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Cart Ease with Automated Billing System

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ABSTRACT:

This project introduces an Automated Shopping Trolley System designed to revolutionize the traditional retail shopping experience. Leveraging state-of-the-art technologies such as RFID, microcontroller atmega328p, and sensor systems, the proposed system aims to streamline the shopping process, improve customer convenience, and enhance overall operational efficiency.

The core of the system involves integrating RFID tags onto retail products, each containing unique identification information. As a shopper adds items to the automated shopping trolley, an RFID reader automatically scans and registers the products in real-time. The Atmega328p microcontroller acts as the central processing unit, managing the data from the RFID reader and other sensors embedded in the trolley.

This system works on the DC supply.

Keywords: Arduino, microcontroller atmega328p, RFID, EM18, and 4x4 Matrix Keypad

I. INTRODUCTION

In the dynamic landscape of retail, technological advancements continuously shape and redefine the way consumers interact with the shopping environment. The conventional shopping experience is undergoing a paradigm shift as innovative solutions emerge to streamline processes, enhance customer convenience, and elevate overall efficiency. This project introduces an Automated Shopping Trolley System, an integration of cutting-edge technologies such as RFID, Atmega328p microcontroller, and intelligent sensors, designed to revolutionize the traditional retail shopping experience.

II. PROBLEM STATEMENT

Inefficient checkout processes, manual inventory management, and a lack of customer engagement in traditional retail settings underscore the need for the Automated Shopping Trolley System, which integrates RFID, Atmega328, and smart sensors to streamline checkout, automate inventory tracking, and enhance the overall shopping experience.

III. NECESSITY OF PROJECT

A smart shopping trolley with Arduino, LCD, thermal printer, and a 4x4 keypad could enhance the shopping experience by providing features like item tracking, real-time pricing, and customizable shopping lists. The LCD can display information, the keypad enables user input, and the thermal printer can generate receipts. It combines technology with shopping for a more efficient and interactive process.

IV. LITERATURE SURVEY

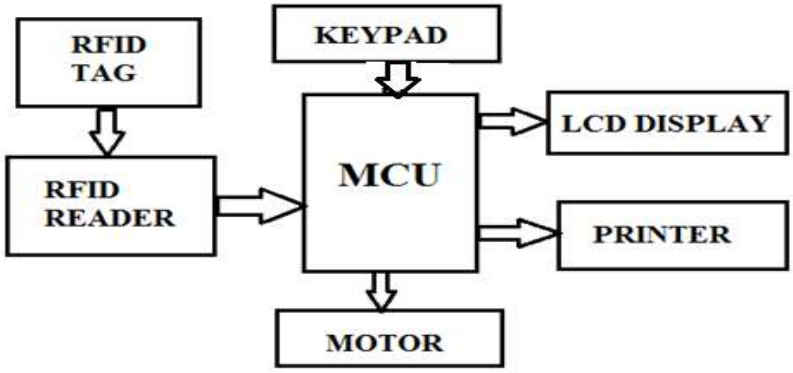
The literature on smart shopping trolleys with Arduino, LCD, thermal printer, and a 4x4 keypad underscores their potential to enhance user experience, automate processes, and address security concerns. Studies also explore market trends, consumer adoption, and sustainability considerations while acknowledging challenges and proposing future improvements.

V. METHODOLOGY

When a consumer selects a product to purchase, they are required to use an RFID tag to scan the item. The rewards for that specific product are contained in those RFID tags. The buzzer will sound and the green light will burst as soon as the customer scans the product. The entire prize will be displayed on

the LCD screen following the RFID tag of that specific product being scanned. The customer must scan the last tag after finishing their purchase. After the last tag has been scanned, the red led will blow, and a text message with the final bill prize will be sent to the customer's registered mobile number. The final bill amount and online UPI links for customers to use to safely and conveniently make payments will be included in the text message. The Human Following Robot is part of the trolley's billing circuit. Using an Arduino board, L298N motor driver IC, DC motors, ultrasonic sensors, and other components, this robot will follow its user around. The overall framework's guiding idea is to minimise the effort required of people when they shop.

