Dataforth Battery Charger

EE Capstone Project

The Problem

Dataforth Corporation designs and manufactures signal conditioning and data acquisition products for industrial process control. To showcase company products at trade shows, an example application solution that takes advantage of unique product features and utilizes a majority of in-house inventory parts is to be developed. A demonstrator that fits these needs is a battery charger/monitor for a 6 cell LiPo or similar modern technology battery. Once developed, the concept can be transferred to similar small applications or scaled to large applications such as electric vehicles (EV) or home energy storage.

Your Client

Dataforth was established in 1984 to provide signal conditioning, data acquisition, and data communication hazard protection solutions to the ever-enlarging factory automation markets. The original entrepreneurial venture was spawned by the Burr-Brown Corporation, an international leader in analog integrated circuits and related products and now part of Texas Instruments, Inc.

Today, Dataforth is a worldwide innovator of signal conditioning, data acquisition, and data communication products. It maintains a positive revenue growth and delivers a steady introduction of new products offering customers high quality solutions for their industrial applications.

John Lehman

VP Product Development
Mr. Lehman has a Master's Degree in Electrical Engineering from the University of Arizona in Tucson, a Bachelor's Degree in Electrical Engineering from Northern Arizona University, and is a licensed Professional Engineer in the State of Arizona. He was in the first Capstone Design course offered at NAU. During his employment at Dataforth since 1989, Mr. Lehman has been involved in the design and manufacture of all Dataforth products with emphasis on high performance signal conditioning products. Mr. Lehman has written articles on signal conditioning theory and practice which have been published in various trade magazines.

Prototype Milestones

      Fall 2020: Design analysis and simulation, prototyping
      Spring 2021: Purchase and assemble charger, testing

Project Features

       Safe, efficient charger/monitor for a 6-cell LiPo battery

       MSP430 microcontroller for charging algorithms

       Efficient PCB layout and analog circuit design

       Majority parts from Dataforth raw materials stock, other parts provided as needed

       Usage of Dataforth products as applicable

       Simple controls and display for the user

       User settable alarm limits for fault conditions

       Fault detection for defective cells

       Fault detection & user protection against incorrect or missing connection to cells

       115V AC power source

Project Success

Students should present a fully documented, working design to Dataforth. The demonstrator would be robust, efficient, safe and well designed. A successful project team would also meet regularly with the client by video or in person as able and keep them up-to-date with progress. As a trade show demonstrator, the final design needs a user manual for salesmen to operate it, a poster or PowerPoint outlining operation and features of Dataforth products used, and a showcase style display suitable for large format video screen in a trade show booth.

Satisfaction Standards

Exemplary – Design is better than current commercially available chargers in more than one metric of: cost, efficiency, or size.

Good – Design is fully operating, meets all testing requirements, and is ready to use in public demonstrations. Documentation shows path to scaling up to larger batteries.

Fair – Design is not meeting all requirements, missing control or display elements, or not scalable in design. Has minimal functionality.

Poor – Non-working prototype.

Special Team Skills

- Analog design
- MSP430 microcontroller familiarity
- PCB design

Specialty Equipment

Depending upon requirements, Dataforth is ready to supply needed parts at no cost.