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Department "Institute for Informatics"
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Master Thesis

Web-Based Creator for Activity Sculptures

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Zusammenfassung

Abstract

The recollection of personal activity data has been greatly facilitated by the increasing amount of applications and devices that encourage users to measure their activity with the primary goal of health improvement. These devices range from mobile applications taking advantage of smart-phone sensors to dedicated fitness trackers presented as modern watches and bracelets. Apart from the analytical insights about the data obtained through classic data visualizations, it is also possible to visualize the information through physical objects also known as activity sculptures. It has been shown that activity sculptures have a positive influence in users and they motivate the user to keep exercising. To further improve the process of visualizing activity information into sculptures an activity sculpture web configurator was developed. This tool takes advantage of modern web technologies and offers a platform in which users can export their data and allows them to experiment creating variations of an activity sculpture which can also be exported for 3D printing. For the development of the configurator actual product customization platforms were analyzed for gathering best practices in user interface and interaction design. In order for users to have a sculpture with a high degree of variability for the data to be mapped on 4 different sculpture prototypes were developed. For the validation of the configurator an online version was released and a user study was performed. User feedback showed that our prototype was easy to operate and that the obtained sculptures were appealing and meaningful.

Task Definition

Activity Sculptures are physical (3D printed) representations of personal tracking data (e.g. step count) that dwell between the artistic and the abstract. For this master's thesis the student will develop a web configurator that will allow to individually create said activity sculptures (a similar example can be seen in www.shapeways.com/creator/statement_vase).

The focus of the thesis will be the development of interaction concepts and their implementation in the configurator. The concepts will be examined and improved in smaller iterative user studies. Another important aspect is a seamless and easy import of external tracking data (e.g. export data from tracking apps). The result should be a stable working prototype that can be used for follow-up works.

Possible research questions

- What interaction concepts are possible? What are their advantages and disadvantages?
- What degree of freedom is possible and meaningful while designing a visualization?
- What is a possible design space for said activity sculptures?

Tasks

- Research and related works (e.g. data visualization, configurators)
- Development of interaction concepts
- Concept implementation
- Planing and executing several small user studies
- Written thesis and presentation of work

Requirements

- Programming skills in web development and computer graphics

I confirm that I independently prepared the thesis and that I used only the references and auxiliary means indicated in the thesis.

Munich, May 16, 2015

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1 INTRODUCTION

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1.1 Motivation

1.2 Problem definition

1.3 Goals

1.4 Content overview

2 BACKGROUND & RELATED WORK

Background & Related Work

2 Background & Related Work

2.1 Product Customization Software

2.1.1 Usability Aspects

2.1.2 Technological Limitations

2.2 Activity Sculptures

2.3 Digital Visualization & Fabrication Workflows

2.4 Summary

3 PROTOTYPE DESIGN

Prototype Design

3 Prototype Design

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3.3 Configurator Design

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4 IMPLEMENTATION

Implementation

4 Implementation

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5 USER STUDY

User Study

5 User Study

5.1 Study Design

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6 CONCLUSION

Conclusion

6 Conclusion

7 FUTURE WORK

Future Work

7 Future Work

Appendix

A Online Questionnaire

B User Study Results

B.1 Questionnaire Results

B.2 Heat Map Images

C Prototype Sketches

C.1 Sculpture Prototypes

C.2 Web Configurator Prototypes

D Code Snippets

Contents of the enclosed CD

Thesis

- L^AT_EX Document
- PDF File

Presentations

- Initial presentation
- Final presentation

Activity Sculpture Web Configurator

- Prototype sketches
- Source code
- Gitlab and Github mirrors
- Instructions for deployment
- Login Data

Sculptures

- Prototype sketches
- .stl 3D print ready example files

User Study

- Questionnaire
- Results
- Heat map images

References