SHAILESH MISHRA

Final year student, Department of Electrical Engineering, IIT Kharagpur

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EDUCATION

Indian Institute of Technology, Kharagpur *2017 - 2022*
Bachelor's + Master's in Electrical Engineering CGPA: 8.89/10
Minor in Computer Science and Engineering

PUBLICATIONS

Journal Papers

Vericom: A Verification and Communication Architecture for IoT-based Blockchain [Link]
Ali Dorri, Shailesh Mishra, Raja Jurdak
Under review at *Elsevier's Ad Hoc Networks Journal*

Near-Immediate Consistency with Tree-chain's Fast Consensus
Ali Dorri, Shailesh Mishra, Raja Jurdak
Under review at *IEEE IoT Journal*

Conference Papers

Smart Voltage Monitoring: Centralised and Blockchain-based Decentralised Approach [Link]
Shailesh Mishra, Shivam Kumar
2020 IEEE International Conference on Internet of Things & Intelligence System

BlockTorrent: A privacy-preserving data availability protocol for multiple stakeholder scenarios [Link]
Ambrose Hill, Shailesh Mishra, Ali Dorri, Volkan Dedeoglu, Raja Jurdak, Salil S. Kanhere
IEEE International Conference on Blockchain and Cryptocurrency 2021 (ICBC 2021)

BlockTorrent: A Blockchain Enabled Privacy-Preserving Data Availability Protocol for Multi-stakeholder Scenarios
Ambrose Hill, Shailesh Mishra, Atharv Singh Patlan, Ali Dorri, Volkan Dedeoglu, Raja Jurdak, Salil S. Kanhere
To appear at *the 4th IEEE International Conference on Blockchain 2021*

Chat2Code: Towards conversational concrete syntax for model specification and code generation, the case of smart contracts
Ilham Qasse, Shailesh Mishra*, Mohammad Hamdaqa* (* - Equal contribution)
Under review at *the 18th European Conference on Modelling Foundations and Applications (ECMFA 2022)*

Workshop Papers

iContractBot: A chatbot for Smart Contracts' Specification and Code Generation [Link]
Ilham Qasse, Shailesh Mishra, Mohammad Hamdaqa
3rd International Workshop on Bots in Software Engineering (BotSE 2021)

Thesis

DIRAS: Distributed Image Reconstruction in Adversarial Scenario [Link]
Shailesh Mishra, Sanand Dilip Amita Athalye
Master's Thesis

RESEARCH EXPERIENCE

Integration of Blockchain and IoT *Jan 2020 - Present*
Supervised by **Prof. Raja Jurdak** and **Dr. Ali Dorri** *Research Assistant*, Queensland University of Technology

- **BlockTorrent: A privacy-preserving data availability protocol for multiple stakeholder scenarios**
  - Developed an overlay network for off-chain communications in a system incorporating Blockchain & BitTorrent
  - Analysed the effect of file size & number of chunks on file splitting, distribution & regeneration based on BitTorrent algorithms to obtain important design choices for optimal network design
- **Vericom: A Verification & Communication Architecture for IoT-based Blockchain**
  - Implemented an IoT-based blockchain to improve its performance by optimizing the number of packets shared
  - Compared the packet overheads, network and processing delays with the existing blockchain architecture
- **Near-Immediate Consistency with Treechain's Fast Consensus**
  - Implemented an efficient consensus algorithm to reduce delay & packet overhead during transactions in IoT networks

  - Developed smart contract for ledger formation and consensus code range allocation for genesis block in Solidity
- **A light-weight blockchain-based data sharing platform for IoT networks**
  - Designed a blockchain-based data sharing platform for IoT networks that works on the basis of trust
  - Currently improving the trust-based algorithm for better load balancing & making it resistant to network attacks
- **Blockchain-based Dynamic Virtual Power Plants (D-VPP)**
  - Building a blockchain-based D-VPP for augmenting the data privacy & efficiency of VPPs
  - Formulating the transaction flow in blockchain & working on decentralized aggregation of nodes to form DVPP

