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DEVELOPMENT OF BARCODE SCANNER USING HANDPHONE

This report is submitted in accordance with the requirement of Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Electronic Engineering Technology (Industrial Electronics) with Honors

by

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DECLARATION

I hereby declare that this project work entitled "Development of Barcode Scanner using Hand phone" is the result of my own research except as cited in reference.

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Date   : 12/12/2016

APPROVAL

This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of Engineering Technology (Industrial Electronics) with (Hons.). The member of the supervisory is as follow:

………………………………
(NURULHALIM BIN HASSIM)

ABSTRACT

Barcode became an extremely important aspect in sales and products services due to the importance of keeping information of all products in one place. Because of this technology, there are many developers who try to make this barcode reading process became more useful to users. Even though the laser barcode scanner method is very popular, it lacks mobility to user. One method to overcome this problem is using a modern mobile technology device such as a smart phone. This platform has become increasingly powerful in recent years. In particular, most cell phones these days regularly include cameras, processors and internet access. With these minimum abilities it is now suitable to create many applications involving barcode reading.

This project created an application for android that can scan one-dimensional barcode to recognize product numbers. From these product numbers the user will know all the details of a specific product, such as price that had being collected on an online database. Specifically, the researcher wanted this application to function as a barcode scanner in a mobile phone with the added ability of adding items to a commercial shopping cart and getting total price of the all items added.

ABSTRAK

Barcode telah menjadi aspek yang amat penting dalam jualan dan produk perkhidmatan kerana kepentingannya menyimpan maklumat dari semua produk di satu tempat. Oleh kerana teknologi ini, terdapat banyak pemaju cuba untuk membuat proses membaca kod bar ini menjadi lebih berguna kepada pengguna pada masa kini. Walaupun kaedah pengimbas laser kod bar adalah sangat popular, namun ia tidak mempunyai mobiliti kepada pengguna. Salah satu kaedah lain untuk mengatasi masalah tersebut adalah dengan menggunakan peranti mudah alih teknologi moden seperti telefon pintar. Platform ini telah menjadi semakin kuat dalam tahun-tahun kebelakangan ini. Khususnya telefon bimbit, kebanyakannya hari ini telah dilengkapi dengan kamera, pemproses dan akses internet. Dengan kebolehan minima ini ia kini sesuai untuk membuat lebih banyak aplikasi yang melibatkan proses membaca kod bar.

Projek ini adalah untuk membuat satu aplikasi berasaskan android yang boleh mengimbas kod bar satu dimensi untuk mengenali nombor produk tersebut. Dari nombor-nombor produk yang telah di imbas, pengguna akan tahu semua butiran produk itu, seperti harga yang diambil dari pangkalan data dalam talian. Secara khususnya, penyelidik mahu aplikasi ini untuk berfungsi sebagai pengimbas kod bar dalam telefon mudah alih dengan keupayaan untuk menambah produk yang ingin dibeli ke dalam troli membeli-belah komersial dan kemudian mendapatkan jumlah harga daripada semua produk yang telah ditambah tadi.

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TABLE OF CONTENTS

Contents

LIST OF TABLE

LIST OF FIGURES

LIST OF ABBREVIATIONS, SYMBOLS AND NOMENCLATURE

1D	One Dimensional
2D	Two Dimensional
UPC	Universal Product Code
EAN	European Article Number
QR	Quick Response
URL	Universal Resource Locator
DB	Data Base
ASCII	American Standard Code for Information Interchange
GSI	Global Security Institute
UCC	Uniform Commercial Code
ITF	In Trust For
IDE	Integrated Development Environment
APK	Android Application Package
PHP	Personal Home Page
SDK	Software Development Kit
API	Application Program Interface
GUI	Graphical User Interface
SMS	Short Message Service

CHAPTER 1

INTRODUCTION

Nowadays, most of the mobile phones have embedded camera devices, which have more than over a megapixel image sensors. Also, the embedded camera devices can be used as a new input interfaces for symbol recognition. In the recent time, most mobile phones, with camera devices support symbol recognition, such as 1D barcode and 2D barcode (PDF417 barcode, data-matrix barcode, and QR code) and these code symbols are used for reading URLs or plaintext. HC2D barcode is the largest capacity of 2D barcode for communication, public relations, and data transport.

