



## A Framework for Safe and Natural Mobility in Lower Limb Exoskeletons

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### Introduction

- Robotic exoskeletons have considerable, but largely untapped, potential to restore mobility in individuals with various disabilities. This technology has not yet been adopted significantly due to several barriers, often related to the complexity of usage and the quality of Human-Robot Interaction. We propose a framework, adopted over the ReWalk exoskeleton by Lifeward™ Ltd., to cope with the challenges of human-exoskeleton interaction.

### Objective

- In a collaborative research between Lifeward and Tel-Aviv University is aimed at finding ways to minimize the user's cognitive effort through intuitive interface, intention recognition and context awareness. Hence, the user will have natural, safe and seamless mobility in varied environments.

### Proposed Framework

#### Stair Detection & Modeling

- A stereo camera is employed to recognize and characterize specific obstacles such as stairs, providing crucial geometric parameters including distance, approach angle and height for enhanced safety and efficiency in navigating varied terrains.

#### Intention & Control

- Introducing an intent recognition module utilizing inertial measurements from the crutch and smart watch to detect transitions. Upon detecting intent and environment, the system dynamically controls exoskeleton motors based on geometric parameters.
- AR glasses provide information regarding perceived intentions and future actions to be taken by the robot.

### System

