

COMPUTER-NETWORK
PRODUCT QUALITY INSPECTION SYSTEM

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Tajuk Projek : COMPUTER-NETWORK PRODUCT QUALITY
 INSPECTION SYSTEM

Sesi Pengajian :

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To my lovely parents, families and friends.

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ABSTRACT

Product quality inspection is becoming a major issue in the industrial and manufacturing line in the world. It is very important to satisfy the customer's desire based on their needs and demands. The project present the way to solve the problem of quality inspection based on computer vision and computer-network system. For the proposed system, the product to be tested is water bottle for softdrink beverages such as strawberry, zappel and fruitale. The system is designed to automatically inspect the water concentration colour and water level quality for the beverages. All the images are taken by a webcam and will be saved in the memory and server for testing. The analysis is done by using image processing toolbox in Matlab in real-time. The result demonstrate that the product were tested based on the water concentration color and water level. It shows that any beverages can be tested and compared based on reference image for each beverages type. As the objectives were achieved, I can concluded it was a successful project.

ABSTRAK

Pemeriksaan kualiti produk menjadi isu utama dalam garisan perindustrian dan pembuatan di seluruh dunia. Ia adalah sangat penting untuk memenuhi keinginan pelanggan berdasarkan keperluan dan permintaan mereka. Projek ini membentangkan cara untuk menyelesaikan masalah pemeriksaan kualiti berdasarkan visi komputer dan sistem rangkaian komputer. Bagi sistem yang dicadangkan itu, produk yang diuji adalah botol minuman ringan seperti strawberi, zappel dan fruitale. Sistem ini direka untuk memeriksa kepekatan warna air dan kualiti tahap air secara automatik. Semua imej yang diambil oleh web kamera akan disimpan dalam memori dan pelayan untuk ujian. Analisis ini dilakukan dengan menggunakan kotak peralatan pemprosesan imej di dalam Matlab secara masa nyata. Hasilnya menunjukkan bahawa produk telah diuji berdasarkan kepekatan warna air dan paras air. Ia menunjukkan bahawa mana-mana minuman boleh diuji dan dibandingkan berdasarkan imej rujukan bagi setiap jenis minuman. Oleh kerana objektif telah tercapai, saya boleh membuat kesimpulan bahawa projek ini telah berjaya.

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LIST OF ABBREVIATION

GUI	-	Graphical User Interface
RGB	-	Red, Green, and Blue
HSV	-	Hue, Saturation, and Value
ROI	-	Region of Interest

CHAPTER 1

INTRODUCTION

This chapter describe about the background of the “Computer-Network Product Quality Inspection System”. This chapter also contains the project background, problems statement, the objectives, the scopes of project, research methodology and also the thesis organization.

1.1 PROJECT BACKGROUND

Product quality inspection is a vital step in the manufacturing and production line process. Since the product realibility is most importance, the process of attempting the 100 % inspection of all parts, subassemblies, and finishing is often being attempted.

Visual inspection seeks to identify both functional and the defects of the product. The performance of human based inspection is generally inadequate and very subjective and allow error during inspection. Visual inspection process on the other hand requires the observation and observing the same type of the image repeatedly to inspect the product [16]. The accuracy of the human visual inspection will always decline with dull, endlessly routine job. The process is slow and will effect the inpection process. [8]

The computer vision inspecting process is obviously the alternative for the pocess to substitute the human visual inspection. The process of computer vision will show and have the general acceptance among manufacturers, in order to increase the productivity and improve the quality. This project here is dealing with the industry needs as developing and creating the algorithm that inspect the quality of the product.

1.2 PROBLEM STATEMENT

The enormous scale from the beverages manufactures in the world are increasing which need for better equipped at the manufacturing and the packaging of the beverages at high speed level. The current market nowadays demands for the quality standards of the production line. The most important thing is to ensure the quality of the product before the product reach to consumer. The manual system that must be replaced with a more accurate and better system that will make it much more stable and manageable.

The quality of products produce by factories sometimes in bad condition as the machine does not separate good and low quality products when through the conveyer and direct been packed for distribution. Therefore a system is needed to help to for better purpose. A system also needed to inspect the product for maintaning its quality. Therefore a new quality inspection system need to be

create to help the factory to easily differentiate and separate good and bad quality product.

The problem of the quality inspector which been used now for the inspection will always have it own problem as human inspecting result will be effected by the scenario of the current situation which need the human inspector to be more alert. It is more reliable for the process if the human quality inspector in a good fatigue .

