Introduction to the HICSS-54 Software Development for Mobile Devices, the Internet-of-Things, and Cyber-Physical Systems Minitrack

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Applications for mobile devices (apps) have facilitated the success of smartphones and tablets. By using apps, the multi-purpose hardware of modern devices can be utilized to the full extent. Despite much progress with regard to development methods, software development kits, and frameworks, app development poses many challenges. This is even more so for novel mobile devices such as wearables and for the hardware that constitutes the Internet-of-Things (IoT) and Cyber-Physical Systems (CPS). Compatibility, performance, battery-saving, and security and safety are only some of the issues that are mainly driven by the quality of the used software. A satisfying level of this quality in many cases is very hard to achieve and proper techniques for testing and formal verification are needed.

Experiences and methods from classical software development can only be utilized to some degree. Moreover, the inherent challenges of the respective new devices ask for novel solutions. The challenges sketched above are even reinforced by the conditions that development activities meet. Typical particularities include the need for multi-platform development, device fragmenta-tion, context-sensitivity, low computational power, little memory, energy conservation requirements, and the heterogeneity of users. With the emergence of multi-platform and multi-device, the new golden standard are applications not only across software ecosystems, but across hardware platforms such as laptop, mobile, tablets, embedded devices, sensors and wearables. Therefore, new threads of research are needed to tackle these issues and to pave the way for improved software standards, better business producibility and an improved user experience (UX).

This minitrack started as *Mobile App Development* (HICSS-49 [1] and HICSS-50 [2]) before broadening to *Software Development for Mobile Devices, Wearables, and the Internet-of-Things* (HICSS-51 [3] and HICSS-52 [4]). In its fifth year (HICSS-53 [5]), we adapted it to the further changing landscape to keep it attractive to the community, now including cyber-physical systems (CPS). We keep the inclusion of CPS for HICSS-54.

HICSS-54 will also be the first virtual HICSS. Likely due to the pandemic, we have received fewer papers than usual. Admittedly, also our own activities have shifted somewhat this year (see e.g. [6]). Nevertheless, our minitrack will have a nice virtual session and we hope it will resume its growth with HICSS-55!

The minitrack covers four papers:

1. *MuTent: Dynamic Android Intent Protection with Ownership-Based Key Distribution and Security Contracts* by Pradeep Kumar Duraisamy Soundrapandian, Tiffany Bao, Jaejong Baek, Yan Shoshitaishvili, Adam Doupé, Ruoyu Wang, and Gail-Joon Ahn

2. *Neverlast: Towards the Design and Implementation of the NVM-based Everlasting Operating System* by Christian Eichler, Henriette Hofmeier, Stefan Reif, Timo Hönig, and Wolfgang Schröder-Preikschat

3. *Architectural Tactics for Energy Efficiency: Review of the Literature and Research Roadmap* by Carlos Paradis, Rick Kazman, and Damian Andrew Tamburri

4. *A Simulation-based Performance Evaluation of Heuristics for Dew Computing* by Matías Hirsch, Cristian Mateos, Alejandro Zunino, Tim A. Majchrzak, Tor-Morten Grønli, and Hermann Kaindl

We are glad that we again had many helping hands. We are proud that all authors that submitted papers to our track got at least three – most even four – constructive reviews as well as an additional meta-review. We think that we outperform many journals with this effort in giving authors advice, whether their papers are accepted or not. And continuing this to the fifth edition of the minitrack makes us glad. Therefore, we would like to thank (and

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References

[1] T. A. Majchrzak and H. Heitkötter, "Introduction to the mobile app development minitrack," in *Proceedings 49th Hawaii International Conference on Systems Science (HICSS-49)*, p. 5682, IEEE Computer Society, 2016.

[2] T. A. Majchrzak and T.-M. Grønli, "Introduction to the mobile app development minitrack," in *Proceedings 50th Hawaii International Conference on Systems Science (HICSS-50)*, p. 6161, AIS Electronic Library (AISeL), 2017.

[3] T. A. Majchrzak and T.-M. Grønli, "Introduction to the HICSS-51 software development for mobile devices, wearables, and the internet-of-things minitrack," in *Proceedings 51th Hawaii International Conference on Systems Science (HICSS-51)*, p. 5686, AIS Electronic Library (AISeL), 2018.

[4] T. A. Majchrzak and T.-M. Grønli, "Introduction to the HICSS-52 software development for mobile devices, wearables, and the internet-of-things minitrack," in *Proceedings 52th Hawaii International Conference on Systems Science (HICSS-51)*, pp. 7399–7400, AIS Electronic Library (AISeL), 2019.

[5] T. A. Majchrzak, T.-M. Grønli, and H. Kaindl, "Introduction to the HICSS-53 software development for mobile devices, the internet-of-things, and cyber-physical systems minitrack," in *Proceedings 53th Hawaii International Conference on Systems Science (HICSS-53)*, pp. 6629–6630, AIS Electronic Library (AISeL), 2020.

[6] G. K. Shahi, A. Dirkson, and T. A. Majchrzak, "An exploratory study of covid-19 misinformation on twitter," *Online Social Networks and Media*, 2020.