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Smart-Spend: Excess Shopping Provoker Trolly with an Alert System

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Abstract: Impulsive and excessive shopping behavior has become a prevalent issue in modern society, leading to financial strain and psychological distress for individuals. This research addresses the pervasive issue of overspending by introducing Smart-Spend —a technological solution designed to proactively curb impulsive purchases and promote budget-conscious shopping behavior. The trolley incorporates a personalized budget-setting feature, allowing users to establish spending limits prior to shopping. As items are added, the trolley dynamically calculates the total cost and issues alerts as the set limit approaches. These notifications serve as immediate reminders, encouraging shoppers to evaluate their choices and make informed decisions. Furthermore, the trolley incorporates human following capabilities to enhance user experience and ensure seamless navigation in retail environments. By merging technology and psychology, the Excess Shopping Provoker Trolley addresses the root causes of excessive shopping behavior. It empowers individuals to regain control over their spending patterns and cultivates responsible consumption habits. This innovative solution presents a tangible means of countering the negative consequences of impulsive shopping, fostering financial stability and emotional well-being in today's consumer-oriented landscape.
Keywords: Alert Notification, Excess shopping, Human Follwing, Impulsive buying, Spending limit, Retail environment

I. INTRODUCTION

Excessive and impulsive shopping behavior has emerged as a significant societal concern, impacting individuals' financial stability and emotional well-being. The Smart-Spend Trolly emerges as a response to this challenge, integrating smart technology into the shopping experience to address the root causes of impulsive buying. Prior studies have contributed valuable insights into the psychological and economic dimensions of consumer choices, shedding light on factors influencing impulsive buying behavior and the repercussions of exceeding budget limits. However, the literature lacks a comprehensive exploration of interactive interventions that actively guide consumers in managing their budgets while shopping. The Smart-Spend Trolly not only builds upon this gap but also introduces an innovative approach to address the challenges of impulsive spending through real-time, technology-driven interventions. This research's distinctive contribution lies in its development of the Smart-Spend Trolly, which serves as both a problem-specific and innovative solution to excessive shopping. By prioritizing real-time budget awareness and intelligent notifications, the project not only identifies a critical gap in existing research but also pioneers a practical tool to promote mindful and budget-conscious consumer behavior. This project represents a significant step towards leveraging technology for the betterment of personal finance management in the context of retail therapy. The unique aspect of the research lies in the development of the Excess Shopping Provoker Trolley, which combines intelligent technologies and human following capabilities to promote mindful shopping behavior. This trolley allows users to predefine a spending limit before each shopping trip, ensuring they are mindful of their budgetary constraints. The trolley's alert notification system serves as a timely reminder, notifying users when they are approaching or exceeding their set spending limit. The project's aim is to empower individuals with greater control over their spending habits and promote conscious decision-making during the shopping process.

II. LITERATURE REVIEW

Several studies and research have been conducted in the field of smart trolleys, aiming to enhance the shopping experience and provide innovative solutions to consumer needs. The study seeks to explore how technology and innovation are being used in Indian supermarkets. It will examine different factors that are influencing these changes. In today's fast-moving world, technological advancements are crucial in the retail sector [1]. In case study looks at how people behave when they use physical cash and digital payments like credit cards or mobile apps. It focuses on how these choices affect how much they spend and save [2]. The paper aims to create a way to evaluate how consumers make decisions when buying things in supermarkets.

