Department of Systems Science and Industrial Engineering

DETECTION AND CLASSIFICATION OF AUTOMATION OF SURFACE MOUNT TECHNOLOGY (SMT) DEFECTS AT AUTOMATED OPTICAL INSPECTION (AOI) USING RESIDUAL NEURAL NETWORK

Master's Thesis Defense

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Online via Zoom:
https://binghamton.zoom.us/j/93490664338?pwd=aG85YTlhTFNWWXZtK1huLzVIWmZPUT09

ABSTRACT

In any sector, quality and customer satisfaction are crucial. Although significant advancements in technology have aided in the improvement of the process for producing electronic circuits, they have made it more difficult to maintain strong customer relations by controlling the quality of a process. With an ever-increasing focus on quality control, process windows have shrunk, and any amount of fault is no longer acceptable. This motivates to look into methods which can automate a given production line in order to increase productivity and maintain high efficiency.

The goal of this research is to enhance the accuracy of defect classification, boost throughput, and reduce the false call rate at an AOI machine in Surface Mount Technology (SMT). This study presents a new deep learning framework for AOI imaging-based PCBA quality control. Deep learning being a sub-branch of artificial intelligence can extract higher-level features from data using the mathematical method of convolution. For intelligent fault identification and categorization of solder joints from the output of an AOI machine, artificial intelligence-based model have been developed. The actual data for this approach were obtained from an SMT line located at an IMS provider. With 98 percent validation accuracy and 15 percent validation loss, a Residual Neural Network (RNN) model was created to categorize six distinct class occurrences on Printed Circuit Board (PCB) images.