

#### **TKTP 2024**

## 41<sup>st</sup> Annual Doctoral Symposium for Computer Science

## 41. Tietojenkäsittelytieteen päivät

Vaasa, Finland | June 10 – 11, 2024

EDITORS

Jussi Kasurinen | Tero Päivärinta | Tero Vartiainen



#### **TKTP 2024:**

# Annual Doctoral Symposium for Computer Science 2024

Proceedings of the

41<sup>st</sup> Doctoral Symposium of the Finnish Society for Computer Science

Vaasa, Finland | June 10 − 11, 2024

CO-ORGANIZED BY
Finnish Society for Computer Science |
University of Vaasa

SUPPORTED BY ABB | Wapice | Wärtsilä



### Copyright © 2024 for the individual papers by the papers' authors Copyright © 2024 for the volume as a collection by its editors This volume and its papers are published under the Creative Commons License Attribution 4.0 International (CC BY 4.0).

Edited by Jussi Kasurinen, Tero Päivärinta, and Tero Vartiainen

Submitted by Jussi Kasurinen

Published on ceur-ws.org

ISSN 1613-0073

https://sites.uwasa.fi/tktp2024/en/

#### **BRIEF CONTENTS**

ORGANIZING COMMITTEE	4
INVITED SPEAKERS	5
PROGRAM COMMITTEE	6
FOREWORD	7

#### **GENERAL CHAIR**

Tero Vartiainen, University of Vaasa, Finland

#### PROGRAM COMMITTEE CHAIRS

Jussi Kasurinen, LUT University, Finland Tero Päivärinta, Luleå University of Technology, Sweden

#### ORGANIZING COMMITTEE CHAIR

Professor Tero Vartiainen

#### Organizing committee at University of Vaasa

Professor Tero Vartiainen
Professor Heidi Kuusniemi
University Lecturer Tomi Pasanen
University Lecturer Timo Mantere
Assistant Jonna Elomaa
Assistant Sara Nyyssölä
Project Manager Camilla Wahlberg

#### **Ross Bailey**

Wärtsilä

#### **Petra Berg**

University of Vaasa

#### Jani Hirvo

**ABB** 

#### Kirsi Karlamaa

Traficom

#### Jyrki Keskinen

Wapice

#### **Scott Kruse**

Texas State University

#### Heidi Kuusniemi

University of Vaasa

#### **Antti Laine**

Sweco

#### **Peter Lund**

Finnish Information Security Cluster (FISC)

#### Kimmo Rousku

Finnish Digital Agency

#### PROGRAM COMMITTEE

Mats Aspnäs

Åbo Akademi, Finland

**Tuomas Aura** 

Aalto University, Finland

Juan M. Corchado

University of Salamanca, Spain

Jussi P. P. Jokinen

University of Jyväskylä, Finland

Jussi Kasurinen

LUT University, Finland

Pauli Miettinen

University of Eastern Finland

Tuomas Mäkilä

University of Turku, Finland

Marko Niemimaa

University of Agder, Norway

Ella Peltonen

University of Oulu, Finland

Timo Poranen

University of Tampere, Finland

Tero Päivärinta

Luleå University of Technology, Sweden

Nikolaj Tatti

University of Helsinki, Finland

Yuan Tian

Nanjing Institute of Technology, China

**Tero Vartiainen** 

University of Vaasa, Finland

Lena-Maria Öberg

Mid-Sweden University

#### **FOREWORD**

The Finnish Society for Computer Science aims to bring together everyone who practices computer science in Finland and others interested in the subject nationally and internationally. The theme of the 41<sup>st</sup> annual doctoral symposium, organized by University of Vaasa, was "Digitalization of Critical Infrastructures".

Critical infrastructures comprise structures and services essential in the functioning of activities of society. Such structures are energy, water supply, and health care, for example. Digitalization means development of activities in the way they depend on information technologies. Digitalization of critical infrastructures strengthens activities, and it is possible to offer new services such as smart meters and Kanta-service. The other side of digitalization is the increase of vulnerabilities: Cyberattacks are targeted towards digital services and cyber-physical plants and components. If these attacks succeed the plants and systems may stall.

The keynote speakers raised vulnerabilities and opportunities of digital society. The event announced also the winners and runner-ups of the doctoral dissertation and master's thesis nominations for the theses of the year and organized thematic workshops for different sub-interest groups. The event was bi-lingual. Three of the keynote speeches were given in Finnish with slides that are in English.

At the doctoral symposium track, the open call for papers attracted 22 submissions, of which 14 were selected to be presented in the symposium and included in the proceedings (acceptance rate 63,6 %). The quality of the submissions was thoroughly good. In addition to Finland, submissions were received from researchers resided in Austria, Germany, Italy, Norway, and Sweden. Each submission got at least two reviews. As well, the program committee involved five international members in addition to the representatives of the Finnish universities. In case of conflicting reviews, a third experienced member of the program committee was asked to give an additional, third, review. Due to the international nature of several researchers resided in Finland and the international participants, the working language of the symposium and the proceedings was English. The symposium was well received, attracting ca. 50 active researchers on-site, majority of the presenting authors being doctoral students and junior researchers presenting their new research projects, concepts or publications towards their doctoral dissertation, or the work their research group is currently involved in. There is a clear benefit in this type of activity to the entire research community, and the society will most definitely continue this tradition to enhance interactions with Finnish and international communities of computer science researchers also in the coming years.

August, 2024,

Assoc. Prof. **Jussi Kasurinen**, Program Chair, LUT University, Finland

Prof. **Tero Päivärinta**, Program Co-Chair, Luleå University of Technology, Sweden | University of Oulu, Finland

Prof. **Tero Vartiainen**, Chair of the Board | General Chair Finnish Society for Computer Science | University of Vaasa, Finland