

*3D Design and Structural Strength Analysis of a Lora Based Master-Slave
Smart Light Trap Framework using Autodesk Inventor in Soybean Fields
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ABSTRACT

Pest control processes in soybean cultivation lacking integration with modern technological systems exhibit low efficiency within the agricultural sector. These practices are predominantly conducted conventionally, requiring excessive time and labor, and posing a risk of degrading harvest quality. This study aims to design a 3D framework for a Master-Slave Smart Light Trap and analyze its structural strength using Autodesk Inventor software to enhance farmer efficiency in pest eradication. The research methodology focuses on design development stages, comprising a literature review, device design, stress analysis simulation, and expert validation. The testing results indicate that the designed framework is capable of robustly supporting all components while maintaining a precise assembly structure. The design feasibility test, conducted via a validation questionnaire, achieved a score of 85%, indicating that the proposed design is highly feasible. Furthermore, the stress analysis simulation results demonstrate that the maximum framework stress remains significantly below the material's yield strength, yielding a Safety Factor of 15 ul. This ensures that the design complies with mechanical safety standards, rendering it highly secure for field operation.

Key words: *Smart Light Trap, Soybean, Autodesk Inventor, Stress Analysis, Pest Control.*