



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DEVELOPMENT OF AUTOMATED SYSTEM INTEGRATED WITH VISION-BASED INSPECTION

This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor Degree of Electrical Engineering Technology (Industrial Automation & Robotics) with Honours.

by

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ABSTRAK

Projek ini akan difokuskan untuk pembangunan sistem automatik yang bersepadu dengan visi yang berdasarkan pemeriksaan. Ia adalah untuk membuat pemeriksaan keatas saiz dan warna epal. Selepas pemeriksaan dibuat, produk tersebut akan diasingkan antara buah epal merah dan buah epal hijau yang segar mengikut ukuran yang telah ditetapkan oleh kilang. Produk ini dipilih atas permintaan yang tinggi dalam pemeriksaan buah epal yang berkualiti. Sistem visi biasanya digunakan oleh pengeluar untuk pemeriksaan visual. Pemeriksaan ini adalah untuk memeriksa ketepatan dimensi. Bahagian-bahagian ini diukur menggunakan kamera dan dikira menggunakan sistem pemprosesan gambar. Data yang terkumpul daripada sistem visi akan dianalisis dan sebarang kerosakkan pada ukuran saiz dan juga warna akan dibuang. Fungsi yang penting dalam sistem ini adalah kebolehan untuk mengenalpasti dan menganalisis produk di atas pita pengangkut barang. Sistem visi juga boleh merekod video dan memindahkan data yang terkumpul ke komputer. Kamera diletakkan di hadapan produk akhir untuk mengambil gambar produk dan dianalisis. Projek ini adalah untuk mengurangkan kos pengeluar dalam pemeriksaan akhir produk yang kebiasaannya menggunakan tenaga kerja manusia. Ia memerlukan masa yang lebih banyak untuk pekerja mengenalpasti sebarang kerosakan yang ada pada produk. Pekerja tidak dapat melakukan kerja berulang kali dalam tempoh yang panjang. Oleh itu, tujuan projek ini adalah dimana untuk menyelesaikan masalah yang dihadapi. Projek ini juga untuk meningkatkan ketepatan pemeriksaan produk.

ABSTRACT

This project will be focusing on development of automated system integrated of vision based inspection. It is demonstrate the inspection of size of an apple and color of an apple. After the inspection it will be sort at the right position to separate the red apples and green apples that follow the range that factory want. The product was chosen due to need in high quality inspection. The vision system usually used by manufacturers for visual inspection. It is used to check parts for dimensional accuracy. These parts are measured using camera and calculated by using image processing program. The collected data from vision system will be analyzed and any defect on size and color product will be exiled. The important function of the system is the ability to identify and analyze the product defect. The vision system also can record video and transfer the data to the computer. The camera installed in front of product to capture image and analysis it. The project is also to reduce the manufacturer's cost in product inspection that usually use human force to do it. It is consume more time for workers to inspect any defect contained in the product. Workers cannot do any repeated work for a long time so that this is one of the purpose of this project which is to solve this problem. It is also to increase the accuracy of the product inspection.

DEDICATION



To my beloved parents En. Zaini Bin Arbaien and Pn. Aishah Binti Ali, I want to confess my gratitude to them for all their love and sacrifice across my life. The sacrifice they had done really make me inspired and the main reason for me to stay strong until now. Their support and faith for my ability to achieve my ambition is not something that can be contradicted.

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LIST OF ABBREVIATIONS

GUI	-	GUIDE User Interface
LCD	-	Liquid crystal library
HMI	-	Human Machine Interface
LED	-	Light Emitting Diodes
PWM	-	Pulse with Modulation
UI	-	User interface
DC	-	Direct current
IC	-	Integrated circuit
RGB	-	Red Green Blue
HSV	-	Hue,Saturation Value
dm	-	Diameter
%	-	Percentage
L	-	Large
M	-	Medium
S	-	Small

LIST OF SYMBOLS

V	-	Voltage
cm	-	centimeter
MPa	-	Mega pascal
N	-	Newton
A	-	Ammeter
mm	-	millimeter
Hz	-	Hertz

CHAPTER 1

INTRODUCTION

1.0 Introduction

Quality control is a nodal point for today's industries. The desired level of quality in product is the main point for the manufacturer to achieve in order to maintain a high-quality end product when customer purchase it. This will be a big benefit and satisfaction to the consumers as they receive a high-quality products. The effective inspection in production process will reduce the production costs. Any wastages happened from the product will give a loss to the producer. Maximum exercise of obtainable resources will decrease wastage is one of the importance of a good quality control. Inspection costs is reduce as there is a vision system that can detect numerous type of defect repeatedly by just changing the programming code.

Vision is the ability to produce a good report of environment around it which is from any measurement that have been set in the programming code. Vision is including building of 3-D environment, conclusion from any surface properties as example of color, texture and material of the product. Vision also including the object recognition and give a prediction about future state. A computer vision is also known as high-level process which is the input an attributes and the output is understanding. Lastly, it will be sorting depending on the size and on the color of an apples.

1.1 Project overview

This project will be focusing on development of automation system integrated with vision-based inspection. This inspection will be try out by using fruit which are red apples and green apples and it need to classify depending on their size. This product is chosen because it need a high quality inspection and time consumption that need to be done by the manufacturer.



Figure 1.1: Red apple and green apple

1.2 Problem Statement

Nowadays, customers are pushed in demand for various features especially new individual products that come out in the market. In today's competitive market, the industry needs to focus on the quality of their products to maintain their competitiveness and customer's satisfaction. Additionally, the time spent on producing a product should be emphasized because in terms of high-speed mass production units, the time of inspection and manufacturing available for each product is very short and it is a constraint in critical design. With the high level of complexity of the manufacturing process, automation systems have been used for final production of the product. It is used to increase productivity in situations where tasks can be repetitive and laborious such as installation operations packaging. In high product demand from customers, the product model may produce different sizes, shapes, and orientations