

DESIGN AND IMPLEMENTATION OF BAR CODES FOR ALL PRODUCTS IN COMMERCIAL CONTROL SYSTEM

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Abstract

The proposed system is to develop bar codes for all products in commercial control system. In the business process, procedures are automated to increase productivity and reduce human error by using barcodes. Barcoding is a method of encoding information system. In this paper, there are three logical steps for barcoding: (i) creating barcodes, (ii) labeling and (iii) reporting. The proposed system will present for three barcode types: code 39, code 128 and code 11. C# programming is used to develop the Graphical User Interfaces (GUIs). Microsoft Access is used for storage products database for the purpose of reporting.

Keyword: Barcoding, Commercial control system, Graphical Use Interfaces (GUIs).

1. INTRODUCTION

A barcode is a method of representing data in [machine-readable](#) form. Barcodes represented data by varying the widths and spacing of parallel lines. Barcode was invented by Norman Joseph Woodland and Bernard Silver and patented in 1951 in United State of America. Barcode invention was based on Morse code that was extended to thin and thick bars.

This paper presents implementation of barcode generation software for all products in commercial control system. This system can generate three bar code types: Code 39, Code 11, and Code 128. Moreover, the system also facilitates reporting function. The report will display the created barcode image and its corresponding information originally stored in products database.

2. BACKGROUND THEORY

There are certain barcode labels that are designed and created by specific barcode printers. Barcode printers can either use thermal transfer or direct thermal technology.

The main function of barcode software is the generation and creation of barcodes. The selection of barcode software depends on the operating system of the company's computer. A common example of barcode software is the Barcode Generator that makes use of several built in alternatives which allow the system to use a variety of combinations and permutations.

Barcode decoders are primarily used to read and translate codes into a text format that is readable by any user. The main part of a decoder is its receiver function that can already be included within the company's automated system.

Barcode scanners are normally located at checkout counters where the items are needed to be scanned before payment or processing. Items go through the scanner in order to be read. Once the item is scanned, information stored on the barcode can be readily available. Several types of barcodes are available such as [symbol barcode scanner](#) that are very handy and convenient; counter top scanners, scanners for industrial use, laser and CCD imagers.

The following sections explains about the barcode types used in this proposed system namely as Code 11, Code 39 and Code 128.

3. CODE 11TYPE

Code 11 type can encode any length string consisting of the digits 0 to 9 and the dash character (-) and a start/stop code..Bar Code 11 type is used primarily in telecommunications. Each character is encoded with three bars and two spaces. Code 11 format is shown in figure 1.

Code 11 digits

Code	Meaning	Code	Meaning
	0		6
	1		7
	2		8
	3		9
	4		- (dash)
	5		* (start/stop)

Figure 1 Code 11 Format

The check digits calculation is as follows:
(The weights for the C check digit range from 1 to 10 while the weights for the K check digit range from 1 to 9.)

1. Starting at the right end of the data, assign a weight to each character starting with 1 and incrementing to 10.
2. For the dash (-), a character value of 10 is used.
3. Sum the products, divide by 11, and take the remainder
4. Append the result of Step 3 to the end of the data.
5. Starting at the right end of the data which now includes the C check digit. If the data is longer than 9 characters, cycle back to 1 and continue.
6. Calculate the product of each data character times its weight.
7. Sum the products, divide by 11, and take the remainder.

Format the complete barcode is used the following (start character + data + C + K + stop character). Barcode with code 11 format is shown in figure 2.



Figure 2 Barcode with Code 11 Format

4.CODE 39TYPE

The Code 39 can be defines 43 characters, consisting of uppercase letters (A through Z), numeric digits (0

through 9) and a number of special characters (-, ., \$, /, +, %, and [space](#)). In code 39 start and stop character is placed at the beginning and end of each barcode. Code 39 is widely used in many industries. It is the standard for many government barcode specifications.

Each character is composed of nine elements with five bars and four spaces. Each character includes three wide and six narrow elements. Figure 3 shows barcode with code 39 formats. Characters are separated by an inter-character gap which is the same width as a narrow bar. Code 39 format is shown in figure 3.



Figure 3 Barcode with Code 39 Format

5.CODE 128TYPE

Code 128 includes 108 symbols which are 103 data symbols, 3 start symbols, and 2 stop symbols. Each symbol consists of three black bars and three white spaces. The Code 128 character includes the digits 0 to 9, the letters A to Z and all standard ASCII symbols and control codes. Figure 4 shows barcode with code 128 formats [6].



Figure 4 Barcode with Code 128 Format [6].

5.DESIGN AND IMPLEMENTATION OF THE PROPOSED SYSTEM

This section shows the flow of preprocessing stages. At this stage, we have to encode the products into code values and save them with their respective information into product database for the reporting purpose. Figure 5 shows system design for preprocessing stage

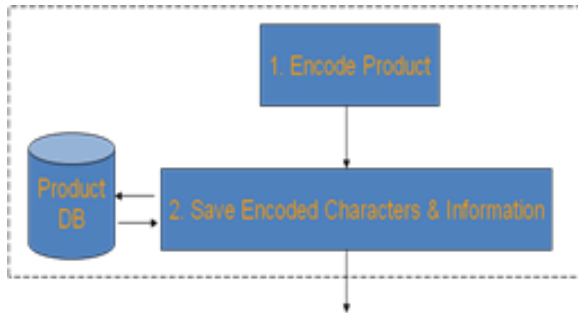


Figure 5 System Design for Preprocessing Stage.

