ABSTRAK

RANCANG BANGUN SISTEM PENGENDALIAN KECEPATAN MOTOR *BRUSHLESS DIRECT CURRENT* MENGGUNAKAN *FUZZY LOGIC* KONTROLER BERBASIS *INTERNET OF THINGS*

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Salah satu jenis motor listrik yang banyak digunakan adalah motor BLDC. Pada penelitian ini akan dibuat sebuah sistem pengendali *closed loop* kecepatan motor BLDC menggunakan Logika *Fuzzy* berbasis *Internet of Things* dengan *Blynk* sebagai *interface* antara perangkat lunak dan perangkat keras. Sistem kendali pada penelitian ini menggunakan Arduino Mega 2560 sebagai mikrokontroler, rangkaian sensor kecepatan, *power supply* 12 volt, rangkaian *gate driver*, rangkaian *inverter* 3 fasa, NodeMCU ESP8266 sebagai mikrokontroler yang terhubung dengan jaringan internet serta motor BLDC 980 kV yang dihubungkan dengan beban berupa generator DC. Sistem kendali logika Fuzzy memiliki input berupa *setpoint*, *error* dan output berupa *delay*. Logika Fuzzy menggunakan metode Mamdani *MAX-MIN* dan memiliki 42 *rule*. Dari hasil penelitian didapatkan kesimpulan pada saat pengujian sistem dengan kontrol logika fuzzy tanpa beban saat *setpoint* 500 rpm, 700 rpm dan 1000 rpm didapatkan rata-rata *rise time* 1,41 detik, *settling time* 2,57 detik, serta *overshoot* 11,6%. Kemudian didapatkan juga kesimpulan pada saat pengujian sistem fuzzy menggunakan beban, kontrol fuzzy mampu menaikkan kecepatan menuju setpoint pada saat sistem diberi gangguan. Sistem pengendalian kecepatan motor BLDC berbasis *Internet of Thing* dapat dilakukan di mana saja dan kapan saja selama perangkat NodeMCU ESP8266 dan smartphone terkoneksi dengan jaringan internet.

Kata kunci: Motor BLDC, Mikrokontroler, Logika Fuzzy, Internet of Things

ABSTRACT

DESIGN AND IMPLEMENTATION OF A BRUSHLESS DIRECT CURRENT MOTOR SPEED CONTROL SYSTEM USING FUZZY LOGIC CONTROLLER BASED ON INTERNET OF THINGS

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One of the most commonly used types of electric motors is the BLDC motor. In this research, a closed-loop speed control system for a BLDC motor will be developed using Fuzzy Logic based on the Internet of Things with Blynk as the interface between software and hardware. The control system in this research uses the Arduino Mega 2560 as the microcontroller, a speed sensor circuit, a 12-volt power supply, a gate driver circuit, a 3-phase inverter circuit, NodeMCU ESP 8266 as the microcontroller connected to the internet network, and a 980 kV BLDC motor connected to a DC generator load. The Fuzzy logic control system has inputs such as setpoint, error, and output in the form of delay. Fuzzy Logic uses the Mamdani MAX-MIN method and consists of 42 rules. From the research results, it is concluded that during the system testing with fuzzy logic control without load at setpoints of 500 rpm, 700 rpm, and 1000 rpm, the average rise time is 1.41 seconds, settling time is 2.57 seconds, and overshoot is 11.6%. Furthermore, it is also concluded that during the testing of the fuzzy system with a load, fuzzy control is able to increase the speed towards the setpoint when the system is disturbed. The speed control system for a BLDC motor based on the Internet of Things can be performed anywhere and anytime as long as the NodeMCU ESP 8266 device and smartphone are connected to the internet network.

Keywords: BLDC Motor, Microcontroller, Fuzzy Logic, Internet of Things