



**Project**  
Advanced Electronics

**Application**  
LED Lighting

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#### Customer Need

A sporting series of portable flashlights that combines the latest rechargeable battery technology along with high-brightness white LEDs to give consumers the next level of advanced lighting solutions. The electronics provide the dimming, spot/flood control, and battery chemistry detection, monitoring and recharging functionality. With previous designs, the light dims as the battery voltage declines, but with smart electronics, a constant current can be maintained until the battery is exhausted and needs to be recharged. The electronics need to be small and efficient to fit in a handheld package while minimizing the production cost. Recharging alternatives include AC, vehicle power, and flexible solar panels.

#### AVID's Solution

Incorporating a switched-mode converter technology, the LED brightness can be maintained while the battery voltage is declining. By implementing a battery gas gauge and intelligent charging algorithms, the Li-Ion batteries can be recharged quickly within safe operating conditions. A variable current limit is implemented for multiple LEDs to control the light intensity and to provide various light patterns. Special thermal techniques including metal clad boards are implemented to address the heat rise of the electronics, and specifically the LED boards.

#### Value Added or Technologies Applied

- Microprocessor Control for LED Dimming and Smart Charging Algorithms
- Switched Mode Power Conversion to Maximize Light Output even as the Battery Voltage Declines
- Special Charge Algorithms for Quick and Safe Charging, as well as Optimization Depending on the Recharge Power Source
- Metal Clad Boards and Other Mechanical Thermal Packaging for Heat Rise due to Concentrated Power of the LEDs
- AVID Supported the Product Specification with the Client, Completed the Hardware and Firmware Design and Prototyping, Validated the Design, and Supported Introduction to Manufacturing



**Project**  
Control Electronics

**Application**  
Home Air Filter/Purifier

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#### Customer Need

As a high end home air filter, this new product required intelligence for functions such as variable fan speed control, dust sensing, filter life monitor, remote control interface. The system has the ability to automatically adjust the fan speed based on the dust in sampled air in addition to a user settable manual mode. A special high speed "turbo" mode is also included for maximum air cleaning. A user panel of LEDs and pushbuttons provides for system monitor and user adjustment. Low cost, high reliability is a requirement.

#### AVID's Solution

A microprocessor-based system was implemented with PWM-controlled output to the fan motor. The micro monitored a dust sensor as well as the user pushbuttons. Control loops were implemented in the firmware for fan speed control. The firmware also controlled the operating modes, kept track of filter life, illuminated user panel LEDs and interfaced via an IrDA port to a remote control device and allows for field upgrades.

#### Value Added or Technologies Applied

- Electronics Specification
- Hardware/Firmware Design
- Prototype and Validation
- Manufacturing Engineering Support, Production Test Procedure



**Project**

Li-Ion Battery Control/Charger Electronics

**Application**

Portable Appliance

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**Customer Need**

The consumer appliance in this case is powered from a removable battery pack which requires a charger. A spare pack may be kept charged and a quick swap allows the user to continue use. The removable pack may also be used to power different appliances. Li-Ion batteries require special care to prolong their life as well as prevent dangerous flare up. Low cost is a key driver in the design.

**AVID's Solution**

A low cost microcontroller was implemented to perform the battery monitoring and charging functions. Provisions for various use cases involving plugging and unplugging, erratic contact during insertion, power draw from the battery during charge cycles, and temperature monitoring for safe operation were implemented. Additionally, a communication channel was added to allow specific battery data to be transferred for status indication.

**Value Added or Technologies Applied**

- Hardware and Firmware Architecture
- Hardware and Firmware Design and Documentation
- Prototype and Validation
- Production Test System Development
- Manufacturing Support
- Manufacturing Techniques and Process Research/Definition



**Project**

RF Electronics

**Application**

Audience Response System

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**Customer Need**

Live audience participation in presentations provides a valuable enhancement to the presentation experience. However, large audiences require the ability to accurately collect large amounts of data real-time and the response devices must not interfere with each other. Battery life and cost are two critical design parameters beyond the primary ability to send reliable RF.

**AVID's Solution**

Our customer had the basic design architecture, but the implementation delivered unacceptable performance. AVID performed a complete review of the design, looking for ways to achieve the required performance while also evaluating the design with regard to cost; either by improvements to the BOM or production processes. AVID also managed initial engineering builds which provided our customer with production-level devices for demonstrations and field trials.

**Value Added or Technologies Applied**

- Hardware and Firmware Architecture Design Review
- Circuit Re-Design and RF Performance Testing
- PCB Layout, Design for Manufacturability
- Prototype and Validation
- Patent Application Support
- Volume Engineering Builds
- Manufacturing Engineering Support

**Project**

Product Design and Production

**Application**

Portable Reminder Device

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**Customer Need**

There are situations relating to a person's job that depend on certain tasks, a repetitive or single event, to occur on time. As people's jobs take on more and more, remembering a multitude of tasks and specific times becomes more difficult. A very simple reminder device was requested that could be customized with special menu options for specific jobs. This is not a PDA and the targeted user does not need be technology driven. Also, cost must be low to make this a viable option for every user.

**AVID's Solution**

AVID took the customer concept and created the complete product design. This includes functional and physical implementation. AVID performed all of the electrical, mechanical and firmware design, as well as created a PC application and a web application to support upgrades and custom configurations. A touch screen provided a simple user interface. A USB port was used for battery charging and downloads from the PC. We set up the production house and provided all of the manufacturing engineering support required for ramping up the product to full production.

**Value Added or Technologies Applied**

- Design Architecture, Component Selection, Battery and Touch Screen
- Hardware, Firmware and Mechanical Design
- PC Application / Web Application Development
- Prototype and Validation
- Manufacturing Engineering Support; Plastic Part Tooling, Production Test, AVL Management, Assembly, Process Review and Support