AUTONOMOUS MOBILE ROBOT FOR CONVENTIONAL WHEELCHAIRS TRANSPORTATION IN HEALTHCARE INSTITUTIONS

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BACKGROUND

Industry 4.0 presents itself as a new era in which the industry is led by technologies such as robotics, artificial intelligence, and the internet of things (IoT). 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 healthcare institutions, the transport of patients is a recurrent, time-consuming, non-ergonomic task and requires the help of assistants [1]. There are solutions such as electric wheelchairs [2] that facilitate patient motion or intelligent wheelchairs [3] 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 service system can play an extremely important role both at the scientific and social levels. At the scientific level, the transport of patients autonomously through a robot in hospital environments, for example, can be validated, and perhaps in the future the adaptation to the transport of hospital equipment. At the social level, allowing health institutions to reduce costs since they can carry out the transport of guardianship patients as conventional wheelchairs.

OBJECTIVES

The objective of this project is to develop a robotic system capable of transporting conventional wheelchairs existing in health institutions and through communication with the management system of the institution streamline the entire transport process, making it safe, fast, and comfortable for all intervening.

METHODOLOGY

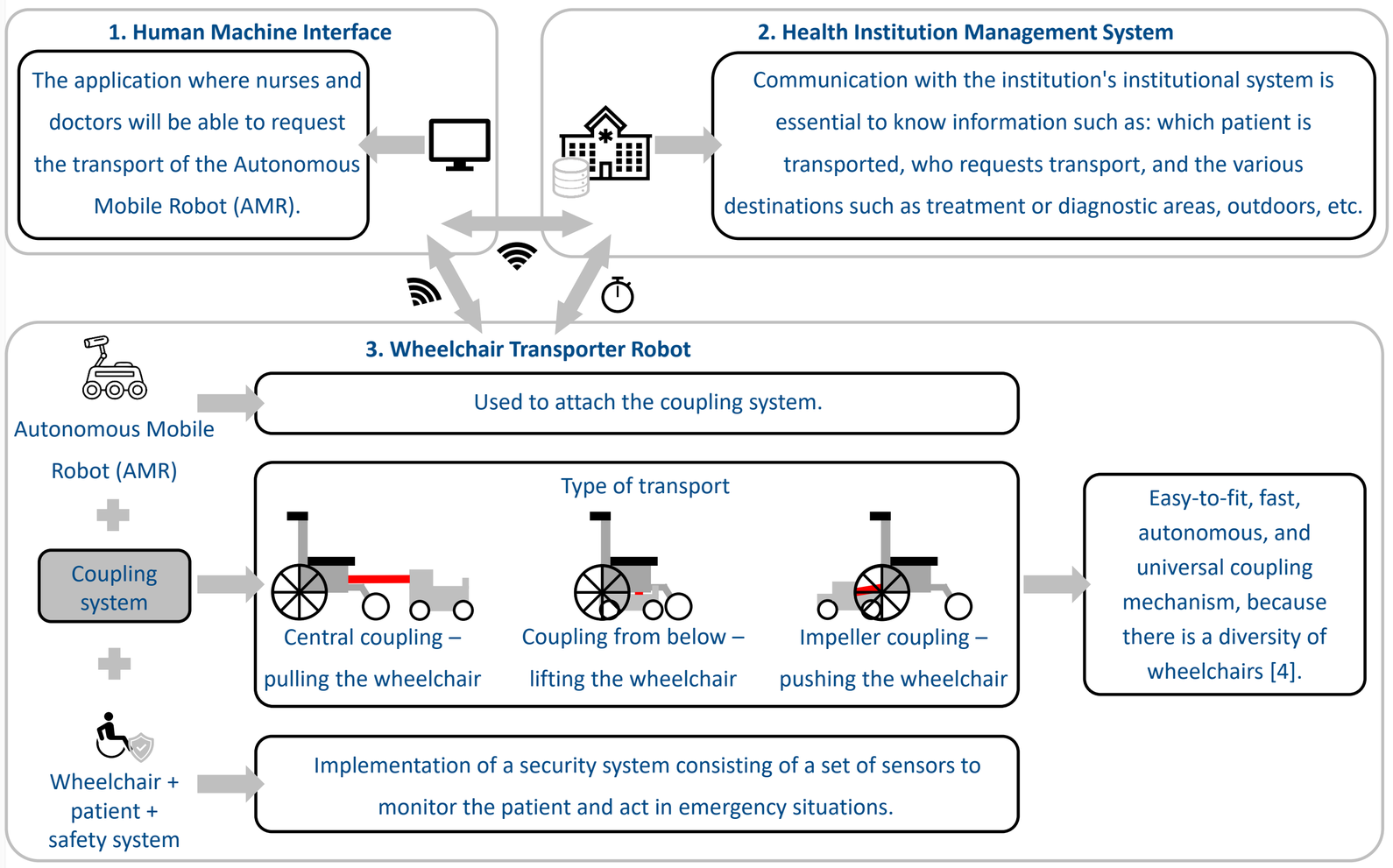

Figure 1 – General diagram.

This project, Figure 1, is divided into three parts:

1. A Human Machine interface consisting in an application or website that allows giving transport orders to the AMR robot;
2. Connection with the management system of the health institution where it has stored all the information of the institution, such as users and spaces;
3. Robotic Wheelchair transport whose main function is to carry out the wheelchairs quickly and safely. The coupling system will have to be studied and for the development of this, one will explore cameras and microcontrollers, whose main function is to discover the coupling points of the wheelchair and move the claw to fix to the chair.

The integration with the institution's information management system will be a complex process since it requires a partnership with the institution. If it is not possible, it will be simulated.

TESTS AND OUTCOMES

Tests

1. Evaluation of the performance of the chair coupling system, coupling effectiveness;
2. Evaluation of the efficiency of the patient safety system;
3. Evaluation of efficiency and the whole system as well as the transport time in a set of tests.

Outcomes

Development of a robotic system based in Robot Operating System (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.

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