Smart Contract Generation from Natural Language [Repository] *Feb 2020 - Oct 2021*
Supervised by **Prof. Mohammad Hamdaqa** *Research Assistant*, Reykjavik University

- Built the beta version of a chatbot using Xatkit to generate smart contract code in Solidity, MS Azure & Composer
- Integrated software engineering modules such as Xtext & Xtend with NLP modules such as DialogFlow & Levenshtein's edit distance to facilitate code generation

Distributed Image Reconstruction in Adversarial Scenario [Repository] *Aug 2021 - Present*
Supervised by **Prof. Sanand Dilip Amita Athalye** *Master's Thesis*, IIT Kharagpur

- Designed an efficient, randomized leader selection algorithm to achieve consensus for distributed image regeneration
- Incorporated RPCA, matrix completion & data splitting for improving data privacy & defense against various attacks

Blockchain-based Intrusion Detection System(IDS) for IoT networks *May 2021 - Present*
Supervised by **Prof. Sathya Peri and Prof. Salil Kanhere** *Research Assistant*, IIT Hyderabad

- Engineered a framework for distributed intrusion detection for improved accuracy & data provenance
- Integrated Hyperledger Fabric (Blockchain), NS3 (IoT network), Python & Shell Scripts (IDS) for implementation

Study of privacy hazards in user reviews on Amazon Marketplace *Jan 2021 - Present*
Supervised by **Prof. Mainack Mondal** *Research Assistant*, IIT Kharagpur

- **PII Detection and qualitative analysis of Amazon Reviews**
  - Processed >100GB data of user reviews from amazon.com & detected critical PII revelations in 14k cases
  - Analyzed the reviews to obtain qualitative code and then, examined a random set of 200 reviews with PII revelations, assigned qualitative codes to reviews & calculated Kripendorff's alpha (for 3 raters)
- **Re-identification Attack and Privacy Sensitive Information (PSI) Detection**
  - Formulated a cross-platform re-identification attack using data obtained from Amazon reviews
  - Defined PSI for Amazon reviews & working on PSI detection from the reviews of products of various categories

Deca-ARCADE, A Decentralized Marketplace [Report] *May 2019 - Jul 2019*
Supervised by **Prof. Uday B. Desai and Prof. Sathya Peri** *Research Assistant*, IIT Hyderabad

- Developed an end-to-end multi-featured decentralized marketplace using Ethereum, IPFS, ReactJS & web3js
- Designed an efficient distributed data sharing framework that could help both sellers & buyers

TERM PROJECTS

Smart Voltage Monitoring *Oct 2019 - Jun 2020*
Supervised by **Prof. Ashok K. Pradhan** *Term Project*, IIT Kharagpur

- Proposed centralized & decentralized models to store & analyze voltage data for detection of thefts & faults
- Studied both the models to evaluate the time taken to distribute & analyse voltage data for anomaly detection

Privacy Analysis of Amazon Reviews *Aug 2020 - Nov 2020*
Supervised by **Prof. Mainack Mondal** *Term Project*, IIT Kharagpur

- Scraped 32.16k user reviews & public profiles from Amazon for quantitative & qualitative analysis
- Executed Named Entity Recognition and RegEx matching to obtain the first set of sensitive information in reviews

Programmable and Embedded Systems *Sep 2020 - Nov 2020*
Supervised by **Prof. A. Routray** *Term Project*, IIT Kharagpur

- **Noise filtering of EEG data on STM** [Repository]
  - Implemented Notch Filter & Particle Swarm Optimization on MATLAB to obtain the filter coefficients
  - Filtered the EEG data using Assembly Language on STM using the coefficients obtained from MATLAB
- **Android Application for Activity Detection** [Repository]
  - Implemented Kalman Filter on Android Studio(Java) for noise reduction of real-time acceleration sensor data
  - Integrated Jenson Shannon divergence for classifying estimated data to walking, standing & climbing stairs

