

# INTERNATIONAL JOURNAL FOR ADVANCE RESEARCH IN ENGINEERING AND TECHNOLOGY

WINGS TO YOUR THOUGHTS.....

## Review on the Barcode Technology of Android Application Development for GST Products Database System

F. Zainal<sup>1</sup>, N. M. Z. Hashim<sup>2</sup>, K. A. A. Aziz<sup>3</sup>,  
N. R. Mohamad<sup>4</sup>, A. Salleh<sup>5</sup>, A. S. Ja'afar<sup>6</sup>

<sup>1,2,4,5,6</sup> Center for Telecommunication Research & Innovation (CeTRI),  
Faculty of Electronic and Computer Engineering,  
Universiti Teknikal Malaysia Melaka,

76100 Hang Tuah Jaya, Durian Tunggal, Melaka, Malaysia.

<sup>1</sup>fathiahbintizainal@gmail.com, <sup>2</sup>nikzarif@utem.edu.my, <sup>4</sup>najmiradhi@utem.edu.my,

<sup>5</sup>azahari@utem.edu.my, <sup>6</sup>shukur@utem.edu.my

<sup>3</sup> Faculty of Engineering Technology,

Universiti Teknikal Malaysia Melaka,

76100 Hang Tuah Jaya, Durian Tunggal, Melaka, Malaysia.

<sup>3</sup>khairulazha@utem.edu.my

**Abstract:** Starting from 1 April 2015, the Goods and Service Tax will be introduced by the Malaysia Government to be implemented in the country. Since there is no such application provided in the market that can help the struggling citizen to recognize the GST goods, hence; this study will compare the existing Goods and Service Tax system and expose the user an idea to know the items with GST. Selected review papers had been chosen as the main reference to review this specific issue that related to Goods and Service Tax. Advantages and disadvantages of the review paper will be tabulated as to compare and to be used in order to produce a user friendly Android application in the future. In conclusion, the grayscale technique was the suitable and convenient to be used in the image processing. Since, the accuracy of the technique is quite high and from all proposed techniques it is the easy one. The emphasis of the 1D barcodes is about the identification, since the scanning of the barcodes (from the android program) going to be connected to the database; this technique will be make the application to be simple and suitable for all type of user.

**Keywords:** 1D Barcode, Android, Barcode, Database, Goods and Service Tax.

### 1. INTRODUCTION

Good and Service Taxes (GST) is not the new thing in the developed countries. The GST was invented by a French tax official in the 1950s and also known as Value-Added Tax (VAT). More than 160 countries in the world have practice the effectiveness on GST and VAT in their country including China, Singapore, Thailand and others. The benefits of GST are to improve standard of living by the revenue from GST could be used for the development of social infrastructure such as health facilities and education institutions. Besides that, it also could increase the global competitiveness since the product of Malaysian exports will become more highly regarded in the global stage. GST also could enhance compliance because the current SST might have few weaknesses and GST system could solve the problems in terms of tax administration. With GST, more businesses can receive benefit from recovering input tax, as to avoid the multiple taxes and higher levels of tax-on-tax (cascading tax) [5]. Since, this the first time Malaysia implementing the GST, Malaysian

is still not familiar with the situation. Citizen also could have some problem to recognize and memorize all the products with the GST charge. Besides that, there is still no application that helps citizen to recognize all GST products yet in the market. Even though, there is a ministry will provide the list of GST items in the early in 2015, still the citizen could not remember all the 944 the items in short time [1]. In addition, problem may occur if the application only provides the list of the product without the scanner, since the items is in the big amount. There are three main objectives for this paper. In order to find the most suitable technique to be used in building an application, these review objectives must be fulfilled. The review objectives are to identify the barcodes reading techniques currently been used or in the market, summarize the comparison between each design by listing down its advantages and disadvantages. Finally this paper will analyze and conclude the most suitable design and technique to be used for designing the user friendly GST products database system.

# INTERNATIONAL JOURNAL FOR ADVANCE RESEARCH IN ENGINEERING AND TECHNOLOGY

WINGS TO YOUR THOUGHTS.....

Year	Country	Rate
1980	 China	17.0%
1985	 Indonesia	10.0%
1985	 New Zealand	12.5%
1991	 Thailand	7.0%
1994	 Singapore	5.0%
1994	 United Kingdom	17.5%
1996	 Philippines	10.0%
2000	 Australia	10.0%
2005	 India	12.5%

Figure 1: GST and VAT rate from the other countries.

