ISMVL 2023

IEEE International Symposium on Multiple-Valued Logic


Hall for Sacred Dances


Matsue Castle


ADACHI Museum of Art

Tentative Program

In the following, days and times are shown in **Japan Time (JST)**.

- May 21: **ULSI Workshop** and **Reception**
- May 22: **Keynotes I** and **Sessions 1 - 3**
- May 23: **Keynote II**, **Sessions 4**, **Excursion**, and **Banquet**
- May 24: **Keynote III**, **Session 5**, **Plenary**, and **Reed-Muller Workshop**

The program consists of 3 keynote addresses and 10 regular sessions.

- Each keynote address: **60 min. including Q&A**
- Each regular session has up to 4 talks
- A regular talk: **20-min presentation** & **5-min Q&A**

Sunday, May 21, 2023 (JST)	
13:00-17:00	**Workshop on Post-Binary ULSI Systems**
17:00-18:00	**ISMVL Registration**
18:00-20:00	**Welcome Reception**

Monday, May 22, 2023 (JST)	
8:30-8:45	**ISMVL Registration**
8:45-9:00	**Opening**
9:00-10:00	**[Keynote Address I]** Tackling the Explosions of Data and Solutions with Low-Bitwidth Computing Architectures *Prof. Masato Motomura (Tokyo Inst. of Tech., Japan)*
10:00-10:20	**Coffee Break**

The program consists of three keynote addresses and 37 high-quality papers in the following 10 sessions:

1A. Machine Learning Circuits
1B. Non Classical Logics
2A. Medical & Healthcare
2B. Function Rep. & Transform.
3A. Signal/Data Processing
3B. Algebra & Clone
4A. Quantum Circuits
4B. SAT Solvers
5A. Security
5B. Emerging Applications

The symposium offers you a great opportunity to follow the recent technologies and explore future directions in multiple-valued logic and its related areas.

10:20-12:00	**[Session 1A] Machine Learning Circuits**	**[Session 1B] Non Classical Logics**
12:00-13:20	**Lunch (Symposium & Executive Committee Meeting)**	
13:20-15:00	**[Session 2A] Madical & Healthcare**	**[Session 2B] Function Representation & Transformation**
15:00-15:20	**Coffee Break**	
15:20-17:00	**[Session 3A] Signal/Data Processing**	**[Session 3B] Algebra & Clone**

Tuesday, May 23, 2023 (JST)	
9:00-10:00	**[Keynote Address II]** A Challenge of Scalable Quantum Computing Control Systems *Prof. Takefumi Miyoshi (QuEL, Inc./e-trees. Japan, Inc./QIQB, Osaka University, Japan)*
10:00-10:20	**Coffee Break**
10:20-12:00	**[Session 4A] Quantum Circuits** / **[Session 4B] SAT Solvers**
12:00-13:20	**Lunch**
13:20-18:30	**Excursion**
19:00-21:00	**Banquet**

Wednesday, May 24, 2023 (JST)	
9:00-10:00	**[Keynote Address III]** Card-based Cryptography: How to Securely Compute Multiple-valued Functions Using a Deck of Cards *Prof. Takaaki Mizuki (Tohoku University, Japan)*
10:00-10:20	**Coffee Break**
10:20-12:00	**[Session 5A] Security** / **[Session 5B] Emerging Applications**
12:00-12:30	**Plenary Session & Closing**
12:30-13:20	**Lunch**
13:20-17:00	**Reed-Muller Workshop**

Papers in Sessions

[Session 1A] Machine Learning Circuits
A Consideration on Ternary Adversarial Generative Networks *Kennichi Nakamura and Hiroki Nakahara*
Write-Energy Relaxation of MTJ-Based Quantized Neural-Network Hardware *Ken Asano, Masanori Natsui, and Takahiro Hanyu*

Easily Reconstructable Logic Functions
Tsutomu Sasao

[Session 1B] Non Classical Logics

Kalmbach Implication in Orthomodular Posets
Kadir Emir and Jan Paseka

Natural Deduction with Explosion and Excluded Middle
Norihiro Kamide

Self-extensional Paradefinite Four-valued Modal Logic Compatible with Standard Modal Logic
Norihiro Kamide

An Inductive Construction for Many-Valued Coalgebraic Modal Logic
Chun-Yu Lin and Churn-Jung Liau

[Session 2A] Medical & Healthcare

On Neural-Network-Based Detection for Hypertensive Subjects Using Classification of Retinal Fundus Photographs
Yuki Sonetsuji, Teijiro Isokawa, Naotake Kamiura, and Hitoshi Tabuchi

Predicting the Development of Chronic Lung Disease in Neonates from Chest X-ray Images Using Deep Learning
Ryunosuke Maeda, Daisuke Fujita, and Syoji Kobashi

Kidney Tumor Recognition from Abdominal CT Images using Transfer Learning
Sefatul Wasi, Saadia Binte Alam, Rashedur Rahman, M Ashraful Amin, and Syoji Kobashi

