# Chapter 1
# Impact of NAMI Robots on Collision Detection, Avoidance, and Applications

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## ABSTRACT

*This chapter includes the implementation, applications, benefits, and potential of Navigational Autonomous Mapping Interface (NAMI) robots. NAMI robots, designed with advanced sensing, perception, and decision-making capabilities, utilize a combination of sensors, machine learning algorithms, and real-time data processing to improve their interaction with dynamic environments. It has a considerable impact on collision detection and collision avoidance into industrial application. The NAMI robot is a humanoid designed with multiple advances sensors and able to takes decision based on received sensor values to avoid collision. NAMI robots can explore unknown territories without causing damage to them. It proves to be a valuable tool for exploration and information support.*

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## 1. INTRODUCTION

Humanoid robots like NAMI (Kitagawa et al. 2009) (Ogava N, 2020) are particularly remarkable among these advancements because they have the potential to provide engagement, rehabilitation, and ways that were previously only found in science fiction. Robots have gained significant importance in various industries and fields, including manufacturing, healthcare, agriculture, and logistics (Saadati 2023) (Cojocaru et al. 2022). One of the fundamental challenges in robots in the sports industry is enabling robots to navigate autonomously in complex and dynamic environments while avoiding obstacles. Obstacle avoidance is a critical aspect of autonomous robotics as it ensures the safety and efficiency of robot operations. An obstacle avoidance robot is a type of autonomous robot that can navigate through the environment with features of detection and avoidance of obstacles. To ensure smooth and secure mobility, these robots use a range of sensors, algorithms, and technologies that understand their environment and modify their path. Sports venues are often large, complex layout areas and unpredictable footfall. In these crowded areas, an autonomous obstacle-avoiding robot can recognize and maneuver around obstructions including people, furniture, sporting goods, and other environmental hazards.

The Navigational Autonomous Mapping Interface (N.A.M.I.) is an advancement in robot navigation that combines state-of-the-art technologies such as Simultaneous Localization and Mapping (SLAM), Lidar sensors, artificial intelligence (AI), and Robotic Operating System (ROS) to achieve previously levels of accuracy and efficiency. It assist robots, drones, or driverless cars in navigating a space by creating and employing precise maps. The system enables the device to make decisions in real time based on the map and environmental data, and these maps are generated automatically. The increasing desire for autonomous robots to function in dynamic and unexpected surroundings requires the development of advanced navigation systems that can adjust and respond in real time. N.A.M.I. is a cutting-edge robotic system designed for effective sports services facility management. N.A.M.I. improves the management of complicated sporting venues, such as stadiums and training facilities, by concurrently producing dynamic maps of its surroundings and pinpointing their exact location inside those maps. With its Lidar (Light Detection and Ranging) sensor, N.A.M.I. can detect and avoid obstacles by conducting 360-degree scans in real time. This ability is essential for guaranteeing seamless operations during events at busy sporting venues where prompt adjustments to shifting conditions are required. N.A.M.I. uses artificial intelligence (AI) tags as predefined destinations to increase navigation accuracy. By facilitating point-to-point movement, these tags allow the robot to guide spectators, help with maintenance duties, and deliver equipment efficiently. Tasks like organizing event areas, maintaining concession