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Automatic Battery Charger

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Abstract:- We've created an automated battery operating system based on battery status. When the battery is fully charged the status is displayed on the LCD and charging stops, and charging begins when the battery is not fully charged. This is beneficial as it prevents the battery from damaging and charging excessively. We have created an automatic charging system based on its battery status. When the battery is fully charged the status is displayed on the LCD and charging stops, and charging begins when the battery is not fully charged. This is beneficial as it prevents the battery from getting damaged and overcharged.

Keywords:- *Pic16f877a, Electric Sensor, Temperature Sensors, Current Sensor, Esp8266.*

I. INTRODUCTION

The aim of the project is to design an automatic battery charger. The features of the devices are as follows. The device is suitable for closed 12-lead lead-acid batteries, as these batteries are selected for use frequencies. The device contains a pic16f877a microcontroller that constantly monitors Voltage, Current and Battery temperature. Permanent cuts and automatic cuts are the methods used to charge the battery. Charging starts when the voltage is below 12v and turns off when the voltage is above 12v.

II. BOOK RESEARCH

Mr. V. Krishnamurthy, Rashmi Varma, Sonali Tribhuvan and Afrin Shaikh designed the battery charger for closed 12V lead-acid batteries. The device is designed to include the Charging Unit, the Battery Housing Unit (Drawers) and their separate batteries within the Chargers that can be charged simultaneously. Each Battery Housing unit is provided with its driver circuit, transformer and power supply module. The power supply module is designed for thermal analysis & efficiency and protection in EMI / EMC matters. Once the battery is connected to the circuit, it indicates the charging status of the battery. The battery charging level is indicated by LEDS and the LCD is used to display the battery-powered and current battery power with the 4X4 manual. The type of battery and the remaining charging time are displayed on the screen during charging of the LCD display. PIC 18f452 Microcontroller constantly monitors battery status and displays on LCD. Charging stops when the battery is fully charged, the sound alarm is displayed with a buzzer and finally the drawer of the drawer tray to remove the charged battery. At the front of the charger are 6 buttons, an LCD, a keypad and 6 LEDs. Fast charging and slow charging facilities are provided as required. The main charger circuit is the current constant charging mode. [1]

Crisantus Oden proposes a simple 12volts charger that operates by providing a fixed DC or DC power source for a rechargeable battery. A simple charger does not convert output based on time or battery charging. This simplicity means that a simple charger is less expensive. The battery charger circuit has the ability to convert voltages from one form to another (usually AC to DCvoltages). This process is done using the most important components such as: rectifiers, capacitor to filter and remove ripples from AC source and power control (IC). However, the project is based on the development of a simple 24V / 12volts battery charger with local features to reduce costs. The proposed project design works on 24V / 12V batteries. There is a resistor connected to the battery charger to limit short circuit current. [2]

J.Ripley, M.T.Ansari and J.Dehn use batteries and battery chargers in both DC and AC power systems. This paper contains information on important information related to: battery types; standard DC load recommendations; standard charging features; site and loading conditions affect battery storage and battery life; charger features that improve battery storage and battery life; requirements when using compatible chargers and / or batteries; manual battery monitoring methods; and automatic battery monitoring. [3]

III. DETAILS OF PROPOSED SYSTEM MODULES

A. Pic16f877a

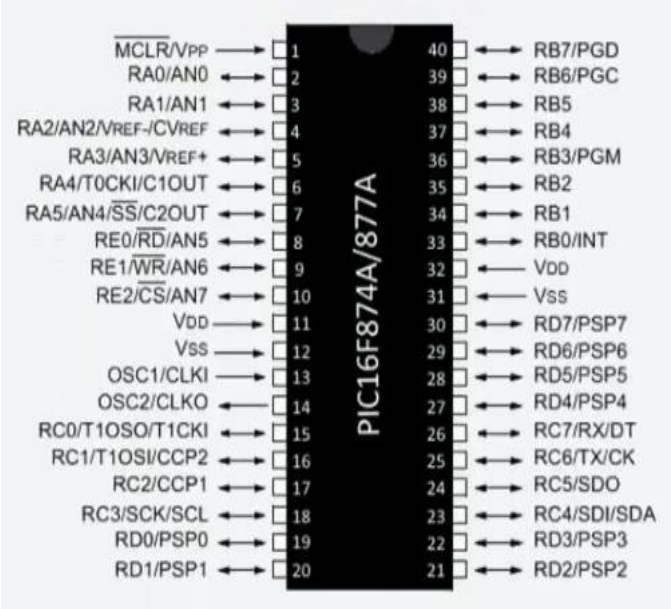

Fig 1:- Pic16f877a

This powerful (200 nanosecond instruction) but easy to execute (only 35 word instructions) CMOS FLASH-based 8-bit microcontroller packs a powerful Microchip PIC® design

