Programme

MONDAY October 24th

	Programming: What is Next? Duality between Documenation and Code ROOM A	Verification and Validation of Concurrent and Distributed Systems I ROOM B	Automated Verification of Embedded Control Software ROOM C
09:00-10:30	**Coherent Description of Software System Properties.** Manfred Broy	**A thread-safe Term Library** Jan-Frise Groote, Maurice Laveaux, and P.H.M. van Spaendonck	**A Model-Based Approach to the Design, Verification and Deployment of Railway Interlocking System.** Arturo Amendola, Anna Becchi, Roberto Cavada, Alessandro Cimatti, Alberto Griggio, Giuseppe Scaglione, Angelo Susi, Alberto Tacchella, Matteo Tessi
	Models as Documents, Documents as Models. Perdita Stevens	**ST4MP: A Blueprint of Multiparty Session Typing for Multilingual Programming** Sung-Shik Jongmans and José Proença	**Guess What I'm Doing! - Rendering Formal Verification Methods Ripe for the Era of Interacting Intelligent Systems.** Martin Fränzle, Paul Kröger
	Using Supplementary Properties to Reduce the Need for Documentation. Ole Lehrmann Madsen, Birger Moller-Petersen	**A Formal Model of Metacontrol in Maude** Juliane Päßler, Esther Aguado, Gustavo Rezende Silva, S. Lizeth Tapia Tarifa, Carlos Hernández Corbato , and Einar Broch Johnsen	**On the Industrial Application of Critical Software Verification with VerCors.** Marieke Huisman, Raúl E. Monti
10:30-11:00	**COFFEE BREAK**		
11:00-12:30	Programming: What is Next? Synergies between Documenation and Code ROOM A	Verification and Validation of Concurrent and Distributed Systems II ROOM B	Automated Verification of Embedded Control Software ROOM C
	Pragmatics Twelve Years Later Reinhard von Hanxleden, Edward A. Lee, Hauke Fuhrmann, Alexander Schulz-Rosengarten, Sören Domrös, Marten Lohstroh, Soroush Bateni, Christian Menard	**An Efficient VCGen-based Modular Verification of Relational Properties** Lionel Blatter, Nikolai Kosmatov, Virgile Prevosto, and Pascale Le Gall	**Towards Automated Service-Oriented Verification of Embedded Control Software Modeled in Simulink.** Timm Liebrenz, Paula Herber, Sabine Glesner
	Assurance Provenance Gabor Karsai, Daniel Balasubramanian	**On Deductive Verification of an Industrial Concurrent Software Component with VerCors** Raúl E. Monti, Robert Rubbens, and Marieke Huisman	**A Concept of Scenario Space Exploration with Criticality Coverage Guarantees - Extended Abstract.** Hardi Hungar
	Formalization of the AADL Run-Time Services John Hatcliff, Jerome Hugues, Daniuelle Steward, Lutz Wrage	**Exploring a Parallel SCC Algorithm - Using TLA+ and the TLC Model Checker** Jaco van de Pol	**Verifying Safety Properties of Robotic Plans Operating in Real-World Environments via Logic-Based Environment Modeling.** Tim Meywerk, Marcel Walter, Vladimir Herdt, Jan Kleinekathöfer, Daniel Große, Rolf Drechsler
12:30-14:30	**LUNCH**		