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It will use a method called "multi-grade fuzzy approach" to do this. This approach helps understand how people decide what to buy [3]. A project presents SMART, a robotic trolley with RFID-based automatic item scanning and real-time cost calculation for queue-free checkout. It utilizes a Kinect Sensor to autonomously trail customers during shopping [4]. This paper introduces the Smart Mobile Autonomous Robotic Trolley (SMART) prototype, designed to aid consumers by minimizing shopping time and analyzing products for accurate billing, ultimately streamlining the shopping experience [5]. In research of a multifunctional trolley using technologies like Arduino-based guided movement, barcode-based tracking and billing, and Android UI. It also offers automatic parking and charging, enhancing customer shopping convenience [6]. In an automated system where items placed in the trolley are recognized and displayed on an LCD screen with prices, contributing to seamless billing. Removal of items updates the central billing via GSM, enhancing shopping convenience and efficiency [7]. The paper proposes an advanced solution for modern shopping malls: the Smart Trolley project, utilizing RFID technology to automatically scan and display purchased items' prices on an LCD, minimizing queues, and addressing COVID-19 concerns [8]. The paper proposes a smart shopping system using RFID and Raspberry Pi to automate billing for items in mall trolleys, displaying total cost on a trolley-attached TFT screen, enhancing shopping efficiency and anti-theft measures [9]. This project presents an automated line-following shopping trolley with a smart system, using a portable robot to guide users to supermarket items and an Android app interface, addressing convenience and safety concerns [10].This project designs a smart trolley with Arduino NANO, RFID, and barcode scanner to improve shopping convenience, replace traditional trolleys, and maintain social distancing through mobile app synchronization, addressing COVID-19 concerns [11]. In introduces an automated customer-following trolley with RFID and Raspberry Pi, simplifying shopping by calculating total costs of grocery items in the trolley, minimizing queues, and enhancing customer experience [12]. The study investigates software engineering challenges for smart devices in public spaces, revealing survey results that highlight the significance of socially-aware and ethical behavior in smart gadgets, with over 80% agreement [13]. The paper proposes a low-cost UHF RFID-based "Smart Trolley" system for real-time item tracking and efficient stock management in retail, addressing shortcomings of barcode and historical purchase patterns like AmazonGo [14]. The project introduces a Smart Trolley with RFID, Arduino, and Wi-Fi, enabling efficient shopping by facilitating instant payments and real-time stock monitoring, enhancing customer experience [15].

III. METHODOLOGY

The shopping trip is initiated by initializing the smart trolley system. The trolley utilizes RFID technology to scan and identify items as they are placed inside. Each item is equipped with an RFID tag containing relevant information such as product details and price. As items are scanned, the trolley keeps track of the total cost. The bill is displayed on the LCD screen attached to the trolley, showing the accumulated amount. Then the trolley compares the total cost with the predefined budget limit set by the user. If the total cost is below the budget limit, the shopping continues, and the trolley proceeds to scan additional items. If the total cost exceeds the budget limit, the trolley triggers an Arduino command. Then Arduino sends a command to a GSM module integrated into the trolley. The GSM module communicates with a mobile network and sends a notification alert to the user's mobile device. Upon receiving the notification alert, the user is informed that the budget limit has been exceeded, and they should stop shopping to avoid overspending. This methodology ensures real-time tracking of the total cost, immediate notification in case of a budget limit breach, and allows users to make informed decisions about their shopping expenditure.
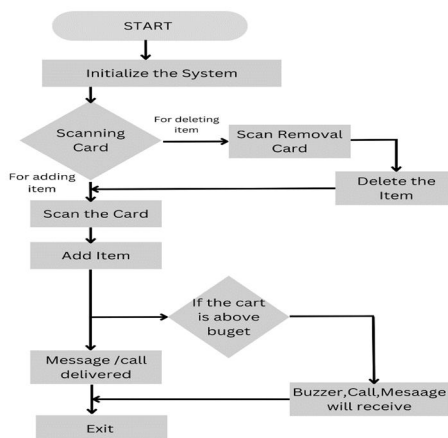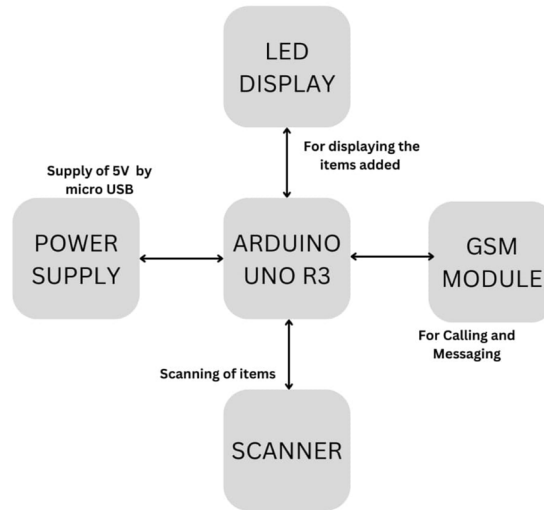

