

Automated Fertilizer Dispensing System

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Abstract: Efficient management of fertilizers is a key requirement for achieving higher agricultural productivity while minimizing environmental damage. In conventional farming, fertilizer application is commonly performed using manual or uniform methods, which often lead to non-uniform distribution, excessive usage, and increased dependence on labor. This paper proposes an automated fertilizer dispensing system aimed at improving precision in nutrient application. The system employs soil nutrient and pH sensors to continuously monitor soil conditions. The sensed data are analyzed by a microcontroller-based control unit and compared with predefined crop-specific nutrient thresholds. Based on this analysis, an automated dispensing mechanism applies fertilizers in controlled quantities. A feedback process ensures that repeated or excessive application is avoided. By enabling need-based fertilizer delivery, the proposed system enhances nutrient use efficiency, reduces manual effort, and supports sustainable and economical farming practices suitable for open-field agriculture.

Keywords: Precision agriculture, automated fertilizer dispensing, soil sensors, IoT-based farming, sustainable agriculture