Programme

MONDAY October 24th

	Programming: What is Next? Executable Documentation **ROOM A**	Verification and Validation of Concurrent and Distributed Systems III **ROOM B**	Automated Verification of Embedded Control Software **ROOM C**
14:30-16:00	**Executable Documenation: Test-First in Action** Steven Smyth, Jette Petzold, Jonas Schürmann, Florian Karbus, Tiziana Margaria, Reinhard von Hanxleden, Bernhard Steffen	**An IoT Digital Twin for Cyber-Security Defence based on Runtime Verification** Jorge David de Hoz Diego, Anastasios Temperekidis, Panagiotis Katsaros, and Charalambos Konstantinou	**Formally Proving Compositionality in Industrial Systems with Informal Specifications.** Mattias Nyberg, Jonas Westman, Dilian Gurov
	Runtime Verification as Documentation Dennis Dams, Klaus Havelund, Sean Kauffman	**On Binding in the Spatial Logic for Closure Spaces** Laura Bussi, Vincenzo Ciancia, Fabio Gadducci, Diego Latella, and Mieke Massink	**Specification, Synthesis and Validation of Strategies for Collaborative Embedded Systems.** Holger Schlingloff
	Executable Documenation: From Documentation Languages to Purpose-Specific Languages Tim Tegeler, Steve Boßelamnn, Jonas Schürmann, Steven Smyth, Sebastian Teumert, Bernhard Steffen	**Discussion:** Heterogeneous systems assurance: scalability and industrial applicability of formal approaches.	**Closing Discussion:** What do we need for the automated verification of embedded control systems today? What are the major challenges for the next 10 years?
16:00-16:30	**COFFEE BREAK**		
	Programming: What is Next? Duality between Documenation and Code **ROOM A**		
16:30-18:00	Closing Panel Documentation: is it a technological or a psychological issue?		
18:30-19:30	**ISoLA WELCOME RECEPTION**		

Programme

TUESDAY October 25th

	Rigorous Engineering of Collective Adaptive Systems Opening of REoCAS and Design of Autonomous Systems ROOM A	Formal methods for DIStributed COmputing in future RAILway Systems (DisCo Rail 2020) Challenges ROOM B	Formal Methods Meet Machine Learning Explanations of Machine Learning Systems ROOM C
09:00-10:30	**Correct by Design Coordination of Autonomous Driving Systems.** Joseph Sifakis, Marius Bozga	**Safe and Secure Future AI-Driven Railway Technologies: Challenges for Formal Methods in Railway.** Seisenberger, M., ter Beek, M.H., Ferrari, A., Haxthausen, A., James, P., Lawrence, A., Luttik, B., van de Pol, J., Wimmer, S.	**Algebraically explainable controllers: Decision trees and support vector machines join forces.** Jüngermann, F., Křetínský, J., Weininger, M.:
	Neural Predictive Monitoring for Collective Adaptive Systems Francesca Cairoli, Nicola Paoletti, and Luca Bortolussi	**Future train control systems: challenges for dependability assessment.** Fantechi, A., Gori, G., Gnesi, S.	**Verifiable and Explainable Machine Learning** Kim Larsen
	An Extension of HybridSynchAADL and Its Application to Collaborating Autonomous UAVs. J aehun Lee, Kyungmin Bae, Peter Csaba Ölveczky	**Standardisation Considerations for Autonomous Train Control.** Peleska, J., Haxthausen, A.E., Lecomte, T.	**Towards rigorous understanding of neural networks via semantics preserving transformation** Schlüter, M., Nolte, G., Steffen, B.:
10:30-11:00		**COFFEE BREAK**	
	Rigorous Engineering of Collective Adaptive Systems Computing with Bio-inspired Communication **ROOM A**	**Formal methods for DIStributed COmputing in future RAILway Systems (DisCo Rail 2020)** Solutions **ROOM B**	**Formal Methods Meet Machine Learning** Verification of Machine Learning Systems **ROOM C**
11:00-12:30	**Discrete models of continuous behavior of collective adaptive systems** Peter Fettke, Wolfgang Reisig	**Automatic generation of domain-aware control plane logic for software defined railway communication networks.** Canonico, R., Flammini, F., Marrone, M., Vittorini, V., Nardone, N.	**Formal Verification for Neural Networks in Autonomous Cyber-Physical Systems** Taylor Johnson
		Safe and Secure Architecture Using Diverse Formal Methods. Lecomte, T.	
	Modelling Flocks of Birds from the Bottom Up. Rocco De Nicola, Luca Di Stefano, Omar Inverso, and Serenella Valiani:	**Formal Modeling for Safety and Performance Evaluation of ERTMS/ ETCS Level 3: The PERFORMINGRAIL Project** Rim Saddem-Yagoubi, Muhammad Usman Sanwal, Simone Libutti, Massimo Benerecetti, Julie Beugin, Francesco Flammini, Mohamed Ghazel, Bob Janssen, Stefano Marrone, Fabio Mogavero, Roberto Nardone, Adriano Peron, Cristina Seceleanu, and Valeria Vittorini	**Analysis of Recurrent Neural Networks via Property-Directed Verification of Surrogate Models** Khmelnitsky, I., Neider, D., Roy, R., Xie, X., Barbot, B., Bollig, B., Finkel, A., Haddad, S., Leucker, M., Ye, L
	Towards Drone Flocking using Relative Distance Measurements. Andreas Brandstätter, Scott A. Smolka, Scott D. Stoller, Ashish Tiwari, Radu Grosu	**A Case in Point: Verification and Testing of a EULYNX Interface.** Mark Bouwman, Djurre van der Wal, Bas Luttik, Mariëlle Stoelinga, Arend Rensink	**The Modest State of Learning, Sampling, and Verifying Strategies** Hartmanns, A., Klauck, M.
12:30-14:30	**LUNCH**		
14:30-22:00	**EXCURSION & ISoLA DINNER**		