This project will concentrate on One-Dimensional (1D) barcode which, systematically represented data by varying the widths and spacing of parallel lines. These include some of the traditional or most well recognized barcode types such as the UPC and EAN code type. Then the information from the barcode will be decoded in the smartphone device and will display the information that the user wants such as name of the product and price comparison of different store.

1.0 Background

A barcode is a strip of data printed in parallel lines and those printed data is a machine-readable representation of a multitude of information. Therefore, the inventor had created a barcode scanner used by retailers to keep the information of inventory and speed up the data entry process to their own database. Otherwise it will be troublesome for the wholesaler or retailer to take the information of the inventory. Those barcode scanning is an application has become producer-centric, where it focuses on improving the productivity, accuracy and efficiency of the supply management. Because of that, the researcher wants to develop an android application that is consumer-centric. By definition, consumer centric is creating a positive consumer experience at the point of

sale and post-sale. Therefore, developing this android application will create those experiences. This application would function as a personal shopper helper, assisting the user by doing the comparison for the same price between different stores. The functions of a barcode reader in the marketplace are countless and there are several ways to make use of it to the consumer to make exciting and innovative applications. For convenience to our users, our device should also be easy to carry and use. Therefore, the researcher wants these applications to be loadable onto a small, multifunctional embedded device such as a smart phone. With this project it's hoped that the barcode reader is incorporated into a handheld device, in the palms of an everyday consumer.

1.1 Project Objectives

The objective of this application is to help buyers from being cheated and make them smarter consumers. In order to create the application and fully understand about android system to connect to the smartphone and about online database. the researcher will study all that is needed in order to make this application fully functional. The objectives of this project are:

I. To study and investigate the EAN barcode type and numbering in the barcode.
II. To design and develop a barcode scanning system using a smartphone camera.
III. To study and investigate about online database.

1.2 Problem Statement

When consumer purchases a product from a supermarket, they could discover the difference in the product price when payment is being made. Maybe this is due to a negligent employee who did not change the old price tag on the product. Another problem could be the difference in prices of the same item between different supermarkets. In addition, some sellers do take advantage of the government price-controlled items and sell them at higher price. This can cause the consumer experiencing unnecessary losses.

1.3   Project Scope

This project is an application limited for android user only, this project will use a prototype data base which mean using an online data base provided by MIT Apps Inventor. It will store and collect the information needed such as which supermarkets offer the lowest price and the name of the product. For this project it will be some limitation on quantities of the product information to be saved in the online database. Therefore, the researcher will choose only certain products such as sugar, milk, cooking oil or flour with EAN-13 barcode as an example to demonstrate the effectiveness of this project.

1.4   Report Outline

Chapter 1 explains the introduction that includes concept of barcode scanner using mobile phone devices for android user. It also outlines the objectives, problem statement and scopes of this system.

Chapter 2 describes the literature review of recent records, software, and problem statement with regard to the project.

Chapter 3 provides description about the methodology in order to implement this project from the start until the end. The methodology is illustrated using the flow chart and each of the contents of the flow chart is described in this part. Justification for any software or hardware that the researcher used in the project.

Chapter 4 is description about result and analysis of the application. In the result, the researcher will show every outcome in this application as result. For the analysis description, the researcher will come out with several test to the application to see the effectiveness of this project.

Chapter 5 is description about conclusion and future work. The researcher will relate to the main objectives of this project whether it achieve the target that have been created. Future work explain about possible upgrade from the weakness of this project.

