3D Printing For Repair

Masters graduation or research project

The problem: Household products and appliances break. 3D printing could be a way of repairing products, i.e. replacing broken parts such as cogwheels or even complete housings. This digital technology also provides options for decentralized manufacturing where spare parts are designed in one place and printed wherever needed. But how much can it really help? How hard is it? How can it be scaled? There are questions of quality and performance, liability during or after the repair process, and the users' knowledge gap of how to 3D scan broken parts or otherwise create CAD models, print, and share designs in the DIY context.

Project goal: Create training or software or systems to make 3D printing more effective for repair of household products and appliances. Possible avenues for research and design include:

- Mapping the opportunities and barriers to 3D printing for repair of consumer products.
- Scaling a spare-parts database of 3DP files, using existing CAD databases systems (like Thingiverse), 3DP generators for general parts (like cogwheels), and develop product-specific parts for the most common repairs.
- Exploring strategies which will result in a comparable functional performance of the spare parts based on printer type, print settings, material properties, etc.
- Exploring and evaluating methods which validate the quality of a 3DP part and its performance in post-repair use.
- Translating results into educational materials and methods for higher education.

Company partner: No industry partner is guaranteed, but connections exist to a Dutch 3D printer manufacturer and multiple nonprofits organizing "repair cafés" in the Netherlands, Belgium, France, Germany, and the UK. Students are also welcome to recruit other partners.

Skills required: Applicants must have strong hands-on experience with desktop extrusion printing and CAD modeling. Experience with 3D scanning desired but not required. Experience with product repair also desired but not required. Time commitment required is a graduation project or a research project of 9 ECTS.

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