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## AN INNOVATIVE, COMPREHENSIVE SYSTEM SUPPORTING THE ELDERLY IN BASIC DAILY ACTIVITIES - DESIGN AND RESEARCH WITH HEALTHY VOLUNTEERS

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The escalating issue of an aging population is a pressing concern globally in all highly developed countries. In Poland alone, a report by the Coalition to Assist the Indigent predicts that by 2030, individuals aged 75 or older will account for over 10% of the population. Simultaneously, the number of potential caregivers, i.e., the working-age population, is declining. These factors are fueling a severe crisis in the senior care sector, underscoring the urgent need for innovative solutions.

'The comprehensive system supporting the elderly in basic daily activities' project attempts to solve a problematic situation in the sector. The project comprises compatible components enabling people to perform daily activities without third-party support. The essential elements of the system are an automatic Transfer Bed (ATB), which allows the effortless transfer of a patient to and from a wheelchair, a patient supporting robot (RCTA), and a compatible wheelchair (AGV).

As part of the R&D work on the system, after the design and FEA calculations phase, a functional prototype of the ATB, along with RCTA and AGV, was prepared. After conducting tests with an ATD, tests were performed on healthy volunteers. The study consisted of a transfer procedure from the wheelchair to the bed and back thrice. Thirty-seven subjects of both sexes, aged between 20 and 65 years, were examined. The average weight of the volunteers was 72.2kg, and the height was 1.72 meters. A questionnaire was administered among the volunteers, consisting of three questions about the reception and impressions of the device, and was completed by 16 of the tested subjects.

All tests of the transfer procedure were completed. The average scores for the survey questions were encouraging, with values of 2.69, 2.56, and 2.81, where 0 was the lowest (negative reception) and 3 was the highest (most positive reception).

The survey results and observed transfer success score are a promising prelude to implementing the presented solution. They also allowed the prototype to be tested on people with mobility disabilities (end users - seniors).

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