

AUTONOMOUS MOBILE ROBOT FOR CONVENTIONAL WHEELCHAIRS TRANSPORTATION IN HEALTHCARE INSTITUTIONS

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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. The increasing implementation of robots in industries allows 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 health institutions, the transport of patients is a recurrent, time-consuming, non-ergonomic task and requires the help of assistants (Lee et al., 2013). There are solutions such as electric wheelchairs (Mazumder et al., 2014) that facilitate patient movement or intelligent wheelchairs (Baltazar et al., 2021) that transport patients to their destination autonomously, nevertheless, the high costs of these replacement wheelchairs are a financial obstacle for institutions.

This project aims to apply and explore an Autonomous Mobile Robot (AMR) to transport conventional wheelchairs in hospitals, clinics, etc., therefore, wheelchairs are not automated. This robot running the Robot Operating System (ROS) will attach itself autonomously to the conventional wheelchair, in a secure, easy, and fast link. 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 communication is essential to know information such as: which patient is transported, who requests transportation, and the various destinations such as treatment or diagnostic areas, outdoors, etc.

To validate the system, we will assess: 1) the effectiveness of the coupling system to the chair, 2) the usability (patient and safety system), and, finally, 3) the efficiency of the application set, a) management system, and b) transport system in typical use cases. The expected result of this project will be a ROS-based robotic system to help manage wheelchair transport in health institutions, increasing their availability and reducing the time required for medical personnel in these tasks.

References

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