VI. BLOCK DIAGRAM



VII. HARDWARE

Aurduino-

Fig. 1. Arduino

The open-source electronics platform Arduino is built on user-friendly hardware and software. Arduino boards have the ability to read inputs, such as a light from a sensor, a finger pressing a button, or a message from Twitter, and convert them into outputs, such as starting a motor, turning on an LED, or posting content to the internet. By sending a set of instructions to the microcontroller on the board, you can instruct your board on what to do. You use the Arduino Software (IDE), based on Processing, and the Arduino programming language, which is based on Wiring, to accomplish this. An assortment of microprocessors and controllers are used in Arduino board designs. Sets of digital and analogue input/output (I/O) pins on the boards allow them to be interfaced with different expansion boards (also known as "shields"), breadboards (used for prototyping), and other circuits.

RFID reader EM-18

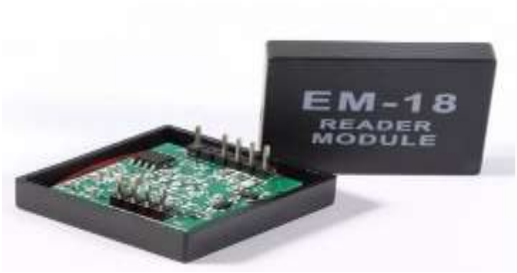


Fig. 2. RFID reader EM-18

Through the use of radio waves, the RFID reader collects data in digital form from the tag that is attached to the item. As a transmitter, the reader requests information from the tags, and the tags, acting as receivers, provide the reader with pertinent data.

The RFID reader operates at different frequencies. The first three frequency ranges are low (125kHz–134kHz) with a distance of 10 cm–30cm, high (13.56MHz) with a distance of 1 m, and ultra-high (865–928MHz) with a distance of 1.5 m–2 m.

RFID Tags

Fig. 3. RFID Tags

There are two types of RFID tags: active tags and passive tags. Active tags generate their own energy due to their built-in self-battery, while passive tags, as their name implies, rely on outside energy to function. These tags are typically utilised because they are inexpensive and come in a variety of shapes.

Liquid Crystal Display

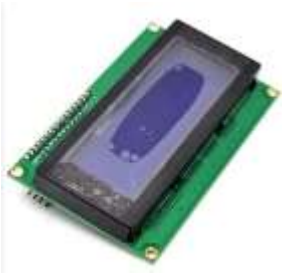


Fig. 4. Liquid Crystal Display

The output of microcontroller is given to LCD. It can display sixteen characters in one line. Its uses 20*4 display. The customers get the data of item as the items are dropped in trolley by displaying Item name, item quantity, item amount with spacing. When items are dropped they get added otherwise gets subtracted. The information of purchased products will be seen on LCD with clarity and list is tabulated below.

I2C

Fig. 5. I2C module

The I2C chip transforms the Arduino's I2C data into the parallel data needed by the LCD. Additionally, it has a backlight jumper that adds a backlight to the display and a tiny trim pot that allows you to adjust the contrast of the display.

Thermal Printer

Fig. 6. I2C module

Thermal printers are dot-matrix printers that operate by driving heated pins against special heat-sensitive paper to “burn” the image onto the paper. They are quiet, but many people don't like the feel of thermal paper, and the images tend to fade.It is used in thermal printers, particularly in inexpensive devices such as adding machines, cash registers, and credit card terminals and small, lightweight portable printers. A receipt printed on thermal paper. A heat source near the paper will color the paper.

Metal gear dc motor

Fig 7. Dc motor

This DC Motor – 30RPM – 12Volts can be used in all-terrain robots and a variety of robotic applications. These motors have a 3 mm threaded drill hole in the middle of the shaft thus making it simple to connect it to the wheels or any other mechanical assembly.

Keypad

Fig.8. Keypad 4 by 4 matrix

A 4x4 keypad has a total of 8 connections, where 4 of them are connected to the column and the remaining rows of the matrix of switches. When an individual button is pressed, a connection is established between one of the rows and columns.

VIII. WORKING PRINCIPLE

The Automated Shopping Trolley System uses RFID technology for automatic product identification, an Arduino Uno for central processing, and a smart sensor system for navigation. As shoppers add items, the RFID reader captures product details, the Arduino processes the data, and the smart navigation system assists users, while an interactive display provides real-time information and facilitates a streamlined checkout process. The system aims to enhance efficiency, reduce checkout times, and provide retailers with valuable data for improved inventory management.