1.5 Conclusion

This chapter gives overall view of the project such as project background that outlines the project objective, problem statements, and project scopes. The investigation of the barcode scanner base on type of barcode that can be scanned using mobile phone application system, with the information from the investigation the researcher will use as references in order to get the whole idea to implement to this project. Then the problem statement is to help improve the system that will be developed. Then it will become more effective to encounter the problem and make it useful to the consumer. Lastly is the project scope, there is a limitation that researcher set up to develop this project before it can be used to the real consumer. The limitation is there because the researcher focus only on certain outcome where the aim is to develop a barcode scanner application that can only detect EAN-13 barcode, then show the detail of the product that had been set in the online database. This application is for android operation system only.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

This chapter will explain some of the important findings related to barcode scanner using smart phone. Before going through the component related more specifically Figure 2.1 below shows the main idea of this application.
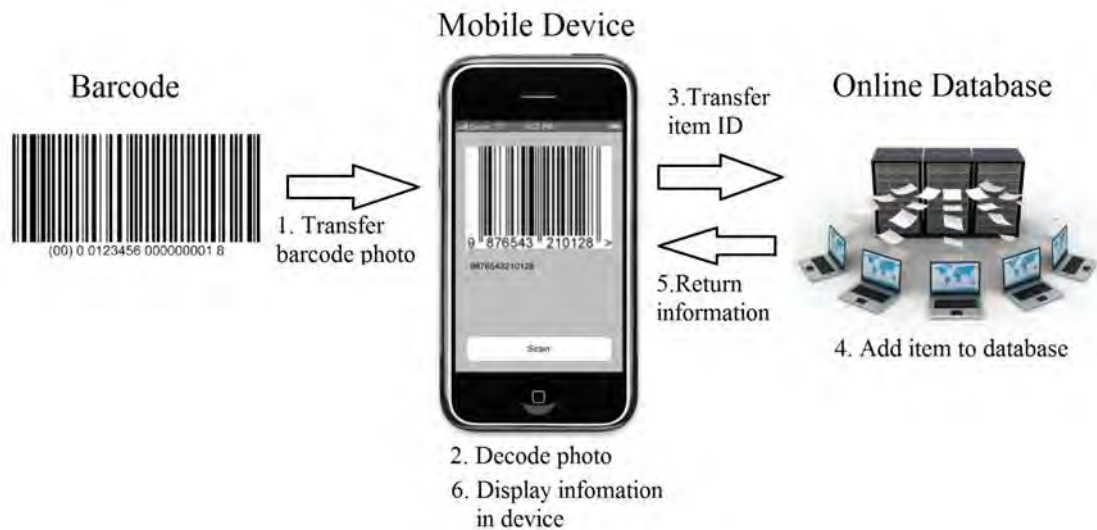
Figure 2.1: The project flow of the application.

2.1 Barcode technology

As shown in figure 2.1 the first component is a barcode where it needed to transfer those photo of barcode to the mobile device. A standardized tag is a photo shown to represent the data of the thing with bars and spaces on a surface. Those diverse widths of bars and spaces are intended to comprise of numbers, characters and images, for example, dot, colon and others. Different information is represented from those different combinations of bars and spaces. There are variety of barcodes used nowadays e.g. Code 128, Code 39, EAN etc. (Brain, 2000). With minimum space given in the product

packaging and the improvement is in order for the product barcode to be really useful to give enough information to the retailer. Because of that, this barcode technology is a successful to help the retailer and other users. Nowadays barcodes are mostly used on books and almost all products at retail stores in order to keep track of the items availability and easy checkout of the products. Normally the barcodes are read by using scanners with cameras or laser beam.

Generally, barcodes are symbols shaped in the form of rectangles which consist of thin or thick parallel lines. Barcodes provide means for automatic rapid data input into the computer. The lines on barcodes contain the reference number of the product. This information should be recorded in the computers. The stores can then separate new each product for counting company sales and purchase quantities. When reading barcodes on the products using laser scanning device, a signal is generated by the system and processed in the computer software. Then this information is used to determine which product is selected. This process provides rapid and reliable sales opportunities to companies for selling their products. There are several types of barcode that were used within the industrial field nowadays. A barcode symbology defines the technical details of a particular type of barcode which includes width of bars, character set, method of encoding and checksum specifications. Each type of symbology (or barcode type) is a standard that defines the printed symbol and how a device, such as a barcode scanner, reads and decodes the printed symbol. Barcode types can be classified into two major symbology types:

