
Growing Traces on Objects of Daily Use: A Product Design Perspective for HCI

Elisa Giaccardi

Delft University of Technology
Industrial Design Engineering
Landbergstraat 15
2628 CE, Delft, Netherlands
e.giaccardi@tudelft.nl

Elvin Karana

Delft University of Technology
Industrial Design Engineering
Landbergstraat 15
2628 CE, Delft, Netherlands
E.Karana@tudelft.nl

Holly Robbins

Delft University of Technology
Industrial Design Engineering
Landbergstraat 15
2628 CE, Delft, Netherlands
H.V.Robbins@tudelft.nl

Patrizia D'Olivo

Delft University of Technology
Industrial Design Engineering
Landbergstraat 15
2628 CE, Delft, Netherlands
P.DOlivo@tudelft.nl

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for components of this work owned by others than the author(s) must be honored. Abstracting with credit is permitted. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee. Request permissions from Permissions@acm.org.

DIS '14, June 21 - 25 2014, Vancouver, BC, Canada

Copyright is held by the owner/author(s). Publication rights licensed to ACM.

ACM 978-1-4503-2902-6/14/06...\$15.00.

<http://dx.doi.org/10.1145/2598510.2602964>

Abstract

This paper offers a product design perspective to emerging material-oriented design methods in HCI. It outlines a research process for the design of interactive media products enabling a patina of deliberate material traces to grow on objects of daily use. In doing so, the paper reports on findings on how materials are perceived to 'mature' with use, discusses a design concept related to such findings, and offers a new direction for rich communication and interaction through and with objects.

Authors Keywords

Materials; Traces; Interactive Media; Product Design

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

Introduction

Whether deliberate or unintentional, every crack and scratch that materials manifest as we interact with objects inscribes a story. Interactions with materials result in alterations, imperfections and ultimately unique objects, which carry traces of time and life [8]. Understanding and interpreting material traces will be of growing importance in design practice. Traces make a product unique and may provide an additional texture for interacting with the shadow of data that ordinary objects are beginning to grow as they become connected to digital networks [3].

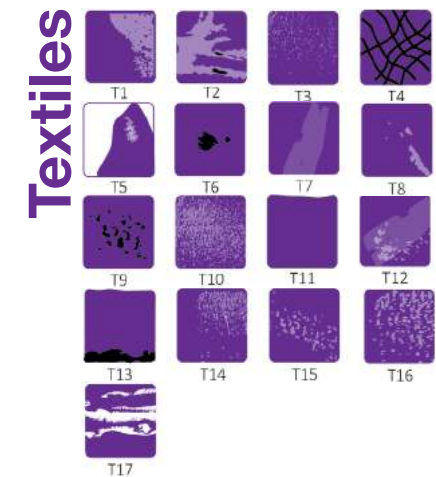
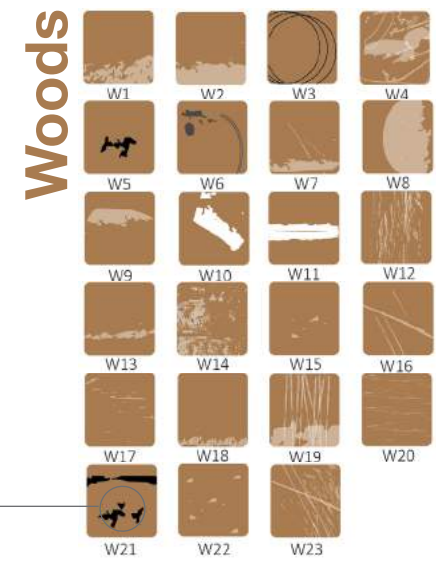
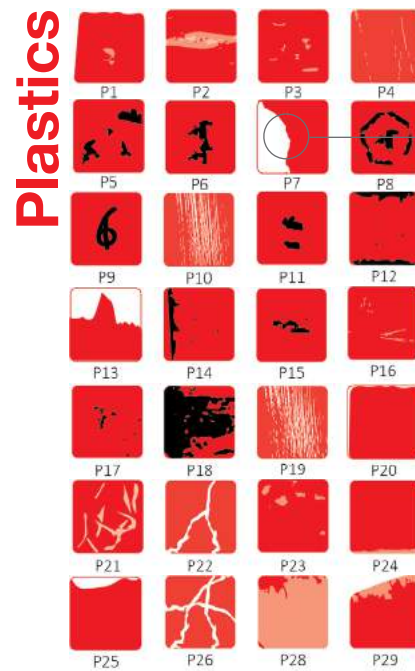
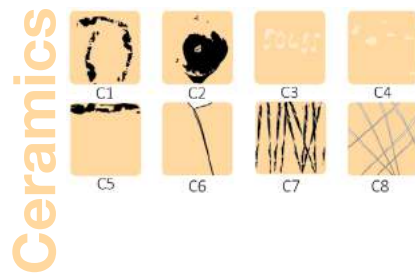
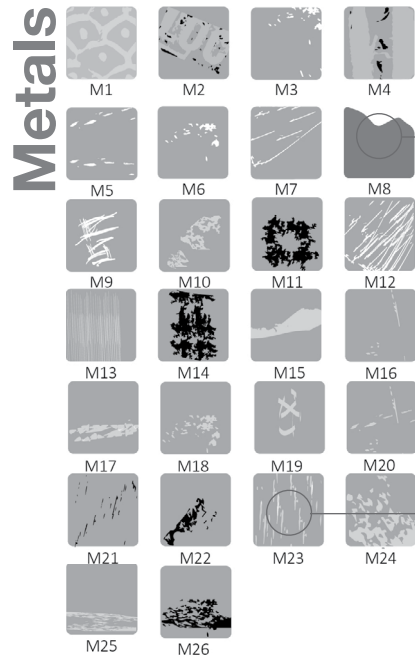
Related Work

