Project No.	Project Title	
2021-01-015	A computerized system for measuring the risk of falls among the elderly through a six-meter walking test on a narrow path	
Academic Advisor		**Co-Advisor**
Prof. Yael Edan		Prof. Itshak Meltzer
Team Members		
Taltal Shahar		
taltal@post.bgu.ac.il		

Abstract

Older adults are at a higher risk of falling than any other age group. Falls are associated with greater morbidity and mortality and have an impact on quality of life, health and health care costs. The consequences for an individual falling include functional decline, loss of mobility, depression, increase in dependency and disability, a fear of falling, loss of confidence, pressure-related injury, infections and even death. The consequences of falling can be severe: 68% report a physical injury, 6% suffer a major injury and 29–92% report fear of falling. Declines in both gait speed and gait stability have been associated with increased fall risk in older adults with the majority of falls occur during walking and unsteady gait.

In this research a computerized system for measuring the risk of falls among the elderly through a six-meter walking test on a narrow path is developed. Narrow Path Walking Test (NPWT) is a common and simple tool for estimating the risk of an individual to fall. Narrow-base walking requires increased frontal plane stability and can be used to assess postural control, and may be useful in understanding the cause of falls when walking and in identifying individuals with an increased risk for falls. Today, due to the complexity of the test, there is no practical examination in clinics. The development of a computerized system for measuring automatic walking analysis and 3D skeleton tracking will enable reliable and accurate interpretations of the NPWT test.

The user's walking is monitored by two RGB-D camera (Realsense D435) and the system provides visual feedback according to the user's performances. The software is developed and implemented using C# code in Visual-Studio.
Initial experiment to examine the validity and reliability was performed with eight participants (students) and 56 trials. During the experiment, the system measures the indices number of steps, number of steps errors and trial time. The success rates of the system in the main experiment are relatively high, with an average success rate of 90% in identifying the number of steps and 94.5% in identifying the number of incorrect steps and 98% success in identifying the duration of the experiment.

These percentages show that the computerize system is indeed able to detect the Narrow Path Walking Test with relative success. However, certain adjustments are required such as adjusting the walking pace of the subject to the speed of the cameras, and improving the accuracy capability.

Keywords: Older Adults, Narrow Path Walking Test (NPWT), Computerized system, Falls.