

# **2020 IEEE International Conference on Blockchain and Cryptocurrency (ICBC 2020)**

**Toronto, Ontario, Canada  
2 – 6 May 2020**



**IEEE Catalog Number: CFP20BLO-POD  
ISBN: 978-1-7281-6681-0**

**Copyright © 2020 by the Institute of Electrical and Electronics Engineers, Inc.  
All Rights Reserved**

*Copyright and Reprint Permissions:* Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

***\*\*\* This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP20BLO-POD
ISBN (Print-On-Demand):	978-1-7281-6681-0
ISBN (Online):	978-1-7281-6680-3

**Additional Copies of This Publication Are Available From:**

Curran Associates, Inc  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: (845) 758-0400  
Fax: (845) 758-2633  
E-mail: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

CURRAN ASSOCIATES INC.  
**proceedings**  
.com

## Table of Contents

Session		Paper title	Author List
TS01	TS01-1	From Hodl to Heist: Analysis of Cyber Security Threats to Bitcoin Exchanges...1	Kris Oosthoek, Christian Doerr
	TS01-2	Liveliness and Consistency of Bitcoin and Prism Blockchains: The Non-lockstep Synchronous Case...10	Jing Li, Dongning Guo
	TS01-3	Characterizing Orphan Transactions in the Bitcoin Network...19	Muhammad Anas Imtiaz, David Starobinski, Ari Trachtenberg
TS02	TS02-1	Trust Management in Decentralized IoT Access Control System...28	Guntur Putra, Volkan Dedeoglu, Salil S. Kanhere, Raja Jurdak
	TS02-2	Monetization using Blockchains for IoT Data Marketplace...37	Wiem Badreddine, Kaiwen Zhang, Chamseddine Talhi
	TS02-3	Exploiting constrained IoT devices in a Trustless Blockchain-based Water Management System...46	Miguel Pincheira, Massimo Vecchio, Raffaele Giaffreda, Salil S. Kanhere
TS03	TS03-1	Optimal Smart Contracts with Costly Verification...53	Akaki Mamageishvili, Jan Christoph Schlegel
	TS03-2	Smart Contract Protocol for Authenticity and Compliance with Anonymity on Hyperledger Fabric..61	Rishi Saket, Nitin Singh, Pankaj Dayama, Vinayaka Pandit
	TS03-3	Verified Development and Deployment of Multiple Interacting Smart Contracts with VeriSolid...70	Keerthi Nelaturu, Anastasia Mavridou, Andreas Veneris, Aron Laszka
	TS04-1	BPCEX: Towards Blockchain-based Privacy-preserving Currency	Wulu Li, Lei Chen, Xin Lai,

TS04		Exchange ...79	Xiao Zhang, Jiajun Xin
	TS04-2	Privacy-Preserving Claims Exchange Networks for Virtual Asset Service Providers...88	Thomas Hardjono
TS05	TS05-1	Scalable Block Execution via Parallel Validation...96	Maya Leshkowitz, Olivia Benattasse, Oded Wertheim, Ori Rottenstreich
	TS05-2	XOX Fabric: A hybrid approach to blockchain transaction execution...105	Christian Gorenflo, Lukasz Golab, Srinivasan Keshav
	TS05-3	State Sharding with Space-aware Representations...114	Avi Mizrahi, Ori Rottenstreich
TS06	TS06-1	Context-based Smart Contracts for Appendable-block Blockchains...123	Henry Nunes, Roben Lunardi, Avelino Zorzo, Regio Michelin, Salil S. Kanhere
	TS06-2	Domain Specific Language for Smart Contract Development...132	Maximilian Woehrer, Uwe Zdun
	TS06-3	Cross-Chain Transactions...141	Narges Shadab, Farzin Houshmand, Mohsen Lesani
TS07	TS07-1	A Data Science Approach for Detecting Honeypots in Ethereum...150	Ramiro Camino, Christof Ferreira Torres, Mathis Steichen, Radu State
	TS07-2	Tracing Cryptocurrency Scams: Clustering Replicated Advance-Fee and Phishing Websites...159	Ross Phillips, Heidi Wilder
	TS07-3	Privacy-Preserving Netting in Local Energy Grids...167	Jacob Eberhardt, Marco Peise, Stefan Tai, Dong-Ha Kim