In HCI, Rosner et al. [9] contribute a comprehensive set of lenses to examine and craft material traces in terms of particularities of form, contingencies and temporal patterns. In product design studies, considerations of material traces have a long tradition and usually concern issues of ageing [8], patina [11] and maturation of materials [1]. These studies highlight the need for ensuring that the way in which materials manifest traces is aesthetically 'acceptable' [2]. They suggest that such aesthetic quality of material traces acquires a yet unexplored dimension with respect to their ability to support (or not) meaningful experiences [5, 12].

Motivation and Contribution

This paper intends to offer a product design perspective to emerging material-oriented design methods in HCI. It outlines a process for the design of interactive media products that deliberately uses material traces as communicative texture. This process entails a combination of design studies and design explorations aimed at empirically and practically examining how to design for material traces that people may perceive as 'acceptable'. Based on product design scholarship, we argue that objects carrying traces that are perceived as an intrinsic element of the material itself are potentially kept longer, and are more likely to become meaningful over time.





Representation of material traces with pictograms

*Bend on material surface
(metal only)*

*Lighter hues of material family color
scratches*

*White annotation
part of the material is lost (e.g. broken, torn, etc.)*

*Black annotation
contains a trace via another material*

Study II

The role of imperfection in the perceived qualities of unintentional material traces

