

Abstract: After examining the traditional barcode system, several problems are found, the following poster attempts to reduce these problems by presenting a mobile-based barcode system. The proposed software will also enhance the customer experience in the store by facilitating the buying process.

1. Introduction

Linear 1 Dimensional (1D) Barcodes are printed black strips of vertical bars attached to almost every product in stores, used to encode less than 20 digits of numbers, scannable by a reading device, presenting a link between computers and the physical world. By 1D it is meant that they are scanned in one direction (horizontally), another type of barcodes scanned in both directions is known as the 2 dimensional barcode (2D). Barcodes play an essential role in point of sale systems, global supply chain management, advertisement, identification, and the safe delivery of health care services. This poster propose a mobile based barcode system. [1]



2. The Problem

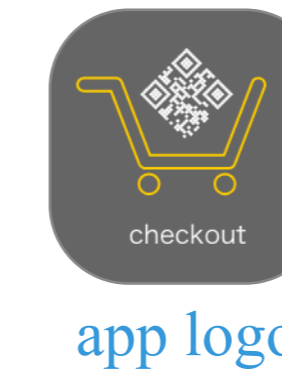
1. Barcode systems are not completely paper-less as a receipt is printed on paper at the end of the buying process.
2. An increasing number of workers is needed for price enquiries.
3. Barcode systems strongly depends on barcode readers devices.
4. The customer is not a real part of the system, contacting costumers and tracking buying habits of them individually is not possible.

3. Related Work

Amazon Go uses computer vision, sensor fusion, and deep learning technologies to allow customers to pick items and leave the store. The only interaction needed is scanning user's 2D code on Amazon Go application when they enter the store. Products taken from or returned to shelves are automatically detected and kept in a virtual cart. After consumers leave the store, they are charged and sent an automatic receipt.[2]

4. Proposed Solution

The proposed system is a mobile application with three user roles: customer, administrator, and cashier. Each role represents an account type that has different view and authorities, depending on its responsibilities and requirements.



The customer has a unique 2D code that is scanned by the cashier at the end of the buying process. In the store customers can scan products with the application for price enquiries. All receipts are available electronically on the customer's application account, and an additional copy is sent to the customer by email.

The administrator is responsible of adding new products to the system and updating prices. The administrator can also manage cashier accounts.

The cashier can perform point of sales transactions by scanning items from the cart and the 2D code from the application on the customer's smart phone at the end of the transaction.



price enquiry process by customer view

5. Implementation Details

The software will be developed on Xamarin cross-platform using C# programming language and SQLite relational database management system. The barcode detection and decoding will be obtained using zebra crossing (Zaxing) image processing library that supports 1D and 2D barcode scanning. The application is going to be available for both android and iOS platforms.

6. Results

After implementing and deploying the proposed system, we expect the results to be as following :

1. Enhanced customer experience as customers can check products prices by their own, inside and outside the store.
2. Less physical effort needed to maintain store daily work.
3. The work will not suspend after a damage in a hardware device.
4. The amount of paper used in buying process is reduced due to the electronic receipts provided by the system.
5. Large amount of customer data available that can be used for tracking customers buying habits.

It is also expected that the system may be associated with these problems :

1. The system may encourage applying bring your own device policy, which is associated with critical security risks.
2. Customers data may be used or stolen by advertisement companies without his/her approval.
3. A traditional barcode system is still needed for the cases that customer do not have an account on the system.

5. Conclusion

Applying the proposed software will provide powerful services for customers, shop keepers, and shop owners. The main advantage of the proposed system for customers is enhancing the customer experience. whilst the shop keepers will benefit from the less physical effort required in daily work. finally the owners gains are reduced cost as less workers, hardware devices, and papers are needed for the system. Apart from few limitations of the proposed software which are mostly security and privacy problems, the new system will provide effective features as the customers are a real part of the system.

References :

- [1] A.Milne, "The rise and success of the barcode: Some lessons for financial services", *Journal of Banking Regulation*, vol.14, no.3-4, pp. 241-254, 2013.
- [2] D. Grewal, A. Roggeveen and J. Nordfält, "The Future of Retailing", *Journal of Retailing*, vol. 93, no. 1, pp. 1-6, 2017.