HackFest'19 | IIT ISM DHANBAD

Walmart
Save money. Live better.

Walmart's Problem Statement

INTRODUCTION

No one enjoys standing in a queue for the payment. During holiday seasons, this becomes more chaotic.

Billing in Mall takes lot of time because people have to wait for a long time in a queue for scanning of products and billing. Looking at the advancement in technology, we came up with an innovative idea of "Smart Shopping Cart for Automatic Object Detection and Billing".

We are trying to tackle it with a smart solution. The customers can simply pick up the item and drop it in the cart. And then the sensor will do everything needed. It will identify the items on the cart, match up the price and then as the shopping spree ends, the users can swipe their card at the payment terminal.

"Apna Smart Cart"

Team Members

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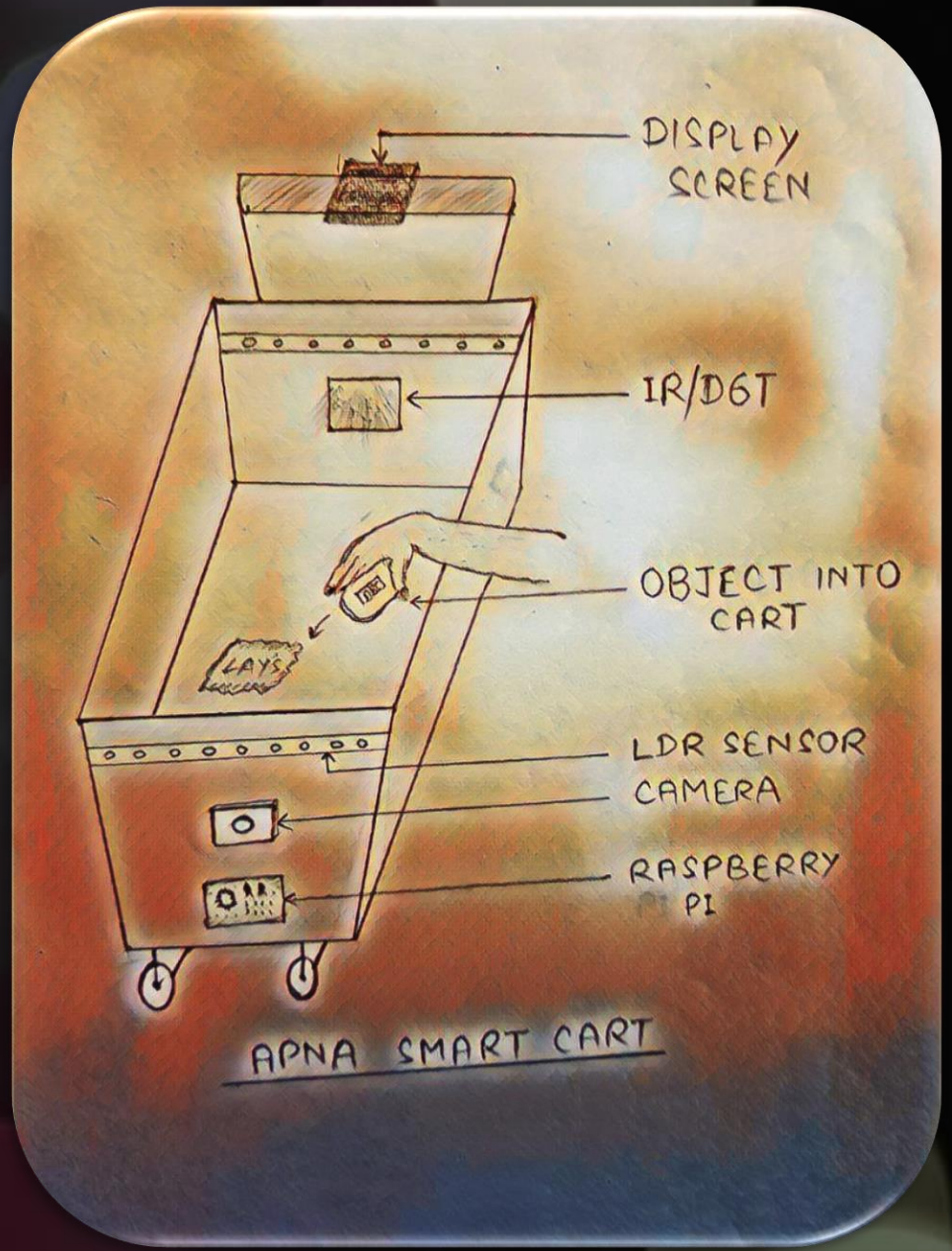