Common among all materials | Shallow nicking



Common among all materials | Deep linear scratching



Material-specific traces

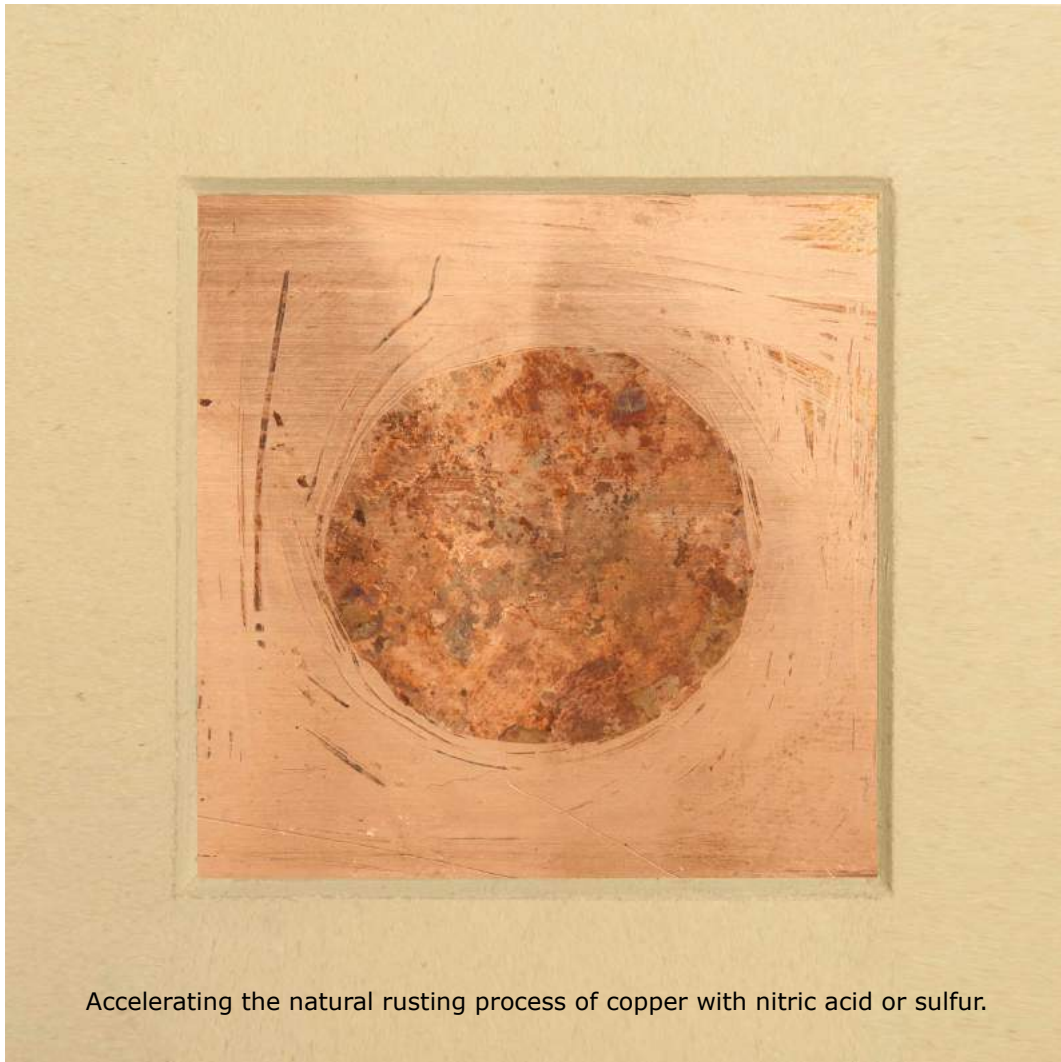


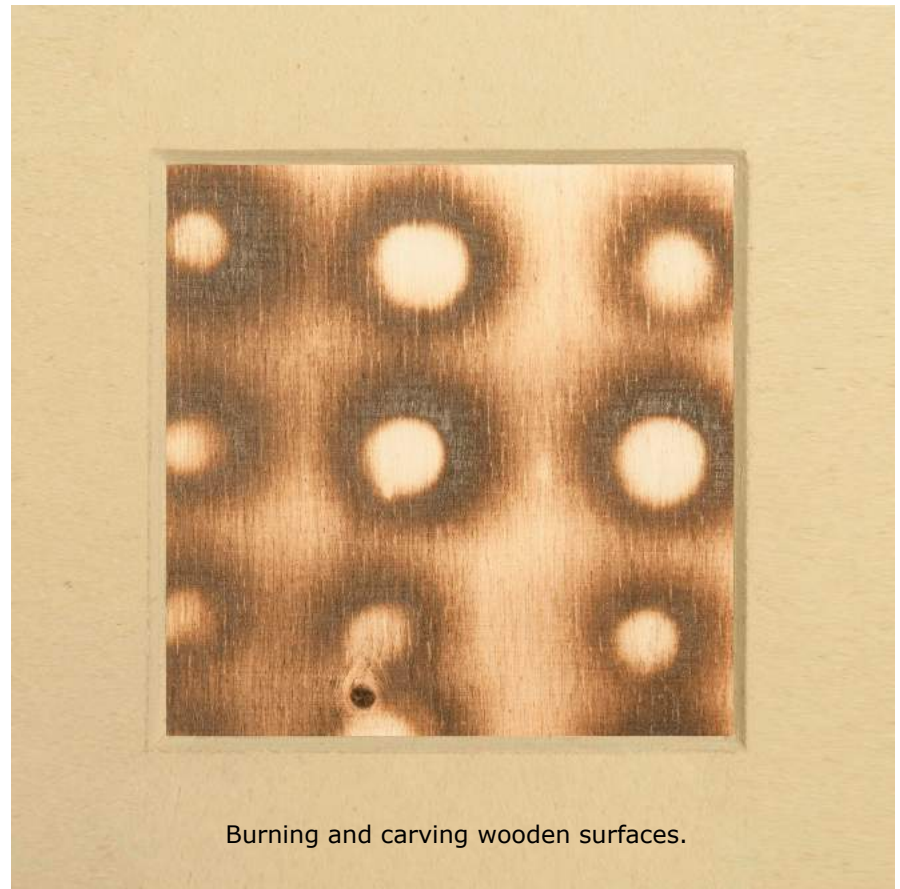
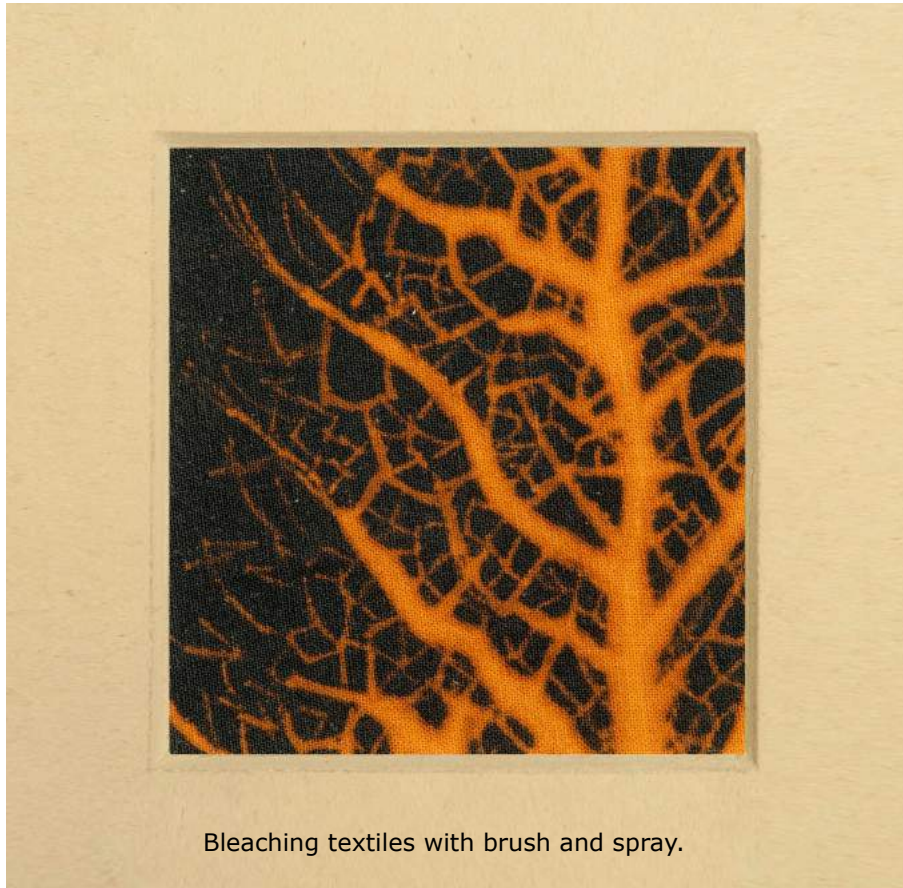
As we interact with objects, material surfaces inevitably 'lose' their initial qualities and manifest 'traces' in the form of alterations. Some materials 'degrade' whilst others 'mature' by maintaining or improving certain qualities over time [8]. The positive term of *maturity* is most commonly used for natural materials such as stone, metal, wood and leather [8].

Our studies revealed that clear patterns of use and additional imperfections are appreciated aesthetic qualities in the 'maturing' of objects [7]. This consisted of material traces that showed how the object had been used in a repetitive manner and had surfaces that were inherently imperfect, such as with the cutting board. Thus additional scratches and discolorations were perceived as embedded naturally in the materials.