IX. BENEFITS

A. The automated billing system saves time for customers, eliminating the need to wait in queues for billing.

B. Automated billing eliminates the risks of overcharging or human errors; hence more accurate bills are calculated.

C. The smart shopping trolley allows customers to be cash-free. Payment options via credit card or mobile payment systems can be made at the exit.

X. RESULT

Fig.9. Smart Shopping Trolley using Automated Billing System

Emerging trend of online shopping, which cuts down the hassle, at the same time that shopping at stores introduction of environment friendly smart carts and smart baskets not only help the stores to eliminate the surge but also serve to reduce the usage of paper, the number of employees making it more economical and unnecessarily wasted in printing copies of bills. Thus the use of RFID based smart trolleys is of major significance.

XI. CONCLUSION

The smart shopping trolley with automated billing system offers a transparent, efficient, and convenient shopping experience for customers, enabling stores to save time, cost, and resources while meeting customer expectations. The system's successful implementation redefines the shopping experience by bringing a positive impact on customers, retailers, and the market.

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REFERENCES

A. https://www.ijraset.com/research-paper/smart-trolleysystem.#:~:text=The%20main%20idea%20of%20the,total%20amount%20on%20the%20LCD

B. https://www.hilarispublisher.com/open-access/smart-trolley-using-smart-phone-and-arduino-2332-0796-1000223.pdf

C. Shankar,S. K., Balasubramani, S., Basha, S. A., Ariz Ahamed S., Kumar Reddy, N. S. 2021. Smart Trolley for Smart Shopping with an Advance Billing System using IoT, 5th International Conference on Computing Methodologies and Communication (ICCMC), pp. 390-394

D. Sahare P.S., Gade A., RohankarJ. 2019. A Review on Automated Billing for Smart Shopping System Using IOT, Review of Computer Engineering Studies, 6(1) 1-5.

E. Das, T. K., Tripathy A. K., Srinivasan, K.2020, A Smart Trolley for Smart Shopping, International Conference on System, Computation, Automation and Networking (ICSCAN), pp. 1-5,

F. Hanooja, T., Raji, C. G., Sreelekha, M., Koniyath, J., Muhammed Ameen V., Mohammed Noufal, M.2020. Human Friendly Smart Trolley with Automatic Billing System, 4th International Conference on Electronics, Communication and Aerospace Technology (ICECA), pp. 1614-1619,

G. Jaishree, M., Lakshmi prabha, K. R. S., Jeyaprabha, Mohan, K.2021. Smart Shopping Trolley Using IOT, 7th International Conference on Advanced Computing and Communication Systems (ICACCS) pp. 793-796,

H. Athauda, T., Marin, J. C. L., Lee J., Karmakar, N. C.2018. Robust Low-Cost Passive UHF RFID Based Smart Shopping Trolley, in IEEE Journal of Radio Frequency Identification, 2(3) 134-143.

I. Sanap, M., Chimurkar P., Bhagat, N. 2020.SMART-Smart Mobile Autonomous Robotic Trolley, 4th International Conference on Intelligent Computing and Control Systems (ICICCS), pp. 430-437.

J. Kumar Yadav, B., Burman, A., Mahato, A., Choudhary M., Kundu, A. 2020. Smart Cart: A Distributed Framework, 2020 IEEE 1st International Conference for Convergence in Engineering (ICCE) pp. 210-213,

K. Khadka, G., Feng J., Karmakar, N. C.2019. Chipless RFID: A Low-cost Consumer Electronics in the Retail marketplace for Moving Item Detection, IEEE 8th Global Conference on Consumer Electronics (GCCE) pp. 618-621,

L. Sutagundar, A., Ettinamani M., Attar, A.2018. Iot Based Smart Shopping Mall, Second International Conference on Green Computing and Internet of Things (ICGCIoT), pp. 355-360,

M. Rupanagudi S. R. 2015. A novel video processing based cost effective smart trolley system for supermarkets using FPGA, International Conference on Communication, Information & Computing Technology (ICCICT) pp. 1-6,

N. Merilaeinen, O., Wernle M. E., Voutilainen, J. 2007.New properties of UHF RFID transponders on metal with microstrip antennas, 3rd European Workshop on RFID Systems and Technologies, pp. 1-7.