Sensor Data Validation under Stress

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ABSTRACT
UPDATED—July 6, 2017. This sample paper describes the formatting requirements for SIGCHI conference proceedings, and offers recommendations on writing for the worldwide SIGCHI readership. Please review this document even if you have submitted to SIGCHI conferences before, as some format details have changed relative to previous years. Abstracts should be about 150 words and are required.

ACM Classification Keywords
H.5.m. Information Interfaces and Presentation (e.g. HCI): Miscellaneous; See http://acm.org/about/class/1998/ for the full list of ACM classifiers. This section is required.

Author Keywords
Authors' choice; of terms; separated; by semicolons; include commas, within terms only; required.

INTRODUCTION
Sensors promising to measure your physical activity, sleep quality and stress level can be found in many devices. ....

The purpose of the study is to evaluate the consumer wearables (Apple Watch, MS Band II, Polar chest straps) as a suitable wearable to infer stress in a controlled lab environment. Therefore,we put participants in a cognitive demanding, stressful situation and collected sensing data from the consumer devices and professional sensors, namely the Nexus Kit. For comparison, we recorded a baseline consisting of a relaxation period.

Conducting our study, we aimed to investing the following research questions:

1. How do the collected physiological data differ between the different consumer good devices under limited physical activity?

2. How do the collected physiological data differ between the different consumer good devices under high physical activity?

3. How does physical data activity affect the data recording of physiological signals in general? **[das muessen wir moeglicherweise raus nehmen, weil ich nicht sicher bin inwiefern wir dazu Aussagen machen kÃűnnen]**

4. What are differences regarding the data collection between the different measures (EDA, ECG, Skin Temperature) with respect to the robustness?

5. How does the user perception of emotions differ between limited and high physical activity under stressful conditions? **[hier wollte ich noch die SAM Ergebnisse einbauen, aber die Frage laesst sich vermutlich erst formulieren, wenn wir wissen ob/was rauskommt]**

Consequently, we contribute user study investigating (a) the amount of perceived stress , (b) the development of two wrist-worn stimulation giving prototypes, and (c) a preliminary as well as a user study exploring and comparing different tactile stimulation patterns.

INTRODUCTION AND RELATED WORK
The number of notifications is continuously increasing. In particular, mobile devices such as smart watches or smartphones generate 65 notifications on average per day [?]. These notifications are communicated via visual, auditory, and tactile cues based on the user's current situation. For example, during meetings, users prefer tactile feedback while auditory notifications are desirable when the user is at home and placed his phone somewhere. Occasions in which tactile feedback is used, are mainly characterized by the fact that the user is highly engaged in other tasks (e.g., meetings, presentations) and, thus, might be easily distracted and stressed by incoming notifications.

Besides vibrational feedback as known from consumer devices, research proposed different tactile feedback methods that can be integrated into mobile and wearable devices. Examples include simple tactile stimulation via tapping, dragging, squeezing, and twisting [?, ?]. Additionally, pressure-based feedback yields advantages such as unobtrusiveness [?]. There are also other approaches using Electrical Muscle Stimulation [?] or changes in temperature [?]. These methods are designed to gain the user's attention as fast as possible. As a performance measure, research therefore investigates the time needed for perceiving the feedback cue. In contrast, we investigate how we can generate a tactile stimulation pattern which induces less stress to the user. We thereby focus on pressure-based stimulation as well as vibrotactile feedback as state of the art. Alvina et al. explored spatiotemporal vibrotactile patterns on

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Consequently, we contribute (a) a concept for deriving tactile stimulation patterns from physiological signals, (b) the development of two wrist-worn stimulation giving prototypes, and (c) a preliminary as well as a user study exploring and comparing different tactile stimulation patterns.

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