1.3 OBJECTIVES

The objectives of this project are :

1. To analyze product quality inspection based on the quality of the water concentration color and the water level.
2. To develop a small prototype running conveyer for product quality inspection.
3. To develop an interactive Graphical User Interface (GUI) for the system.

1.4 SCOPE

This project involves with software and hardware such as designing and creating the algorithm which will works together with the hardware. The algorithm development in software design focusing on the color concentration and water level

This project is aiming to designing of the algorithm based on computer-network product quality inspection system. The scope of the project also involve the part of designing and creating the algorithm which will works together with the hadware. The software of Matlab used to process the image taken from the webcam as a computational tools. The work will classify the sample of the bottle of the beverages based on the condition of the inspection detail as mention early as also based on two condition which are pass or fail product. Overall, this project will involve with software and hardware which the software development will include the MATLAB coding for water color and water level and the hardware development contain of camera for image processing, conveyer for the product to run through, motor for the conveyer to run, sensor to sense product, motor driver, and laptop.

This project also created and proposed for the consideration of upgrading to online system. The application of the online system to make the system more stable and real time.



Figure 1.1: Sample Beverages [14]

Sample beverages as in Figure 1.1 are from the F&N type. The variety of the F&N beverages make it more easier as the variety option of the beverages can be checked and tested.

1.5 RESEARCH METHODOLOGY

The project methodology begins with collecting data and information either from the primary or secondary resources. Some of the information's are also taken from journals, books, magazines and web sites. The project methodology shows that the step by step taken to complete the project. The methodology includes the planning, the software and hardware development of the project.

Data collection for this project is from samples taken by using the webcam. Then it will be analyse for the next process of the testing. The research also done by using the internet connection as the internet have a lot of information that can be used for the purpose of reference which there are a lot of people doing research on anything or everything in the world. The analysis of some of the related project was also a based reference for the project of mine which need to study and do some analysis about the existing project that might have some connection with these project.

1.6 THESIS ORGANIZATION

This thesis or this report consist or contain of five chapter. Each chapter will be explained in summaries version as below. This report is one of the requirement for the PSM II management. The requirement for the the last report of PSM I only consist of the three chapter and another two continued chapter were continued in this PSM II report.

Chapter 1 will describe about the introduction of the project, the problem statement that describe the reason for developing the project, the objective of the project which stated why the project is been developed, the scope of the project, the research methodology and also the organization of the thesis. In this chapter, all necessary of the project will try to be elaborate.

Chapter 2 will describe about the review on previous research by other researcher in or outside of Malaysia. Then the various method and approaches that related to the project which been discuss and review in the chapter. The review of previous research about the topic that related hopefully will help for the management of understanding this project. This chapter also will explain about the theory of the project. It will review the basic theory of the involve component in the project. . In this chapter also discuss the method, concept, theory, and some characteristics of software or hardware that used in this project.

Chapter 3 will describe about the method used in the project. The Matlab algorithm will be used for the software in this project and also python for raspberry be used for the project. The flowchart, the block diagram and a few more extra information will be discussed in this chapter. Then describing on the methodology including the overall flow chart, the details explanation of the project procedure and studies done to achieve aimed objectives.

Chapter 4 will describe about the result and dicussion. The result from this project and justification of its performance to make sure the objectives are achieved. The on and off for this project a few more extra information will be discussed in this chapter.

Chapter 5 will describe about the conclusion and the recommendation for the project. This chapter also will conclude about everything about the project and will propose any new recommendation to upgrade or to improvise the project for the future in order to make it more better project in future.

CHAPTER 2

LITERATURE REVIEW

This chapter will discuss about the literature review. The literature review or background studies on topics which are related will be discussed in this chapter. The literature in this chapter are supported by knowledge that refers from books, journals, articles and related websites. The reviews include about the component and it's important in this project. Furthermore, this chapter also discusses about the contents of each part involve in the project.

2.1 INTRODUCTION

This chapter consist of the dented bottle or product defect, bottle cap, water level inspection, the water concentration color inspection, the fundamental of the computer vision, the system hardware, the image processing and the analysis for the

project, raspberry pi 3, infrared module, motor driver and webcam. All the review or the synopsis or the summary of each subtopic will be done in this chapter.

The research for the image processing have been done in the world. The quality of the product in this case will effect the product itself. The name of the branded product will be bad as if people received bad or rejected product in term of the quality of the product. The few characteristic will be review as each proposed problem that matter for the quality inspection will be review in this topic.



Figure 2.1: Product quality inspection.

The inspection by inspector as in the Figure 2.1 still be used in some of the production line. The quality inspector that make the inspection also sometimes werent manage to inspect all of the product. therefore will leave errors and bad product.