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Collaborative Robots (Cobots) in Manufacturing: Integration and Safety Challenges

Mr. Vineet Khamrai
Assistant Professor, Department of Information Technology
Nirmala Memorial Foundation College of Commerce and Science

Abstract: *Collaborative robots, or cobots, have revolutionized the manufacturing sector by enabling closer and safer human-robot interaction. Unlike traditional industrial robots, cobots are designed to work alongside humans, enhancing productivity and flexibility in manufacturing processes. This research paper explores the integration and safety challenges associated with cobots in manufacturing. It delves into the technological requirements for cobot integration, implementation strategies, and their impact on operational efficiency. Additionally, the paper examines the safety standards and regulations governing cobots, risk assessment and mitigation techniques, and the dynamics of human-cobot interaction. Through case studies and real-world applications, the paper highlights successful implementations and lessons learned. Finally, future trends and research directions are discussed, emphasizing emerging technologies and potential new applications of cobots in manufacturing. The findings underscore the importance of addressing integration and safety challenges to fully harness the benefits of cobots in the manufacturing industry.*