

Standalone Docking Station with Combined Charging Methods for Agricultural Mobile Robots

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Abstract : One of the biggest concerns in the field of agriculture is around the energy efficiency of robots that will perform agriculture's activity and their charging methods. In this paper, two different charging methods for agricultural standalone docking stations are shown that will take into account various variants as field size and its irregularities, work's nature to which the robot will perform, deadlines that have to be respected, among others. Its features also are dependent on the orchard, season, battery type and its technical specifications and cost. First charging base method focuses on wireless charging, presenting more benefits for small field. The second charging base method relies on battery replacement being more suitable for large fields, thus avoiding the robot stop for recharge. Existing many methods to charge a battery, the CC CV was considered the most appropriate for either simplicity or effectiveness. The choice of the battery for agricultural purposes is of most importance. While the most common battery used is Li-ion battery, this study also discusses the use of graphene-based new type of batteries with 45% over capacity to the Li-ion one. A Battery Management Systems (BMS) is applied for battery balancing. All these approaches combined showed to be a promising method to improve a lot of technical agricultural work, not just in terms of plantation and harvesting but also about every technique to prevent harmful events like plagues and weeds or even to reduce crop time and cost.

Keywords : agricultural mobile robot, charging methods, battery replacement method, wireless charging method

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