AUTOMATED POWER MANAGEMENT: DESIGNING AN AUTONOMOUS MOBILE ROBOT DOCKING SYSTEM FOR SEAMLESS CHARGING

A Project report submitted for the partial fulfillment of the requirements for the award of degree of

BACHELOR OF TECHNOLOGY

IN

ELECTRONICSANDCOMMUNICATIONENGINEERING

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TAMARAM, MAKAVARAPALEM, NARSIPATNAM-531113

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CERTIFICATE

This is to certify that the project entitled "**AUTOMATED POWER MANAGEMENT: DESIGNING AN AUTONOMOUS MOBILE ROBOT DOCKING SYSTEM FOR SEAMLESS CHARGING**" is the partial fulfillment of the requirements for summer internship program of Bachelor of Technology in the Department of ELECTRONICS AND COMMUNICATION ENGINEERING at AVANTHI INSTITITUTE OF ENGINEERING AND TECHNOLOGY , Makavarapalem, Narsipatnam, is a bonafide work carried out by K. GEETHA SREE LAKSHMI (21815A0401), L. L. S. SRI HAVYA (21815A0404), Y. MANEESHA (21815A0410), CH. HEMA LATHA (21815A0411) under the guidance and supervision during 2023-2024.

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ABSTRACT

The project utilizes Computer Vision with Aruco codes to implement an autonomous docking system for charging stations. Through Computer Vision algorithms, the system enables robots to detect and recognize Aruco markers placed on the charging station and the robot itself. By analyzing the markers' positions and orientations, the robot autonomously navigates towards the charging station for docking. This integration of Computer Vision and Aruco codes streamlines the charging process, ensuring seamless and efficient recharging of autonomous mobile robots.

This paper presents the design and implementation of an Autonomous Mobile Robot (AMR) docking system for efficient and seamless charging operations. With the increasing deployment of mobile robots in various industrial and service sectors, the need for autonomous power management solutions has become crucial to ensure continuous operation and minimal downtime. Our proposed docking system addresses this need by providing an automated approach for the AMR to locate, align, and connect to charging stations without human intervention.

The design incorporates several key components, including sensors for environmental perception, algorithms for localization and navigation, and actuators for precise maneuvering and connection. By leveraging technologies such as LiDAR, computer vision, and machine learning, the docking system enables the AMR to accurately identify and approach charging stations within its operational environment. Real-time feedback loops and adaptive control mechanisms ensure robust performance and reliability even in dynamic or unstructured surroundings.

Furthermore, the docking system features a modular architecture that facilitates integration with various types of charging infrastructure and compatibility with different AMR models. This versatility allows for scalability and interoperability across diverse applications and industries. Additionally, the system prioritizes safety and energy efficiency, incorporating fail-safe mechanisms and optimization algorithms to minimize power consumption and mitigate potential hazards during charging operations.