Study III

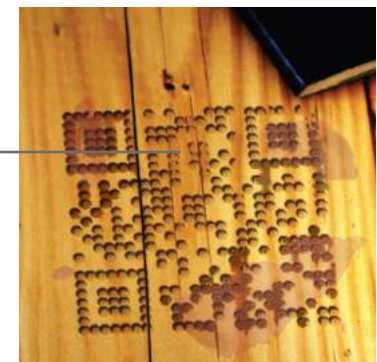
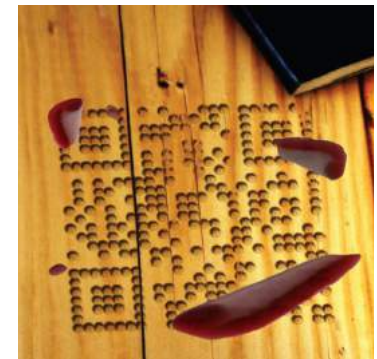
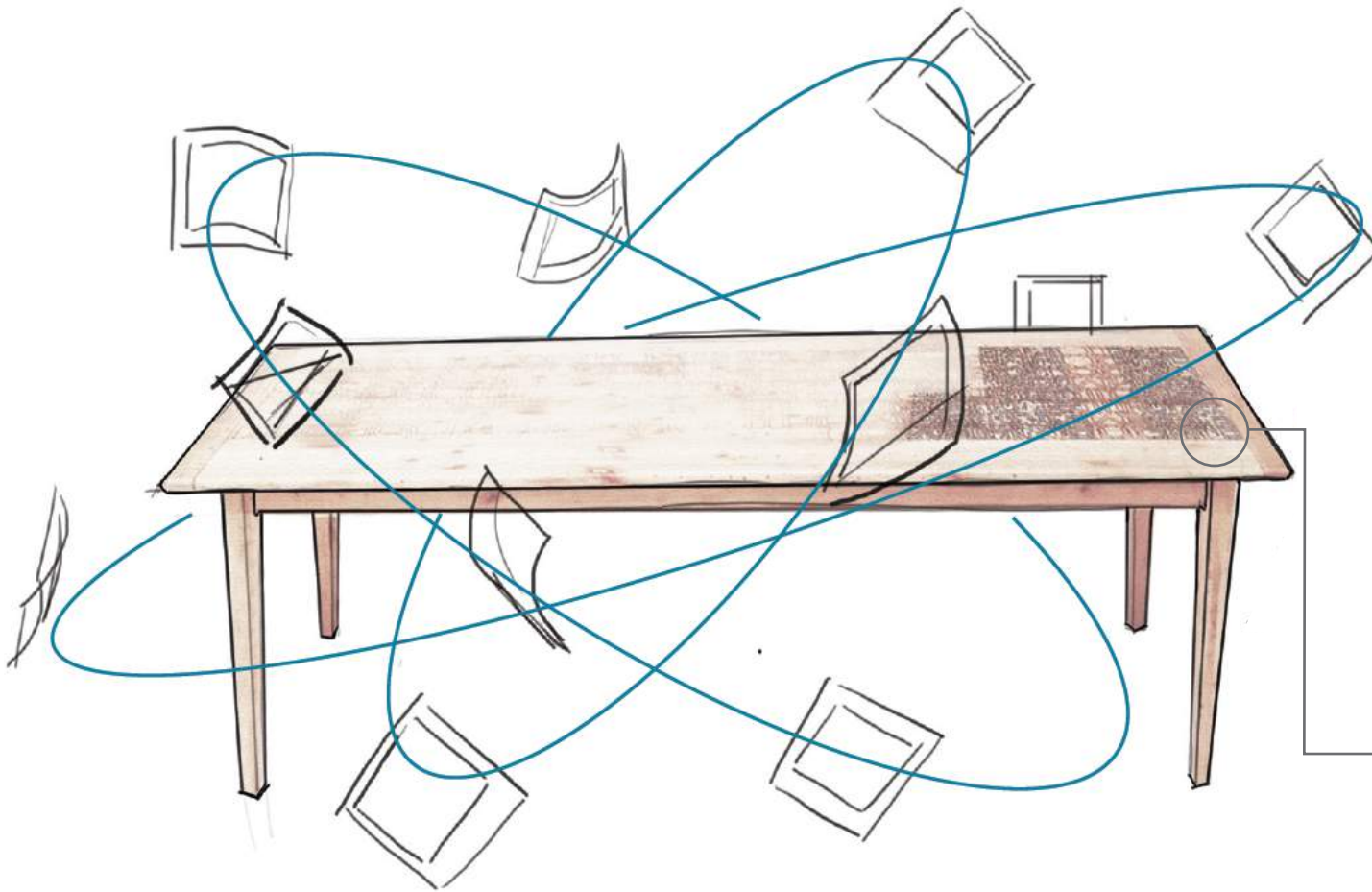
Design explorations of deliberate material traces