TS08	TS08-1	Decentralized Identity and Trust Management Framework for Internet of Things...176	Markus Lücking, Christian Fries, Robin Lamberti, Wilhelm Stork
	TS08-2	Consentio: Managing Consent to Data Access using Permissioned Blockchains...185	Rishav Agarwal, Dhruv Kumar, Lukasz Golab, Srinivasan Keshav
	TS08-3	Put Your Money Where Your Mouth Is - Towards Blockchain-based Consent Violation Detection...194	Jonathan Heiss, Jacob Eberhardt, Max Ulbricht
TS09	TS09-1	AGWS: Blockchain-enabled Small-scale Farm Digitization...203	Nelson Bore, Andrew Kinai, Penina Waweru, Isaac Wambugu, Juliet Mutahi, Everlyne Kemunto, Reginald Bryant, Komminist Weldemariam
	TS09-2	A Controlled Natural Language to Support Intent-based Blockchain Selection...212	Eder John Scheid, Patrick Widmer, Bruno Rodrigues, Muriel Franco, Burkhard Stiller
	TS09-3	Hyperledger Fabric Performance Characterization and Optimization Using GoLevelDB Benchmark...221	Takuya Nakaike, Qi Zhang, Yohei Ueda, Tatsushi Inagaki, Moriyoshi Ohara
TS10	TS10-1	Optimizing All-to-All Data Transmission in WANs...230	Hao Tan, Wojciech Golab
	TS10-2	Right-of-Stake: Deterministic and Fair Blockchain Leader Election with Hidden Leader...239	Teik Guan Tan, Vishal Sharma, Jianying Zhou
	TS10-3	A Correlated Equilibrium based Transaction Pricing Mechanism in Blockchain...248	Qin Hu, Yash Nigam, Zhilin Wang, Yawei Wang,

			Yinhao Xiao
SS01	SS01-1	Attribute-based Multi-Signature and Encryption for EHR Management: A Blockchain-based Solution...255	Hao Guo, Wanxin Li, Ehsan Meamari, Chien-Chung Shen, Mark Nejad
	SS01-2	Ransomware as a Service using Smart Contracts and IPFS...260	Christos Karapapas, Iakovos Pittaras, Nikos Fotiou, George Polyzos
	SS01-3	HushRelay: Privacy-Preserving Routing Algorithm for Off-Chain Payments...265	Subhra Mazumdar, Sushmita Ruj, Ram Govind Singh, Arindam Pal
	SS01-4	A Blockchain-based Decentralized Data Sharing Infrastructure for Off-grid Networking...270	Harris Niavis, Nikolaos Papadis, Venu Reddy, Hanumantha Rao Morusupalli, Leandros Tassioulas
	SS01-5	Shellproof: More Efficient Zero-Knowledge Proofs for Confidential Transactions in Blockchain...275	Xianfeng Li, Chongjian Xu, Qinglin Zhao
SS02	SS02-1	From Legal Agreements to Blockchain Smart Contracts...280	Ravi Rahman, Lalana Kagal
	SS02-2	A Preliminary Study on Using Acceptance Tests for Representing Business Requirements of Smart Contracts...285	Patricia Vilain, John Mylopoulos
	SS02-3	Building Hybrid DApps using Blockchain Tactics? The Meta-Transaction Example...291	Florian Blum, Benedikt Severin, Michael Hettmer, Philipp Hückinghaus, Volker Gruhn
	SS02-4	A Cost-efficient IoT Forensics Framework with Blockchain...296	Suat Mercan, Mumin Cebe, Ege Tekiner, Kemal Akkaya, Melissa Chang, Selcuk Uluagac
	SS03-1	Imbalance measure and proactive	Rene Pickhardt, Mariusz

SS03		channel rebalancing algorithm for the Lightning Network...301	Nowostawski
	SS03-2	Parallel Hash-Mark-Set on the Ethereum Blockchain...306	Zachary Painter, Pradeep Kumar Gayam, Victor Cook, Damian Dechev
	SS03-3	Hardening Permissioned Blockchains with Verifiable Randomness...311	Hagar Meir, Artem Barger, Yacov Manevich
	SS03-4	Criticality Aware Orderer for Heterogeneous Transactions in Blockchain...316	Umang Goel, Rahul Sonanis, Ishan Rastogi, Siddharth Lal, Aloknath De
	SS03-5	A Simulation-Based Analysis of Multiplayer Selfish Mining...320	Shiquan Zhang, Kaiwen Zhang, Bettina Kemme
Poster/Demo 1A	PD1A-1	Verification of customizable blockchain consensus rule using a formal method...325	Ryo Kawahara
	PD1A-2	A Time Bank System Design on the Basis of Hyperledger Fabric Framework...328	Yu-Tse Lee, Jhan-Jia Lin, Jane Yung-Jen Hsu, Ja-Ling Wu
	PD1A-3	Crypto Terminal: A New Open Device For Securing Blockchain Wallets...331	Pascal Urien
	PD1A-4	Trust-based Ecosystem to Combat Fake News...334	Zakwan Jaroucheh, Mohammad Alissa, William J Buchanan
	PD1A-5	Incorruptible Auditing: Blockchain-Powered Graph Database Management...337	Victor Ermolaev, Indrek Klangberg, Yash Madhwal, Silver Vapper, Sjoerd Wels, Yury Yanovich
	PD1A-6	SkillCheck: An Incentive-based Certification System using Blockchains...340	Swaprava Nath, Jay Gupta

