

ICFEM 2024

CONFERENCE PROGRAM

**THE 25th INTERNATIONAL CONFERENCE
ON FORMAL ENGINEERING METHODS**

WITH THE WORKSHOP OF

SFPVV 2024

**THE 1st INTERNATIONAL SYMPOSIUM ON SOFTWARE FAULT PREVENTION,
VERIFICATION, AND VALIDATION**

December 2-6, 2024

VENUE

**International Conference Center Hiroshima
1-5, Nakajima-cho, Naka-ku, Hiroshima
(in the Peace Memorial Park)**

730-0811

Japan



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Conference Venue



International Conference Center Hiroshima

<https://www.pcf.city.hiroshima.jp/icch/location.html>





Conference Schedule

SFPVV 2024 Symposium

December 2, 2024 (Monday, UTC+9)

| | |
|---------------|---------------------------------|
| 09:15 ~ 09:25 | Opening |
| 09:25 ~ 10:25 | Keynote Session 1 |
| 10:25 ~ 10:40 | Coffee Break |
| 10:40 ~ 12:20 | Session 1: Formal Methods |
| 12:30 ~ 14:00 | Lunch |
| 14:00 ~ 15:15 | Session 2: Testing and Analysis |
| 15:15 ~ 15:30 | Coffee Break |
| 15:30 ~ 16:20 | Session 3: Formal Semantics |
| 16:20 ~ 17:35 | Session 4: Defect Detection |
| 18:30 ~ 20:30 | SFPVV 2024 Banquet |

December 3, 2024 (Tuesday, UTC+9)

| | |
|---------------|---|
| 09:15 ~ 10:15 | Keynote Session 2 |
| 10:15 ~ 10:45 | Coffee Break |
| 10:45 ~ 12:00 | Session 5: Specification and Implementation |
| 12:30 ~ 14:00 | Lunch |
| 14:00 ~ 15:15 | Session 6: Language and Blockchain |
| 15:15 ~ 15:20 | Closing |

ICFEM 2024 Main Conference

December 4, 2024 (Wednesday, UTC+9)

| | |
|---------------|---------------------------------------|
| 09:15 ~ 09:30 | Opening |
| 09:30 ~ 10:30 | Keynote Session 1 |
| 10:30 ~ 11:00 | Coffee Break |
| 11:00 ~ 12:30 | Session 1: Modeling and Specification |



| | |
|---------------|--------------------------------------|
| 12:30 ~ 14:00 | Lunch |
| 14:00 ~ 15:30 | Session 2: Timed Automata |
| 15:30 ~ 16:00 | Coffee Break |
| 16:00 ~ 17:30 | Session 3: Improving Neural Networks |
| 18:30 ~ 20:30 | Conference Reception |

December 5, 2024 (Thursday, UTC+9)

| | |
|---------------|-----------------------------|
| 09:15 ~ 10:15 | Keynote Session 2 |
| 10:15 ~ 10:45 | Coffee Break |
| 10:45 ~ 12:15 | Session 4: Formal Analysis |
| 12:30 ~ 14:00 | Lunch |
| 14:00 ~ 15:30 | Session 5: Defect Detection |
| 15:30 ~ 16:00 | Coffee Break |
| 16:00 ~ 17:20 | Panel Discussion |
| 18:30 ~ 20:30 | Conference Banquet |

December 6, 2024 (Friday, UTC+9)

| | |
|---------------|--------------------------------|
| 09:15 ~ 10:15 | Keynote Session 3 |
| 10:15 ~ 10:45 | Coffee Break |
| 10:45 ~ 12:15 | Session 6: Formal Verification |
| 12:30 ~ 14:00 | Lunch |
| 14:00 ~ 16:00 | Session 7: Model Checking |
| 16:00 ~ 16:10 | Closing |


Onsite Sessions

SFPVV 2024 Symposium

December 2, 2024 (Monday, UTC+9)


| Keynote Session 1 09:25 ~ 10:25 Chair: Shaoying Liu | |
|--|---|
| 09:25 ~ 10:25 | Some Achievements of the International Joint Research Project "Formal Analysis and Verification of Post-quantum Cryptographic Protocols" Prof. Kazuhiro Ogata |

| Session 1: Formal Methods 10:40 ~ 12:20 Chair: Fumiko Nagoya | |
|---|--|
| 10:40 ~ 11:05 | Generating Simulink Models from Hybridised Event-B Models Neeraj Singh, Guillaume Dupont, Yamine Ait Ameer and Marc Pantel |
| 11:05 ~ 11:30 | Towards a Novel Approach to Railway Safety using STPA and Promise Theory Felix Schaber, Atif Mashkooor and Michael Leuschel |
| 11:30 ~ 11:55 | Formal Specification and Model Checking of a Synchronous Leader Election Protocol in Maude Tomoyoshi Ogura, Kazuhiro Ogata and Canh Do |
| 11:55 ~ 12:20 | Functional Modelling of the Matroid and Application to the Knapsack Problem Zikang Wan, Zhen You, Chen Zhang, Zhengkang Zuo, Changjing Wang and Qimin Hu |



