ABSTRACT

Global warming, accelerated by pollution from greenhouse gases (GHGs), has prompted the Indonesian government to take proactive measures in combating carbon dioxide (CO_2) emissions by transitioning to electric vehicles, with an emphasis on electric motorcycles. As a critical component in this endeavour, the government has provided backing for the transition from fuel-powered to electric motorcycles (EM) via the conversion program. Moreover, it is developing the Battery Swapping Stations (BSS) to serve as an infrastructure that facilitates the operation of EM.

In order to secure the sustainability and productivity of this conversion program, a highly advanced battery monitoring system for BSS is necessary. This monitoring system is based on Internet of Things (IoT) and all data collected is transferred by NodeMCU ESP32 microcontroller to the Firebase Realtime Database for real-time monitoring through applications and websites. This system is intended for monitoring the battery's normality status, including battery State of Health (SoH) and cycle, battery power, which includes battery State of Charge (SoC), voltage, and current, battery availability status, battery temperature, and cabin temperatures. Additionally, this system can display the ID of each battery. Additionally, it is designed to be implemented at an economical cost.

Additionally, the system is designed to be cost-effective for widespread implementation. The monitoring system uses Gesits motorcycle batteries. Batteries connected to power undergo a 3-hour monitoring process via designated applications and websites. The system's monitoring yielded several results. Firstly, the new battery has a cycle of 0 and will increase in capacity based on the frequency of charging. Secondly, the optimal temperature for charging the battery is 28°C. Lastly, a fully charged battery has a voltage of 82V. Real-time updates on the battery's status, including battery SoH and cycle, SoC, voltage, current, availability, and temperature, are displayed by the system. The system is also capable of issuing notifications upon the occurrence of specific events.

Keywords: BSS, monitoring, Gesits, Electric Motorcycle, Electric Vehicle, Firebase, IoT