Fig. 1: Flowchart
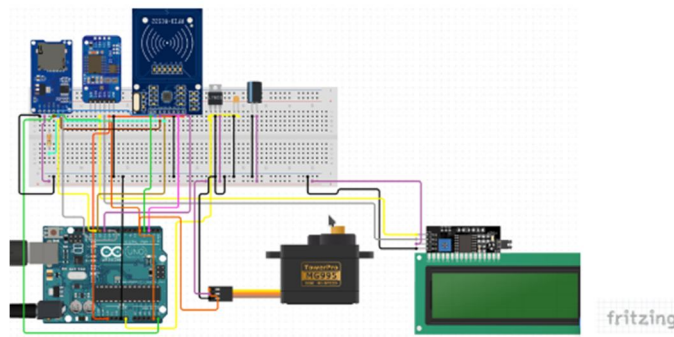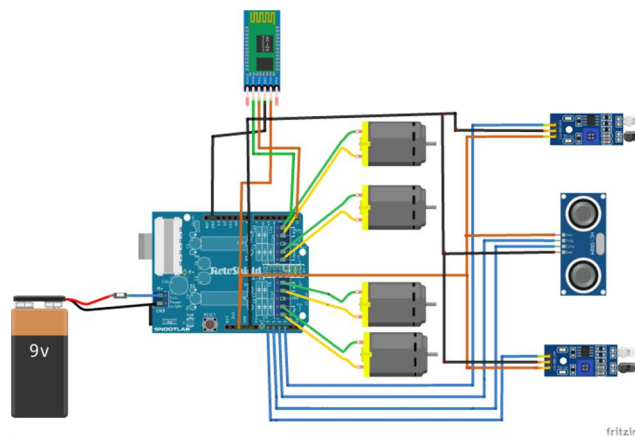
Fig. 2: Block Diagram

Fig. 3: Circuit Diagram

Fig. 4: Circuit Diagram of Human Following Bot

IV. RESULTS AND DISCUSSIONS

Preliminary testing of the Excess Shopping Provoker Trolley demonstrates promising results. Users reported increased awareness of their spending habits and a greater sense of control over impulsive shopping behaviors. The trolley's alert notification system effectively reminded users when their spending limit was approaching, prompting them to make more informed purchase decisions. The human following capabilities of the trolley ensured a smooth shopping experience, allowing users to focus on their shopping needs while eliminating concerns about the trolley's navigation.

Fig. 4: Proposed System

Items	Quantity	Cost
Basmati Rice	2 kg	Rs. 110
Slippers	1	Rs. 99
Notebooks	3	Rs. 135
		TOTAL: Rs. 344

Table 2: LCD displaying the list of the items purchased and total cost.

Fig. 5: LCD display of welcome screen.

V. FUTURE SCOPE

In the future, there is a potential to create a trolley that can shop on its own by looking at a shopping list using advanced image processing. This trolley would be able to move around the store, find the items on the list, and keep track of their prices in real-time. It would require improvements in recognizing different products and navigating crowded store environments. Collaboration with retailers would be important to make sure the trolley fits well into existing store systems. This kind of trolley could make shopping much easier, saving time and helping people stick to their budgets.

VI. CONCLUSION

The Excess Shopping Provoker Trolley stands out for its user-friendly interface, making budget management accessible to all. Equipped with real-time tracking and customizable budget alerts, it transforms the shopping experience into a proactive and mindful financial activity. By seamlessly integrating technology into the everyday task of shopping, this innovative solution empowers users to make informed decisions, fostering a sense of financial responsibility. Say goodbye to impulse buying and hello to a more conscientious approach to shopping with the Excess Shopping Provoker Trolley – where budget control meets modern convenience, helping you achieve both your financial goals and a stress-free shopping experience.

VII. ACKNOWLEDGEMENT

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