5.1. Overall System Design

This section explains about the overall system design. Firstly, we have to enter the encoded characters to draw its barcode image. The system's draw function will draw the image according to their barcode type. The barcode patterns are already explained in Sections III. After drawing the barcode images, these are stored in barcode images database. Overall System Design is shown in Figure 6.

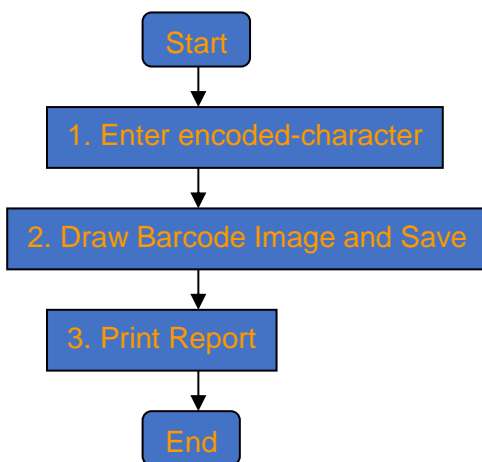


Figure 6 Overall System Design

5.2. System Design (Report Printing Process)

At the next step, the printing report, we have planned to retrieve the information of barcode images into a report form. We can see the report by entering the encoded characters. The system will search the respective information in accordance with this character in product database and retrieve them from database. At the time of writing this paper, we can only generate

barcode images with three barcode types. This reporting function will continue later. Figure 7 shows the idea of flow of reporting process.

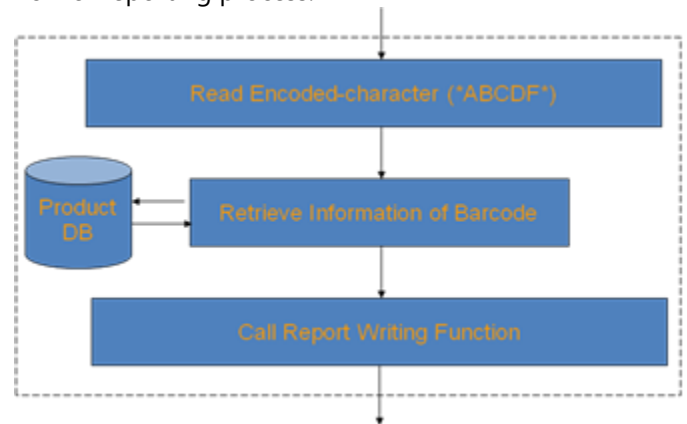


Figure 7 Flow of Report Printing Process

5.3. Implementation Results



Figure 8 Main Form

Figure 8 shows main form of the system. User can select the button want to draw.

If the user wants to create code 11 barcode. User must choose code11 button and also insert item name and code number for item. Barcode creation with code 11 is shown in Figure 9.



Figure 9 Barcode Creation with Code 11

If the user wants to create code 39 barcode. User must choose code39 button and also insert item name and code number for item also. Barcode creation with Code 39 is shown in Figure 10.



Figure 10 Barcode Creation with Code 39

The barcode image generation with three code types for the same content is shown in Figure 11.

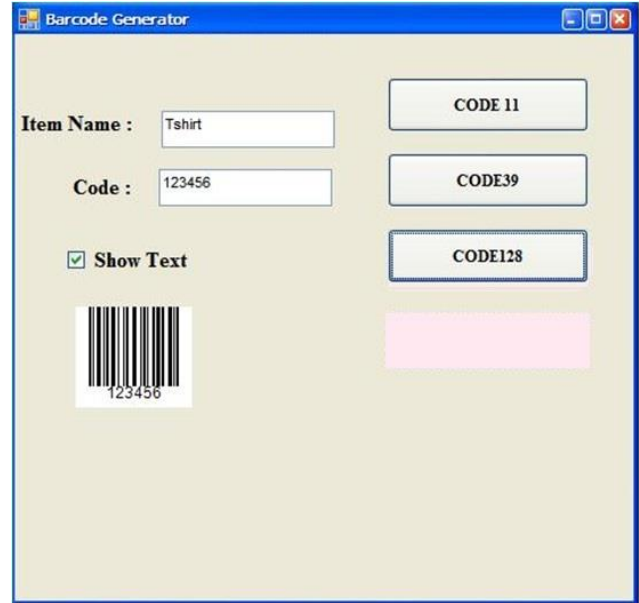


Figure 11 Barcode Creation with Code 128

6.CONCLUSIONS

Advantage of code 39 is that barcode readers will read code 39. It is a flexible symbology because of its ability to encode virtually any number of alpha as well as numeric characters within a single symbology. But, because Code 39 uses only two module widths, it is not a very dense code (i.e., it takes many elements to make up a single character, hence a larger symbol. If the space for the symbol is at a premium, a Code 39 symbol may not fit. Many industries (e.g., automotive, healthcare) have adopted Code 39 as a standard.

Advantage of code 128 is that it is the most space efficient barcode in current existence which offers as large as a character set. But, some older or cheap barcode readers don't read code 128. Writing software to print code 128 symbols can be a bit of a nightmare because of the three character sets. Code 11 is used for telecommunication equipments and it has no significant things to be explained.

7.ACKNOWLEDGEMENT

The author wishes to express his truthfully thanks to Daw Moh Moh Khaing, Lecture , department of information technology , Technological University (Taunggyi), for her suggestions and advice for the completion of this paper. Finally, the author would like

to acknowledge the very considerable contribution of his parents and all teachers from Information Technology department, Technological University Taunggyi and all those who gave up most effort on his way of living and to all of his friends and sisters, very helpful persons for his progression.

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