

Message from the Chairs

The Software Engineering community is pushing a significant effort on self-adaptive systems. Such systems are required to modify their behavior to maintain goals in response to unpredicted changes in their execution environment. Key challenges for self-adaptive systems include time-efficient diagnosis of requirements violation, fast decision making, and systematic procedures to assess their effectiveness and dependability. Further challenges arise in correlating local and global decision-making for larger-scale or distributed systems. Despite a variety of approaches has been proposed for self-adaptive software, only a few of them can provide formal guarantees about the quality of adaptation, mainly due to the difficulty of grounding the adaptation mechanisms within suitable theoretical frameworks.

Control theory has established effective mechanisms to make controlled plants behave as expected. Although the similarity with software adaptation is self-evident, most of the attempts to apply "off-the-shelf" control theory to software applications have been unsuccessful. The main challenge has been model software systems as dynamical system -- i.e., by means of differential or difference equations -- because of the intrinsic non-linearities, the variety of usage profiles, and the interconnection of heterogeneous components, together with the common lack of control theory skills in the software engineering education, research, and practice. As result, the current use of control theory is limited to very specific applications and hard to generalize to large classes of software.

The aim of this workshop is to provide a forum to discuss a different route. Bringing together researchers from the communities of software engineering and control theory and fostering their debate and cooperation, our goal is twofold. On one hand, exploring new modeling strategies to incorporate control in software systems design and development, empowering software engineers with theoretical and practical skills to bring control to the core of adaptation. On the other hand, outlining the new challenges and opportunities the very nature of software and computing systems place to established control theory, due to its higher decoupling from the physical constraints of an classic plant. For the future, we envision a fruitful hybridization of the two disciplines for engineering adaptive software.

We received a total of 11 submissions, out of which 6 were accepted for presentation. To complement the program, the workshop proposes a keynote speech by Prof Karl-Erik Årzen about his experience with the design of self-adaptive resource managers for embedded systems and an introductory tutorial on control theory for computer scientists by Prof Alberto Leva, to provide a first contact point for the software engineering researchers aiming at knowing more about this discipline.

We would like to thank the program committee members for providing valuable and constructive feedback to the authors under a tight schedule, as well as each author and presented who submitted their work to the CTSE 2015 workshop.

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