## 2. LITERATURE REVIEW

### 2.1. Automatic Location for Multi-Symbology and Multiple 1D and 2D Barcodes.

This paper proposed a general localization framework for extraction of real barcodes under a complex background when multiple symbology types exists in the same snapshot for 1D barcodes, 2D barcodes or both.

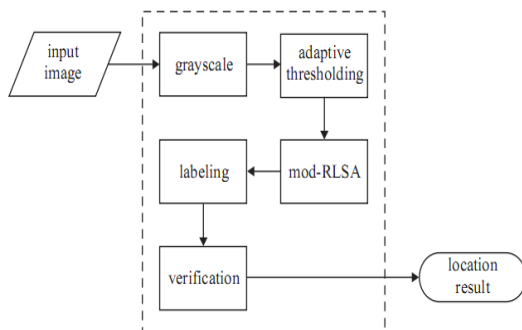


Figure 2: Flowchart of the proposed barcode location framework

This equation below was applied to generate a grayscale image G, which is used as a measure of overall brightness or luminance. R, g and b individually represent red, green and blue channel in an image. The grayscale technique has been proposed by Daw-Tung Lin and Chin-Lin Lin.

$$G(x,y) = 0.299 \times r(x,y) + 0.587 \times g(x,y) + 0.114 \times b(x,y) \quad \dots(1)$$

There are other techniques are listed including adaptive thresholding, application of modified run length smearing algorithm, connected-

component labeling and barcode verification. After the proposed technique was implemented, several of 1D barcodes and 2D barcodes in mixture form were experimented. Experimental result as shown in the figure below [3].

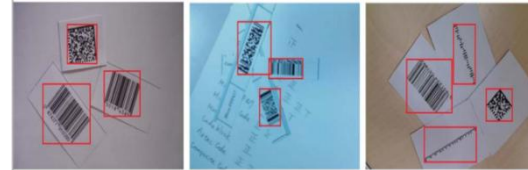


Figure 3: Barcode location result

### 2.2 Reading 1D Barcodes with Mobile Phones Using Deformable Templates.

Barcodes reading need a strong accuracy to surrounding conditions like blur, noise, low resolution, or low quality camera lenses. The proposed approach is relied on deformable templates and exploits all of the gray-level information of each pixel due to the parameterization of the templates. An image containing a barcode, two distinct operations are needed for accessing the information contained in the barcodes: localization and decoding. Localization algorithm assumes that the image of the barcode is captured with camera oriented so that its vertical axis is approximately parallel to the bars. While decoding algorithm analyzes a single scan line extracted from the detected barcode area.

According to Orazio Gallo and Roberto Manduchi, the localization algorithm assumes the barcode image captured is vertical. The image captured has to compute the horizontal and vertical derivatives,  $I_x(n)$  and  $I_y(n)$ , at each pixel n and combine them together in a nonlinear fashion as by:

$$I_e(n) = |I_x(n)| - |I_y(n)| \quad (2)$$

In case of decoding, based on the previous detected end point of scanline, the spatial location is computed for each digit segment in the barcode [4].

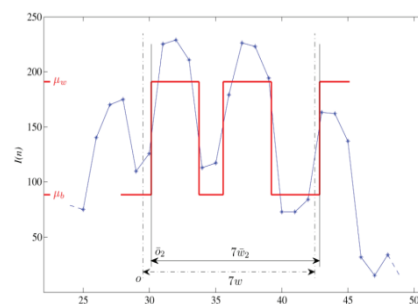


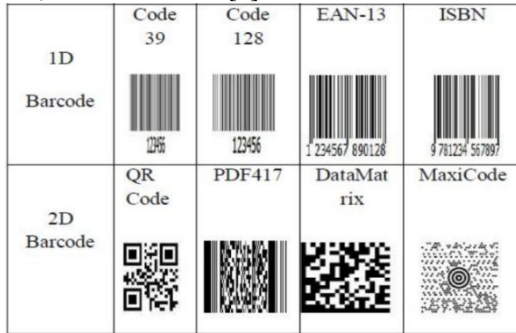
Figure 4: A sample of the intensity profile in a scan line (blue line)

# INTERNATIONAL JOURNAL FOR ADVANCE RESEARCH IN ENGINEERING AND TECHNOLOGY

*WINGS TO YOUR THOUGHTS.....*

### 2.3 A Review on 1D & 2D Barcode with QR Code Basic Structure and Characteristics.

Due to the high speed in decoding, the QR code is widely used in commercial application since it could store high capacity information. Barcodes use the different width between each line to another. For 1D barcodes, the lists of codes are as follows, code 39, code 128, EAN-13, EAN-128, ISBN and so on [6].