Programme

WEDNESDAY October 26th

	Rigorous Engineering of Collective Adaptive Systems New system models for ensembles ROOM A	Formal Methods Meet Machine Learning Test-based Validation ROOM B	Digital Twin Engineering ROOM C
09:00-10:30	**Epistemic Ensembles** Rolf Hennicker, Alexander Knapp, Martin Wirsing	**An Overview of Structural Coverage Metrics for Testing Neural Networks** Usman, M., Sun, Y., Gopinath, D., Dange, R., Manolache, L., Pasareanu, C	**Engineering of Digital Twins for Cyber-Physical Systems** John Fitzgerald, Peter Gorm Larsen, Tiziana Margaria, Jim Woodcock and Cláudio Gomes
	A modal approach to consciousness of agents Chen Yifeng and J. W. Sanders	**Importance splitting in Uppaal. in this volume (2022)** Larsen, K.G., Legay, A., Mikučionis, M., Poulse, D.B.:	**Towards Requirements Engineering for Digital Twins of Cyber-Physical Systems** Tao Yue, Shaukat Ali, Paolo Arcaini and Fuyuki Ishikawa
	VAn Experimental Toolchain for Strategy Synthesis with Spatial Properties. Maurice ter Beek, Davide Basile, and Vincenzo Ciancia	**Verification of variability-intensive stochastic systems with statistical model checking.** Lazreg, S., Cordy, M., Legay, A.: V	**Digital Twins for Organ Preservation Devices** Aaron John Buhagiar, Leo Freitas, William E. Scott III and Peter Gorm Larsen
			Using Digital Twins in the Development of Complex Dependable Real-Time Embedded Systems Xiaotian Dai, Shuai Zhao, Benjamin Lesage and Iain Bate
			Small summary session
10:30-11:00	**COFFEE BREAK**		
	Rigorous Engineering of Collective Adaptive Systems Large ensembles and Collective Dynamics **ROOM A**	**Formal Methods Meet Machine Learning** **ROOM B**	**Digital Twin Engineering** **ROOM C**
11:00-12:30	**Towards a Kinetic Framework to Model the Collective Dynamics of Large Agent Systems.** Stefania Monica, Federico Bergenti, Franco Zambonelli	**Robust and Dependable Artificial Intelligence** Nils Jansen	**Towards Reactive Planning With Digital Twins and Model-Driven Optimization** Martin Eisenberg, Daniel Lehner, Radek Sindelarand Manuel Wimmer
	Understanding social feedback in biological collectives with smoothed model checking. Julia Klein, Tatjana Petrov	**On Training and Verifying Robust Autoencoders** Benedikt Böing	**Digital Twin Reconfiguration Using Asset Models** Eduard Kamburjan, Vidar Norstein Klungre, Rudolf Schlatte, S. Lizeth Tapia Tarifa, David Cameron, and Einar Broch Johnsen
			Formally Verified Self-Adaptation of an Incubator Digital Twin Thomas Wright, Cláudio Gomes and Jim Woodcock
	Efficient Estimation of Agent Networks Alexander Leguizamon-Robayo and Max Tschaikowski	Closing	**Adaptive Data-driven Predictor of Ship Maneuvering Motion Under Varying Ocean Environments** Tongtong Wang, Robert Skulstad, Motoyasu Kanazawa, Lars Ivar Hatledal, Guoyuan Li and Houxiang Zhang
			Small summary session
12:30-14:30	**LUNCH**		