	PD1A-7	Vote Delegation and Malicious Parties...343	Hans Gersbach, Akaki Mamageishvili, Manvir Schneider
	PD1A-8	Evaluation of Security and Performance of Master Node Protocol in the Bitcoin Peer-to-Peer Network...345	Muntadher Fadhil Sallal
Poster/Demo 1B	PD1B-1	Profiling of Malicious Users Using Simple Honeypots on the Ethereum Blockchain Network...348	Kazuki Hara, Teppei Sato, Mitsuyoshi Imamura, Kazumasa Omote
	PD1B-2	Reasonableness Discussion and Analysis for Hyperledger Fabric Configuration...351	Song Hua, Shenbin Zhang, Bingfeng Pi, Jun Sun, Kazuhiro Yamashita, Yoshihide Nomura
	PD1B-3	Democratization of Smart Contracts: A Prototype for Automated Contract Generation...354	Felix Franz, Tobias Fertig, Andreas E Schutz
	PD1B-4	SC-Flare: Cooperative DDoS Signaling based on Smart Contracts...357	Bruno Rodrigues, Spasen Trendafilov, Eder John Scheid, Burkhard Stiller
	PD1B-5	Wallet Contracts on Ethereum...360	Monika Di Angelo, Gernot Salzer
	PD1B-6	Rational Exchange: Incentives in Atomic Cross Chain Swaps...362	Janick Rueegger, Guilherme Sperb Machado
	PD1B-7	Mining Blocks in a Row: A Statistical Study of Fairness in Bitcoin Mining...365	Shengnan Li, Zhao Yang, Claudio Tessone
	PD2A-1	On the Fairness of Distributed Ledger Technologies for the Internet of Things...369	Luigi Vigneri, Wolfgang Welz
	PD2A-2	Gamified Service Exchange Platform on Blockchain for IoT Business Agility...372	Shahin Gheitanchi
	PD2A-3	EcoBoost: Efficient Bootstrapping for Confidential Transactions...375	Chenggang Wang, Boyang



Poster/Demo 2A			Wang, Xinxin Fan
	PD2A-4	Balance Transfers and Bailouts in Credit Networks using Blockchains...378	Roopa Vishwanathan, Kartick Kolachala, Lalitha Muthu Subramanian
	PD2A-5	Distributed Consensus for Mobile Devices using Online Brokers...381	Mehrdad Kiamari, Bhaskar Krishnamachari, Muhammad Naveed, Seokgu Yun
	PD2A-6	A Blockchain-Based Privacy-Preserving Intelligent Charging Station Selection for Electric Vehicles...384	Syed Muhammad Danish, Kaiwen Zhang, Hans-Arno Jacobsen
	PD2A-7	Determining Optimal Shard Size in a Hierarchical Blockchain Architecture...387	Shyam Kantesariya, Dhruvajyoti Goswami
	PD2A-8	Architecting Configurable Blockchain Network Simulators: A Model-driven Perspective...390	Sotirios Liaskos, Tarun Anand, Nahid Alimohammadi
Poster/Demo 2B	PD2B-1	A Containerized Proof-of-Concept Implementation of LightChain system...393	Yahya Hassanzadeh-Nazarabadi, Nazir Nayal, Shadi Sameh Hamdan, Oznur Ozkasap, Alptekin Küpçü
	PD2B-2	SkipSim: Scalable Skip Graph Simulator...395	Yahya Hassanzadeh-Nazarabadi, Ali Utkan Sahin, Oznur Ozkasap, Alptekin Küpçü
	PD2B-3	From Curved Bonding to Configuration Spaces...397	Michael Zargham, Krzysztof Paruch, Jamsheed Shorish
	PD2B-4	Towards Usable Protection Against Honeypots...400	Christof Ferreira Torres, Mathis Baden, Radu State