**Figure 5:** 1D and 2D barcodes

### 2.4 A Bayesian Algorithm for Reading 1D Barcodes

There are several research on about this algorithm for reading 1D barcodes, including waveform analysis, scan line date (by a laser scanner) and other signal / image processing techniques to detect edges. In Bayesian Model, all knowledge of barcode technology was combines [7-8]. These are including geometric distortion, checksum and few others. From the figure 6, the barcode pattern consists of a group of black and white bars with difference gaps between the bars [9-20]. There are 29 white and 30 black bars, giving a total of N=60 edges. From left to right polarity of edge  $i$  (where  $i = 1 \dots N$ ) is  $(-1)^i$ . Each bar has one of four possible widths: 1, 2, 3 or 4, where is the modulus or fundamental width of the barcodes[21-34].



**Figure 6:** UPC-A barcode, encoding 12 digits

In the checksum part, the digits of barcodes are obeyed to the equation below.

$$[3 \sum_{i \text{ odd}} d_i + \sum_{i \text{ even}} d_i] \text{mod } 10 = 0 \quad \dots(3)$$

$$\begin{cases} 3di & \text{mode } 10 & \text{if } i = 1 \\ (3di + ci - 1) & \text{mode } 10 & \text{if } i = \text{is odd} \\ (di + ci - 1) & \text{mode } 10 & \text{if } i = \text{is even} \end{cases} \quad (4)$$

This mechanism allows for verification of the barcodes by the reader [9-34].

### 3. COMPARISON

From the review paper, few methods for image or signal processing that suitable for new Android Development for GST Products that connect to Database Systems collected. Below are the list and the few advantages and few precautions from the technique.

**Table 1** Comparison of the review paper

Papers	Advantages	Disadvantages
Automatic Location for Multi-Symbology and Multiple 1D and 2D Barcodes.	Include adaptive thresholding, application of modified run length smearing algorithm, connected-component labeling and barcode verification	Cannot handle of real barcodes under complex background when 1D and 2D exits in one snapshot.
Reading 1D Barcodes with Mobile Phones Using Deformable Templates.	Relies on deformable templates and exploits all of the gray-level information of each pixel due to the parameterization of the templates	Effect could occur the reading of barcodes from blur and low resolution.
A Review on 1D & 2D Barcode with QR Code Basic Structure and Characteristics.	Emphasis on the identification of the products. Easy to read by scanning the lines and the spaces.	Limited size of storing (1D). Less safety (1D) compared to 2D

### 4. CONCLUSIONS AND FUTURE WORK

In this paper, there are several types of image processing to recognize the barcodes. For this

# INTERNATIONAL JOURNAL FOR ADVANCE RESEARCH IN ENGINEERING AND TECHNOLOGY

WINGS TO YOUR THOUGHTS.....

project the most suitable is the grayscale technique because the convenient of processing. Since, the accuracy of the technique is quite high and from all proposed techniques it is the easy one. The emphasis of the 1D barcodes is about the identification, since the scanning of the barcodes (from the android program) going to be connected to the database; this technique is simple and suitable.

## Acknowledgment

We are grateful to Centre for Telecommunication Research and Innovation (CeTRI) and Universiti Teknikal Malaysia Melaka (UTeM) through PJP/2013/FKEKK (29C)/S01215 for their kind and help for supporting financially and supplying the electronic components and giving their laboratory facility to complete this study.

