Air Pump Platform

Dynamic Chair Stabilizer for Study Spaces

SPLARTZ

Eliminating chair wobbling caused by uneven leg lengths to improve student experience in U of T study spaces

OBJECTIVES

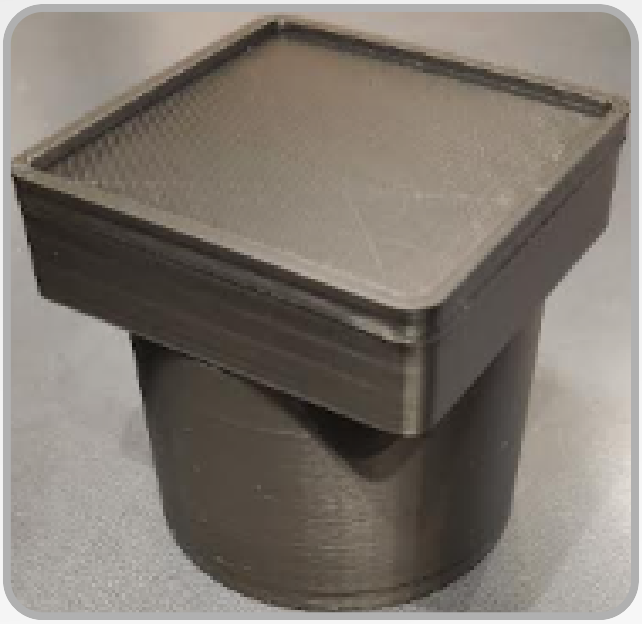
- Compact and portable
- Improves user comfort
- Compatible with existing square-legged chairs

DESIGN HIGHLIGHTS

- Corrects leg differences between **1.25 mm** and **12 mm**
- Supports up to **150 kg**
- Does not require fixed installation
- Prototype accuracy of **98%** correction rate in testing

DESIGN OUTCOMES

The adjustable Air Pump Platform prototype corrects leg height discrepancies in 26 × 26 mm square-legged study chairs with, creating a more stable seating experience.



Air Pump Platform

- Placed under square-legged chairs to stabilize uneven legs
- Elastic ring traps air inside, adjusting pressure based on user weight
- Prototype sized to fit standard 26×26 mm legs

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CONVERGING PROCESS

- Used structured comparisons (e.g., Measurement Matrix, Pugh chart) to analyze concepts.
- Systematically evaluated performance, usability, durability, and feasibility.
- Final decision: air pump platform selected for adaptability and simplicity.
  - Verification testing aligned with requirement framework.

KEY DESIGN DECISIONS

- **Compact Base Design Reduces Material & Increases Safety**
  - Final design optimized for square 26x26 mm legs, minimizing footprint.
  - Reducing excess edges increased durability and usability.
  - Helped meet requirement to avoid sharp edges that could harm users.
  - Reduced material usage while maximizing strength and safety.
- **Platform Height Reduced for Stability & Comfort**
  - Early prototypes had excessive height (7.2 cm), risking tipping.
  - Final solution retracts platform into the base, improving center of gravity.
  - Helps correct uneven leg lengths (9–12 mm) without overcompensation.
  - Improves both user comfort and safety.
- **Gyroid Infill Structure for Weight-Bearing Strength**
  - Internal gyroid structure creates near-isotropic strength.
  - Chosen material: PLA, selected for superior tensile strength vs. ABS.
  - Target load capacity: 150 kg (chair + user), as per design brief.
  - Uses less material than traditional patterns while maintaining strength.

Gyroid infill material to be used in the proposed design. This decision would save material while meeting the weight requirement.