BARCODE RECOGNITION SYSTEM USING IMAGE PROCESSING

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To my beloved parents Ibrahim Bahari and Norseha Ismail, my family and all my fellow friends.

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ABSTRACT

This project is to develop a barcode recognition system by using image processing. The system will be able to read barcode through image and it will be captured by webcam. This project will be using MATLAB software program to develop the system and it will integrate with webcam or digital camera. System will analyze the image then display on the Graphical User Interface (GUI) the barcode type, data and size of the image.

System designation is to recognize different types of barcode and display the data once the barcode image is captured. System also is to provide convenience way of observing data from the barcode with lower costing compared by using the electronic barcode scanners. This system can be used anytime and anywhere by the user who likes to observe the data represented by the barcode numbers without going any places providing the barcode scanner services.

ABSTRAK

Tujuan projek ini adalah untuk membangunkan sebuah sistem pengenalan kodbar menggunakan pemprosesan imej. Sistem ini berupaya membaca imej kodbar dimana imej kodbar diambil menggunakan kamera web. Projek ini menggunakan perisian program MATLAB untuk membangunkan projek dan system akan disatukan dengan web kamera atau kamera digital. Sistem akan menganalisis imej yang diperolehi dan paparkan jenis kodbar, data dan saiz imej pada pengantara muka grafik.

Rekabentuk sistem ini adalah untuk mengenalpasti jenis-jenis kodbar dan memaparkan data sebaik sahaja imej diambil. Sistem ini juga adalah untuk menyediakan cara yang sesuai untuk melihat data daripada kodbar disamping dengan kos yang rendah berbanding dengan menggunakan pengimbas kodbar elektronik. Sistem ini boleh digunakan pada bila-bila masa dan dimana sahaja oleh pengguna yang berminat untuk mengetahui data yang diwakili oleh kodbar tanpa pergi ke tempat-tempat yang menyediakan perkhidmatan pengimbas kodbar.

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LIST OF ABBREVIATIONS

1D	1-Dimensional
2D	2-Dimensional
ASCII	American Standard Code for Information Interchange
AVI	Audio Video Interleave
EAN	European Article Number
GSI	Gemological Science International
GUI	Graphical User Interface
HSV	Hue Saturation Value
I/O	Input and Output
IAT	Image Acquisition Toolbox
IPT	Image Processing Toolbox
ISBN	International Standard Book Number
ISBT	International Society of Blood Transfusion
ISSN	International Standard Serial Numbering
LCD	Liquid Crystal Display
OPC	Optical Product Code
PC	Personal Computer
PDF	Portable Data File
PIC	Programmable Integrated Circuit
PSM	Projek Sarjana Muda
QR	Quick Response
RGB	Red Green Blue
ROI	Region of Interest

SISAC	Serial Industry Systems Advisory committee
UCC	Uniform Code Council
UPC	Universal Product Code
US	Unite State
YUV	Lume (Y) and two chrominance (UV)

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CHAPTER I

INTRODUCTION

1.1 Project Overview

Barcode is a visual depiction of information in the form of bars and spaces on a surface. The bars and spaces and be of different widths and consists of numbers, characters and symbols such as dot, colon and others. Different combinations of these alphanumeric characters are used to depict information. There are various types of barcodes in use today. These include Code 128, Code 39, EAN etc. (Brain, 2000) [13]

The successful barcode technology has been constantly improving in order to accommodate more information in the least possible space. Today barcodes are widely used on books and at retail stores in order to keep track of the products available and easy checkout of the products. The barcodes are read using scanners using laser beams or cameras. (Seideman, 1993)[14]

This project is to develop an algorithm of barcode recognition system by using web camera or digital camera or image from any folder then display the barcode information for the user. Nowadays most of the barcode scanners are using infrared methods to scan a barcode. This may lead to the cost issue where those scanners are

expensive and unaffordable to the user. To overcome this problem, the camera based system for barcode reading is applied to develop a barcode recognition system.

1.2 Project Objectives

i. To develop a barcode recognition system by using MATLAB programming code and image processing.
ii. To design a barcode system that can read different types of barcode and capable to recognize what is the code type.
iii. To design another alternative way of reading barcode with the lowest cost and effective.

1.3 Problem Statement

Usually, data from barcode can only be read with the barcode scanner. There is no other device or method that capable to read barcode thus, this project is proposed to be an additional method for barcode reading; by using image processing. The image processing module comprises an image-preprocessing module that transforms the camera-captured image or any image from file or folder into a preprocessed grayscale image, reduces noise in the preprocessed image, and enhances contrast between bars and spaces in the preprocessed image. So it is hard for user who is interested with the barcode system usually hard to find cheapest way to learn about the barcode because of the high price barcode scanner. This is due to the high price for an electronics scanner in the markets.

