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Smart Shopping Trolley with Automated Billing and Theft Prevention

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Abstract: *In modern retail stores and supermarkets, customers often face long billing queues, disorganized trolley storage, and increased chances of theft or unpaid product removal. Conventional shopping trolleys do not provide any automated billing mechanism or security control, which results in time wastage at checkout counters and poor shopping experience. To overcome these issues, this paper presents the design and implementation of a Smart Shopping Trolley with Automated Billing and Theft Prevention.*

The proposed system consists of a trolley with four secure compartments that remain locked until the user scans an item. Once an item barcode is scanned, the corresponding compartment unlocks automatically using a servo motor mechanism. All scanned items are simultaneously updated to a cloud-based billing system (Firebase), enabling real-time bill calculation. The customer can view cart details and total bill on a mobile application and complete payment using a QR code. Additionally, the trolley provides theft prevention using a buzzer alert system that activates if any compartment is forcefully opened or if the trolley attempts to exit without completing payment.

This system improves shopping efficiency by reducing billing time, ensures organized item placement, and enhances store security. The Smart Shopping Trolley provides a practical and scalable solution for modern retail automation using IoT and embedded systems..

Keywords: Smart Shopping Trolley, Automated Billing, Barcode Scanner, IoT, ESP32, Firebase, Theft Prevention, Cloud Billing

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