FEV-60: Flying Electric Vehicle - 60 kW

Team Skytanic

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The Problem

There exist no affordable alternatives to piston internal combustion engines in the experimental amateur built light aircraft category. There are a handful of off-the-shelf components which are aimed at automotive enthusiasts for electric vehicle conversions, but none meet the requirements for use in aircraft. They are too heavy, or lack the safety and redundancy needed for aviation use.

Our Solution

FEV-60 is a first pass at the design of an electric propulsion system for aircraft under 1500 lbs. The system provides an alternative to combustion engines for recreational planes that is optimized for aviation requirements. While FEV-60 needs mechanical components in the future, the current focus is on the electrical systems. These consist of motor drivers, power systems, and battery systems, all of which are fully redundant. FEV-60 also includes a user interface, which interacts with the user via a traditional plane throttle. The plane throttle provides direct input to FEV-60's precise motor control system. FEV-60 provides real time system information to the user. FEV-60 provides users with a fully electric propulsion system that can be implemented in multiple light airframes.

Why Go Electric and E-AB?

Experimental-Amateur Built (E-AB) is 10% of a $16.4 Billion Market

Gas: $40/hour vs. Electric: $3/hour

Benefits: Cleaner, Quieter, More Efficient, Fewer Repairs | Helps: Student Pilots, Amateur-Pilots, the Environment

Software Flow Diagrams

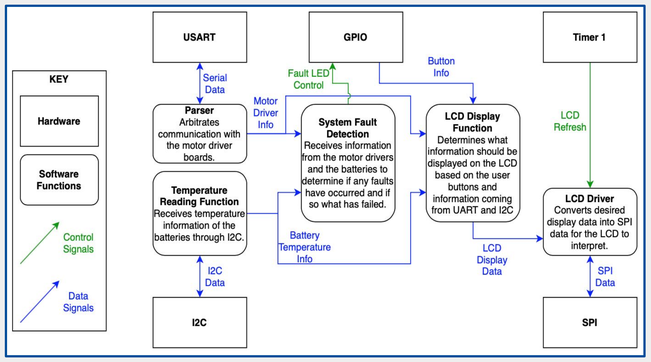

Figure 2: IO Board Software Flow Diagram

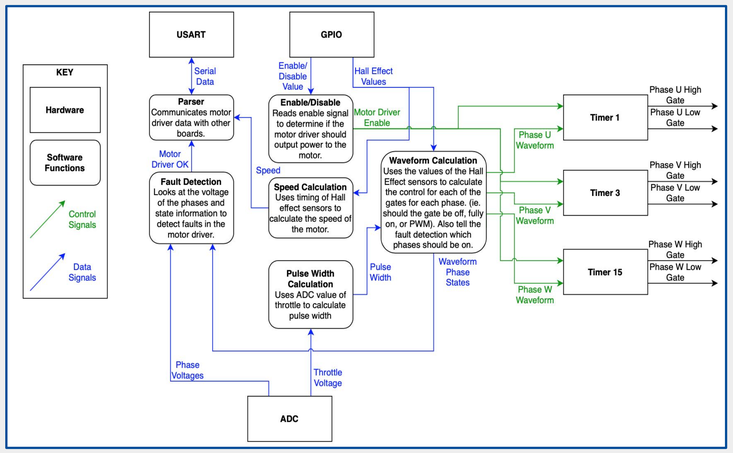

Figure 3: Motor Driver Software Flow Diagram

The System at a Glance

FEV-60 has been designed with system redundancy in mind. This means that if a module such as a motor driver fails mid-flight, the system will continue to operate. This also means the system is modular, and can thus be scaled up easily to meet higher power requirements. The dual motor driver system below is capable of supplying 2 kW to a brushless DC motor.