| Session 2: Testing and Analysis 14:00 ~ 15:15 Chair: Jiandong Li | |
|---|--|
| 14:00 ~ 14:25 | Automated Software Test Input Generation with Diffusion Models Yujin Zhu, Xiujing Guo, Hiroyuki Okamura and Tadashi Dohi |
| 14:25 ~ 14:50 | A Framework for Standardized Partitioning Analysis in Integrated Modular Avionics Systems Jilu Zhang, Yong Cai and Weikai Miao |
| 14:50 ~ 15:15 | Improving and Evaluating Sparse Decision-Based Black-Box Attacks and Defenses Jonas Brager Jacobsen, Jingyue Li and Mathias Lundteigen Mohus |

| Session 3: Formal Semantics 15:30 ~ 16:20 Chair: Shaoying Liu | |
|--|---|
| 15:30 ~ 15:55 | An Executable Operational Semantics of Quantum Programs and Its Application Canh Minh Do and Kazuhiro Ogata |
| 15:55 ~ 16:20 | Relational Denotational and Algebraic Semantics Based on UTP Zhiru Hou and Huibiao Zhu |



| Session 4: Defect Detection 16:20 ~ 17:35 Chair: Weikai Miao | |
|---|---|
| 16:20 ~ 16:45 | S3DA: A 3D point cloud based PCB solder defect detection algorithm Yilongfei Xu, Zhewei Wang, Jinhao Liang, Yueling Zhang, Jincao Feng, Weikai Miao, Jiangtao Wang and Geguang Pu |
| 16:45 ~ 17:10 | ASTD Patterns for Integrated Continuous Anomaly Detection In Data Logs Chaymae el Jabri, Marc Frappier and Pierre-Martin Tardif |
| 17:10 ~ 17:35 | The Three-point Optimization Algorithm: A novel Physics-based metaheuristic approach Xiong Deng, Shaoying Liu and Yanli Liu |

December 3, 2024 (Tuesday, UTC+9)

| Keynote Session 2 09:15 ~ 10:15 Chair: Shaoying Liu | |
|--|--|
| 09:15 ~ 10:15 | Developing the industrial-strength tools for modeling, testing and verification: A formal-methods perspective Prof. Geguang Pu |

| Session 5: Specification and Implementation 10:45 ~ 12:00 Chair: Yamine Ait Ameur | |
|--|--|
| 10:45 ~ 11:10 | Consistency Naming between Requirements Analysis and Specifications Fumiko Nagoya |
| 11:10 ~ 11:35 | Recovery of Trace Links Between a SOFL Formal Specification and its Corresponding Incomplete Java Code Jiandong Li, Shaoying Liu and Zhi Jin |



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| 11:35 ~ 12:00 | A Methodology for Rating Maintainability Metrics of SOFL Formal Specifications Yu Du and Shaoying Liu |
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| Session 6: Language and Blockchain 14:00 ~ 15:15 Chair: Fumiko Nagoya | |
| 14:00 ~ 14:25 | A Common Declarative Language for UML State Machine Representation, Model Transformation, and Interoperability of Visualization Tools Ali Jannatpour and Constantinos Constantinides |
| 14:25 ~ 14:50 | Blockchain Solutions for Cash-on-Delivery: Utilizing Encrypted NFTs, Smart Contracts, and IPFS Technology Bang Le, Trung Phan and Son Ha Xuan |
| 14:50 ~ 15:15 | Revolutionizing Animal Health Privacy: Blockchain and Encrypted NFTs Bang Le, Trung Phan and Son Ha Xuan |




ICFEM 2024 Main Conference

December 4, 2024 (Wednesday, UTC+9)

| Keynote Session 1 09:30 ~ 10:30 Chair: Kazuhiro Ogata | |
|--|--|
| 09:30 ~ 10:30 | Formal Specification of Autonomy Features with ARE and KnowLang Prof. Mike Hinchey |

| Session 1: Modeling and Specification 11:00 ~ 12:30 Chair: Yamine Ait Ameur | |
|--|---|
| 11:00 ~ 11:30 | NL2CTL: Automatic Generation of Formal Requirements Specifications via Large Language Models Mengyan Zhao, Ran Tao, Yanhong Huang, Jianqi Shi, Shengchao Qin, Yang Yang |
| 11:30 ~ 12:00 | Repairing Event-B Models through Quantifier Elimination Tsutomu Kobayashi, Fuyuki Ishikawa |
| 12:00 ~ 12:30 | Tuning Trains Speed in Railway Scheduling Étienne André |

| Session 2: Timed Automata 14:00 ~ 15:30 Chair: Zhe Hou | |
|---|---|
| 14:00 ~ 14:30 | The Bright Side of Timed Opacity Étienne André, Sarah Dépernet, Engel Lefaucheux |
| 14:30 ~ 15:00 | Clock-Dependent Probabilistic Timed Automata with One Clock and No Memory Jeremy Sproston |




