THE PARTICIPATORY DESIGN OF EXPOSURE ASSESSMENT APPARATUS

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Background and Aims: Sensor-equipped phones, handheld monitors, and instrumented bicycles are just three examples of the diverse forms of personal and microenvironmental monitoring equipment that could emerge from advances in increasingly affordable, digital, and real-time measurement technologies. Who participates in the design of this emerging set of technologies, how, and what effect does it have on exposure assessment and environmental health? What benefits could emerge from involving research participants more extensively in the design of instrumentation, as well as its staging and operation? What systematic approaches can guide broader participation in this activity? We present a process-oriented framework and method for eliciting and thinking through these problems as well as reflections and lessons learned.
Methods and Materials: We review the Participatory Design (PD) framework, a well-established tradition of theory and method for the user-centered design of persuasive digital technologies (Davis 2009), as well as recent case studies in community-oriented PD (DiSalvo 2008) and citizen sensing (Willett 2010, Dutta 2009). We extend the contributions of this work by describing an iterative, workshop-oriented approach for the participatory design of exposure assessment apparatus. Relying on small-group sketching and description, as well as intensive rapid prototyping, the method results in the construction of functioning artefacts as well as stories and demonstrations.
Results: Using commercially available, open-source components, we were able to construct several artefacts within a series of six workshops spread over three months. We identified four areas for future work to streamline and increase the value of such activity for exposure assessment stakeholders: (1) benchmarking and response characterization of low-cost, off-the shelf sensors; (2) modularization of components identified and described in multiple artefacts; (3) curricula and analytical techniques guiding the use and interpretation of measurements obtained from such artefacts; and (4) collaboration with the emerging maker and hacker subculture, from whom we drew examples, materials, and inspiration.
Conclusions: Low-cost and do-it-yourself (DIY) sensing platforms may offer innovative ways for professionals and non-professionals to expand participation by cooperating on the design of exposure assessment instrumentation. Workshop methods are time-intensive and require dedicated involvement from scientists, designers, and engineers; however, this might be ameliorated. Further exploration of the potential for Participatory Design methods in exposure assessment is warranted.

References

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