USDA Pecan Postharvest – Industry 4.0

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Project Overview

Leveraging state-of-the-art Industry 4.0 technologies, we aim to transform pecan post-harvest operations, enhancing operational efficiency and the rate of whole kernel extraction, and paving the way for a sustainable and economically viable future.

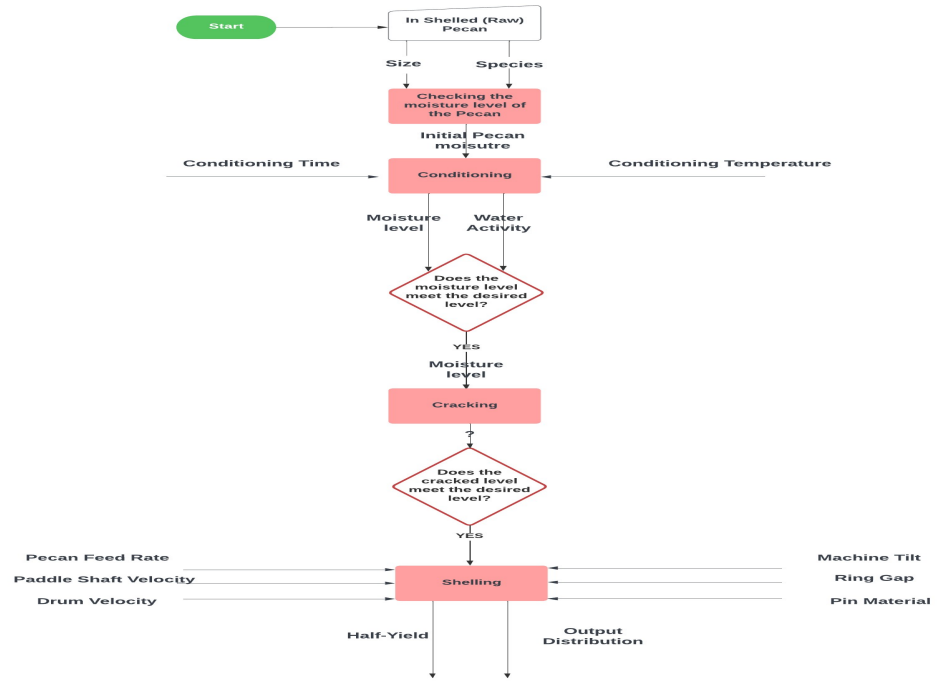
Key used Industry 4.0 Technologies

- Internet of Things (IoT) Devices
- Cyber-Physical Systems (CPS)
- Cloud Computing
- Artificial Intelligence (AI) and Machine Learning

Key Steps in the Project

1. Mapping the pecan production process to identify areas where Industry 4.0 technologies can be integrated.
2. Identifying input and output variables for each stage of the process, including moisturizing, cracking, and shelling.
3. Using sensors and vision systems to measure key variables such as moisture level, crack quality, and half yield metrics.
4. Employing a cloud-based IIoT Platform to monitor and collect data in real-time from the production line.
5. Employing AI/ML techniques to understand the relationships between variables, building predictive models and uncovering process optimization opportunities.
6. Determining optimal levels for each variable based on the analysis.
7. Implementing control systems to monitor and control the production process in real-time, optimizing efficiency, reducing variability, and ensuring all components work together effectively.

Mapped Process



Project Outcomes

- Real-time data collection and analysis, providing up-to-date information on the status of the production process
- Enhancing the efficiency of the production line, resulting in a more sustainable and profitable pecan industry
- Achieving the best whole kernel extraction with a high degree of probability.

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Sponsor/Client: USDA