Phase I Abstract

This Small Business Innovation Research (SBIR) Phase I project is developing an integrated computer vision system to objectively measures a person's gait, range of motion and balance and other mobility static and dynamic factors, targeted at fall risk in the elderly. This compact system is cost-effective and easy to use. It tracks people's mobility, identifies problems to correct losses, and provides feedback to motivate the patient to follow their prescribed treatment. The initial focus is the rapidly growing older adult population, who are living longer through advances in medicine, and yet, there are gaps in modern healthcare technologies that prevent elderly people from living independent lives. The project will result in an autonomous intelligent system developed to assess the elderly and others with potential limitations in mobility, to provide comparisons with norms, and to archive test outcomes to allow the subject to see their progress or regress and allow for clinical intervention. The product uses state-of-the-art developments in hardware and software, including existing motion analysis, aerospace technology, mobile telephones and the computer game industry, resulting in a system equipped to follow the motion of a person at a constant scale and quantitatively determine that motion.

The broader impact/commercial potential of this project is in the analysis, rehabilitation and monitoring of mobility issues. The project succinctly responds to priority areas of robotics technology development in the following ways: (1) leveraging improvements in core technologies and algorithms to innovatively yet cost efficiently develop a highly intelligent system capable of making objective, quantitative, "real time" measurements of mobility to replace current subjective testing or time-consuming clinical gait analysis; and (2) using this technology to support and enhance independent living and improve health service delivery to elders and the disabled allowing for more effective treatment protocol. The above broad aims are proven feasible through focused Phase I objectives: (1) connecting the tracking data to articulated human skeletal movement and (2) evaluating key, high-risk components and algorithms using a test article and computer simulation. Phase I will clear barriers to development of an advanced prototype in Phase II--resulting in additional refinements, testing in clinical trials and partnering with a manufacturer in transition to commercialization. The growth plan includes home care applications with the capacity to telemonitor and report to practitioners.