Abstract:

An automated visual printed circuit board (PCB) inspection is an approach used to counter difficulties occurred in human’s manual inspection that can eliminates subjective aspects and then provides fast, quantitative, and dimensional assessments. In this study, referential approach has been implemented on template and defective PCB images to detect numerous defects on bare PCBs before etching process, since etching usually contributes most destructive defects found on PCBs. The PCB inspection system is then improved by minimum thresholding technique and median filtering in order to solve alignment and uneven illumination problem. Finally, defect classification operation is employed in order to identify the source for two types of defects namely, missing hole, pin hole.

INTRODUCTION:

The design and development of reliable electronic system is highly challenging task. In this project we present the results of research carried out in order to improve the reliability of the printed circuit boards of a high reliability electronic consumer product manufactured locally by the application of accelerated interconnect stress testing by using Microscope.

Matlab process:

Image acquisition. In this study, real PCB images are captured using a high resolution 320 x 240 pixels UNIQ monochrome charged coupled device (CCD) camera. Height in between the CCD camera and the inspected PCBs is set to 15 cm as this is the highest available distance for the camera stand that can be set up such that CCD camera can grab the entire PCB images. A PC2-Vision frame grabber has been used to digitize and store the images into computer. Detection and classification algorithms are developed and tested in MATLAB 7.8.0 environment by employing Image Processing Toolbox, on Windows platform, with Pentium Intel® Core™ 2 personal computer, 1.86 GHz and 2 GB RAM (Random Access Memory).
which electronic components are assembled. The reli-
ability of the manufactured PCB is a function of both
the reliability of the components used on the board and
the reliability of the board itself. To develop this project
we are using 8051 controller board, microscope, cam-
era, PC. Printed Circuit Board is place on table. Above
the board microscope is connected, by using microscope
clearly we can see board design for ex: if any hole is
missed or line is not connected so on.

And for this module one camera is connected to take the
image of the board and this image is sent to the PC. all
testing will be done by using matlab application. Micro-
controller acts as the heart of this project, which controls
the whole system. It contains 1k RAM, 64k Flash, 3 Tim-
ers, 2 external interrupts, 1 UART, 32 GPIO’s, ISP pro-
gramming support etc. KEIL IDE is used to program the
microcontroller and the coding will be done using Em-
bedded C.

Block Diagram:

```
void delay(unsigned char);
void main(void){
    uart_init();
    while(1) {
        if(SBUF==2)
            { h1=1; h2=0;
              delay(500); delay(500);delay(500); delay(100);
              h1=1; h2=1; g=0;
            }
        if(SBUF==3)
            { h1=0; h2=1;
              delay(500); delay(500); delay(500); delay(100);
              h1=1; h2=1; n=0; } }
    }
}
void delay(unsigned char value)
{
    unsignedintii,j;
    for(ii=0;ii<value;ii++)
    for(j=0;j<125;j++);
}
```

Schematic Diagram:

![Schematic Diagram]

DC Motor Connections:

Figure shows schematically the different methods of con-
necting the field and armature circuits in a DC Motor. The
circular symbol represents the armature circuit, and the
squares at the side of the circle represent the brush com-
mutator system. The direction of the arrows indicates the
direction of the magnetic fields.
Methodology:

Printed circuit defects are mainly missing or extra elements on the board. PCB defects can be categorized into two groups; functional defects and cosmetic defects. Functional defects can be fatal to the circuit operations while cosmetic defects affect the appearance of the circuit board but may affect the performance of the circuit in the long term.

The PCB manufacturing process is based on chemical and mechanical actions that may damage the intended design. Frequently, various PCB defects such as break out, pin-hole, open-circuit, under-etch and mouse bite occurred during production. Computer generated printed circuit board images absent from any defects, known as Template Images are designed as control images to compare with the circuit that contains defects.

Any anomalies between Template and Test Image are declared as defects. Indera Putera classified these defects into seven groups. Based on reviews of previous works, Heriansyah developed a PCB image segmentation algorithm to separate PCB images into four main segments which are square segment, hole segment, thin line segment and thick line segment using mathematical morphology and windowing technique.

Morphological process involves techniques such as dilation, erosion, opening and closing which helps in partitioning the images and associates certain types of defects with certain patterns. Refer to Figure 1 for an example of PCB image segmentation.

Softwares used:

1. Embedded C
2. Keil Compiler
3. Flash Magic
4. MATLAB

Real time Example:

KHO-KHO: Kho-Kho is to catch by pursuit and to chase the defect or waste in the process.

Chaser:

Chaser is a 7 Quality Tools & 5S / 6S
- Histogram
- Run Chart
- Control Chart
- Scatter Plot
- Pareto Chart
- 5-whys
Fish Bone - Root Cause
Kaizen 5s/6s:
Sorting, Setting, Shining, Standardization, Sustain

**Runner:** Runner is a DOWNTIME i.e. (Defect, Overproduction, Waste, non-utilization of Talent, Invoice, Extra Process)

**REFERENCES:**