	PD2B-5	Discover DaVinci A Gamified Blockchain LearningApp...402	Marko Suvajdzic, James Oliverio, Angelos Barmpoutis, Liam Wood, Paul Burgermeister
	PD2B-6	Distributed Fractionalized Data Networks for Data Integrity...404	Arun Majumdar, Govind Mohan
	PD2B-7	Customer Data Sharing Platform: A Blockchain Based Shopping Cart...407	Ajay Shrestha
	PD2B-8	Improving Transaction Success Rate via Smart Gateway Selection in Cryptocurrency Payment Channel Networks...410	Suat Mercan, Enes Erdin, Kemal Akkaya
Poster/Demo 3A	PD3A-1	Formalizing Correct-by-Construction Casper in Coq...413	Elaine Li, Traian Serbanuta, Denisa Diaconescu, Grigore Rosu
	PD3A-2	Energy Consumption Analysis of XRP Validator...416	Crystal A Roma, M Anwar Hasan
	PD3A-3	A Relational Network Framework for Interoperability in Distributed Energy Trading...419	Samuel Maina Karumba, Salil S. Kanhare, Raja Jurdak
	PD3A-4	PLEDGE: A Proof-of-Honesty based Consensus Protocol for Blockchain-based IoT Systems...422	Imran Makhdoom
Poster/Demo 3B	PD3B-1	Performance and Fault Tolerance Tradeoffs in Sharded Permissioned Blockchains...425	Chunyu Mao, Anh Duong Nguyen, Wojciech Golab
	PD3B-2	FabricUnit: A Framework for Faster Execution of Unit Tests on Hyperledger Fabric...428	Shashank Motepalli, Patricia Vilain, Arno Jacobsen
	PD3B-3	Software Architecture for Blockchain-based Trade Certificate Systems...431	Qinghua Lu, Mark Staples, Hugo O'Connor, Shiping Chen, Adnene Guabtni
	PD3B-4	Leveraging Lightweight Blockchain to Establish Data Integrity for Surveillance Cameras...434	Regio Michelin, Nadeem Ahmed, Salil S. Kanhare, A

			Seneviratne, Sanjay Jha
Poster/Demo 4A	PD4A-1	On the Fairness of Distributed Ledger Technologies for the Internet of Things...N/A	Luigi Vigneri, Wolfgang Welz
	PD4A-2	Gamified Service Exchange Platform on Blockchain for IoT Business Agility...N/A	Shahin Gheitanchi
	PD4A-3	EcoBoost: Efficient Bootstrapping for Confidential Transactions...N/A	Chenggang Wang, Boyang Wang, Xinxin Fan
	PD4A-4	Balance Transfers and Bailouts in Credit Networks using Blockchains...N/A	Roopa Vishwanathan, Kartick Kolachala, Lalitha Muthu Subramanian
	PD4A-5	Distributed Consensus for Mobile Devices using Online Brokers...N/A	Mehrdad Kiamari, Bhaskar Krishnamachari, Muhammad Naveed, Seokgu Yun
	PD4A-6	A Blockchain-Based Privacy-Preserving Intelligent Charging Station Selection for Electric Vehicles...N/A	Syed Muhammad Danish, Kaiwen Zhang, Hans-Arno Jacobsen
	PD4A-7	Determining Optimal Shard Size in a Hierarchical Blockchain Architecture...N/A	Shyam Kantesariya, Dhruvajyoti Goswami
	PD4A-8	Architecting Configurable Blockchain Network Simulators: A Model-driven Perspective...N/A	Sotirios Liaskos, Tarun Anand, Nahid Alimohammadi
	PD4B-1	Democratization of Smart Contracts: A Prototype for Automated Contract Generation...N/A	Felix Franz, Tobias Fertig, Andreas E Schutz
	PD4B-2	A Containerized Proof-of-Concept Implementation of LightChain system...N/A	Yahya Hassanzadeh-Nazarabadi, Nazir Nayal, Shadi Sameh Hamdan, Oznur Ozkasap, Alptekin K�p�u

