AUTONOMOUS MOBILE ROBOT FOR WHEELCHAIRS TRANSPORTATION IN HEALTHCARE INSTITUTIONS

João Pedro Moreira Faria (jpfaria@ipca.pt) MEEC

António Herculano de Jesus Moreira (amoreira@ipca.pt)

Keywords

Autonomous Mobile Robot (AMR), Artificial Intelligence, Transportation, Wheelchair, Management Health Institutions

Abstract

Industry 4.0 presents itself as a new era in which the industry is led by technologies such as robotics, artificial intelligence, and device interconnection (IIoT). The increasing implementation of robots in industries allows for a better quality of service with high accuracy in less time. As a result, these advantages are now in other areas such as medicine or the military to mitigate problems.

In healthcare institutions, the transport of patients is a recurrent, time-consuming, non-ergonomic task and requires the help of assistants. There are solutions such as electric wheelchairs that facilitate patient motion or intelligent wheelchairs that transport patients to their destination autonomously, however, their costs are high, and replacing them with these chairs requires a huge financial effort from the institutions.

This project aims to propose an AMR robot for existing conventional wheelchair transportation in hospitals, clinics, etc. The transport request commands will be given to the robot through a central application by the doctor or nurse and will be in constant communication with the institution's management system. This robot running ROS, will attach itself autonomously to the conventional wheelchair, in a secure, easy, and fast link. Communication with the institution's management system is essential, as sometimes transportation involves a change of floor and, thus, access to elevators is mandatory, since destination may be as diverse as cafeterias, areas of treatment or diagnostic, outdoor, etc.

The expected result of this project will be a robotic system based in ROS to assist in the management of wheelchair transportation in health institutions, increasing their availability and reducing the time needed for medical staff in these tasks.

References

Lee, S. Y., Kim, S. C., Lee, M. H., & Lee, Y. I. (2013). Comparison of shoulder and back muscle activation in caregivers according to various handle heights. *Journal of Physical Therapy Science*, *25*(10), 1231–1233. https://doi.org/10.1589/jpts.25.1231

Dai, Z., Du, C., Chen, Z., Yuan, M., & Peng, G. (2019). Design of a New Type of External Traction Device of Wheelchair based on STM32 Chip. In *Journal of Physics: Conference Series* (Vol. 1176). Institute of Physics Publishing. https://doi.org/10.1088/1742-6596/1176/5/052050

Baltazar, A. R., Petry, M. R., Silva, M. F., & Moreira, A. P. (2021). Autonomous wheelchair for patient's transportation on healthcare institutions. *SN Applied Sciences*, *3*(3). https://doi.org/10.1007/s42452-021-04304-1