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SMART BILLING SYSTEM

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ABSTRACT

This paper proposes an Al-powered based Smart Billing System designed for amazing shopping experience. The system utilizes an Raspberry-pi for core processing. The System combines the power of computer vision and machine learning to provide an amazing shopping experience. The system provides a faster checkout experience to minimize human interactions in the store to keep shoppers and employees safer during the pandemic.

KEYWORDS; - *Raspberry pi, load Cell, Camera Module.*

● INTRODUCTION

Smart billing system combines the power of computer vision and machine learning to provides an amazing shopping experience. It provides a faster checkout shopping experience to minimize human interactions in the store to keep shoppers and employees safer during the pandemic. Once the items are identified, things are automatically added to the cart and the bill is generated instantaneously. QR code is generated for payment, allowing users to settle their bills swiftly and securely by simply scanning the code with their smartphones. Experience the future of shopping with Smart Billing System, where efficiency meets safety for an unparalleled shopping experience

● LITERATURE SURVEY

A literature review of smart billing systems would encompass various aspects including technological advancements, benefits, challenges, and implementation strategies. Several studies have explored the benefits of smart billing system in various industries.

A. Smart supermarket Billing system Using python

Unmanned retail stores have become increasingly popular in recent years and have a tremendous impact on 's traditional shopping habits. Unmanned retail containers play an important role in this; can significantly affect the shopping experience of consumers, while traditional methods based on weight sensors cannot identify what a customer is consuming. Using the image with the aim of determining, it is possible to realize retail without personal purchase Style.

B. Image Processing System for Automatic Segmentation, And Yield Prediction of fruits using OpenCV

Automatic yield counting becomes a big problem in fruit picking systems. Image processing techniques minimize the manual labour of fruit identification and counting. The document proposes an image processing system for automatic segmentation and prediction of fruit yield based on colour and shape traits. First, pre-processing is performed on the input images of the fruit tree. It is then converted from the RGB colour space to the HSV colour space in order to recognize the region of the fruit from it background.

C. New Object Detection, Tracking, And Recognition Approaches over Camera Network

This article provides a framework for performing these tasks on a non-overlapping network of multiple cameras. A new object detection algorithm using displacement mean (MS) segmentation has been introduced, and occluded objects are further separated by using depth information from stereoscopic vision. The detected objects are then tracked by a new object tracking algorithm using the new Kalman-Bayes filter with Simplified Gaussian Blend (BKF-SGM).

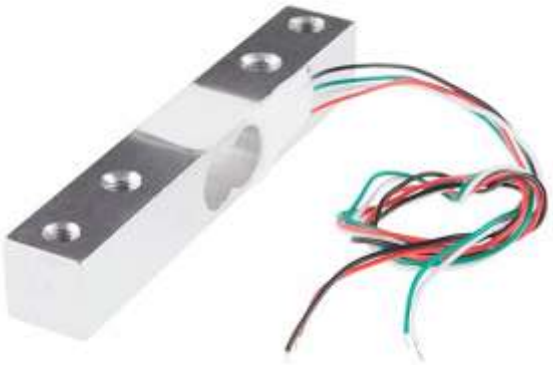
Hardware components:

- Raspberry Pi 4 Model-B
- Weight Sensor (Load Cell) 0-3 Kg
- Load Cell Amplifier Module - HX711
- 5V 2A Power Supply
- REES52 5 Megapixel 160 degrees Wide Angle Camera

1. Raspberry Pi 4 Model-B :

The Raspberry Pi 4 Model B is a versatile single-board computer developed by the Raspberry Pi Foundation. It's the fourth generation in the Raspberry Pi series and offers significant improvements over its predecessors.It features a Broadcom BCM2711 quad-core Cortex-A72 (ARM v8) 64-bit SoC running at 1.5GHz. It also features ethernet port, bluetooth 5.0, Dual micro HDMI ports and 40-pin GPIO header.

