110V UNIVERSAL BATTERY CHARGING PANEL USING PIC MICROCONTROLLER

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by

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DECLARATION

The work submitted in this dissertation is the result of my own investigation, except where otherwise stated.

It has not already been accepted for any degree, and is also not being concurrently submitted for any other degree.

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Date: 11/01/2007

We/I endorse the declaration by the candidate.

... ***UOM Verified Signature*** .....

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Abstract

Conventional power electronics and electronic control circuits have been replacing by the intervention of the microprocessors/microcontrollers in modern industrial applications. This is mainly because with their applications the whole systems becomes more and more compact while enhancing the durability. On the other even with the more robust applications hand more accurate & fine operation could achieve by using such modern programming devices.

This project was origin from based on an actual requirement of designing 110v battery charging panel (to energize the batteries in spring charge type breakers)for electrical engineering division of Jaya Container Terminal(J.C.T) of Sri Lanka Ports Authority. But this technique would use to not only to charge batteries of spring charge breakers , but also batteries widely use in VHF communication hand held sets, explosive detectors, emergency lamps, etc...

Rechargeable batteries are vital to portable electronic equipment such as laptop computers and cell phones. Fast charging circuits must be carefully designed and are highly dependent on the particular battery's chemistry. The most popular types of rechargeable batteries in use today are the Sealed-Lead-Acid (SLA), Nickel-Cadmium (NiCd), Nickel-Metal-Hydride (NiMH), and Lithium-Ion (Li-Ion). Li-Ion is fast becoming the chemistry of choice for many portable applications because it offers a high capacity-to-size (weight) ratio and a low self-discharge characteristic.

Depending on the battery chemistry the charging characteristics of a battery differs to each other. In this project simply what I have done is allows the particular battery to follow its charging characteristic curve when they where you could not find in conventional charging techniques. The charging process is controlled by the software program microcontroller (PIC16F876).Since the battery chemistries are different for different types of batteries, several sets of programs would have to written to the controller for each battery given by the manufacturer.

There are some theoretical design calculations included for designing of power electronics modules. (DC-DC converter, square pulse generator, single rail power & dual rail power supplies,etc...) Calculations have been done based on highly theoretical facts. Therefore some practical observations are tends to differ from the theoretical approach. Most of the theories studied in the power electronic lessons of my M.Sc post graduate were widely used in doing above mentioned designs.

At the beginning the actual target was to built a battery charging panel of 110V,but due to some limitations of purchasing of high capacity transformer which suit to this application, the project was limited to 40V panel only. But the concept, approach & the guide line would be more or less same for the more advanced systems also.

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