



## Smart Wearables in Clinical Training and Routine

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Intelligent wearable sensors, devices and textiles open new ways to interact with the digital infrastructure. These so-called wearables will dominate the digital evolution for the next years similar to the revolution that smartphones have caused in the prior decade. Large effects are already noticeable in fitness applications (activity-tracker, smart watches, etc.) and smart homes (Internet of Things). Increasing availability and connectivity of wearables will not only have an impact on personal well-being, but will also allow redefine and reshape the professional life. Wearables and ambient sensors allow a continuous assessment of one's physical and psychological capabilities and workload while maintaining a high level of privacy. This can be used to reduce harmful situations for the wearer. In addition, new approaches like gamification or serious games can be combined with wearables to improve upon own skills and knowledge. The project Health Observer (HObs) was for informal caregivers who often suffer from lack of experience and formal training. A smart shirt was developed to measure three of the most common problems in informal care: tiredness, stress and back pain. The most important features of the shirt are: (1) unobtrusiveness, (2) usage of inexpensive and readily available hardware, (3) high accuracy of measured parameters, and (4) an intuitive user experience through immediate feedback. A prototype was developed with a total budget of 120 Euros (US\$130) and a feasibility study was performed with a positive readout of several physiological parameters. A smartphone can be connected to the shirt via an app that warns the caregiver when tiredness or stress is detected, or when being at risk of injury. Additionally, the app can display remedies or even train correct execution of certain tasks through immediate feedback. The Hand-Hygiene-Training project deals with the problem of hospital acquired infections (HAIs). HAIs are a major concern even in developed countries. One of the main causes is insufficient hand hygiene. Here, two aspects of hand hygiene have to be dealt with: compliance and effectiveness of hand hygiene. The Hand-Hygiene-Training project deals with the latter. Electromyography (EMG) armbands are used in training of effective hand cleansing procedures. The EMG armbands measure the movement of the forearms and muscle movement of the fingers, thereby allowing to assess whether hand hygiene has been performed according to standards like the one's defined by the World Health Organization (WHO). The armbands are coupled with an eLearning application on a tablet or smartphone, which trains the correct execution through videos and graphics, and gives detailed background information. Such an application could be enhanced through a serious game that creates high scores within a hospital or clinic to allow comparison between "players" anonymously or using a pseudonym. This can also help to see one's ability in context and might foster competition for the best performances.

### Speaker:

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