Poster/Demo 4B	PD4B-3	SkipSim: Scalable Skip Graph Simulator...N/A	Yahya Hassanzadeh-Nazarabadi, Ali Utkan Sahin, Oznur Ozkasap, Alptekin Küpçü
	PD4B-4	From Curved Bonding to Configuration Spaces...N/A	Michael Zargham, Krzysztof Paruch, Jamsheed Shorish
	PD4B-5	Towards Usable Protection Against Honeypots...N/A	Christof Ferreira Torres, Mathis Baden, Radu State
	PD4B-6	Discover DaVinci A Gamified Blockchain Trivia App...N/A	Marko Suvajdzic, James Oliverio, Angelos Barmpoutis, Liam Wood, Paul Burgermeister
	PD4B-7	Distributed Fractionalized Data Networks for Data Integrity...N/A	Arun Majumdar, Govind Mohan
	PD4B-8	Customer Data Sharing Platform: A Blockchain Based Shopping Cart...N/A	Ajay Shrestha
Poster/Demo 5A	PD5A-1	Crypto Terminal: A New Open Device For Securing Blockchain Wallets...N/A	Pascal Urien
	PD5A-2	TRUSTD: Combat Fake Content using Blockchain and Collective Signature Technologies...N/A	Zakwan Jaroucheh, Mohammad Alissa, William J Buchanan
	PD5A-3	Incorruptible Auditing: Blockchain-Powered Graph Database Management...N/A	Victor Ermolaev, Indrek Klangberg, Yash Madhwal, Silver Vapper, Sjoerd Wels, Yury Yanovich
	PD5A-4	SkillCheck: An Incentive-based Certification System using Blockchains...N/A	Swaprava Nath, Jay Gupta
	PD5A-5	Vote Delegation and Malicious Parties...N/A	Hans Gersbach, Akaki Mamagishvili, Manvir Schneider

	PD5A-6	Evaluation of Security and Performance of Master Node Protocol in the Bitcoin Peer-to-Peer Network...N/A	Muntadher Fadhil Sallal
	PD5A-7	Formalizing Correct-by-Construction Casper in Coq...N/A	Elaine Li, Traian Serbanuta, Denisa Diaconescu, Grigore Rosu
	PD5A-8	Energy Consumption Analysis of XRP Validator...N/A	Crystal A Roma, M Anwar Hasan
Poster/Demo 5B	PD5B-1	Improving Transaction Success Rate via Smart Gateway Selection in Cryptocurrency Payment Channel Networks...N/A	Suat Mercan, Enes Erdin, Kemal Akkaya
	PD5B-2	SC-Flare: Cooperative DDoS Signaling based on Smart Contracts...N/A	Bruno Rodrigues, Spasen Trendafilov, Eder John Scheid, Burkhard Stiller
	PD5B-3	Wallet Contracts on Ethereum...N/A	Monika Di Angelo, Gernot Salzer
	PD5B-4	Rational Exchange: Incentives in Atomic Cross Chain Swaps...N/A	Janick Rueegger, Guilherme Sperb Machado
	PD5B-5	Mining Blocks in a Row: A Statistical Study of Fairness in Bitcoin Mining...N/A	Shengnan Li, Zhao Yang, Claudio Tessone
	PD5B-6	Performance and Fault Tolerance Tradeoffs in Sharded Permissioned Blockchains...N/A	Chunyu Mao, Anh Duong Nguyen, Wojciech Golab
	PD5B-7	FabricUnit: A Framework for Faster Execution of Unit Tests on Hyperledger Fabric...N/A	Shashank Motepalli, Patricia Vilain, Arno Jacobsen
Poster/Demo 6A	PD6A-1	A Relational Network Framework for Interoperability in Distributed Energy Trading...N/A	Samuel Maina Karumba, Salil S. Kanhare, Raja Jurdak
	PD6A-2	PLEDGE: A Proof-of-Honesty based Consensus Protocol for Blockchain-based IoT Systems...N/A	Imran Makhdoom
	PD6A-3	Verification of Customizable Blockchain Consensus Rule for Assurance of Fault Tolerance in a	Ryo Kawahara

		Network of Distrusting Organizations N/A	
	PD6A-4	A Time Bank System Design on the Basis of Hyperledger Fabric Framework...N/A	Yu-Tse Lee, Jhan-Jia Lin, Jane Yung-Jen Hsu, Ja-Ling Wu
Poster/Demo 6B	PD6B-1	Software Architecture for Blockchain-based Trade Certificate Systems...N/A	Qinghua Lu, Mark Staples, Hugo O'Connor, Shiping Chen, Adnene Guabtni
	PD6B-2	Leveraging Lightweight Blockchain to Establish Data Integrity for Surveillance Cameras...N/A	Regio Michelin, Nadeem Ahmed, Salil S. Kanhare, A Seneviratne, Sanjay Jha
	PD6B-3	Profiling of Malicious Users Using Simple Honeypots on the Ethereum Blockchain Network...N/A	Kazuki Hara, Teppei Sato, Mitsuyoshi Imamura, Kazumasa Omote
	PD6B-4	Reasonableness Discussion and Analysis for Hyperledger Fabric Configuration...N/A	Song Hua, Shenbin Zhang, Bingfeng Pi, Jun Sun, Kazuhiro Yamashita, Yoshihide Nomura