

An Open-Source Guidance System for an Autonomous Planter Robot in Precision Agriculture

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Abstract : Precision agriculture has revolutionized farming by enabling farmers to monitor their crops remotely in real-time. By utilizing technologies such as sensors, farmers can detect the state of growth, hydration levels, and nutritional status and even identify diseases affecting their crops. With this information, farmers can make informed decisions regarding irrigation, fertilization, and pesticide application. Automated agricultural tasks, such as plowing, seeding, planting, and harvesting, are carried out by autonomous robots and have helped reduce costs and increase production. Despite the advantages of precision agriculture, its high cost makes it inaccessible to small and medium-sized farms. To address this issue, this paper presents an open-source guidance system for an autonomous planter robot. The system is composed of a Raspberry Pi-type nanocomputer equipped with Wi-Fi, a GPS module, a gyroscope, and a power supply module. The accompanying application allows users to enter and calibrate maps with at least four coordinates, enabling the localized contour of the parcel to be captured. The application comprises several modules, such as the mission entry module, which traces the planting trajectory and points, and the action plan entry module, which creates an ordered list of pre-established tasks such as loading, following the plan, returning to the garage, and entering sleep mode. A remote control module enables users to control the robot manually, visualize its location on the map, and use a real-time camera. Wi-Fi coverage is provided by an outdoor access point, covering a 2km circle. This open-source system offers a low-cost alternative for small and medium-sized farms, enabling them to benefit from the advantages of precision agriculture.

Keywords : autonomous robot, guidance system, low-cost, medium farms, open-source system, planter robot, precision agriculture, real-time monitoring, remote control, small farms

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