ABSTRAK

RANCANG BANGUN SISTEM PENGISIAN BATERE MODE CEPAT BERKAPASITAS 5A BERBASIS MIKROKONTROLLER ARDUINO UNO

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Baterai adalah perangkat penyimpanan energi listrik yang banyak digunakan pada peralatan elektronika, kendaraan listrik, industri militer dan dirgantara. Baterai ion litium merupakan jenis baterai isi ulang yang paling populer untuk peralatan elektronik bersifat mobile. Kehidupan modern saat ini mengharuskan mobilisasi yang tinggi khususnya dibidang peralatan elektronik maka dibutuhkanlah pengisian daya yang cepat dan aman agar peralatan elektronik tersebut bisa digunakan secara mobile dengan efisiensi waktu pengisiannya yang tinggi. Ada beberapa skema pengisian baterai lithium-ion diantaranya metode pengisian *constan current* (CC) dan *constan voltage* (CV), yaitu CC pada awal pengisian dengan tegangan baterai meningkat dari tegangan awal sampai baterai terisi 80%-90%, kemudian baterai akan diisi dengan metode CV sampai terisi penuh. Pengujian pengisian baterai dilakukan pada saat baterai berada di tegangan 3,4 V sampai baterai terisi penuh berada di tegangan 4,2 V dengan arus pengisian 3A dan 4A. Selama proses pengisian pada saat baterai berada di tegangan 3,4 V arus pengisian konstan berada di 3A dan 4 A sampai baterai terisi 80 % kemudian baterai diisi dengan metode CV sampai terisi penuh. Setelah baterai terisi penuh ditegangan 4,2 V pengisian baterai otomatis berhenti dengan mengatur nilai tegangan keluaran *buck converter* di beri *duty cycle* 0 % sehingga tidak lagi memberi supply tegangan terhadap baterai. Dengan dibatasi arusnya 3A proses *charging* berlangsung dalam waktu 127 menit, Sedangkan dengan dibatasi arusnya 4A proses *charging* berlangsung dalam waktu 86 menit sudah mampu mengisi baterai sampai penuh. Penelitian ini menggunakan *power supply*, *buck converter*, mikrokontroler Arduino Uno, sensor arus, sensor tegangan dan keypad. Rangkaian *buck converter* menggunakan frekuensi 10 KHz, induktor 3 mH, dan kapasitor 100 uF.

Kata kunci: Baterai lithium-ion, Buck konverter, Arduino Uno, Arus Konstan, Tegangan Konstan

ABSTRACT

DESIGN AND BUILD OF FAST BATTERY CHARGING SYSTEM WITH 5A CAPACITY BASED ON MICROCONTROLLER ARDUINO UNO

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Batteries are electrical energy storage devices that are widely used in electronic equipment, electric vehicles, military and aerospace industries. The lithium ion battery is the most popular type of rechargeable battery for electronic equipment that is mobile. Today's modern life requires high mobilization, especially in the field of electronic equipment, so fast and safe charging is needed so that electronic equipment can be used on a mobile basis with high charging time efficiency. There are several lithium-ion battery charging schemes including the method of charging constan current (CC) and constan voltage (CV), which is CC at the start of charging with the battery voltage increasing from the initial voltage until the battery is filled 80% -90%, then the battery will be charged CV until full. Battery charging tests are carried out when the battery is at 3.4 V until the battery is fully charged at a voltage of 4.2 V with charging currents 3A and 4A. During the charging process when the battery is at 3.4 V the constant charging current is in 3A and 4 A until the battery is filled 80% then the battery is filled with the CV method until it is fully charged. After the battery is fully charged at 4.2 V, the automatic battery charging stops by setting the output value of the buck converter to give a 0% duty cycle so that it no longer supplies voltage to the battery. With a limited current of 3A the charging process takes place within 127 minutes, while with limited current 4A the charging process takes place within 86 minutes has been able to fully charge the battery. This study uses a power supply, buck converter, Arduino Uno microcontroller, current sensor, voltage sensor and keypad. The buck converter circuit uses a frequency of 10 KHz, 3 mH inductor, and 100 uF capacitor.

Keywords: *Lithium-ion battery, Buck converter, Arduino Uno, Constant current, Constant voltage*