Abstract

With a problem of waiting in a long queue to check-out the shopping items. Our team is developing a Smart Shopping Cart, a system that allows faster check-out. A device that consists of a display screen, AI object detection camera, microprocessor, IR and weight sensor, Zigbee will be implemented on the shopping cart. The customer would simply drop items into the cart or remove it, and the sensor will automize the billing process. The information will be stored and checked against a database to retrieve the appropriate information and update the cart. It also enables the microprocessor to calculate the total price for all scanned items, and display it on the cart screen. Additionally, the concept of Market Basket Analysis and Deep Learning are implemented to recommend items in the store and a GPS system to track the cart. At last, counter with least number of queues will be detected and displayed on the cart LCD. Then, the final bill will be transferred to the counter having least waiting list using Zigbee. The total price will be sent to the cashier using a tag for the respective cart, and the receipt will be automatically printed. All the customer has to do is to pay for the total price without unloading the items from the cart. The team expects that the smart shopping cart will be a more reliable form of check-out process that will decrease the amount of time a customer has to wait while shopping.

WALMART's Apna Smart Cart Workflow

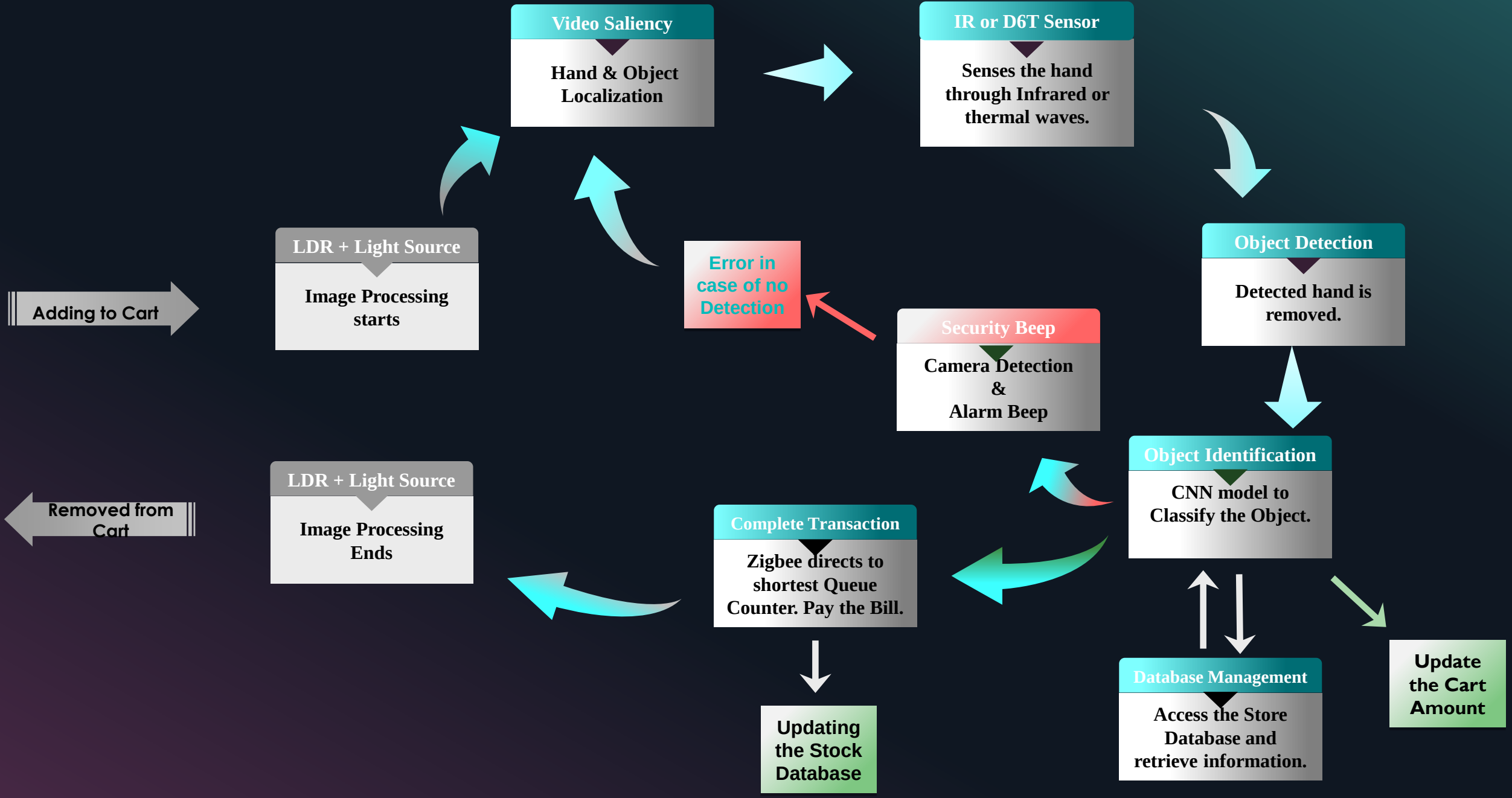


Image Processing

Advanced AI based Image Detection and updating the Stock Database seems the faster and economical approach to list items than Barcode Scanning or RFID Readers.

LDR + Light Source

LDR sensor will help detect the motion and regulate the duration of processing of data.
When an object comes in the vicinity of the cart, sensor will activate the camera.

It would not only help us detect the direction of motion of object but also reduce the image processing data and prevent computational draining.

Saliency Detection

Aims to detect motion saliency while the cart is in rest. This highlights the major area in the frame, here it includes the Hand and the Object.

Removal of hand solely retains the object in frame if any.

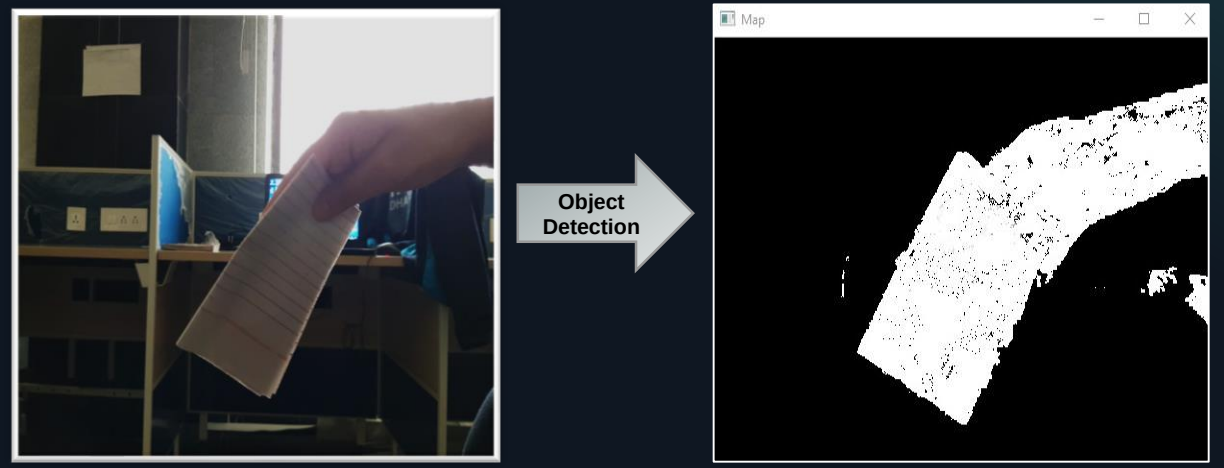
Object Detection

Detection of Hand by two ways: IR Sensor or D6T Sensor (Thermal Sensing).

