

中文摘要

印刷電路板在電子資訊工業佔著舉足輕重的地位，世界各主要工業國家均列為最重要的基礎工業。雖然電路板組裝的過程已經是十分自動化了，但仍然有許多檢測工作需要檢測員目測，這樣做法不僅浪費時間、而且檢測員會因個人主觀不同或者視覺產生疲勞，使得檢測結果不一致，讓品質控管變的困難。

本論文主要提出以彩色電腦視覺技術為主的系統替代人工目視的方式，針對電阻、電容及二極體等電路板元件做缺件、錯件及極性相反等檢測。本系統首先利用二值化(Threshold)、邊緣偵測(Edge Detection)及細線化(Thinning)等基本影像處理對電路板進行自動定位，然後以差異值(Variance)和不變矩(Invariant Moment)配合歐幾里德距離對待測元件進行辨識。最後以實際電路板元件進行實驗，其結果驗證了本論文所提檢測系統的可行性及正確性。

英文摘要

Printed Circuit Board plays a very important role on electronic information industry. It has been listed as the most important and fundamental industry in many industrialized countries around the world. Although the assembly of the circuit board has been more automatic than it used to be, there are still much inspection work to be done by the inspector with their eyes, which not only wasting time, but also getting inconsistent results due to different judgment of the inspectors or visual tiredness, so that the quality control becomes difficulty.

This paper mainly renders the idea to use the system based on colored computer visual technique instead of manual visual inspection method. The inspection of our system for the circuit board elements such as missing item, wrong item and reversed polarity, etc., has aimed at electric resistor, capacitor and diode. This system first used the basic image processing methods including thresholding, edge detection and thinning, etc., to proceed with auto positioning on circuit board. Then we used the variance and invariant moment to coordinate with Euclidean distance to identify the elements to be inspected. Finally, this thesis used the real circuit board elements to do experiment. The results verified the feasibility and accuracy of the inspection system submitted by this research.