A smart guidance indoor parking system based on Dijkstra's algorithm and ant colony algorithm

ABSTRACT

One of the more apparent problems associated with the growing number of parking spaces in shopping complexes, office buildings, and other types of building is the lack of notification to drivers of vacant and occupied parking bays in a large parking space. Given the heavy traffic commonly seen during the weekends, most drivers might spend at least 20 to 30 minutes just to find an empty parking bay, which leads to wasteful fuel consumption. Currently, most shopping malls have conventional parking systems, where heavy traffic can lead to an increase in the number of accidents occurring. This is a serious problem that requires a solution. The existing parking systems are complex and have poor performance due to low-speed processing and inefficiency. Thus, to overcome these problems, a smart parking system should be designed and implemented. This paper introduces a smart guidance indoor parking system based on embedded system integrated with both the Dijkstra's algorithm and Ant Colony algorithm (ACO) to provide drivers with an efficient path to the nearest parking bay. The smart guidance indoor parking comprises two parts, namely the hardware and the software. The hardware part explains the components used in the system and the software part explains the algorithms which have been used in the system. The proposed smart guidance indoor parking has achieved 37.50%, 10.81%, and 34.88% improvement compared with the conventional Dijkstra's algorithm. . The smart guidance indoor parking system was successfully developed in an adaptable structure, convenient cost and easy handling procedure.

Keyword: Smart parking system; Dijkstra’s algorithm; Shortest path problem; Embedded system; Ant Colony algorithm (ACO)