Programme

WEDNESDAY October 26th

	Rigorous Engineering of Collective Adaptive Systems Panel ROOM A	NN Challenges ROOM B	Digital Twin Engineering ROOM C
14:30-16:00	**On the Borderline between Collective Stupidity and Collective Intelligence,** Panelists: Tomáš Bureš, Thomas Gabor, Tatjana Petrov, Joseph Sifakis, Franco Zambonelli (tbc.), Moderator: Stefan Jähnichen		**Robust Adaptive Back-stepping Control Approach Using Quadratic Lyapunov Functions for MMC-based HVDC Digital Twins** Le Liu, Aleksandra Lekić and Marjan Popov **Data-Driven Reachability Analysis of Digital Twin FMI Models** Sergiy Bogomolov, John Fitzgerald, Sadegh Soudjani and Paulius Stankaitis **Towards Secure Digital Twins** Tomas Kulik, Cláudio Gomes, Hugo Daniel Macedo, Stefan Hallerstede, Peter Gorm Larsen Closing session discussing ways ahead concerning "Digital Twin Engineering"
16:00-16:30	**COFFEE BREAK**		

	Rigorous Engineering of Collective Adaptive Systems Machine Learning for Collective Adaptive Systems ROOM A	X-by-Construction CbC: robustness and digital twinning ROOM B	Digital Twin Engineering ROOM C	Doctoral Symposium ROOM D
16:30-18:00	**Attuning Adaptation Rules via a Rule-Specific Neural Network** Tomáš Bureš, Petr Hnětynka, Martin Kruliš, František Plášil, Danylo Khalyeyev, Sebastian Hahner, Stephan Seifermann, Maximilian Walter, Robert Heinrich **Measuring Convergence Inertia: Online Learning in Self-Adaptive Systems with Context Shifts,** Elvin Alberts and Ilias Gerostathopoulos **Capturing Dependencies within Machine Learning via a Formal Process Model** Fabian Ritz, Thomy Phan, Andreas Sedlmeier, Philipp Altmann, Jan Wieghardt, Reiner Schmid, Horst Sauer, Cornel Klein, Claudia Linnhoff-Popien, and Thomas Gabor	**Opening by M.H. ter Beek, L. Cleophas, M. Leucker, I. Schaefer** **Robustness-by-Construction Synthesis: Adapting to the Environment at Runtime** S.P. Nayak, D. Neider, M. Zimmermann **Twinning-by-Construction: Ensuring Correctness for Self-Adaptive Digital Twins** / E. Kamburjan, C.C. Din, R. Schlatte, S.L. Tapia Tarifa, E.B. Johnsen **On Formal Choreographic Modelling: a Case Study in EU Business Processes** A. Coto, F. Barbanera, I. Lanese, D. Rossi, E. Tuosto	General Assembly for the INTO-CPS Association	**Till Schallau** Safety of Autonomous Systems through Scenario-based Testing and Monitoring Properties **Sebastion Teumert, Marvin Krause** A Graphical Approach to Rule-based Model-to-Model Transformations **Florian Karbus** Cenario-Based Interactive **Bruno Steffen** HTTP Integration into DIME **Marco Krumrey** Learnability by Design: Towards **Till Schallau** Safety of Autonomous Systems through Scenario-based Testing and Monitoring Properties