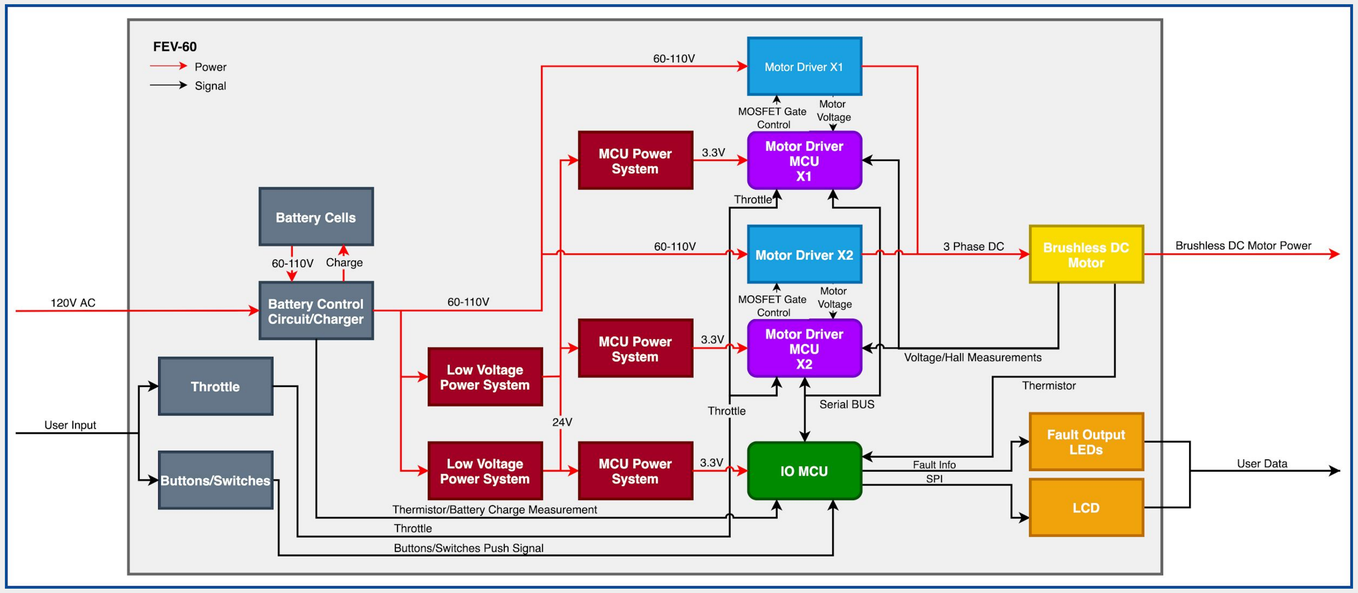

Figure 1: Functional Decomposition

Printed Circuit Boards (PCBs)

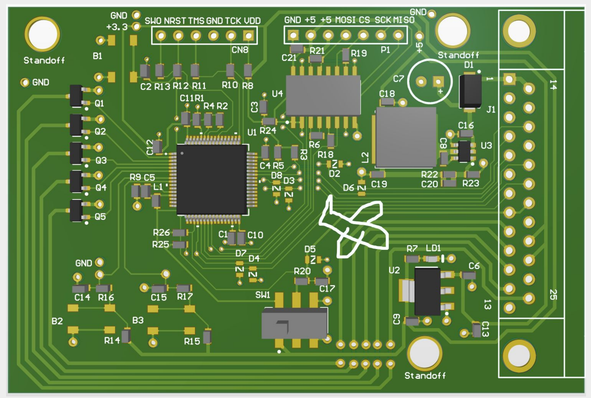

Figure 4: User Interaction Module (MCU/MCU Power)

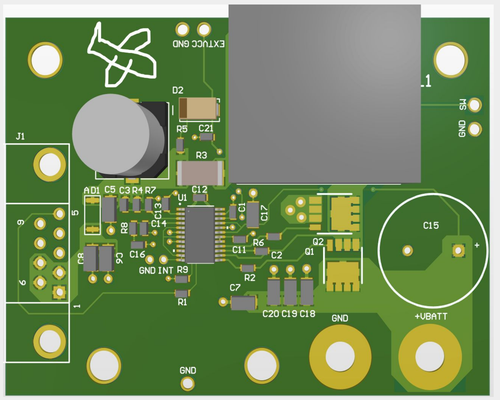

Figure 5: 120V to 24V Module (Low Voltage Power)

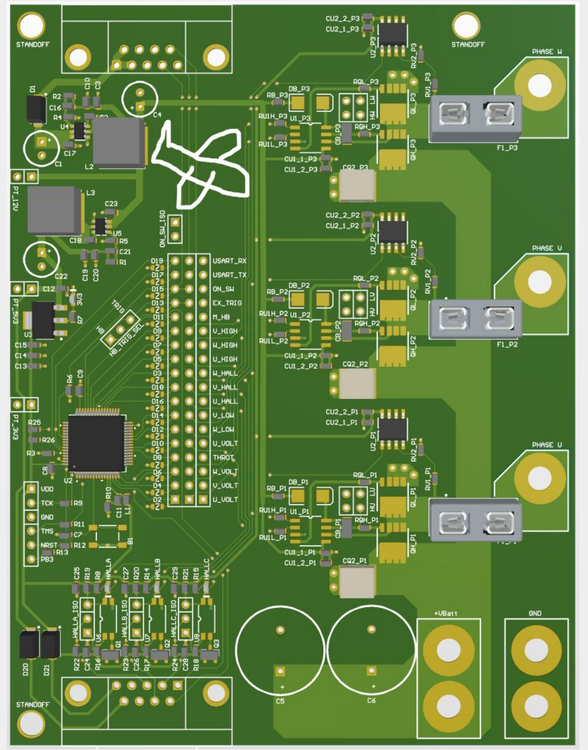

Figure 6: Motor Driver Module (MCU/MCU Power)

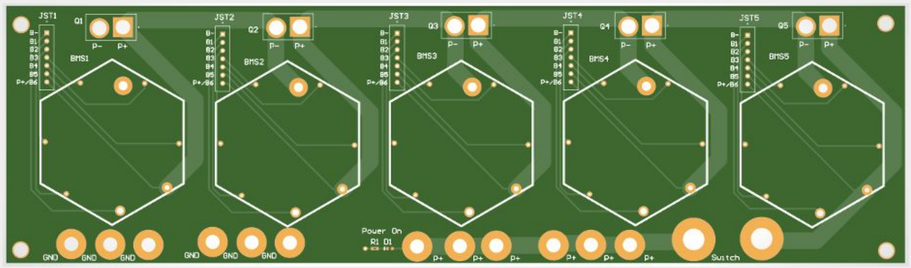

Figure 7: Battery Module (Battery Control)

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