

ABSTRACT

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THE IMPLEMENTATION OF EMBEDDED SYSTEMS IN CARGO BIKES

This study focuses on developing an energy meter module for an embedded system-based cargo bike. The module is designed to monitor energy parameters in real-time, including current (A), voltage (V), battery capacity (Ah), energy consumption (Wh), and operational time (h). The project was conducted at Spora EV, a company dedicated to electric vehicle innovation. The development process involved multiple stages, including algorithm design, software implementation, and system testing. The algorithm was crafted to process data from current and voltage sensors. The software was implemented using the C++ programming language to integrate hardware components such as Arduino Nano, current sensors, and an OLED display. Testing was conducted to validate data accuracy through battery discharging and charging methods using a dummy load and solar panels. The test results demonstrate that the energy meter module delivers reliable energy parameter readings with an acceptable error margin. During the discharging test, the battery voltage decreased from 78.89 V to 76.45 V under a stable load. Conversely, the charging test revealed an increase in voltage from 76.05 V to 79.70 V with high efficiency. This project significantly contributes to advancing electric vehicle technology. The developed module integrates seamlessly into the cargo bike, enhancing operational efficiency and promoting environmental sustainability.

Keywords: energy meter, cargo bike, electric vehicle, embedded system, battery testing.