ABSTRACT:

The optimal placement of electronic components on a printed circuit board (PCB) requires satisfying multiple conflicting design objectives as most of the components have different power dissipation, operating temperature, types of material and dimension. In addition, most electronic companies are currently emphasizing on designing a smaller package electronic system in order to increase the system performance. This paper presents a new self organizing genetic algorithm (SOGA) method for solving this multi-objective optimization problem. The SOGA can be viewed as a cascade of two GAs which consists of two steps fitness evaluation process to ensure that the fitness of selected chromosomes for each iteration process is optimally selected. The algorithm is developed based on weighted sum approach genetic algorithm (WSGA) where an inner loop GA is used to optimize the selection of weights of the WSGA. Experiments are conducted to evaluate the performance of SOGA. Four objective functions are formulated in the experiments which are temperature of components, area of PCB, high power component placement and high potential critical components distance. Comparisons of the performance of SOGA are made with two well known methods namely fixed weight GA (FWGA) and random weighted GA (RWGA). The results show that the SOGA gives a better optimal solution as compared to the other methods.