An external device for wheelchair access up stairs

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Catalog

- Background & Motivation
- Constraint & Goals
- Overview of technical project plan
- Validation

Background & Motivation

Background: The disabled group living alone in the old urban area needs assistance in going upstairs.

Questions: Most of the assistive wheelchairs currently on the market are only suitable for flat walking, and going up the stairs requires extra help or human support.

Motivation: The motivation of this project is to solve the difficulties in the process of going upstairs. We wanted to design an external device that would enable wheelchair users to go up stairs autonomously and safely.

Constraint & Goals

Constraint :

Cost
Numerical Control device
Dimension
Versatility
Mechanical frame design
- Center of gravity
- Stability

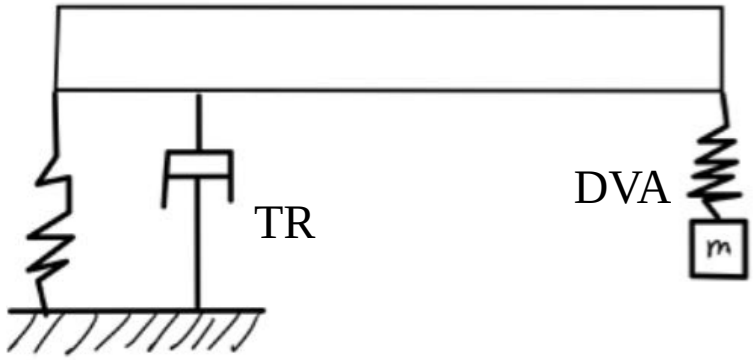
Goals :

1.Compact and lightweight
2.Safe and reliable
3.Moderate cost
4. practical, reliable
5. affordable external device

Technical project plan

- DVA: Dynamic vibration absorber
  Eliminating vibration at specific critical frequency

Dynamics & control of mechanical system class



- TR: Transmissibility
  Relieve vibration through vibration isolation

Dynamics & control of mechanical system class

- Lightweight design
  Topology optimization (Python)

Scientific computing for mechanical engineering class

- Drawing
  Design specific mechanical structure (SolidWorks)

- Part processing
  Factory

Validation

- Abaqus: Calculate design rationality by inputting specific parameters (stair size, gravity)

- Real test: People actually use our equipment to climb stairs.

Reference

Figure source

- http://mms1.baidu.com/it/u=1897991613,4179915444&fm=253&app=120&f=JPEG?w=400&h=533
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