1. Linear barcodes(1D)
   - Intelligent Mail
   - Databar
   - UPCa and UPCe
   - Code 128
   - Code 39
   - Interleaved 2of 5
   - EAN8 and EAN13
   - Postnet

2. Two-dimensional barcodes(2D)

- Maxicode
- Aztec
- Data Matrix
- QR code
- PDF417

In 2.1.1 the researchers will explain more about all types of barcodes.

In this project, the researcher preferred to use a particular type of barcode, called EAN-13. EAN-13 barcode is used worldwide for marking retail goods. The numbers encoded in EAN-13 barcode are product identification numbers. EAN-13 barcode is a (7,2) code, which means each character has a total width of 7 modules, composed of two bars and two empty bars alternately, and the width between each bar and empty space is no more than 4 modules. EAN-13 barcode is formed by the left blank area, start character, left data character, intermediate separator, right data character, check character, terminator character and right blank area. An example of the EAN-13 barcode is shown in Figure 2.2.
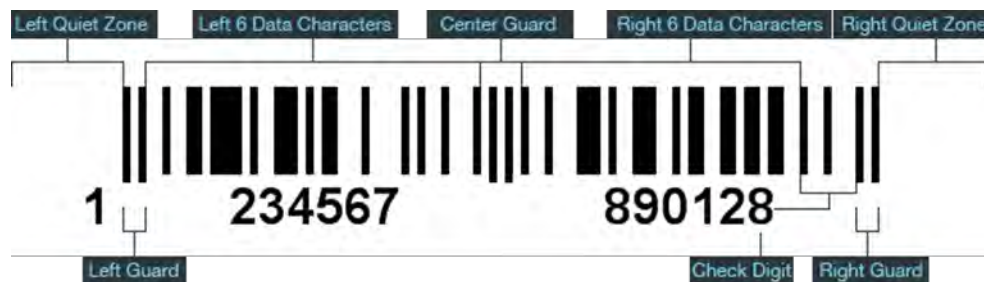

Figure 2.2: An example of EAN-13 barcode

EAN-13 barcode has 13 numeric characters, also known as digits. The first two or three characters are the country of origin code. Depending on the length of the country code, it is followed by either nine or ten characters for manufacturer code and product code. The 13th character of the EAN-13 barcode is the checksum digit. The EAN -13 barcode is a graphical rendering of a 13 –digit code in the form of line pattern. One can consider such line pattern as being constructed using dark bars and light spaces of various

thicknesses, but for better clarity we simply treat the pattern as alternating black and white bars of various widths.

2.1.1 Types of barcode:

I. Code 39

This standardized identification likewise is called as the code 3 of 9, barcode39 and 3 of 9 scanner tag. This standardized identification is a standardized tag that is regularly utilized for assortment of names, for example, inventory, industry application and identifications. This kind of standardized identification comprises an arrangement of character of scanner tag images that corresponds to numbers 0 until 9, capitalized letters an A until Z, the space character and the accompanying images: -. $/+%. Figure 2.3 below shows an example of product barcode of barcode code39.

Figure 2.3: An example of barcode code39

For this barcode scanner tags, it is the easy way of the alpha-numeric standardized tags to be utilized and it is intended for character self-checking. This way disposes of the requirement for checking character approximation. A check character is a character that is added to the end of a piece of transmitted information and used to check the exactness of the transmission.

II. Code 128

Code 128 is one of the high-thickness direct symbology scanner tag; this standardized identification is a sort that deciphers content, numbers, various capacities and the whole 128 ASCII character set which uses ASCII to ASCII 128. This kind of standardized identification is ordinarily utilized for some of usage and this are alluded to as USS Code

128, UCC-128, GSI-128, and ISBT-128. Figure 2.4 below is shows an example product barcode for barcode 128.

