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Abstract

Revolutionizing Food Safety in Agri-Food Supply Chains: The Impact of Autonomous Mobile Robots on Inspections †

Abhay K. Grover

Robert H. Smith School of Business, University of Maryland, College Park, MD 20742, USA; akgrover@umd.edu

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Food safety managers across agri-food supply chains face complex challenges in meeting regulatory requirements, managing consumer expectations, and dealing with a shortage of qualified professionals. Despite efforts, food facilities still struggle with foundational safety issues. This study aims to explore how the deployment of autonomous mobile robots (AMRs) augments the efforts of food safety professionals by helping them to perform inspections.

Unlike conventional robots, AMRs can traverse complicated physical spaces without human aid and use wireless communication for real-time assessments, record-keeping, and regulatory compliance. AMRs come in different forms and have advanced sensors and AI-enabled processors. They can be trained manually and guided to relevant inspection points using a digital twin or 3D map. AMRs offer several benefits, including inspections in hazardous locations, sanitization capabilities, thermal and visual inspections, facility patrolling and security, and pest control. Challenges include operating in harsh conditions, mobility in complex environments, battery charging, and cost considerations.

Despite challenges, AMRs indicate promise in increasing process efficacy, lowering downtime, increasing safety, and permitting data analysis. This paper identifies the advantages and challenges of AMR adoption for food inspections using specific use cases.

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