2010年臺灣國際科學展覽會
優勝作品專輯

國家： **Canada**

編號： **100026**

作品名稱

The Actuator

得獎獎項

Engineering Second Award

作者姓名

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Abstract

The purpose of the Actuator is to create a practical device that passively exercises the lower legs to help prevent blood clots, Deep Vein Thrombosis (DVT), in wheelchair-bound individuals of any age. The secondary purpose of the device is to improve range of motion of the lower legs and speed the recovery of their leg action. It is hoped that this invention will help to prevent DVT, and allow some people to even use their legs again, through passive or active muscular motion. The invention was produced using a number of prototypes and design sketches. Although the current model is quite functional, as it keeps the users legs in motion, it is still in the prototypic design stage.

The Actuator is a simple to use, easy to retrofit device. It is also portable and will be able to attach onto the front of any wheelchair. It harnesses the motion of the wheelchair to drive the users legs in a circular motion.

The invention was tested in a closed and controlled environment: the duration of the Actuator's use was constant, a doctor was present to take blood pressure and heart rate, and the rotation speed of the user's legs was controlled by keeping the wheelchair speed constant. The data was collected by monitoring heart rate and skin surface temperature of healthy individuals, and blood pressure and heart rate of a wheelchair bound individual.

As seen with both experiments (wheelchair bound, and healthy individuals) heart rate increased. In addition, the wheelchair bound individual's heart rate also noticeably increased, with an evident increase in blood pressure as well. However, skin surface temperature is sensitive to surroundings and often provides little indication of deep vein blood flow, thus the skin surface temperature measurements were too inaccurate for any conclusions to be formulated.

The inventor's grandmother had developed DVT's in 2005, and passed away because of them. Had she been given an Actuator it may have prevented such a tragedy. Her death was the driving force behind the project's development. Over the time period that this project has been in process, the true potential of this invention has been realized.

I truly believe that it will revolutionize the way that we treat people in wheelchairs, and the way people in wheelchairs can treat themselves.