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Software for Operation of Automated Peanut Digging Depth Controller (2020-045)

Precision agriculture automation technology for control of peanut digger blade depth

Market Overview

This precision agriculture automation software is designed for intuitive, simple end-user interface and improved control of peanut digger blade depths. In 2017, the global farm management software and services market was valued at $1.5 billion, and is expected to grow at a constant annual growth rate (CAGR) of 7.6% between 2017 and 2021. The U.S. peanut production industry was valued at approximately 1,155 million U.S. dollars in 2018. In conventional peanut farming, the best machinery operator at a farm is often responsible for harvesting, as proper digging setting and operation are critical to maximizing yield recovery. However, frequently adjusting depth settings during digging can lead to operator fatigue. Clemson University researchers have developed a novel harvesting software to automatically control and optimize peanut digger blade depth, resulting in reduced digging losses, simplified operation of equipment, and increased profits.

Technical Summary

This automation software controls the operation of peanut digging depth technology using a Windows system located in the cab of the peanut digging tractor. Two depth gauges are mounted to the frame of the digger to report the blade depth to a USB controller as a sensor response from rotary potentiometers. In automated depth control mode, the operator specifies a target depth and a hydraulic center link is automatically actuated in an effort to maintain this specified target depth. The software performs actuation of the cylinder by communicating with a USB controller, which operates mechanical relays to control a hydraulic solenoid valve. The hydraulic solenoid valve directs fluid to either retract or extend the hydraulic center link, retraction effecting greater blade depth and extension effecting lesser blade depth. The software also provides an autodive feature, which retracts the cylinder slightly whenever the digger is lifted to assist in "taking ground" at the start of the next pass, especially in hard, compacted soil conditions.

Application

Precision Agriculture, Peanut Farming, Software, Farm Management

Development Stage

Prototype

Advantages

- Software controls and optimizes peanut digger blade depth, maximizing yield recovery and increasing profits
- Automated depth control technology, reducing operator fatigue and allowing less experienced/trained operators to successfully dig
- Software has autodive feature, enabling efficient harvesting in less than ideal soil conditions

App Type	Country	Serial No.	Patent No.	CURF Ref. No.	Inventors
Copyright	United States	NA	NA	2020-045	Dr. Kendall Kirk

About the Inventors

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Dr. Kendall Kirk earned his Ph.D. in Biosystems Engineering from Clemson University. He is a Precision Agriculture Engineer and Assistant Professor in the Edisto Research and Education Center at Clemson University. Dr. Kirk is a member of several professional societies including the American Society of Agricultural and Biological Engineers, World Aquaculture Society, and Aquaculture Engineering Society. His research interests focus on precision agriculture, agricultural power and machinery, control systems, and computer modeling.

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