Programme

THURSDAY October 27th

	Rigorous Engineering of Collective Adaptive Systems Programming and Analysing Ensembles ROOM A	X-by-Construction CbC and RV: configurable and cyber-physical systems ROOM B	Automating Software Re-Engineering Models and Meta-Models ROOM C
09:00-10:30	**On Model-based Performance Analysis of Collective Adaptive Systems** Maurizio Murgia, Riccardo Pinciroli, Catia Trubiani, and Emilio Tuosto	**Configurable-by-Construction Runtime Monitoring** C. Dubslaff, M.A. Köhl	**A Consolidated View on Specification Languages for Data Analysis Workflows** Hilbrich, Müller, Kulagina, Lazik, De Mecquenem, Grunske
	Programming Multi-Robot Systems with X-KLAIM Francesco Tiezzi, Khalid Bourr, Lorenzo Bettini, and Rosario Pugliese	**Runtime Verification of Correct-by-Construction Driving Maneuvers** A. Kittelmann, T. Runge, T. Bordis, I. Schaefer	**A Systematic Approach for Interfacing Component-Based Software with an Active Automata Learning Tool** Hendriks, Aslam
	Bringing Aggregate Programming towards the Cloud Giorgio Audrito, Ferruccio Damiani, Gianluca Torta	**Leveraging System Dynamics in Runtime Verification of Cyber-Physical Systems** H. Abbas, B. Bonakdarpour	**Verified Software Units for simple DFA modules and objects in C** Beringer
		TriCo — Triple Co-Piloting of Implementation, Specification and Tests W. Ahrendt, D. Gurov, M. Johansson, P. Rümmer/	
10:30-11:00	**COFFEE BREAK**		
	Rigorous Engineering of Collective Adaptive Systems Machine Learning and Tools for Formal Analysis and Design **ROOM A**	**X-by-Construction** **CbC and RV: reinforcement learning and synthesis** **ROOM B**	**Automating Software Re-Engineering Verification and Testing** **ROOM C**
11:00-12:30	**Ensemble-based modeling abstractions for modern self-optimizing systems.** Milad Abdullah, Michal Topfer, Tomas Bures, Petr Hnetynka, Martin Krulis	**Automata Learning meets Shielding** M. Tappler, S. Pranger, B. Könighofer, E. Muskardin, R. Bloem, K. Larsen	**Towards practical abstract execution** Abusdal, Kamburjan, Ka I Pun, Stolz
	Formal Analysis of Lending Pools in Decentralized Finance Massimo Bartoletti, James Chiang, Tommi Junttila, Alberto Lluch Lafuente, Massimiliano Mirelli, and Andrea Vandin	**Safe Policy Improvement in Constrained Markov Decision processes** L. Berducci, R. Grosu	**Towards a Usable and Sustainable Deductive Verification Tool** Bubel, Hähnle, Ulbrich, Beckert

Programme

THURSDAY October 27th

	Rigorous Engineering of Collective Adaptive Systems Machine Learning and Tools for Formal Analysis and Design ROOM A	X-by-Construction CbC and RV: reinforcement learning and synthesis ROOM B	Automating Software Re-Engineering Verification and Testing ROOM C
11:00-12:30	**A Formal Framework for Distributed Cyber-Physical Systems** Benjamin Lion, Farhad Arbab, and Carolyn Talcott	**Runtime Verification meets Controller Synthesis** S. Azzopardi, N. Piterman, G. Schneider	**On Technical Debt in Software Testing - Observations from Industry** Eldh
		Assumption Monitoring of Temporal Task Planning Using Stream Runtime Verification F. Gorostiaga, S. Zudaire, C. Sánchez, G. Schneider, S. Uchitel	
12:30-14:30	LUNCH		
	Rigorous Engineering of Collective Adaptive Systems Model Checking, Graphs, and Closing ROOM A	**X-by-Construction** **XbC: security, resilience, and consumption properties** ROOM B	**Automating Software Re-Engineering** Security and Privacy ROOM C
14:30-16:00	**Model Checking Reconfigurable Interacting Systems** Nir Piterman, Yehia Abd Alrahman and Shaun Azzopardi	**Automated Repair of Security Errors in C Programs via Statistical Model Checking** K.H.T. Dam, F. Duchêne, T. Given-Wilson, M. Cordy, A. Legay	**Refactoring Solidity Smart Contracts to Protect Against Reentrancy Exploits** Demeyer, Verheijke, Rocha
	Towards Declarative Specification and no-code engineering of Collective Adaptive Systems with DCR Graphs Thomas Troels Hildebrandt	**Towards Safe and Resilient Hybrid Systems in the Presence of Learning and Uncertainty** J. Adelt, P. Herber, M. Niehage, A. Remke	**-A Refactoring for Data Minimisation Using FormalVerification** Ulbrich, Weigl, Lanzinger
	Closing of the REoCas Track	**Non-Functional Testing of Runtime Enforcers in Android** O. Riganelli, D. Micucci, L. Mariani	**Closing discussion**
		Closing M.H. ter Beek, L. Cleophas, M. Leucker, I. Schaefer	
16:00-16:30	COFFEE BREAK		

