Design and Manufacture of an Autonomous Agricultural Robot for Pesticide Application

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Abstract : The use of pesticides in agricultural activities is the most harmful to the environment and farmers' health, and it also has the greatest input prices, along with fertilizers. In this study, an electric, electrostatically charged, autonomous agricultural robot was developed, modeled, and prototyped and manufactured. It allows for sensitive pesticide applications with variable levels, has controllable spray nozzles, and uses camera distance sensors to detect and spray into tree canopies. The created prototype was produced with flexibility in mind. Two stages of prototype manufacture were completed. The initial stage involved designing and producing the flexible primary body of the autonomous vehicle. Detachable hanger assemblies are employed so that the main body robot can perform a variety of agricultural tasks. The design of the spraying devices and their fitting to the autonomous vehicle was completed as the second stage of the prototype. The built prototype spraying robot's itinerary was planned using the free, open-source program Mission Planner. PX4, telemetry, and RTK GPS are used to maneuver the autonomous car along the designated path. To avoid potential obstructions, the robot uses ultrasonic and lidar sensors. The developed autonomous vehicle's energy needs are intended to be met entirely by electric batteries. In the event that the batteries run out of power, the sockets are set up to be recharged both by using the generator and the main power source through the specifically constructed panel.

Keywords : autonomous agricultural robot, pesticide, smart farming, spraying, variable rate application
Conference Title : ICAST 2023 : International Conference on Agricultural Science and Technology
Conference Location : Berlin, Germany
Conference Dates : May 11-12, 2023