Image Processing based PCB Component Detection

Prof.Pallavi M. Taralkar #1, Prof.Swati D.Patil*2


1pallavi.kavathekar@gamil.com
2sdpatil2007@gmail.com

Abstract— automated visual inspection (AVI) is becoming an integral part of modern industry in assembly process. This high technology assembly produces printed circuit boards (PCB) with different electronic components. With the increase in demand for such PCB’s high-volume production has to take care for both the quality and zero defect quality assurance. The ever changing technologies in fabrication, placement and soldering of electronic components have caused an increase in PCB defects both in terms of numbers and types. In this project, we will reduce inspection time and increase the throughput of the PCB production. Our solution is for missing defects of devices on a PCB. An alternative visual inspection approach using background subtraction algorithm

Keywords— AVI, PCB, ICT, LCD, IR SENSOR.

I. INTRODUCTION

AVIs are often used to check the functionality of a PCB assembly. Today, PCBs have evolved to become more complex in design, multi layered and are assembled with increasingly miniaturized components. This has made quality control of PCBs more challenging and demanding. Currently, AVIs combined with in-circuit-testers (ICT) are the most prominent systems that are used to check the functionality of a PCB assembly. This is because AVI systems provide better quality control at lower costs. Inspection systems placed at appropriate sections along an assembly line will reduce rework cost which would eventually provide better results during the electrical testing phase. Many authors as cited in the vast reference list of have repeatedly emphasized the importance of developing techniques and algorithms for an automatic inspection system in the electronic industry. Components on an assembled PCB come in a wide range of sizes, colours, shapes and uniqueness. These variations seem to be the major bottleneck in most of the existing defect detection techniques. Variations in the type of defects present on a PCB assembly and the numerous fabrication technologies of electronic components have made development of AVI systems a challenging issue in the last few decades. In the development of such systems, several studies has outlined missing components as one of the top five common defects and the need for AVI systems to have suitable algorithms to detect these defects.

To the best of our knowledge, within the semiconductor industry, automated non-contact inspection of PCB assemblies using image processing techniques has not been done using colour background subtraction. In this paper, we present the feasibility of such a procedure to detect missing or misaligned components.

II. SYSTEM ARCHITECTURE

A. Block Diagram of image processing based pcb component detection

The system block diagram is shown in Fig. 1. The hardware consists of IR sensor and webcam, DC motor and motor driver IC, 89s52 microcontroller board, conveyor assembly and PC. Here, we are making a dc motor based conveyor system, when PCB pass on the conveyor belt conveyor the conveyor starts. An IR sensor detects the PCB and stops the PCB exactly in front of the webcam. On pc we have mat lab s/w which automatically takes the picture of PCB. The matlab s/w will then analyze and compare the PCB with OK PCB based on the color algorithm. If nay
component is missing from PCB our software will result the missing component in PCB and separator will separate that PCB as faulty PCB PC will send the information to controller about whether it is faulty or not and PCB will get sorted out in particular bucket with help of our project automatically. This system will make the Inspection department fully automatic.

![Fig.1 Block Diagram of image processing based pcb component detection]

### III. SOFTWARE ARCHITECTURE

A. **Software Architecture of image processing based PCB component detection**

Fig. 2 shows the software architecture of image processing based PCB component detection.

![Fig2. System algorithm]

Firstly we initialize all devices such as LCD, controller, camera. LCD is used by system to display PCB verification that is whether PCB is ok or faulty message will be displayed on it. Initially PCB will move on conveyor belt and stops in front of webcam and it will take the picture of the PCB and compare it with fault free image stored in pc. Fig. 3 shows the data logger algorithm.
IV. RESULTS

Fig. 4 shows the simulation of the PCB component detection done in proteus software.

Circuit diagram consist interfacing of AT89s52 microcontroller with LCD, IR sensor, MAX232 and L293d driver IC for driving dc motor.
Fig. 5 shows the final results of PCB component detection includes the missing components and place of the component.

V. CONCLUSION

PCB quality system can be used in various industry areas focused on bringing the revolution in the field, EMBEDDED and IMAGE PROCESSING implementation is useful and provide added advantage of accuracy which overcome the lacunas of visual inspection automation.

REFERENCES


