



TECHNISCHE UNIVERSITÄT  
CHEMNITZ

Fakultät für Informatik  
Angewandte Informatik  
Professur Softwaretechnik

Technische Universität Chemnitz · 09107 Chemnitz  
To  
Studijni oddeleni-doktorske studium  
Ke Karlovu 3  
121 16 Praha 2

Bearbeiter: Steffen Becker  
Raum: B216B  
Telefon: +49 371 531-36144  
Fax: +49 371 531-836144  
E-Mail: [steffen.becker@informatik.tu-chemnitz.de](mailto:steffen.becker@informatik.tu-chemnitz.de)  
Internet: [www.tu-chemnitz.de/informatik/ST](http://www.tu-chemnitz.de/informatik/ST)

Ort, Datum: Chemnitz, 06.04.16

**Review of the PhD thesis submitted by  
Mgr. Michal Kit  
Titled  
"Component-based engineering of Smart Cyber-Physical systems"**

### **Context**

The thesis under review addresses the important and up-to-date area of designing and verifying software architectures for Smart Cyber-Physical Systems (sCPS). In this area systems are built from distributed components, which communicate over unreliable links in a very dynamic way to achieve a set of overall system goals. The behaviour, the system exhibits, is a so-called emergent behaviour as it only manifests itself at runtime based on the actual composition of (dynamic) system elements. Such systems only gained attention a few years ago and there is still a huge lack of engineering support for these systems ranging from modelling languages to verification or (early) analysis approaches.

### **Contents**

The thesis by Mr. Kit addresses the challenges arising from the design, implementation, and validation of sCPS. For this, the thesis consists of five sections: an introduction and motivation part, a related work discussion, a summary of the thesis' goals and contributions, a collection of articles co-authored by Mr. Kit, and a summary including an outlook to future work.

Overall, the thesis is very well written and I enjoyed reading most sections of it. Only Section 3 drops a bit in quality wrt. English language use. The goals of the thesis are motivated nicely and the addressed challenges were made clearly explicit in Section 3. However, the Section also lacks a bit of a discussion of the novel conceptual work done by Mr. Kit. While I have no doubts that Mr. Kit did a lot of conceptual work on all three aspects of his contributions (DEECo, jDEECo, jDEECoSim), they could have been highlighted more prominently. In the current thesis, Section 3 it is a bit hard to understand where the real challenges and conceptual contributions of Mr. Kit were allocated in the overall work done by Mr. Kit's research group. A clear statement of group contributions including a quantification of Mr. Kit's parts, and individual contributions would have helped. This is a good point to ask during the PhD

Dienst- u. Paketanschrift: Technische Universität Chemnitz · Professur Softwaretechnik  
Straße der Nationen 62 · 09111 Chemnitz  
Postanschrift: Technische Universität Chemnitz · 09107 Chemnitz · GERMANY

Bankverbindung: Hauptkasse des Freistaates Sachsen · Ostsächsische Sparkasse Dresden  
IBAN: DE82 8505 0300 3153 0113 70 · BIC: OSDDDE81XXX



defence in Prague. The most it becomes clear for Goal 2, where the contributions on novel networking protocols as well as implementation of the necessary simulators are outlined as main contributions by Mr. Kit.

The overall good impression was strengthened to a large extent by the extensive related work overview in Section 2 of the thesis. None of the approaches in the field I could think of being related were missing here. A selection of these approaches, which had close relation to the presented thesis have been discussed in detail. For each of them, the thesis either provides arguments why the approach is not suited for the studied context.

Section 4 gives a collection of papers co-authored by Mr. Kit. For each paper, he provides a summary of the paper and a statement about the parts of the paper that he contributed. Here, again, he could have more pointed out his share on the conceptual work inside the paper, in particular, if I assume the author's are listed in the order of that share for some papers. Among the papers there are several papers published at high ranked conferences in our research area. This shows, that also the community considers the work to be novel and important. One paper even received a best paper award.

### Evaluation

In summary, I have no doubts about the contribution of Mr. Kit to the work and also no doubts that his overall contribution would not be worth issuing a PhD. In particular, doing all the engineering work was needed for the described approach must have been labor-intensive. In summary, his contributions cover a component model for sCPS including a runtime environment and a dedicated simulator which is interconnected with other simulators to cover the full range of the addressed problem and domains. All of this gives very strong evidence of the ability of Mr. Kit to perform independent, high-quality scientific research.

The thesis concludes with a summary of the achieved goals. Together with a brief but interesting future work outlook in Section 5 this gives strong evidence of the ability of Mr. Kit to also transfer his results into other, novel application domains. In particular, as Mr. Kit already had to work interdisciplinary in his evaluations, I am sure that we will have an impact in the research on sCPS.

Overall, I think that the thesis shows Mr. Kit's abilities to work scientifically and I see no reasons why not to issue a PhD for his contributions.

Yours sincerely,

Steffen Becker  
Head of the Software Engineering Chair at the TU Chemnitz