

***Estimation Analysis Of Battery SoC In Green Guardian Equipment Using The  
Coulomb Counting Method***

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**ABSTRACT**

*Power management in Green Guardian automatic sprayers relies heavily on accurate battery State of Charge (SoC) estimation. This research analyzes changes in battery SoC using the Coulomb Counting method during the discharging and charging process. Data collection is carried out by monitoring voltage, current and load capacity during the tool's operational cycle. Test results show that at the discharge stage, the initial voltage of 13V drops to 12.2V when the load is turned on, then stabilizes for two hours with a decrease in SoC from 96% to 44%. This pattern indicates high power consumption at the start of operations and becomes more stable over time. In the charging stage, SoC increases from 64% to 94% in 330 minutes with a gradual increase pattern which is influenced by fluctuations in sunlight intensity. Analysis of the relationship between voltage and SoC shows almost symmetrical characteristics of power changes during the charging and discharging processes. These results confirm that SoC monitoring is very important to maintain power efficiency and ensure devices can operate optimally. Further development is recommended to improve the accuracy of SoC estimation with a real-time monitoring system and charging optimization using MPPT.*

**Keywords:** *Automatic Spraying Tool, State of Charging (SoC), Coulomb Counting*