Figure 2.4: An example of barcode code128

III.   Interleaved 2 of 5 (ITF)

This sort of standardized identification is a numeric scanner tag utilized for encoding numbers combines as a part of a high-thickness standardized identification. This standardized identification is intended for character self-checking, which mean it disposes of the necessity for checksum characters' part. This scanner tag dependably contains a significant number of digits in light of the fact that a solitary ITF standardized identification character speaks to two numbers to achieve a higher thickness that other scanner tag sorts. The ITF scanner tag character set comprises of standardized identification images speaking to twofold digit characters 00 to 99 notwithstanding begin and stop characters. The entire of this standardized identification have a main calm zone, a begin design, interleaved 2 of 5 scanner tag speaking to encoded information, a stop design and a trailing calm zone which ought to be 10 times the width of the short bar, as indicated by ANSI details. Figure 2.5 below shows an example of product barcode for interleaved 2 of 5 (ITF).

Figure 2.5: An example of interleaved 2 of 5 (ITF)

IV. UPCa, UPCe, EAN8, EAN13

This sort of scanner tag that the scientist utilized as a part of the venture, the UPC and EAN standardized tag have been use since the 1970s to encode worldwide exchange thing numbers (GTIN) which particularly recognize a result of retail checkout or following reason. This scanner tag generally utilized on distributable things, for example, retail item, books, magazines and canned products. Figure 2.6 below shows an example of EAN 13 barcode, the one of several types of UPC and EAN barcodes..
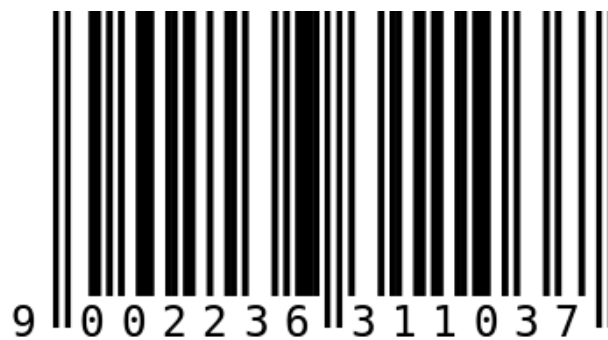

Figure 2.6: example of EAN 13 barcode, one of several types of UPC and EAN barcodes

V. Databar

GS1 DataBar standardized identification symbology is the most recent scanner tag for space-compelled distinguishing proof from GSI. In the past EAN International and the Uniform Code Council, Inc. DataBar standardized identifications have been used to take care of numerous issues in POS, staple and medicinal services, where things are too little to consider customary scanner tag sorts, or where extra data should be encoded, for example, item weight, close dates, nation of cause or serial numbers. DataBar is likewise the main standardized identification symbology affirmed by GS1 to encode GTIN-14 numbers in all retail checkout frameworks. Figure 2.7 below shows an example of this type of barcode.

0614141 - 654321

8110106141416543213500110000310123196000

Figure 2.7: An example of databar barcode.

VI.   Postnet

The POSTNET (Postal Numeric Encoding Technique) barcode type was developed by the U. S. Post Office to encode zip code information. POSTNET barcodes on U.S. mail improve the speed, accuracy and delivery of mail. Some U.S. Post Offices also offer a discount for sending bulk mail that contains the POSTNET barcode. Figure 2.8 below shows an example of postnet barcode.
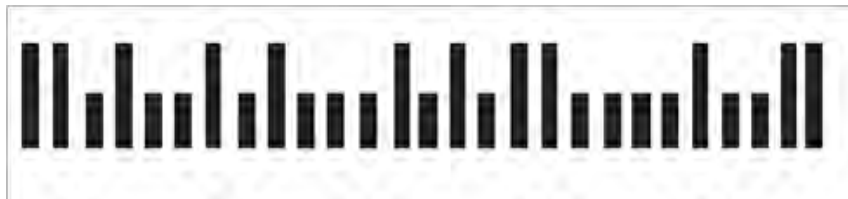

Figure 2.8: An example of postnet barcode