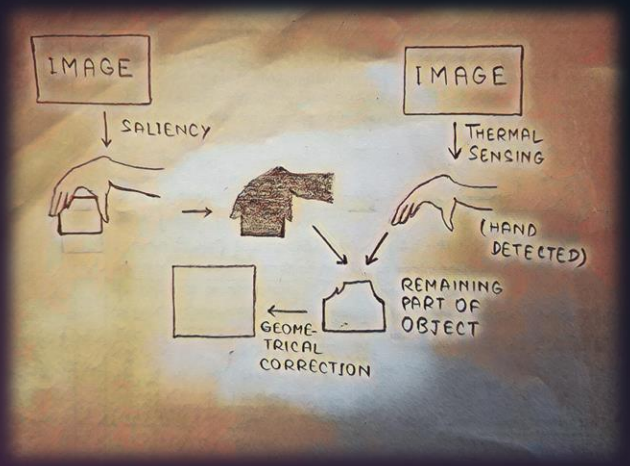
Locates the hand in frame will the remaining part shall be object. To prevent the loss of data (item detected) covered by hand can be geometrically retrieved.

Object Recognition

Object is detected, relevant data is accessed from the database, cart is update and bill is generated against the Item.



Additional Features



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Security

Ensure reliability in service

- Alarm Beep in case of error in Detection
- Cross tally of Detected Item with the stock available in store.
- Suggest the least queue counter for faster billing using Zigbee Sensor.

2

Recommendation

Increase the sales

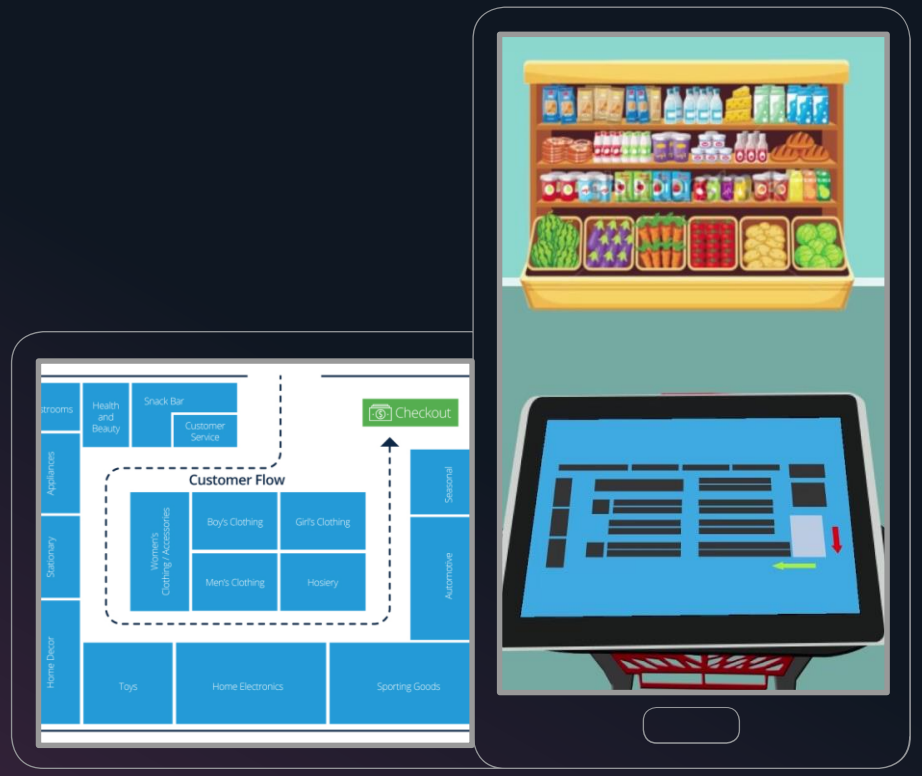
- Recommendation system to suggest similar products and items that compliments the one in cart.
- Notify about available sales and discount offer in similar products.
- Map Navigation to guide for searched item in the store and display in the mobile screen.

3

If Possible

Certain substitution for efficiency

- Inbuilt screen in the cart for efficient usability.
- Smart RFID card to identify customer, store data and better recommendation based on their previous history.
- Weighing scale to track the In and Out of Cart with greater accuracy.



Technology Stack

Image Processing, Motion Detection, Database Management and Invoice Generation for faster and efficient automated shopping.

- Image Processing: OpenCV contrib (Haar Cascading, Motion Saliency and other features), cmake, Tensorflow, Scikit-Image.
- Development board-Raspberry Pi
- Computer Vision-PiCam
- Electronic Modules: IR/ D6T Sensor.
- App Development: Flask, XML, Android SDK (with Java and XML)
- Database Management (MySQL, Mongo DB)
- Web-Server: XAMPP