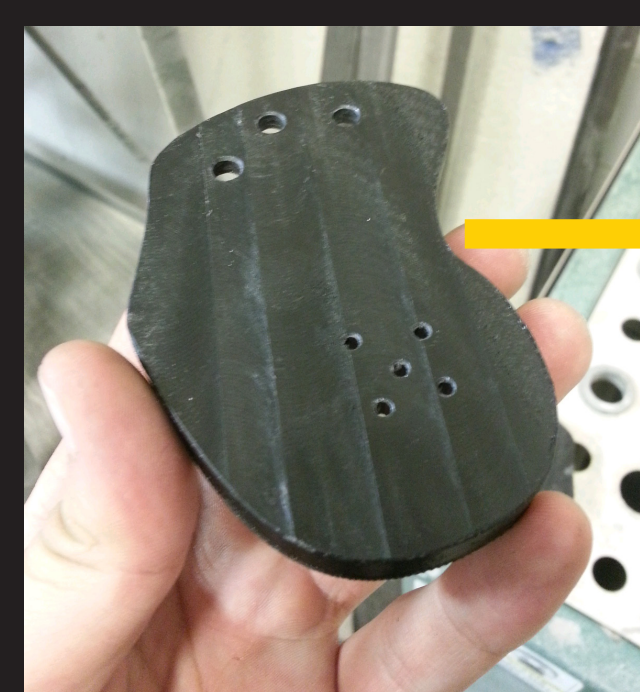
Prototyping, Testing, & Issues
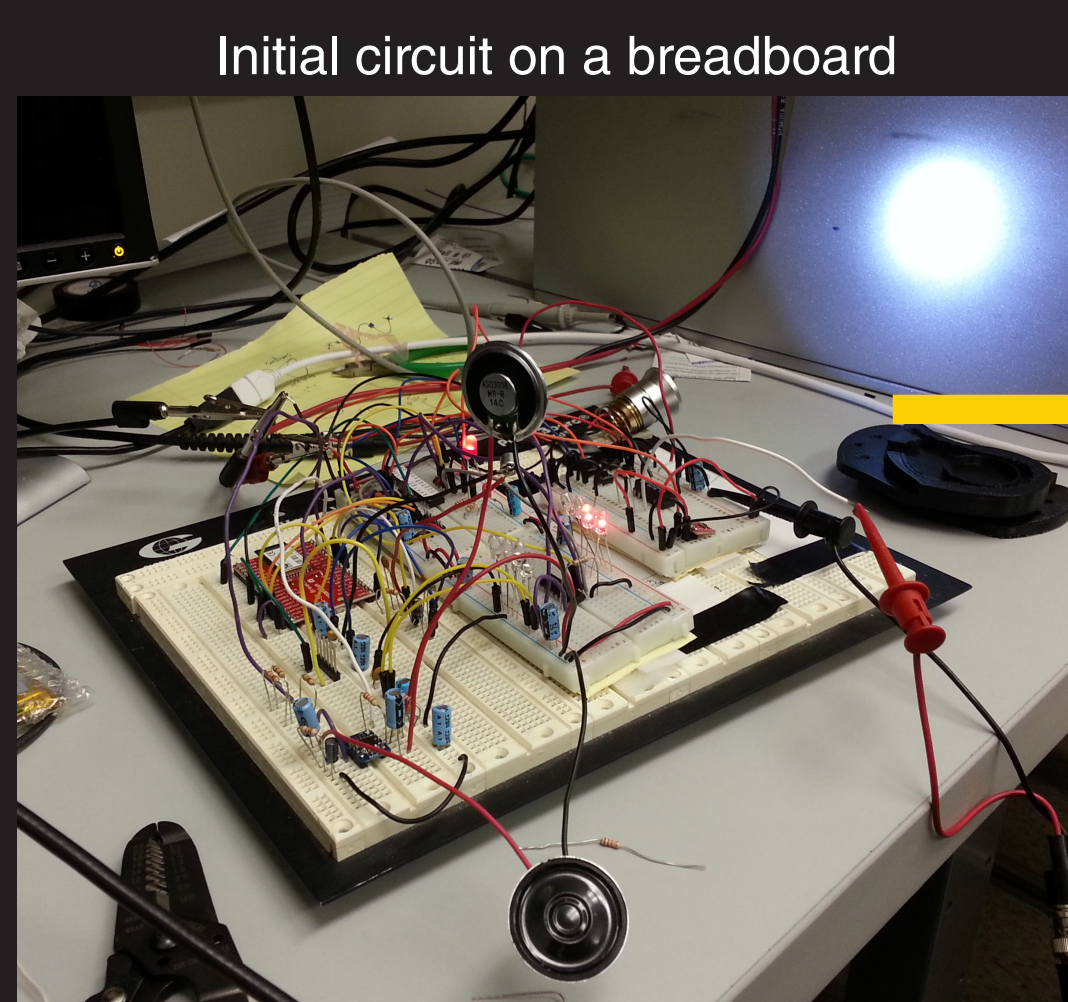
Initial circuit on a breadboard
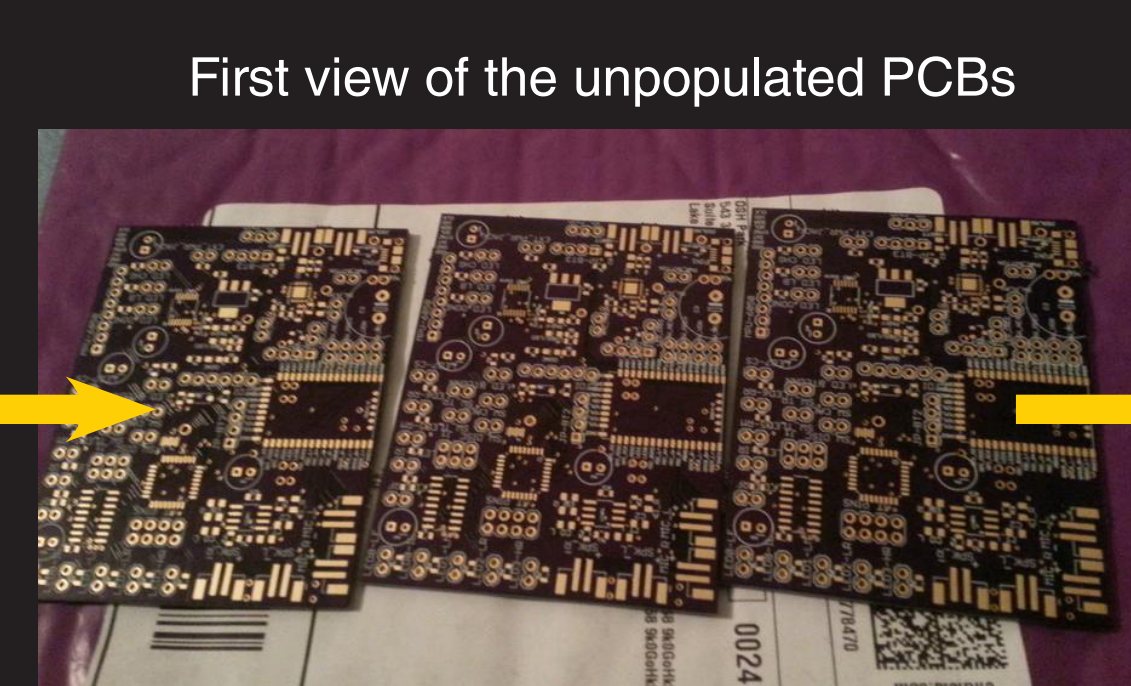
First view of the unpopulated PCBs

Populated, tested, and running PCB

Circuit Progress

Helmet Process

Milled and cleaned 3-D printed part

First mockup of the Hail-met layout

Continuing to add parts to the final prototype

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https://github.com/inventowiz/Hail-Met

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