2. Weight Sensor (Load Cell) :



The load cell is a sensor or a transducer that converts a load or force acting on it into an electronic signal. This electronic signal can be a voltage change, current change, or frequency change depending on the type of load cell and circuitry used. There are many different kinds of load cells. Here we are using a resistive load cell. Resistive load cells work on the principle of piezo-resistivity. When a load/force/stress is applied to the sensor, it changes its resistance. This change in resistance leads to a change in output voltage when an input voltage is applied.

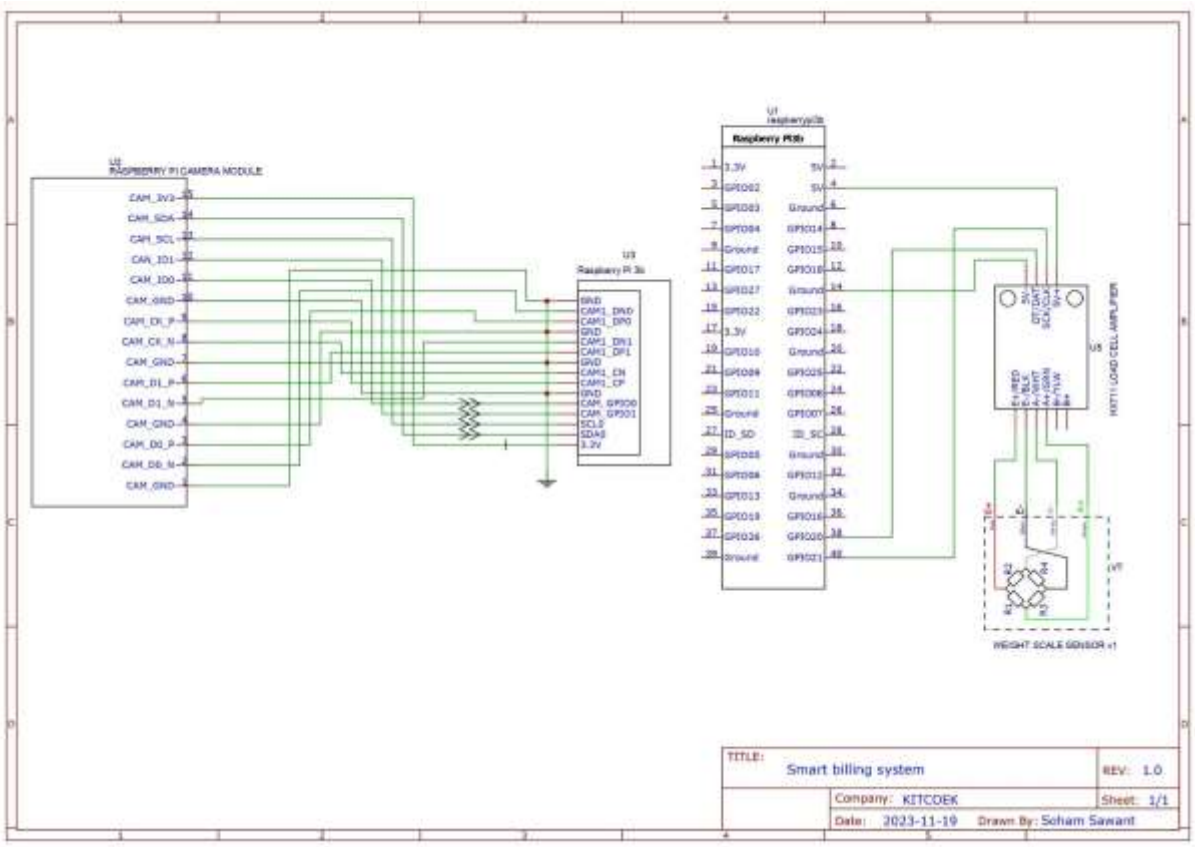
3. Load Cell Amplifier Module - HX711 :

The HX711 module is a Load Cell Amplifier breakout board that allows you to easily read load cells to measure weight. This module uses 24 high-precision A/D converter chips HX711. It is specially designed for the high precision electronic scale design, with two analog input channels, the internal integration of 128 times the programmable gain amplifier.