Detection of Osteochondritis Dissecans Using Convolutional Neural Networks for Computer-aided Diagnosis of Baseball Elbow
Kenta Sasaki, Daisuke Fujita, Kenta Takatsuji, Yoshihiro Kotoura, Masataka Minami, Yusuke Kobayashi, Tsuyoshi Sukenari, Yoshikazu Kida, Kenji Takahashi, and Syoji Kobashi

[Session 2B] Function Representation & Transformation

Properties of the Reed-Muller-Fourier Spectra of Maiorana-McFarland Bent Functions
Claudio Moraga, Radomir Stanković, and Milena Stanković

Remarks on Gibbs Permutation Matrices for Ternary Bent Functions
Radomir Stanković, Milena Stanković, Claudio Moraga, and Jaakko Astola

Decomposition-Based Representation of Symmetric Multiple-Valued Functions
Shinobu Nagayama, Tsutomu Sasao, and Jon Butler

Logic Synthesis from Polynomials with Coefficients in the Field of Rationals
Bhavani Sampathkumar, Bailey Martin, Ritaja Das, Priyank Kalla, and Florian Enescu

[Session 3A] Signal/Data Processing

Delta-Sigma Domain Signal Processing: A Review with Relevant Topics in Stochastic Computing
Takao Waho, Akihisa Koyama, and Hitoshi Hayashi

PAM-4 Data Transmission Quality Evaluation Using Two- and Three-Dimensional Mapping of Received Symbols
Yasushi Yuminaka, Kazuharu Nakajima, and Yosuke Iijima

Evaluation and Symbol Classification of Multi-Valued Signaling Using Two-Dimensional Symbol Mapping with Linear Mixture Model
Yosuke Iijima, Kazuharu Nakajima, and Yasushi Yuminaka

Data Mining Using Multi-Valued Logic Minimization
Tsutomu Sasao

[Session 3B] Algebra & Clone
Kleene Algebra With Tests for Weighted Programs *Igor Sedlar*
On Quotient Algebras of Normal eo-algebras by Congruences *Mayuka F.Kawaguchi and Michiro Kondo*
Search for Some Majority Operation and Studies of its Centralizing Monoid *Hajime Machida*
Weak Bases for Maximal Clones *Mike Behrisch*

[Session 4A] Quantum Circuits
Towards an Automated Framework for Realizing Quantum Computing Solutions *Nils Quetschlich, Lukas Burgholzer, and Robert Wille*
Optimized Density Matrix Representations: Improving the Basis for Noise-Aware Quantum Circuit Design Tools *Thomas Grurl, Jürgen Fuß, and Robert Wille*
An Improved Optimization Method for Quantum Boolean Circuits Using Relative-Phase Toffoli Gates and S gates *David Clarino, Shohei Kuroda, and Shigeru Yamashita*
Quick Computation of the Lower Bound on the Gate Count of Toffoli-Based Reversible Logic Circuits *Takashi Hirayama, Rin Suzuki, Katsuhisa Yamanaka, and Yasuaki Nishitani*

[Session 4B] SAT Solvers
Benchmarking ŋukasiewicz Logic Solvers with Properties of Neural Networks *Sandro Preto, Felip Manyà, and Marcelo Finger*
Linking ŋukasiewicz Logic and Boolean Maximum Satisfiability *Sandro Preto, Felip Manyà, and Marcelo Finger*
A Tableau Calculus for Signed Maximum Satisfiability *Shuolin Li, Jordi Coll, Djamal Habet, Chu-Min Li, and Felip Manyà*
From Ramon Llull To Lov Grover: Towards A Universal Logic Machine *George Opsahl and Marek Perkowski*

[Session 5A] Security
Multiple-Valued Logic Physically Unclonable Function in Photonic Integrated Circuits *Duncan MacFarlane, Hiva Shahoei, Ifeanyi Achu, Evan Stewart, Willam Oxford, and Mitchell Thornton*
Higher-Order Boolean Masking Does Not Prevent Side-Channel Attacks on LWE/LWR-based PKE/KEMs *Kalle Ngo, Ruize Wang, Elena Dubrova, and Nils Paulsrud*
Efficient DFA-Resistant AES Hardware Based on Concurrent Fault Detection Scheme *Rei Ueno, Yusuke Yagyu, and Naofumi Homma*

[Session 5B] Emerging Applications
A Logical Method to Predict Outcomes After Coronary Artery Bypass Grafting *Tsutomu Sasao, Anders Holmgren, and Patrik Eklund*
Discovering Emerging Applications of Multi-Valued Logic: Protocols for Human-Autonomy Teaming *Peter Shmerko, Marek Perkowski, Yumi Iwashita, Adrian Stoica, and Svetlana Yanushkevich*
Some Consistency Criteria for Many-Valued Judgment Aggregation *Christian Fermüller*