

EU R&D Project



FIT-WHEEL: TRAINING SYSTEM FOR WHEELCHAIR USERS

POLYTECH SA. in cooperation with BIOMECHANICAL SOLUTIONS-BME, will proceed with the implementation of the project "**FIT-WHEEL Wheelchair Exercise System Personalized for Chronic Wheelchair Users**" after submitting the research proposal which was approved by the ESPA 2014-2020 "Research-Create-Innovate" business program.

PARTICIPANTS

1. POLYTECH SA
2. BIOMECHANICAL SOLUTIONS - BME

PROPOSAL

The general objective of the proposal is to develop a functional, "intelligent" and user-friendly lever-propelled exercise system, called FIT-WHEEL (Functional and Intelligent Training system for WHEEL chair users), which can be adapted to wheelchairs available in the market and support the rehabilitation process on a personalized basis. FIT-WHEEL will be

functional because it will be feasible to accommodate each person's specific needs and be used at his own home environment. The proposed exercise system will be intelligent, because it will integrate video games in real-time while exercising (exergaming) and provide individual feedback via a smart phone/tablet application.

FIT-WHEEL will emphasize eccentric exercise, during which muscles lengthen while under tension and offer advantages compared to conventional training, due to low-energy cost of force production and subsequent lower fatigue. Moreover, it will be novel and inexpensive, as it will use pneumatic resistance to actuate upper limbs' rotational movement. Each lever will be actuated by a separate pneumatic device. By changing air pressure in the chamber, it will be possible to adapt the required resistance based on the specific needs of each patient. As a result, the users will be able to improve their strength, aerobic capacity and movement synergy between their upper limbs.

The adoption of FIT-WHEEL by the medical community is expected to create a multifaceted impact on the economy and society as a whole. It is estimated that the overall financial cost for the health care system and the society could be decreased up to 15% each year, because FIT-WHEEL will help minimize hospitalization time, the need for continuous expert assistance and users can delay the transition to electric powered wheelchairs. Furthermore, the exploitation of the project's results could improve competitiveness of our country in the middle of the economic crisis, create job opportunities and provide indirect savings for the national economy by reduction of labour-related losses.

Last but not least, by maintaining wheelchair users' mobility and physical condition, FIT-WHEEL could also lower the emergence of social isolation and be essential for improving the quality of life and well-being of the patients, as well as of their families.

OBJECTIVE

With the proposed project, the business partnership of the proposal aims to create a new product that is absent from the global market. After a thorough search it seems that there is a lack in the market despite the large buying interest from patients and rehabilitation centers for innovative, safe and user-friendly wheelchair mobility systems. This enables FIT-WHEEL's partnership to penetrate in a rising world market and create an identity with its own product in the field of medical exercise equipment. The resulting product, due to its international originality and its usefulness in personalized support for chronic patients, is expected to generate intense purchasing interest from several countries, bringing significant revenue to the Greek medical equipment sector and stimulating overall competitiveness of the national economy in the midst of economic crisis. Additionally, the FIT-WHEEL project, besides to maintaining and creating jobs for the patients themselves, will favor the creation of new jobs in specialized areas related to the exercise and rehabilitation of clinical populations.