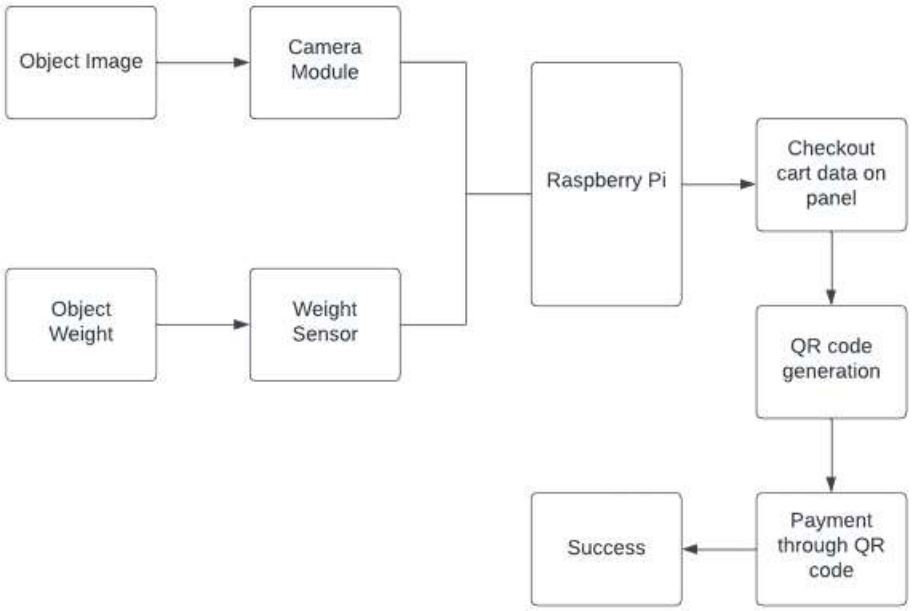
4. Raspberry Pi Camera Module :

Here we are using the REES52 5 Megapixel 160° degrees Wide Angle Fish-Eye Camera for object detection. Due to its high viewing angle, it can cover more area than the normal camera module.

Circuit Diagram :



Block Diagram:



CONCLUSUION

Autobill presents a promising solution for retail stores seeking to streamline checkout processes through AI automation. Its ability to accurately identify items and process transactions efficiently can significantly enhance customer experience while reducing operational costs. With the help of this model consumer will be able to experience instatnt and contact free shopping at checkout terminals. Also, with the payment gateway through QR code, payment can also be donr within few seconds. However, thorough testing and integration considerations are essential to ensure seamless implementation and address any potential challenges.

● FUTURE SCOPE

Advancements in technologies, cashless transactions, multi-product scanning, coin dispensing system, and intensive user interface will result in the fastest growth. The growing demand for professional services and customized software to update the smart-checkout system is expected to impel market growth. The service sector will see more growth over the years, to work efficiently in the store's front end, the retailers will be opting for the smart-checkout system for easy integration, consulting, maintenance, and implementation.

Generate Digital Receipt. Creating a digital receipt involves several key elements:

1. Transaction Information: Include details such as the date and time of the transaction, items purchased, quantities, prices, and any applicable taxes or discounts.

2. Merchant Information: Include the name, address, contact information, and possibly a logo or branding to identify the seller.

3. Customer Information: Depending on privacy regulations and customer preferences, include the customer's name, email address, or other contact information.

4. Payment Information: Specify the payment method used (cash, credit card, etc.), the last few digits of the card number (for reference), and any authorization codes.

5. Receipt Number: Provide a unique identifier for the receipt for easy reference in case of returns or disputes.

6. Additional Details: Depending on the nature of the transaction, you may include other information such as return policies, warranty information, or terms of service.

7. Digital Signature: In some cases, especially for transactions requiring legal validation, a digital signature may be included to verify the authenticity of the receipt.

8. Delivery Method: Specify how the digital receipt will be delivered to the customer, whether via email, SMS, or through a mobile app.