	STTT Editorial Meeting **ROOM A**	Doctoral Symposium **ROOM B**	
16:30-18:00		**Barbara Steffen** Digitalization from Fiction to Vision **Jette Petzold** Tool Support for System-Theoretic Process Analysis **Chinmayi Prabhu Baramashetru** A Formal Model of Language Based GDPR in Distributed System **Gerrit Nolte, Max Schlüter** Neural Networks and how to explain them	

Programme

FRIDAY October 28th

	SpecifyThis ROOM A	Digital Thread in Smart Manufacturing ROOM B	Industrial Day ROOM C
09:00-10:30	**Deductive Verification Based Abstraction for Software Model Checking** Jesper Amilon, Christian Lidström, and Dilian Gurov	Introduction Tiziana Margaria, Dirk Pesch, Alan McGibney	**Keynote Speech**
	Abstraction in Deductive Verification: Model Fields and Model Methods David Cok and Gary Leavens	**Integrating Wearable and Camera based Monitoring in the Digital Twin for Safety Assessment in the Industry 4.0 Era** Michele Boldo, Nicola Bombieri, Stefano Centomo, Mirco De Marchi, Florenc Demrozi, Graziano Pravadelli, Davide Quaglia and Cristian Turetta	**Aspects of virtual assurance of highly automated vehicles** Hardi Hungar
	Trust and Security Analyzer for Collaborative Digital Manufacturing Ecosystems Pasindu Kuruppuarachchi, Susan Rea and Alan McGibney	**Model-driven Engineering in Digital Thread Platforms: A practical use case and future challenges** Hafiz Ahmad Awais Chaudhary, Ivan Guevara, Jobish John, Amandeep Singh, Amrita Ghosal, Dirk Pesch and Tiziana Margaria	
		A Hoare Logic with Regular Behavioral Specifications Gidon Ernst, Alexander Knapp and Toby Murray	
10:30-11:00	**COFFEE BREAK**		
	SpecifyThis ROOM A	Digital Thread in Smart Manufacturing ROOM B	Industrial Day ROOM C
11:00-12:30	**Specification-based Monitoring of C++** Klaus Havelund	**DISTiL: DIStributed Industrial Computing Environment for Trustworthy digiTaL workflows: A Design Perspective** Alan McGibney and Sourabh Bharti	**Domain-Specificity as Enabler for Global Organization aLignment and Decision** Barbara Steffen and Steve Boßelmann
	Specification and Verification With the TLA+ Trifecta: TLC, Apalache, and TLAPS Igor Konnov, Markus Kuppe, and Stephan Merz	**Using Model Selection and Reduction to develop an empirical model to predict energy consumption of a CNC machine** Liam Morris, Andriy Hryshchenko, Rose Clancy, Dominic O'Sullivan and Ken Bruton	**Evolving Data Space Technologies: Lessons Learned from an IDS Connector Reference Implementation** Julia Pampus, Brian-Frederik Jahnke, and Ronja Quensel
	Selective Presumed Benevolence in Multi-Party System Verification Gordon Pace and Wolfgang Ahrendt	**Crazy Nodes: Towards Ultimate Flexibility in Ubiquitous Big Data Stream Engineering, Visualisation, and Analytics, in Smart Factories** Mirco Soderi and John Breslin	**Model-Driven Edge Analytics: Practical Use Cases in Smart Manufacturing** Ivan Guevara, Hafiz Ahmad Awais Chaudhary, and Tiziana Margaria
			Towards a Methodology for Formally Analyzing Federated Identity Management Systems Katerina Ksystra, Maria Dimarogkona, Nikolaos Triantafyllou, Petros Stefaneas, and Petros Kavassalis
12:30-14:30	**LUNCH**		

FRIDAY October 28th

	SpecifyThis ROOM A	Doctoral Symposium ROOM B	
14:30-16:00	**On the Pragmatics of Moving from System Models to Program Contracts** Thomas Santen **Closing Discussion**: How can the integration of specification paradigms impact the scope, the effectiveness, and the usability of formal methods?	**Amandeep Singh** Low-Code Pipelines for Analysis of Imbalanced Medical Datasets **Colm Brandon** AI and XMDD Driven Approach to Automating the Quality Evaluation of Web-Based Health Information **Alexander Schieweck** Viva in 10 **Jonas Schürmann** Towards Better Collaboration Systems With Lazy Merging **Daniel Busch** Towards Code-centric Code Generators	
16:00-16:30	**COFFEE BREAK**		