

**UNIVERSITI TEKNOLOGI MARA
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**PCB DEFECT DETECTION SYSTEM
USING RUN-LENGTH
ENCODING**

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ABSTRACT

The good quality of the printed circuit board is one important thing to produce the highest quality of the electronic devices in the electronics industries. Nowadays, electronic devices were widely used for the development of the technology. In PCB manufacturing many defects have been detected. It was important to produce the zero defect of the PCB to get the best quality of electronic devices. Initially the bare PCBs, which is the PCB without components were inspected by human operators. By using this technique, it was quite costly since the human is tedious, slow, not consistent and highly error due to human error. In order to get the zero defect of the PCB, the automatic inspection has been developed for inspection of PCBs. One of the algorithm that has been built for inspections of PCB is template matching. This technique also cannot solve the previous problem because it is not effective. This method not effective because it was detected the defect only and it cannot classify the defects that have been happen. Besides, these methods need a long time to execute the result. In this project, the technique that quite good than template matching for inspection of PCB was introduced that is run-length encoding (RLE). This technique provides fast, dimensional assessment and quantitative. This technique also saved the time of inspection, save space and more effectively. The main objective using this technique is to reduce the time consuming to inspect the PCB. The secondary objective is to design run-length encoding algorithm able to detect and classify the defect of printed circuit board (PCB). Both of the PCB test and PCB original images was created an analysis window. Each of the analysis windows contents the RLE code. Each of the RLE code of the test image will be compared with the RLE code of the original image. The outcomes by using this technique is it can classify and detect the defect of the PCB. This technique also more effective, save space and not waste the time of inspection.

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CHAPTER 1

INTRODUCTION

1.1 OVERVIEW

Production of printed circuit board (PCB) is one of the key components in electronic industries. The printed circuit board (PCB) also is the common method of assembling modern electronic circuits. Since the growth of the technology nowadays, the electronic devices has widely used over the world regardless of age. It is predicted the manufacturing of PCB will ever grow. The growing of manufacturing of the printed circuit board should be in line with the current technology development. As other countries, Malaysia has taken a necessary step in conjunction with the development of current technology. Since the technology is going towards full digital, in daily life, electronic device always has been used such as phone, television, laptop and anything else. During the manufacturing of printed circuit board (PCB) many defect are detected which is the quality of PCBs are not good. The quality of PCBs will have a major effect on the performance of many electronic products. So, to get the good quality of the product, the basic item in electronic item that is PCB must be in good quality. The most important things to get the highest quality of PCBs are should produce the zero-defect of the PCB. Before this, in order to get the zero-defect of PCB, in manufacturing industries, many techniques that were used in inspection of printed circuit board detection (PCB) defect [1][2].

As the electronic circuitry technology developments, the PCB design becomes denser and complex to ease the smaller end products. Thus, manual inspection is not relevant anymore. Meanwhile, the developments in computers in term of high speed, greater memory with low cost have caused in well and inexpensive tools for image processing. Hence, there exists an option that was recommended and applying an automated PCB inspection system to take away the subjective aspects of template matching. At the same time, the automated PCB inspection system that is run-length encoding provides real time assessment of the PCB board. Up till now there are still