Awards issued prior to January 20, 2025, were funded under previous Administrations and may not reflect the priorities and policies of the current Administration.

United States Department of Agriculture
Project Initiation

Project Data for Accession Number 1029908

Project Title

AUTONOMOUS AI BASED MONITORING AND IMPROVEMENT OF PACKAGING AND LABELING FOR MEAT PROCESSING

Project Details

Sponsoring Institution National Institute of Food and Agriculture	**Project Status** COMPLETE
Funding Source NIFA Non Formula	**Grant Year** 2023
Grant No. 2023-70439-39186	**Cumulative Award Amt.** $1,000,000.00
Proposal No. 2023-01076	**Multistate No.** (N/A)
Project Start Date Feb 15, 2023	**Project End Date** Aug 14, 2025
Program Code [MPPRI] Meat and Poultry Processing Research and Innovation	

Project Director

GANAPATHI, S.

Recipient Organization

VIMAAN ROBOTICS, INC.

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Performing Department

(N/A)

Non Technical Summary

Vimaan Robotics, Inc. (Vimaan) is pleased to respond to this RFA for NIFA's Meat and Poultry Processing Research and Innovation (MPPRI). Vimaan is a small business entity for process and workflow automation, using Artificial Intelligence and Machine Learning for monitoring, tracking and tracing of food, driving lower food cost, improved safety and higher quality for diverse community needs. Vimaan's proposal aims to address vulnerabilities that Small to Medium-Sized Meat and Poultry Processors (SMMPPs) face from larger meat and poultry processors with similar automation technologies.Vimaan will achieve this with minimal additional research to improve the supply chain resilience of SMMPPs. Vimaan will work with two SMMPPs in underserved communities, addressing this RFA's Priority Area 1: "Monitoring and Improving Complex Processes", aligning partially or fully with USDA Strategic Goals 2 to 5 for FY 2022-2026. Vimaan will demonstrate a sound approach to generate higher revenues and profitability for

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SMMPPs, reducing waste at scale, with field validation and commercialization of this innovation.Vimaan will use its proprietary machine learning to read labels on meat packaging and also examine the seal integrity and quality on these packages to ensure that the quality is maintained at a high level. This will help reduce food related contaminations, food wastage due to returns and destruction, and overall, allow small and medium meat processors to become more efficient and profitable.Vimaan has an active NSF SBIR Phase 2 award to use robots, computer vision and AI to enhance inventory visibility, traceability and product quality in warehouses. Vimaan's technology is commercially live at several Fortune 500 companies, including Food & Beverage distribution, where Vimaan's customers use the technology to highlight expiry date issues, damaged packaging, and incorrect order fulfillment (which can result in food condemnation).

Animal Health Component

Animal Health Component: 0%

Research Effort Categories

Basic	0%
Applied	0%
Developmental	100%

Classification

Knowledge Area (KA)	Subject of Investigation (SOI)	Field of Science (FOS)	Percent
512	3320	2080	100%

Knowledge Area

[512] Quality Maintenance in Storing and Marketing Non-Food Products

Subject Of Investigation

[3320] Meat, beef cattle

Field Of Science

[2080] Mathematics and computer sciences

Keywords

AI, Automation, Labeling, Meat Processing, Quality, Computer Vision, Product Packaging

Goals / Objectives

The meat processing industry faces common quality problems in product packaging and labeling, which can lead to health safety issues, regulatory non-compliance, and meat recalls. SMMPPs expend considerable expense on workers to inspect each package. But this approach is expensive, and besides, COVID has exposed challenges both with worker proximity as well as availability. A fully automated solution would therefore greatly improve SMMPPs capabilities.Vimaan proposes to use its autonomous Computer Vision and Artificial Intelligence platform to solve this problem. Vimaan will implement its technology at the packaging and labeling process steps during processing to

enable 100% real-time automated inspection of each package for compliance. This will highlight quality issues as they occur, which will in turn enable SMMPPs to reduce waste, improve product tracking and traceability, and ultimately improve quality, and safety. Vimaan's autonomous solution for monitoring, tracking and tracing would help SMMPPs build resiliency over the longer-term, as shown by larger processors.Vimaan will work with its two partner SMMPPs to conduct a pilot project in an actual meat processing environment to demonstrate the technology capability at scale. Metrics to assess the solution's efficacy will be identified and tracked during the pilot project. Using these metrics, the performance of the production line using Vimaan's technology will be compared against existing manual quality processes currently in place at the processor.The pilot project will allow Vimaan to reach a TRL 9. As part of the project, Vimaan will also pursue broader commercialization of the technology across the domestic SMMPP sector by conducting ROI and techno-economic analyses to identify the value proposition, generate a go-to-market plan and initiate business development activities with various target SMMPPs.

Project Methods

Solution Overview: DockTRACK Parcel and PackVIEWVimaan Robotics ("Vimaan" or "Company") is responding to USDA's Meat and Poultry Processing Research and Innovation (MPPRI) Funding Opportunity Number USDA-NIFA-OP-009506, which aims to maintain and improve food supply chain resiliency. Vimaan is targeting Priority Area 1: Monitoring and Improving Complex Processes. Vimaan proposes a pilot project using its innovative automated Computer Vision, Machine Learning and Artificial Intelligence (AI) technologies to enable meat package monitoring, improve product tracking and traceability, and ultimately improve quality, safety and resiliency in the industry (the "Pilot Project"). Vimaan will implement the Pilot Project at two small meat processors to address representative quality issues that are widely experienced across the meat processing industry.Vimaan has received an NSF SBIR Phase 2 award for the use of robots and AI to capture, track and validate inventory in warehouses. During the Phase 2, Vimaan conducted extensive work using computer vision and AI to enhance inventory visibility, traceability and product quality. Vimaan uses sophisticated cameras and sensors to capture data from a work environment and processes this data through a complex AI software pipeline to read labels, measure dimensions, capture box contents, identify anomalies, etc. The aim of this application is to monitor package quality, validate labeling and flag quality issues.Vimaan will use its previously developed technologies for other applications to accomplish the goals for this project.DockTRACK Parcel [1] is a computer vision station - mounted on conveyors or table-tops - that scans packages and labels with high speed and fidelity. DockTRACK Parcel captures 1D/2D barcodes, reads label text, inspects packages for defects, dimensions the package, and reports anomalies against prior database entries. DockTRACK Parcel includes ViewDECK, Vimaan's web application, which is an intuitive tool that supports package searches, reporting and includes a comprehensive photographic historical archive of all captured packages. Figure 1 shows the conveyor belt version (DockTRACK Parcel) and the table-top version, called PackVIEW[2].[1] https://vimaan.ai/resources/video/parcel-receiving-and-shipping-with-docktrac/[2] https://vimaan.ai/resources/video/order-packing-with-100-accuracy/