

# Application of Graph Theory for a Pick and Place Machine

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Automation is the use of control system for handling different process and machineries in an industry to replace human. Pick and place machine are one of the important machines used in Robotic industry. In here Printed Circuit Boards (PCB) are consumed as input. Graph Theory can be used to find the shortest path in PCB to place the components in PCB. PCBs are ubiquitous. So, most electronic manufacturing industries relays on PCB as they serve as backbone of almost every electronic device. Therefore, PCB plays a vital role in many industrial production processes. Some machines don't choose the optimal route to complete their task. So, this research is mainly based on finding the shortest path way in PCB by using appropriate algorithm. Starting from a random point, the nearest point to the initial position was determined and automatically updated by the selected algorithm. This process was continued until analyzing all points and obtaining a feasible solution in the determination of optimal route. In here three types of algorithm were selected for my studies to find and confirm the shortest path. They are Dijkstra's algorithm, Genetic algorithm and Floyd's algorithm. Among these Floyd's algorithm works slower than other algorithms and Genetic algorithm displays shortest path in a matrix form for a selected PCB design. Dijkstra's algorithm guarantees to find the shortest path much faster and in easily visible form. The analysis shows that the best route which provide the part of the shortest distance will be from node 36-47-7-34-25-37-32 with 1.34 m. This concluded that the Dijkstra's algorithm is the best method to find optimal route for PCB in pick and place machine. So, this method is much effective and leads to find the shortest path in Printed Circuit Boards.

*Keywords:* Printed circuit boards, Pick and place machine, Dijkstra's algorithm, Genetic algorithm, Floyd's algorithm