9. Accessibility: Ensure that the digital receipt is easily accessible and can be stored or retrieved by the customer as needed.

10. Compliance: Ensure compliance with relevant regulations, such as GDPR for handling customer data and local tax laws for reporting transaction details.

● **Keeps Transaction History**

Keeping transaction history is essential for businesses and customers a like:

Businesses benefit by:

1. Record Keeping: Maintaining a history of transactions helps businesses track sales, analyze trends, and manage inventory.

2. Customer Service: Having a record of past transactions enables businesses to provide better customer service, such as processing returns or addressing inquiries.

3. Analytics: Transaction history can be analyzed to gain insights into customer behavior, preferences, and purchasing patterns, aiding in marketing strategies and business decision-making.

Customers benefit by:

1. Convenience: Accessing transaction history makes it easy for customers to track their purchases, review past orders, and keep records for personal or business purposes.

2. Returns and Exchanges: Having a documented history of transactions simplifies the process of returning or exchanging items, as proof of purchase is readily available.

3. Budgeting and Planning: Reviewing transaction history helps customers track their spending, budget effectively, and plan future purchases.

Overall, maintaining transaction history benefits both businesses and customers by providing valuable insights, facilitating smooth operations, and enhancing the overall shopping experience.

● ***Screen Promotions and Offers***

Screening promotions and offers involves several key steps:

1. Target Audience Analysis: Identify the target audience for the promotions and offers based on demographics, purchase history, and preferences.

2. Promotion Objectives: Determine the objectives of the promotions, whether it's to drive sales, increase brand awareness, promote new products, or reward loyal customers.

3. Offer Development: Create compelling offers and promotions that resonate with the target audience and align with the business goals. This could include discounts, BOGO deals, loyalty rewards, or exclusive perks.

4. Channel Selection: Choose the most effective channels for promoting the offers, such as email marketing, social media, website banners, in-store signage, or mobile apps.

5. Timing: Strategically time the promotions to coincide with peak shopping periods, holidays, or special events to maximize impact and response.

6. Personalization: Personalize promotions and offers whenever possible based on customer data and preferences to increase relevance and engagement.

7. Measurement and Optimization: Track the performance of promotions using metrics such as sales lift, redemption rates, and customer engagement. Use this data to optimize future promotions and improve ROI.

8. Compliance: Ensure that promotions comply with relevant regulations and guidelines, including advertising standards and consumer protection laws.

By carefully screening promotions and offers, businesses can effectively engage their target audience, drive sales, and enhance brand loyalty.

- **Integration for multiple stores for easy analytics**

Integration for multiple stores for easy analytics streamlines data management and analysis across various retail locations:

1. Centralized Data Management: Integration consolidates data from multiple stores into a centralized platform, making it easier to access and analyze information such as sales, inventory levels, and customer behavior.

2. Unified Reporting: By integrating data from multiple stores, businesses can generate unified reports that provide insights into overall performance, trends, and opportunities across all locations.

3. Comparative Analysis: Integration enables businesses to compare performance metrics between different stores, identifying top-performing locations, areas for improvement, and factors driving success.

4. Forecasting and Planning: *Integrated analytics allow for more accurate forecasting and planning by providing a comprehensive view of sales trends, demand patterns, and inventory levels across all stores.

5. Efficiency and Cost Savings: Centralized data management reduces the time and resources required for data collection, processing, and analysis, leading to increased efficiency and cost savings.

6. Real-time Insights: Integration facilitates real-time monitoring of store performance, enabling businesses to quickly identify issues, seize opportunities, and make data-driven decisions to optimize operations.

7. Scalability: Integrated analytics solutions are scalable, allowing businesses to easily add new stores or expand their operations without significant additional investment in data infrastructure.

8. Data Security and Compliance: Integration platforms prioritize data security and compliance, ensuring that sensitive information is protected and that analytics processes adhere to relevant regulations and standards.

Overall, integration for multiple stores for easy analytics empowers businesses to gain deeper insights, make informed decisions, and drive growth across their retail operations**.**

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