

# SHAILESH MISHRA

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## EDUCATION

Indian Institute of Technology, Kharagpur

Bachelor's + Master's in Electrical Engineering

Minor in Computer Science and Engineering

2017 - 2022

CGPA: 8.89/10

## PUBLICATIONS

### Journal Papers

**Vericom: A Verification and Communication Architecture for IoT-based Blockchain**

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**

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**

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*

**Chat2Code: Towards conversational concrete syntax for model specification and code generation, the case of smart contracts**

Ilham Qasse\*, Shailesh Mishra\*, Mohammad Hamdaga

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**

Ilham Qasse, Shailesh Mishra, Mohammad Hamdaga

*3rd International Workshop on Bots in Software Engineering (BotSE 2021)*

## 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 a 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 the delay & overhead during transactions in IoT networks
  - Implemented ledger formation and consensus code range allocation in a Solidity smart contract
- **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 Krippendorff'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 Jensen 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 kids with dyslexia
- Incorporated tests for improving both listening & reading ability of kids with dyslexia; Integrated a teacher module so that new words can be added by teachers for enhancing learning; included a tutorial module for learning new words

**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**

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**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 discover system dynamics and abstract controls of three different robots

**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

**DisHA: An aid for people stuck in disasters** [[Report](#)]

Oct 2018 - Mar 2019

Product Design

IIT Kharagpur

- Designed a cost-effective product to locate distressed people during disasters using RF waves; analyzed the different modes of working of the device to reduce the power consumption
- Sketched out the working of RFID reader & various algorithms for the rescue teams to locate the affected people

**ALCOLOC: A product for making driving safe** [[Report](#)]

Aug 2018 - Sep 2018

Product Design

IIT Kharagpur

- Designed a product to road prevent accidents due to drink-and-drive cases by using blood alcohol content
- Integrated a feature of sending an SOS signal to an acquaintance of the intoxicated person for immediate help

**MEDI-BIN: A product for safe disposal of biomedical waste** [[Report](#)]

Oct 2017 - Mar 2018

Product Design

IIT Kharagpur

- Developed a compact product to decompose biomedical waste using plasma pyrolysis technology
- Planned out the geometry as well as working of plasma chamber & plasma torch for proper decomposition of waste

**TECHNICAL SKILLS**

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<b>Software</b>	Truffle, Ganache, IPFS, web3, Hyperledger Fabric, NS3, MS Office, AndroidStudio, L <sup>A</sup> T <sub>E</sub> X, MATLAB, SNAP, Rasa, DialogFlow, Xatkit, Xtext, Xtend
<b>Libraries</b>	Flask, Pandas, Socket, Scrapy, NumPy, Matplotlib, scikit-learn, Gym
<b>Languages</b>	C, C++, Java, Python, Go, HTML, CSS, JavaScript, Solidity, ReactJS, Arduino, Assembly Language

**RELEVANT COURSEWORK**

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

## AWARDS AND ACHIEVEMENTS

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

## EXTRA-CURRICULAR ACTIVITIES

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- 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