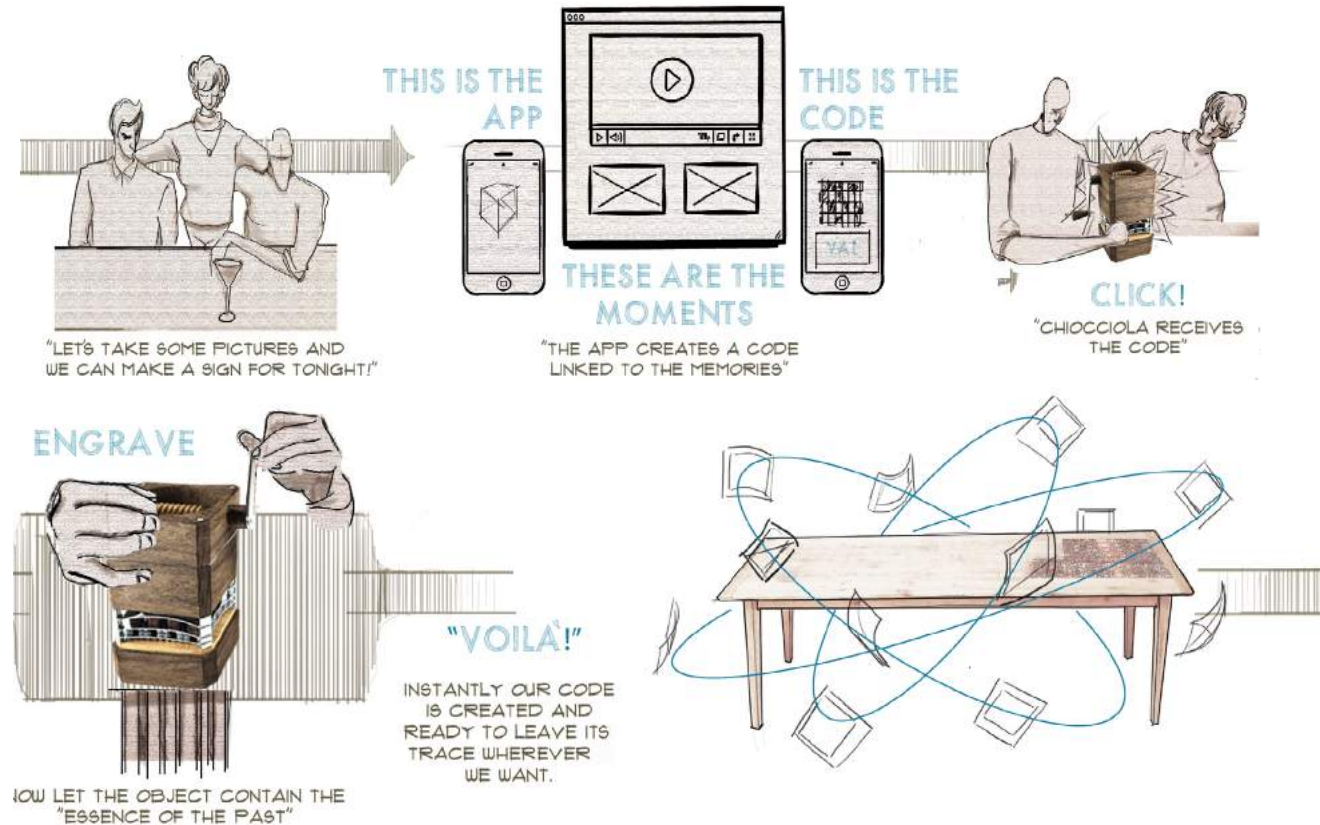
Study IV

Chiocciola: Growing a patina of deliberate material traces (and memories)



The focus of our design explorations was to create a deliberate and permanent trace on materials that are natural with irregular surfaces, and achieve a similar effect of 'maturity'. We wanted to develop an aesthetic language incorporating our previous research on the 'acceptability' of traces. Drawing inspiration from this, as well as previous work on digital augmentation [10], we built Chiocciola (in Italian, "snail") [6].

