Hapticlabs – A toolkit to democratize the design of tactile feedback

Position Paper for CHI 2022: Improving collaboration, sharing, and reuse in haptic design research

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1 INTRODUCTION

One of the major reasons why active haptic technology is rarely implemented in everyday products is due to the complexity of the design process and lack of intuitive tools. Current prototyping methods are not built for fast physical prototyping, but either aimed at expert users or limited to extremely rudimental functionality. In addition, acquiring the required basic understanding of eg. electronics, coding, physiology and psychology can take weeks of research. This makes it an additional considerable effort that researchers or developers need to make when deciding to work on haptics, be it the design of new haptic actuators or the implementation of haptics into their own projects. As a result, in many cases, haptics is disregarded because of the high effort and the seemingly low gain it comes with.

Hapticlabs is a toolset that allows designers, engineers and researchers across disciplines to evaluate and integrate tactile feedback without requiring any previous expertise and breaks down the process into simple steps. It provides an ecosystem consisting of plug and play hardware, easy to use software and a digital platform with everything one needs to know to start prototyping. This significantly lowers the time and effort investment for potential use and research regarding haptics, allowing it to be used more widely and opening it up to experts and novices alike.

1.1 Toolkit

The prototyping toolkit allows you to design, evaluate, and integrate haptic feedback without requiring any previous expertise in the field. Due to a user-centered design approach and the close collaboration with designers, engineers and researchers within R&D departments, universities and manufacturers of haptic technology, it builds upon established processes and can easily be implemented into existing structures.
One of the major challenges while building the toolkit was the lack of commonly used and established processes or resources. Haptics being a niche application, combined with a blurred market as well as license and patent situation makes it difficult to grasp the current state and build upon it. Extensive research along own experiences and experiments gave valuable insights into the painpoints to be addressed and how to approach them, resulting in a need-oriented design.
Through an intuitive composer application, custom feedback patterns can be designed and instantly evaluated in real-time through the wireless hardware unit (the satellite). It breaks down the commonly daunting start into easy to follow steps. Especially beginners benefit from the easy to follow parametric input for the feedback design and simplified visualizations.

Up to two electro-mechanic actuators can be attached at the same time to the satellite, which covers the vast applications in everyday devices and wearables. Due to its small footprint it is suitable to include in a wide range of prototypes and applications.
Furthermore to support the creation of meaningful haptic feedback, the online knowledge base provides everything you need to know to get started: A introductory tutorial with condensed and easy-to-digest information, opportunity areas showcasing capabilities to inspire your next project and a collection of design principles to avoid pitfalls along the way and guide you through the process. Besides the theoretical input, the platform serves also as a place to exchange projects and build up a community in the long-term.

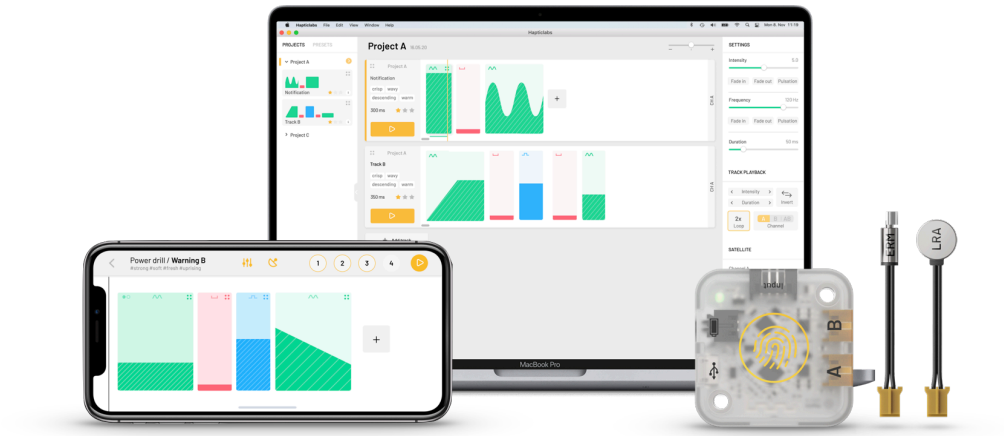

Figure 1: Overview of the toolkit system

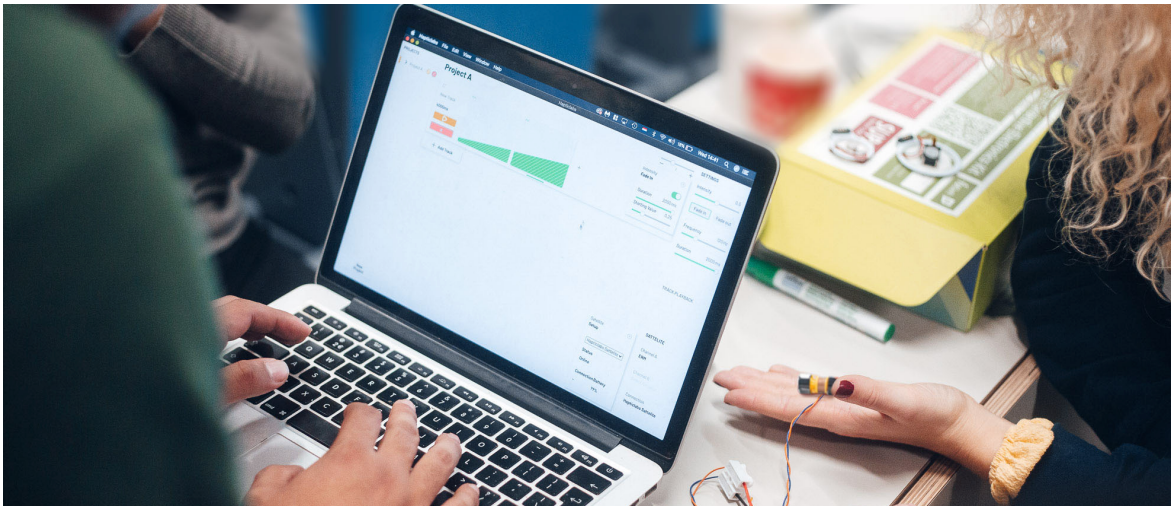

Figure 2: Students evaluating their feedback design