## A MATHEMATICAL PROGRAMMING MODEL FOR OPTIMAL CORRECTION OF JIG POSITION IN PCB INSPECTIONS AND ITS NATURE-INSPIRED SOLUTION ALGORITHMS

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ABSTRACT. Pin probe inspection methods have been widely used in printed circuit board electrical inspection. Due to the miniaturization of electronic devices, the positioning of inspection jig (called probe jig) is very important for precisely conducting pattern tests of wiring on PCBs. This article newly presents a mathematical programming approach to the optimal position correction of a probe jig. The optimal position correction problem is formulated based on nonlinear programming problem. Several nature-inspired algorithms, such as firefly algorithm (FA), bat algorithm (BA), cuckoo search (CS) and flower pollination algorithm (FPA), are developed for obtaining optimal position correction. The position correction of a probe jig is attained through interactive processes between an operator and the system. The performances of the integrated bio-inspired algorithms for correcting a probe jig position in PCB inspection.

Key words and phrases. Printed circuit board (PCB), mathematical programming, bio-inspired meta-heuristics, electrical inspection, wiring pattern test.