Conception and Implementation of a Mobile Application with Fitness Trackers as Supportive Tools for Computed Stress Detection

Bachelor Thesis
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Motivation

• Enhance teaching and learning at universities
• Help students to self-assess their emotional state such as stress
• Allow lecturers to gain access to emotional states of students in combination with their physiological data
• Align teaching to the students skills and their (physical and mental) capabilities
Goals

• Functional evaluation of the fitness trackers
• Conception of a stress detection model
• Implementation an Android app
• Improvement of the students awareness of computed stress
• Combining (learning) activities and self-assessments with the computed stress
Conception

• Focus on good user-experience
• Computed Stress Visualization
  – derived by heart rate data of fitness trackers
• Activities
  – users can record their daily activities…
  – …and self-assess their emotional state
  -> combines the objective measures and the users self-assessments
Computed Stress Model

- Heart Rate
  - measured with blood volume pulse (BVP)
Computed Stress Model

• **HRV**
  – measures variations in heart rate
  – depends on a set of factors
    • endogenous: age, gender
    • exogenous: fitness, body weight, drugs, …
    • constitutional: genetics, circadian rhythms
  – higher HRV → lower stress and vice versa

• **HRV Score**
  – snapshot of the autonomic nervous system
  – very personal and individual score
Computed Stress Model

- Computed Stress
  - inverted HRV score
  - higher Computed Stress level \( \rightarrow \) lower HRV score and vice versa
CStress Demo

![CStress Demo](image)
Evaluation Results

• Computed Stress fairly reflects students stress levels
• activity tracking in CStress is too sophisticated
• design approach is appropriate
• users ask for more possibilities of interaction and gamification
Future works

• automated activity tracking
• integration of different devices from different manufacturers
• usage of more and different sensors
• detect positive and negative stress
• align teaching to the students stress levels
More information about project Stila:

http://stila.pms.ifi.lmu.de

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