Chiocciola enables users to intentionally create material traces as a medium to inscribe, grow and relive memories onto ordinary objects. Cherished pictures of family moments around the kitchen table can be added to the object itself and become digitally accessible via a physical trace made on the table material surface. Slowly and carefully engraving the trace (in the form of a QR code) into a natural wooden surface, allows this surface to 'mature' and develop a deliberate 'patina' subject to both intentional use and environmental factors.



Conclusion and future work

Chiocciola is not meant to be exemplary, but an initial exploration into how to enable and use material traces as texture in the design of a new generation of interactive media products and connected ordinary objects. The core of the concept is not on the technology used, but the way in which the QR code (or any other identifiable pattern for what matters) is understood and designed as a material trace with a strong aesthetic quality.

As designers thinking in terms of HCI, we are exploring the relationship that people have with objects and the histories associated with them. The body of work presented in this paper represents an initial attempt at understanding and designing for the impact that desirable yet unintentional material traces have on objects and the people that interact with them. By facilitating a way for the desirable aspects of those traces (and their references to maturity and patina) to be made deliberately upon objects by those interacting with them, we have been exploring a new direction for rich communication through and with objects. In future work, we will take this conceptual design into the wild and see how groups of people engage with the opportunity to make traces. Given the data that we have gathered, we are interested to see how will people respond to the opportunity to make traces of their own that echo unintentional desirable traces. How will these traces provide the object with a unique character, and possibly newly and highly situated reading rituals?

Acknowledgements

We would like to thank Valentina Rognoli for her support at Politecnico di Milano and all the students that contributed to this work: Segourney Muntslag, Mirsaeid Mousavi, Andrea Mambrini, Ludovica Zengiaro, Pietro Malvezzi and Arianna Antognazza.

References

- [1] Candy F., Sommerville S., Kalviainen M., and Oksanen H. (2008) Temporal transformation of materials. In *Proc. Design & Emotion 2004*. Middle East Technical University: Ankara, Turkey.
- [2] Fischer, H.T. (2007) What we touch, touches us: Materials, affects, and affordances. *Design Issues*, 20(4): 20-31.
- [3] Giaccardi, E. (2014) *Design for the Connected Everyday*. Delft University of Technology Press, Delft, The Netherlands.
- [4] Karana, E. (2009) *Meanings of Materials*. PhD dissertation. Delft University of Technology, The Netherlands.
- [5] Manzini, E. (1990) *Artifacts: Towards a New Ecology of the Artificial Environment*. Domus Academy: Milano, Italy.
- [6] Mousavi, M. (2014). *Chiocciola: Personal Memory Tracer*. MSc thesis, Politecnico di Milano, Italy.
- [7] Muntslag, S. (2014). *Designing for Deliberate Traces*. MSc thesis, Delft University of Technology, Netherlands.
- [8] Rognoli, V. and Karana, E. (2013) Towards a new materials aesthetic based on imperfection and graceful ageing. In E. Karana, O. Pedgley, and V. Rognoli (eds) *Materials Experience: Fundamentals of Materials and Design*, Butterworth-Heinemann, Oxford, UK.
- [9] Rosner, D.K., Ikemiya, M., Kim, D., and Koch, K. (2013) Designing with traces. In *Proc. CHI 2013*, ACM Press, 1649-1658.
- [10] Rosner, D.K., Ryokai, K. (2008). Spyn: augmenting knitting to support storytelling and reflection. In *Proc. Ubicomp '08*, ACM Press, 340-349.
- [11] Saito, Y. (2007). *Everyday Aesthetics*. Oxford University Press: New York.
- [12] van Hinte, E. (1997). *Eternally Yours: Visions on Product Endurance*. 010 Publishers: Rotterdam, Netherlands.