ABSTRAK

OPTIMALISASI PENGISIAN BATERAI *LITHIUM ION* PADA MOBIL DARI PEMBANGKIT SEL SURYA DENGAN SISTEM *BOOST CONVERTER* VARIASI JUMLAH LILITAN DAN DIAMETER

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Pada penelitian ini, telah dilakukan perancangan sistem pengisian baterai Litihium Ion 48 volt 20 Ah dengan menggunakan alat *boost converter* variasi lilitan dan diameter kawat induktor. Boost converter terdiri dari tiga sistem yaitu rangkaian kontrol, *gate driver* dan rangkaian *boost*. Rangkaian kontrol terdiri dari arduino uno dan potensiometer, *gate driver* terdiri dari IC TC4420, resistor 1k ohm dan kapasitor polyester 104 nF, rangkaian boost terdiri dari MOSFET IRFP460, induktor dengan variasi lilitan kawat 96, 42, 18 dan variasi diameter kawat ukuran 0,5 mm, 1 mm, 1,5 mm, kapasitor elco 47 uF/50 V dan dioda schoottky. Arduino uno sebagai pembangkit *pulse width modulation* (PWM) digunakan untuk mengontrol tegangan *output boost converter* berdasarkan nilai *duty cycle* yang diatur menggunakan potensiometer. Hasil penelitian menunjukkan bahwa lilitan dan diameter kawat induktor mempengaruhi keluaran dari *boost converter* dan tegangan baterai hasil pengisian selama 360 menit. Tegangan baterai optimal terjadi saat menggunakan lilitan sebanyak 96 dan diameter ukuran 1,5 mm. *Boost converter* menghasilkan kenaikkan tegangan 2 kali lipat dibandingkan tegangan masukannya. Tegangan *input* panel maksimum sebesar 23,86 volt ketika ditambahkan *boost converter* tegangan maksimum mengalami peningkatan mencapai 51,56 volt.

Kata Kunci : *Boost Converter*, Diameter Kawat, Lilitan Kawat, *Lithium Ion*

ABSTRACT

OPTIMIZATION OF CHARGING LITHIUM ION BATTERIES ON CAR FROM SOLAR CELL GENERATORS WITH BOOST CONVERTER SYSTEM VARIATION OF NUMBER OF TURNS AND DIAMETERS

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In this research, a charging system for a 48-volt 20 Ah Lithium Ion battery has been designed using a boost converter with a variety of windings and inductor wire diameters. The boost converter consists of three systems, namely the control circuit, gate driver, and boost circuit. The control circuit consists of an Arduino Uno and a potentiometer, the gate driver consists of the TC4420 IC, a 1k ohm resistor, and a 104 nF polyester capacitor, the boost circuit consists of an IRFP460 MOSFET, an inductor with a variety of wire turns 96, 42, 18 and a variety of wire diameter sizes of 0.5 mm, 1 mm, 1.5 mm, 47 uF/50 V Elco capacitor and Schottky diode. Arduino Uno as a pulse width modulation (PWM) generator is used to control the output voltage of the boost converter based on the duty cycle value that is set using a potentiometer. The results showed that the inductor winding and wire diameter affect the output of the boost converter and the battery voltage resulting from charging for 360 minutes. Optimal battery voltage occurs when using as many as 96 coils and a diameter of 1.5 mm. The boost converter produces a voltage increase of 2 times compared to the input voltage. The maximum panel input voltage is 23.86 volts when a boost converter is added, the maximum voltage increases to 51.56 volts.

Keywords **:** *Boost converter, Coil of Wire, Diameter of Wire, Lithium-ion*