1.4 Project Scope

Research and find information about the image processing, barcode type, barcode applications and all related calculations. For the image-processing module comprises an image-preprocessing module that transforms the camera-captured image into a preprocessed grayscale image, reduces noise in the preprocessed image, and enhances contrast between bars and spaces in the preprocessed image.

Design program by using MATLAB and other suitable software on barcode reading. The Image Processing Toolbox extends the basic capabilities of MATLAB by providing a number of specialized I/O, display, and processing functions for images and image processing.

1.5 Project Methodology

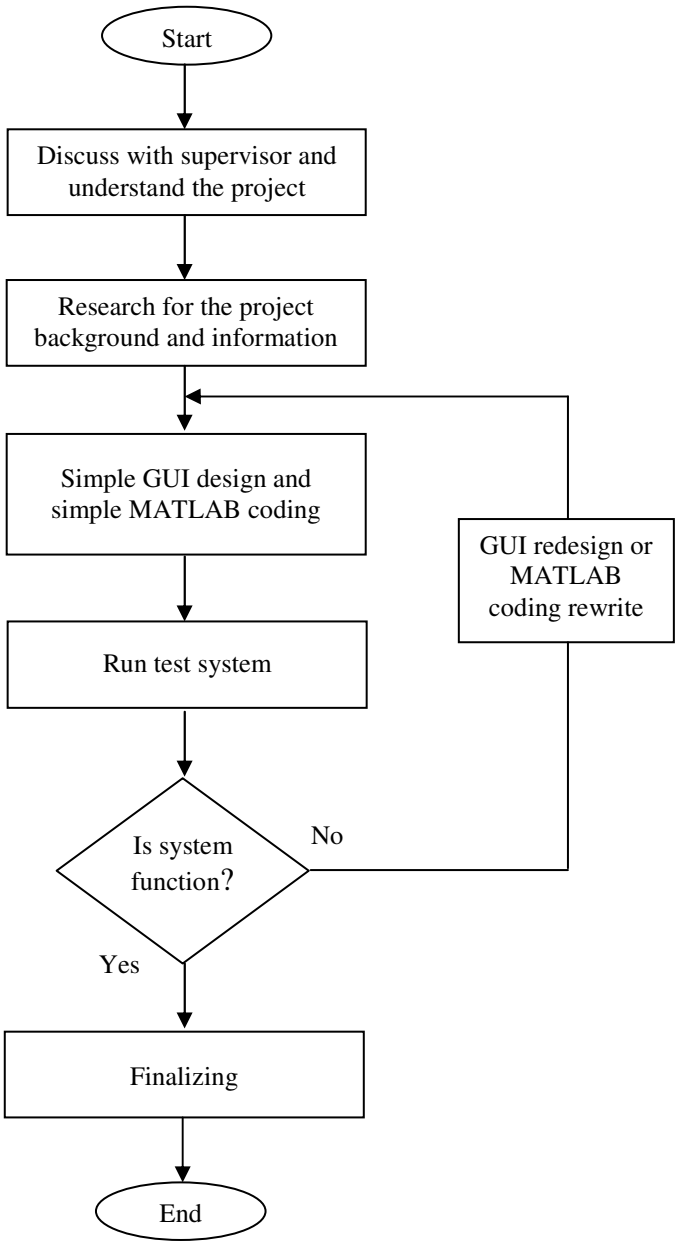

Figure 1.1 Project Flowchart

1.5.1 Flowchart Explanation

i. **Discussion with supervisor and understand the project concept.**
Found that this project was related with barcode and image processing.

ii. **Discussed with supervisor and understand the concept of project**.
Project was about barcode reading but using image processing method to extract data from barcode.

iii. **Do research background and information of the project.**
Search for the barcode system information and how the data is read out from the barcode.

iv. **Simple GUI design and write simple MATLAB coding.**
Design the GUI by using MATLAB GUI for the barcode and image processing user interface and write MATLAB coding.

v. **GUI redesign or MATLAB coding rewrite.**
Observe system functionality whether system function as it should be or otherwise system need to be redesign or program debugging.

vi. **Finalizing.**
Being well prepared for the presentation and make sure all tools and materials require for the presentation are prepared before the presentation day.

1.6 Thesis Outlines

This thesis represented by five chapters and every chapter will be generally describes about the contents inside those chapters.

Chapter 1

This chapter will describe about the project background including objectives of the project, problem statement, methodology of project and scope of work.

Chapter 2

This chapter describes about the literature review which is focus to the research and information about the project. Every facts and information which is found through journals or other references will be compared and the better methods have been chosen for this project.

Chapter 3

This chapter describes about the project methodology approach taken and a closer look on how the project is implemented. Each achievement and selection taken when the project is implemented will be explained in detail for each stage until the project is success. This chapter will briefly describe on history, materials that were used and how to operate it.

Chapter 4

This chapter describes about the project findings such as result and analysis of the barcode recognition system using image processing. The result is presented by tables, simulation, graphs and figures.

Chapter 5

Discussion and conclusion achieved in this project and also future suggestion in order to improve this project.