## References

- [1] (2014, November 17), Panduan Pembeli senarai barang kena GST, Januari depan, BH Online.
- [2] Technology, B. O., Engineering, C., Naik, A. K., & Engineering, C. (2013). DEVELOPING A LOCATION BASED REMINDER APPLICATION ON ANDROID PLATFORM DEVELOPING A LOCATION BASED REMINDER APPLICATION ON, 1-39.
- [3] Lin, D., & Lin, C. (2013). MULTI-SYMBOLLOGY AND MULTIPLE 1D AND 2D BARCODES, 21(6), 663-668. doi:10.6119/JMST-012-0829-6
- [4] Gallo, O., Member, S., & Manduchi, R. (2011). Reading 1D Barcodes with Mobile Phones Using Deformable Templates, 33(10), 1-10.
- [5] Tax, S. (2014). GST Customs Malaysia, 1-11. Retrieved from www.gstmalaysia.org
- [6] M, R. R., Student, P. G., & Institue, P. (2014). A Review on 1D & 2D Barcode with QR Code Basic Structure and Characteristics, 4(01), 4-7.
- [7] Tekin, E., & Coughlan, J. (2009). A Bayesian Algorithm for Reading 1D Barcodes. Proceeding Canadian Conference on Computer and Robot Vision, 2009, 61-67. doi:10.1109/CRV.2009.31
- [8] NMZ Hashim, NA Ibrahim, NM Saad, F Sakaguchi, Z Zakaria, "Barcode Recognition System," International Journal of Emerging Trends & Technology in Computer Science, vol. 2, no. 4, pp. 278-283, 2013.
- [9] A Salleh, NR Mohamad, MZA Abd Aziz, MH Misran, MA Othman, NMZ Hashim, "Simulation of WiMAX System Based on OFDM Model with Difference Adaptive Modulation Techniques," International Journal of Computer Science and Mobile Computing, vol. 2, no. 9, pp. 178-183, 2013.
- [10] NMZ Hashim, NB Hamdan, Z Zakaria, RA Hamzah, A Salleh, "Flood Detector Emergency Warning System," International Journal Of Engineering And Computer Science, vol. 2, no. 8, pp. 2332-2336, 2013.
- [11] NR Mohamad, ASAM Soh, A Salleh, NMZ Hashim, MZA Abd Aziz, N Sarimin, A Othman, ZA Ghani "Development of Aquaponic System using Solar Powered Control Pump," IOSR Journal of Electrical and Electronics Engineering (IOSR-JEEE), vol. 8, no. 6, pp. 01-06, 2013.
- [12] A Salleh, NR Mohamad, MZ A Abd Aziz, NMZ Hashim, MH Misran, MA Othman, "Design the High Gain and Low Power Amplifier for Radio over Fiber Technology at 2.4 GHz," American Journal of Engineering Research, vol. 2, no. 9, pp. 163-170, 2013.
- [13] A Salleh, MZA Abd Aziz, NR Mohamad, MH Misran, MA Othman, NMZ Hashim, "Simulation of 2.4 GHz Low Power RF Front End Design for Radio over Fiber Technology," International Journal of Emerging Trends in Engineering and Development, vol. 5, no. 3, pp. 345-354, 2013.
- [14] SH Husin, MYN Hassan, NMZ Hashim, Y Yusop, A Salleh, "Remote Temperature Monitoring And Controlling," International Journal for Advance Research in Engineering and Technology, vol. 1, no. 8, pp. 40-47, 2013.
- [15] NMZ Hashim, MHA Halim, H Bakri, SH Husin, MM Said, "Vehicle Security System Using Zigbee," International Journal of Scientific and Research Publications, vol. 3, no. 9, pp. 03-09, 2013.
- [16] SH Husin, AA Ngahdiman, NMZ Hashim, Y Yusop, AS Ja'afar, "Home Electrical Appliances Smart System," International Journal of Computer Science and Mobile Computing, vol. 2, no. 9, pp. 85-91, 2013.
- [17] A Jaafar, N Arasid, NMZ Hashim, A Latiff, Hazli Rafis, "Three Bit Subtraction Circuit via Field Programmable Gate Array," International Journal for Advance Research in Engineering and Technology, vol. 1, no. 8, pp. 01-06, 2013.
- [18] AS Ja'afar, NMZ Hashim, AAM Isa, NA Ali, AM Darsono, "Analysis of Indoor Location and Positioning via Wi-Fi Signals at FKEKK, UTeM," International Journal of Engineering and Technology, vol. 5, no. 4, pp. 3570-3579, 2013.
- [19] KAA Aziz, N Mohamood, MNZ Hashim, "Sliding Window for Radial Basis Function Neural Network Face Detection," International Journal of Science and Engineering Applications, vol. 3, no. 2, pp. 94-97, 2014.
- [20] KAA Aziz, RA Ramlee, NMZ Hashim, RA Rahman, "Machine Vision Based Height

# INTERNATIONAL JOURNAL FOR ADVANCE RESEARCH IN ENGINEERING AND TECHNOLOGY

WINGS TO YOUR THOUGHTS.....