DyslexHelp: An application to help kids with dyslexia [Repository] *Jan 2020 - Jun 2020*
Supervised by **Prof. Manjira Sinha** *Term Project*, IIT Kharagpur

- Built a web-application using text-to-speech, flask modules to enhance the learning of children with dyslexia
- Incorporated tests for improving both writing & reading ability of children with dyslexia; Integrated an Instructor's Module to ensure the content is curated to meet the learning curve of the users

Voltage Monitoring System [Repository] *Dec 2018 - Mar 2019*
Supervised by **Prof. Ashok K. Pradhan** *Term Project*, IIT Kharagpur

- Constructed a handy & accurate hardware device using Arduino to obtain voltage values
- Developed an efficient client-server application to transfer voltage data from clients to server on Java; designed an efficient method to package & extract data & applied DFT to improve the voltage measurement procedure

COMPETITIONS

Learning By Doing NeurIPS 2021 Competition – ROBO [Repository] *Aug 2021 - Sep 2021*
Robotics Competition NeurIPS 2021

- Built a gym environment for three different robots with unknown dynamics using a neural network-based model
- Employed various system identification techniques including Neural networks and SINDy to model system dynamics and design optimal control policies for trajectory tracking

HelpMate: A helmet meant for all-round protection of a driver [Report] *Aug 2019 - Apr 2020*
Product Design IIT Kharagpur

- Fashioned a compact helmet which enhanced overall safety of a person riding on a two-wheeler vehicle; incorporated a tilt-sensor and a GSM module to provide immediate aid to an affected person during accidents
- Secured **1st Position** among 17 teams in Open-IIT Product Design Competition

Litigator: A law based search engine [Report] *Mar 2019 - Apr 2019*
Software Development IIT Kharagpur

- Built an efficient law-based search engine in the Indian domain for both law-experts & common people; included Summarization Module, Spelling Correction Module & Query Detection Module for better results
- Secured **1st Position** among 12 teams in Inter-Hall Open Soft Competition

TECHNICAL SKILLS

Software	Truffle, Ganache, IPFS, web3, Hyperldeger Fabric, Hyperldeger Indy, NS3, AndroidStudio, LaTeX, MATLAB, SNAP, Rasa, Xtext, Xtend
Libraries	Flask, Pandas, Socket, Scrapy, NumPy, Matplotlib, scikit-learn, Gym
Languages	C, C++, Java, Python, Go, HTML, CSS, JavaScript, Solidity, ReactJS, Arduino

RELEVANT COURSEWORK

Computer Science	Security Aware CPS & IoT Design, Theory & Applications of Blockchain, Social Computing, Usable Security & Privacy, Computer Architecture & Operating System, Programming & Data Structures, Smartphone Computing & Analysis
Mathematics	Transform Calculus, Probability & Stochastic Processes, Linear Algebra
Electrical	Digital Signal Processing, Statistical Signal Processing, Signals & Networks, Programmable & Embedded System

AWARDS AND ACHIEVEMENTS

JEE 2017	Ranked among the top 0.1% of the students in India in Joint Entrance Examination - 2017
KVPY Scholar	Selected for the prestigious KVPY fellowship offered by IISc, in the year 2016-17
SRFP Recipient	Selected for the prestigious Summer Research Fellowship Programme(SRFP) conducted by the Indian Academy of Sciences in the year 2018-19

EXTRA-CURRICULAR ACTIVITIES

- A regular tennis player & participated in the **Inter-IIT Tennis Camp 2019** as well as an **Inter-IIT Probable**; lead a team of 5 players as the **Captain** of RK Hall Tennis Team
- Tutored over **100 first-year undergraduate students** in Programming & Data Structures Doubt Sessions
- Guided over **70 undergraduate students** as **Vice-Captain** of RK Hall Product Design & OpenSoft Team
- Mentored **4 first-year UG students** of Electrical Engineering Dept. under the Student Mentorship Program