RINGKASAN

RANCANG BANGUN SISTEM MONITORING DAN MANAJEMEN PENGISIAN BATERAI MOBIL LISTRIK MENGGUNAKAN SUMBER DAYA PLN DAN PHOTOVOLTAIC BERBASIS INTERNET OF THINGS

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Pertumbuhan kesadaran tentang pengaruh kendaraan berbahan bakar fosil terhadap lingkungan termasuk polusi udara dan perubahan iklim, telah mendorong permintaan akan energi alternatif yang lebih ramah lingkungan salah satunya dengan mewujudkan mobil listrik yang dianggap sebagai solusi yang lebih bersih karena tidak menghasilkan emisi langsung pada saat beroperasi. Pemerintah telah menyatakan kesiapannya untuk memasuki era kendaraan listrik. Baterai merupakan salah satu komponen utama menyimpan tenaga untuk menggerakan mobil listrik. Seiring dengan perkembangan zaman menyebabkan teknologi semakin maju sehingga sistem digitalisasi memiliki peran penting terhadap kehidupan manusia. Pemerintah Indonesia telah mendorong perkembangan teknologi berbagai inisiatif. Salah satunya ialah program "Making Indonesia 4.0" yang bertujuan untuk memperkuat sektor industri dengan menerapkan teknologi seperti Internet of Things (IoT), big data, dan kecerdasan buatan (AI).

Pada penelitian ini, dilakukan perancangan sistem monitoring dan manajemen pengisian daya baterai mobil listrik menggunakan aplikasi Blynk dengan bantuan Relay, sensor Arus, Tegangan, dan Suhu. Pengujian keseluruhan sistem dilakukan saat kondisi rangkaian paralel terhubung baterai saat kapasitas baterai 25% pembacaan tegangan AC mendapatkan nilai 1.7% kesalahan dan nilai 98.3% ketelitian, pembacaan arus AC 3.8% kesalahan dan 96.2% ketelitian, pembacaan tegangan DC rangkaian Penyearah PLN mendapatkan nilai kesalahan 20.7% dan nilai 79.3% ketelitian, pembacaan arus DC kesalahan 11.3% dan ketelitian 88.7%, pembacaan tegangan DC rangkaian Buck-Boost Chopper sebesar 20% kesalahan dam 80% ketelitian, arus DC 11.5% kesalahan dan 88.5% ketelitian. Ketika baterai mencapai 80% pembacaan tegangan AC mendapatkan nilai kesalahan 1.32% dan ketelitian 98.68%, arus AC mendapatkan nilai kesalahan 5.55% dan ketelitian 94.45%, pembacaan tegangan DC rangkaian Penyearah PLN mendapatkan nilai kesalahan 11.3% dan ketelitian 88.7%, pembacaan arus DC kesalahan 14% dan ketelitian 86%, pembacaan tegangan DC rangkaian Buck-Boost Choper kesalahan 11% dan ketelitian 89%, arus DC 13% kesalahan dan 87% ketelitian.

Kata Kunci: Kendaraan Listrik, Pengisian Baterai, Internet of Things, Sistem Monitoring.

SUMMARY

DESIGN AND IMPLEMENTATION OF A MONITORING AND MANAGEMENT SYSTEM FOR ELECTRIC VEHICLE BATTERY CHARGING USING POWER FROM THE GRID AND PHOTOVOLTAIC SOURCE BASED ON THE INTERNET OF THINGS

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Awareness of the impact of fossil fuel-powered vehicles on the environment including air pollution and climate change has driven demand for alternative environmentally friendly energy sources. One of these solutions is the development of electric vehicles, seen as a cleaner option due to their lack of direct emissions during operation. Governments have expressed readiness to transition into the era of electric vehicles. Batteries constitute a key component for storing energy to power electric cars. As time progresses and technology advances, digitalization systems play a crucial role in human life. The Indonesian government has been promoting technological advancements through various initiatives, such as the "Making Indonesia 4.0" program, aiming to strengthen the industrial sector by implementing technologies like the Internet of Things (IoT), big data, and artificial intelligence (AI). With these reasons in mind, the author has designed a monitoring and management system for charging electric vehicle batteries using resources from PLN and Photovoltaic based on the Internet of Things.

In this study, an electric car battery charging and charging system was designed using the Blynk application, Relays, Current, Voltage, and Temperature sensors. The whole system test was carried out when the parallel circuit condition was connected to the battery when the battery capacity reached 25% AC voltage reading got a value of 1.7% error and a value of 98.3% accuracy, AC current reading of 3.8% error and 96.2% accuracy, DC voltage reading of the PLN rectifier circuit got an error value of 20.7% and a value of 79.6% accuracy, DC current reading of 11.3% error and 88.7% accuracy, DC voltage reading of the Buck-Boost Chopper circuit of 20% error and 80% accuracy, DC current 11.5% error and 88.5% accuracy. When the battery reaches 80% AC voltage reading gets an error value of 1.32% and accuracy of 98.68%. AC current gets an error value of 5.5% and accuracy of 94.5%, DC voltage reading of the PLN Rectifier circuit gets an error value of 11.3% and accuracy of 88.7%, DC current reading of 14% error and accuracy of 86%, DC voltage reading of the Buck-Boost Chopper circuit of 11% error and accuracy of 89%, DC current 13% error and 87% accuracy.

Keywords: Electric Vehicle, Battery Charging, Internet of Things, Monitoring System