in a 40- or 44-pin pack and goes up compatible with PIC16C5X, PIC12CXXX and PIC16C7X devices. PIC16F877A includes 256 bytes EEPROM data memory, editing, ICD, 2 templates, 8 10-bit Analog-to-Digital (A / D) converter channels, 2 scanning / comparisons / PWM functions, a compatible serial port can be configured as a 3 Serial Peripheral Interface (SPI ™) or an Inter-Integrated Circuit (I²C ™) bus with 2 cables and a Universal Asynchronous Receiver Transmitter (USART). All of these features make it ideal for advanced A / D applications in automotive, industrial, electronics and consumer applications.

B. Buck Converter

The buck converter (drop converter) is a DC-to-DC power converter that lowers the voltage (while pulling the minimum current) from its input (supplied) to the output (load). The modified power supply phase (SMPS) typically consists of at least two semiconductors (diode and transistor, although modern color converters often replace the diode with a second transistor used for parallel adjustment) and a single energy storage element. , capacitor, inductor, or these two are combined. To reduce the voltage ripple, capacitors made of capacitors (sometimes combined with inductors) are usually added to the output of the converter (filter next to the load) and inputs (supply side filter). [1] It is called a buck converter because the voltage across the inductor "dollars" or counteracts the supply voltage.

Switch converters (such as color converters) offer greater power efficiency as DC-to-DC converters than line controls, which are simple circuits that reduce voltage by output power such as heat, but do not increase output power.

The efficiency of the color converters can be very high, often over 90%, making them useful for tasks such as converting large computer power, usually 12 V, down to the low voltage required by USB, DRAM and -CPU, which is. usually 5, 3.3 or 1.8 V.

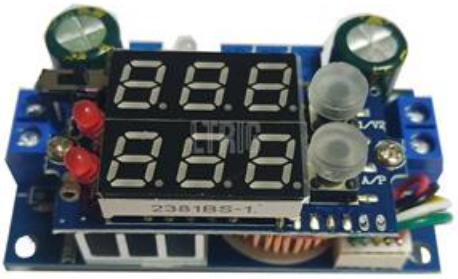

Fig 2 Buck Converter

C. Current Sensor

The ACS712 is a fully integrated current line sensor, based on the hall output with a 2.1kVRMS voltage divider and an integrated ground-resistant current conductor. The technical terms, on the other hand, are simply set as the current sensor that the operator uses to calculate and measure the current value used.

Fig 3 Current Sensor

D. Esp8266

The ESP8266 WiFi Module is a self-contained SOC with an integrated TCP / IP protocol stack that can give any microcontroller access to your WiFi network. ESP8266 is able to host the program or release all Wi-Fi network activities on another application processor.

Fig 4 Esp8266

E. LCD Module

An LCD is an electronic display module that uses liquid crystal to produce a visual image. The 16 × 2 LCD display is the most basic module used in this project to communicate directly with people. 16 × 2 translates o the display of 16 letters in each line on 2 such lines.

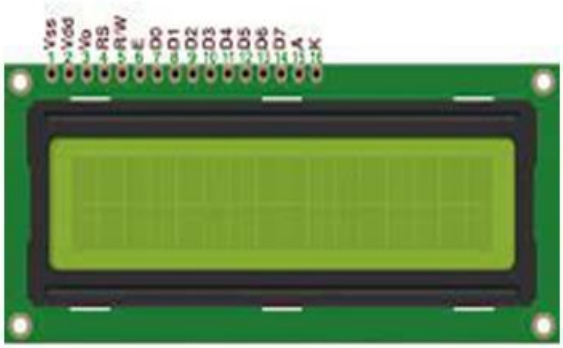

Fig 5 LCD Display

IV. PROPOSED SYSTEM DESCRIPTION

The sensors embedded within the system send information to the control unit and are monitored during continuous operation. If the voltage is less than 12v then the current is checked, if it is mA then charging is started by turning on the relay switch and buck and the charging process stops as soon as the current is not visible.

