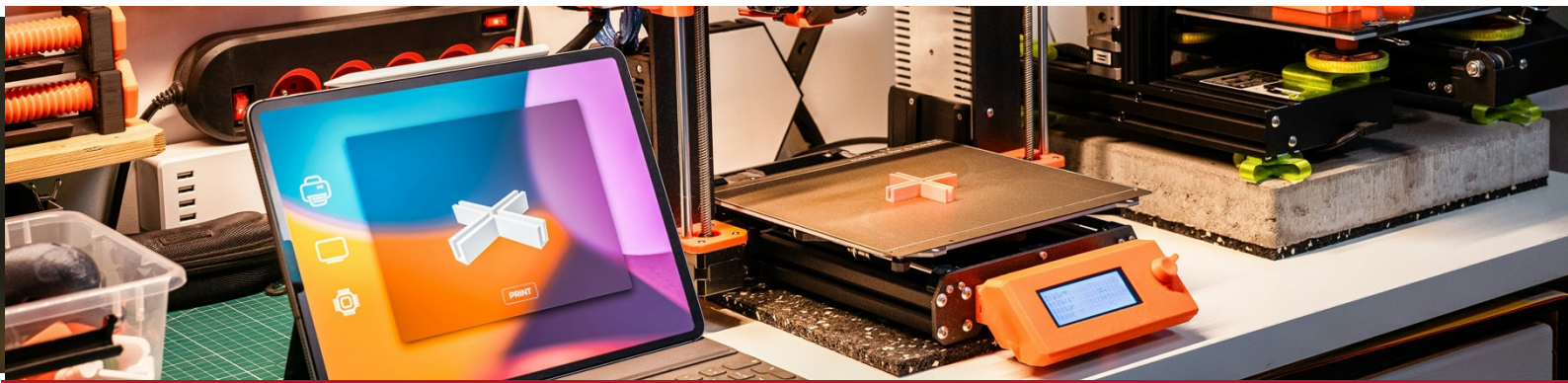




Making the Missing Piece: Personal Fabrication of Replacement Parts

Background

Many everyday objects contain components that are difficult to replace because they are unavailable, discontinued, expensive, or sold only as part of a larger assembly. Personal fabrication technologies, such as 3D printing, offer an alternative by enabling users to manufacture replacement components themselves. However, producing a suitable part can require finding an existing design, creating or modifying a CAD model, determining the necessary dimensions, selecting an appropriate material, and choosing suitable fabrication settings. Dimensional inaccuracies or unsuitable material properties may prevent a fabricated component from fitting or functioning as intended. Making these processes more accessible could expand the practical use of personal fabrication for everyday repair.

Approach

Through an initial analysis of existing CAD and fabrication workflows, the project investigates the challenges users encounter when creating or obtaining replacement parts. These findings inform the development of a prototype that supports users in finding, adapting, or creating replacement part designs. For example, the prototype could help users locate existing CAD models, derive dimensions from a broken component, modify a parametric model, or select suitable fabrication settings and materials.

The prototype is evaluated through a practical fabrication task using pre-defined components and known reference dimensions. Evaluation measures include dimensional accuracy, successful fit with the target object, fabrication success rate, time required to obtain a usable part, and the level of assistance required.

The scope of this thesis is adjusted based on Bachelor or Master level.

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Focus in this project

Personal Fabrication
Hardware/Software Prototype
User-Centered Design
User Evaluation