- Measuring System,” International Journal of Research in Advent Technology, vol. 2, no. 8, pp. 48-50, 2014.
- [21] MHA Ilmudin, NMZ Hashim, AS Ja'afar, A Salleh, A Jaafar, MFM Sam, “Traffic Light Control System using 434 MHz Radio Frequency,” International Journal of Research in Advent Technology, vol. 2, no. 8, pp. 26-31, 2014.
- [22] A Salleh, NR Mohamad, NMZ Hashim, MZA Abd Aziz, MH Misran, “Design of Wideband Microstrip Bandpass Filter for S-Band Application,” Australian Journal of Basic and Applied Sciences, vol. 8, no. 4, pp. 843-848, 2014.
- [23] KA Muhamad, NMZ Hashim, WMSW Azman, NR Mohamad, “Digital Images Restoration Application in Digital Signal Processing,” International Journal of Emerging Technology & Research, vol. 1, no. 6, pp. 79-83, 2014.
- [24] SS Razali, N M Z Hashim, S Z Yahya, K A A Aziz, A Salleh, N R Mohamad, “Different Approach of Video Compression Technique: A Study,” International Journal of Science and Engineering Applications, vol. 3, no. 5, pp. 143-149, 2014.
- [25] D Jalaputhra, N M Z Hashim, M Izhah Ibrahim, A S Ja'afar, A Salleh, N R Mohamad. “Application of Digital Signal Processing In Echo Cancellation: A Survey,” International Journal of Science and Engineering Applications, vol. 3, no. 5, pp. 150-153, 2014.
- [26] NMZ Hashim, HH Basri, A Jaafar, MZAA Aziz, A Salleh, AS Ja'afar, “Child In Car Alarm System Using Various Sensors,” Journal of Engineering & Applied Sciences, vol. 9, no. 9, pp. 1653-1658, 2014.
- [27] NMZ Hashim, MR Anuar, A Jaafar, MZAA Aziz, A Salleh, AS Ja'afar, “Graphical User Interface For Wireless Patient Monitoring System Using Zigbee Communication,” Journal of Engineering & Applied Sciences, vol. 9, no. 9, pp. 1554-1558, 2014.
- [28] A Jaafar, MS Omar, NMZ Hashim, KAA Aziz, NAA Hadi, “Booth's Algorithm Design Using Field Programmable Gate Array,” International Journal For Advance Research In Engineering And Technology, vol. 2, no. 7, pp. 86-93, 2014.
- [29] A Jaafar, MM Lazim, NMZ Hashim, A Salleh, AS Jaafar, “Division Algorithm Design Using Field Programmable Gate Array,” International Journal For Advance Research In Engineering And Technology, vol. 2, no. 7, pp. 95-104, 2014.
- [30] SAWAS Mokhtar, NMZ Hashim, NR Mohamad, A Jaafar, A Salleh, “Vehicle Security System Using ZigBee Technology,” International Journal For Advance Research In Engineering And Technology, vol. 2, no. 7, pp. 81-85, 2014.
- [31] A Salleh, NMZ Hashim, NR Mohamad, NAA Hadi, MZA Ab Aziz, “Development of High Performance and Low Cost Automatic Toll Payment System using RFID Technology for Malaysia Environment,” International Journal For Advance Research In Engineering And Technology, vol. 2, no. 10, pp. 01-07, 2014.
- [32] R. A. Hamzah, M. A. Hamid, H. N. Rosly, N. M. Z. Hashim, and Z. A. F. M. Napih, “An Aligned Epipolar Line for Stereo Images with Multiple Sizes ROI in Depth Maps for Computer Vision Application,” International Journal of Information and Education Technology, vol. 1, no. 1, pp. 15–19, 2011.
- [33] R. A. Hamzah, M. S. Hamid, H. N. Rosly, and N. M. Z. Hashim, “A distance and pixel intensity relation for disparity mapping in region of interest,” 2011 IEEE 3rd International Conference on Communication Software and Networks, pp. 15–19, May 2011.
- [34] R. A. Hamzah, M. S. Hamid, H. N. Rosly, and N. M. Z. Hashim, “An analysis of multiple size region of interest in disparity mapping for stereo vision application,” 2011 IEEE Symposium on Computers & Informatics, no. 1, pp. 192–196, Mar. 2011.