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## A bio-robotic leg orthosis for rehabilitation and mobility enhancement

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### Abstract:

This paper describes a wearable powered leg orthosis that includes a high-torque actuator, electronics, sensors, and embedded firmware. The device provides multiple modes of operation including automatic assistance, manual assistance, continuous passive motion and robotic therapy. Patients affected by neurological conditions including stroke, MS, and Parkinson's disease may benefit from robotic therapy and from the improved mobility provided by this portable, lightweight device. A preliminary study of chronic stroke patients has shown retained improvement in walking speed for patients undergoing rehabilitation with the device.

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#### I. Introduction

THE availability of lower-limb active orthoses offers promising new technology for rehabilitation from conditions affecting mobility. In particular, those suffering from neurological conditions such as stroke, Multiple Sclerosis (MS) and Parkinson's disease can benefit from robotic therapy and improved mobility provided by portable, lightweight bio-robotic orthoses. This paper describes the engineering challenges and early patient feedback encountered in the development in the Tibion PK100 bionic leg orthosis.

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