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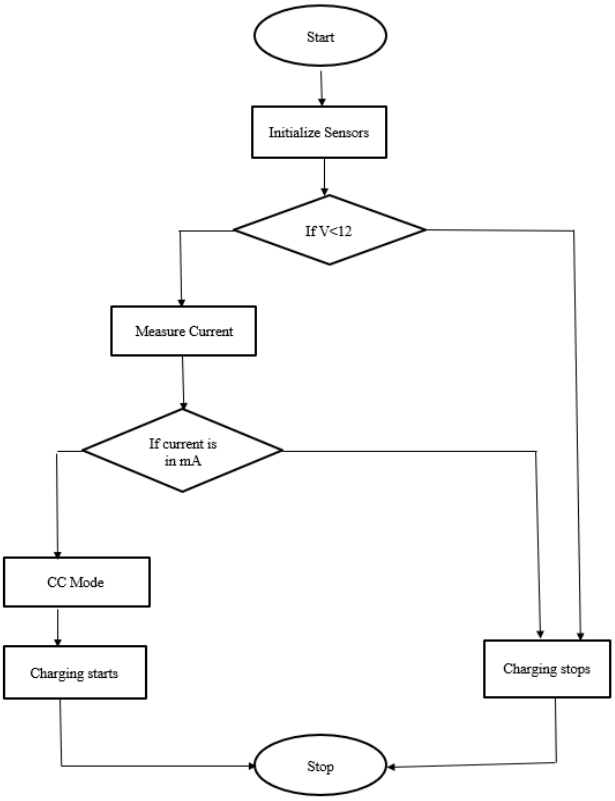

Fig 6

V. WORKING OF THE SYSTEM

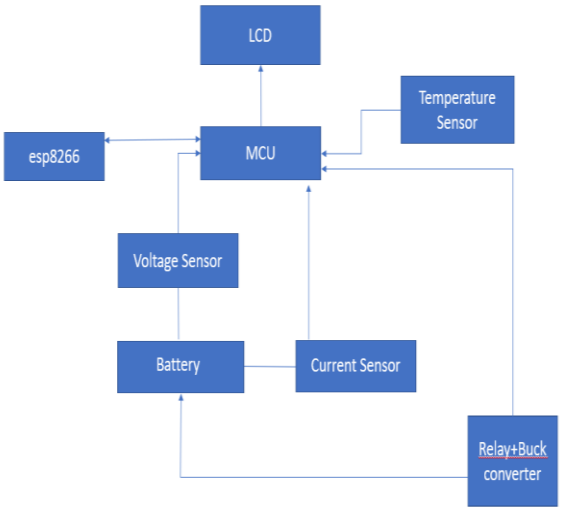

Fig 7

The block diagram contains LCD, MCU (pic16f877a), esp8266, Voltage sensor, current sensor, Relay, Buck Converter, closed acid battery.

Once the battery is connected to the circuit, it then displays the battery charging status on the LCD.

Current sensor and voltage sensor are used to sense current and current voltage in the battery. The MCU constantly monitors the battery status and is displayed on the LCD.

The charging process starts when the voltage is below 12v and stops when the voltage is above 12v with the help of a relay. Finally we receive a notification on the phone via esp8266.

VI. PCB BOARD OUTPUT

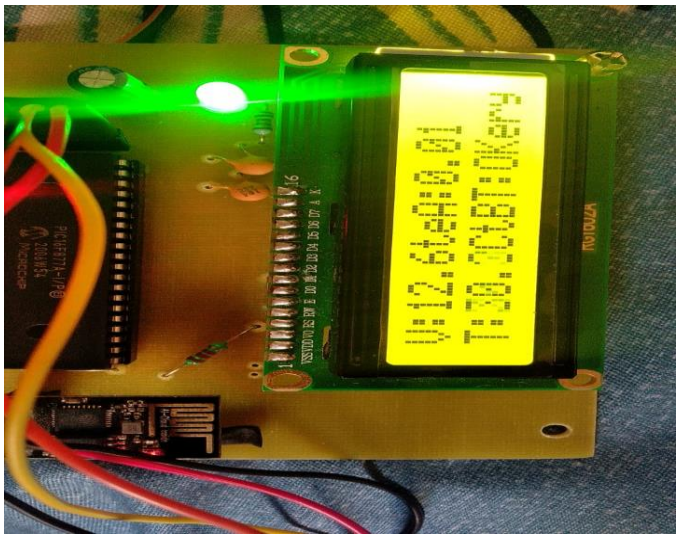

Fig 8:- PCB Board Output

The performance of the proposed system is shown in the figure above where the software provided by the microcontroller contains a voltage and current value, based on which the charging process is determined.

VII. CONCLUSION

The use of Automatic Battery Charge Channel is a new way to overcome the risk of an explosion. It also solved the problem of battery decay. It works well and reduces staff capacity, retention and complexity. There is no need to constantly monitor batteries and charging changes.

THE FUTURE PLAN

For future recommendations, our charging input should be on high to reduce battery charging time. Besides, the charger should come with a small size so that users can use it freely anywhere.

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