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| 15:00 ~ 15:30 | Efficient State Estimation of Discrete-Timed Automata Julian Klein, Paul Kogel, Sabine Glesner |
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| Session 3: Improving Neural Networks 16:00 ~ 17:30 Chair: Jinsong Dong | |
| 16:00 ~ 16:30 | LRNN: A Formal Logic Rules-Based Neural Network for Software Defect Prediction Yuxiang Shang, Shaoying Liu |
| 16:30 ~ 17:00 | Quantitative Symbolic Robustness Verification for Quantized Neural Networks Mara Downing, William Eiers, Erin DeLong, Anushka Lodha, Brian Ozawa Burns, Ismet Burak Kadron, Tefvik Bultan |
| 17:00 ~ 17:30 | Graph Convolutional Network Robustness Verification Algorithm Based on Dual Approximation Dongdong An, Jianqi Shi, Jing Liu |

December 5, 2024 (Thursday, UTC+9)

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|--|---|
| Keynote Session 2 09:15 ~ 10:15 Chair: Meng Sun | |
| 09:15 ~ 10:15 | Synthesizing (Differential) Invariants by Reduction Non-Convex Programming to SDP Prof. Naijun Zhan |

| | |
|--|---|
| Session 4: Formal Analysis 10:45 ~ 12:15 Chair: Fumiko Nagoya | |
| 10:45 ~ 11:15 | Formal Kinematic Analysis of Epicyclic Bevel Gear Trains Kubra Aksoy, Adnan Rashid, Sofiene Tahar |



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| 11:15 ~ 11:45 | Deciding the synthesis problem for hybrid games through bisimulation Catalin Dima, Mariem Hammami, Youssouf Oualhadj, Régine Laleau |
| 11:45 ~ 12:15 | Formal Analysis of FreeRTOS Scheduler on ARM Cortex-M4 Cores Chen-Kai Lin, Bow-Yaw Wang |

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| Session 5: Defect Detection 14:00 ~ 15:30 Chair: Weikai Miao | |
| 14:00 ~ 14:30 | Differential Property Monitoring for Backdoor Detection Otto Brechelmacher, Dejan Nikovic, Tobias Nießen, Sarah Sallinger, Georg Weissenbacher |
| 14:30 ~ 15:00 | MemSpate: Memory Usage Protocol Guided Fuzzing Zhiyuan Fu, Jiacheng Jiang, Cheng Wen, Zhiwu Xu, Shengchao Qin |
| 15:00 ~ 15:30 | Formalizing Potential Flows using the HOL Light Theorem Prover Elif Deniz, Sofiene Tahar |


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| Panel Discussion 16:00 ~ 17:20 Chair: Shaoying Liu | |
| 16:00 ~ 17:20 | What Roles Can Formal Methods Play in the AI Era? |

December 6, 2024 (Friday, UTC+9)

| Keynote Session 3 09:15 ~ 10:15 Chair: Dominique Méry | |
|--|--|
| 09:15 ~ 10:15 | Challenges and Opportunities in Assurance of Software Defined Vehicle Prof. Mark Lawford |

| Session 6: Formal Verification 10:45 ~ 12:15 Chair: Shengchao Qin | |
|--|---|
| 10:45 ~ 11:15 | The Continuum Hypothesis Implies the Existence of Non-Principal Arithmetical Ultrafilters -- A Coq Formal Verification Guowei Dou, Si Chen, Wensheng Yu, Ru Zhang |
| 11:15 ~ 11:45 | Observability of Boolean Control Networks: New Definition and Verification Algorithm Guisen Wu, Zhiming Liu, Jun Pang |
| 11:45 ~ 12:15 | On-the-Fly Proof-Based Verification of Reachability in Autonomous Vehicle Controllers Relying on Goal-Aware RSS Peter Riviere, Tsutomu Kobayashi, Neeraj Singh, Fuyuki Ishikawa, Yamine Ait Ameer, Guillaume Dupont |

| Session 7: Model Checking 14:00 ~ 16:00 Chair: Étienne André | |
|---|--|
| 14:00 ~ 14:30 | Efficient SMT-Based Model Checking for HyperTWTL Ernest Bonnah, Luan Nguyen, Khaza Anuarul Hoque |



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|----------------------|---|
| 14:30 ~ 15:00 | A Tableau-based Approach to Model Checking Linear Temporal Properties Canh Minh Do, Tsubasa Takagi, Kazuhiro Ogata |
| 15:00 ~ 15:30 | Simple LTL Model Checking on Finite and Infinite Traces over Concrete Domains David Doose, Julien Brunel |
| 15:30 ~ 16:00 | Model Checking Concurrency in Smart Contracts with a Case Study of Safe Remote Purchase Yisong Yu, Naipeng Dong, Zhe Hou, Jin Song Dong |



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