

# SHAILESH MISHRA

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## EDUCATION

**Ecole Polytechnique Federale de Lausanne**

2022 - Present

PhD in School of Computer and Communication Sciences

**Indian Institute of Technology, Kharagpur**

2017 - 2022

Bachelor's + Master's in Electrical Engineering

CGPA: 9.03/10

## PUBLICATIONS

### Journal Papers

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

[\[Link\]](#)

Ali Dorri, [Shailesh Mishra](#), Raja Jurdak

Accepted at Elsevier's Ad Hoc Networks 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 Blockchain Enabled Privacy-Preserving Data Availability Protocol**

[\[Link\]](#)

Ambrose Hill, [Shailesh Mishra](#), Atharv Singh Patlan, Ali Dorri, Volkan Dedeoglu, Raja Jurdak, Salil S. Kanhere

4th IEEE International Conference on Blockchain 2021

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

[\[Link\]](#)

Ilham Qasse\*, [Shailesh Mishra](#)\*, Mohammad Hamdaqa

(\* - Equal contribution)

Under review

**Privacy preservation in decentralised identities using selective disclosure**

Rahma Mukta, Shantanu Pal, [Shailesh Mishra](#), Salil Kanhere

Under preparation for submission

### 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

**Distributed Secure Image Regeneration in CyberPhysical Systems**

[\[Link\]](#)

[Shailesh Mishra](#), Sanand Dilip Amita Athalye

Master's Thesis

## RESEARCH EXPERIENCE

**Integration of Blockchain and IoT**

Jan 2020 - Oct 2021

Supervised by [Prof. Raja Jurdak](#) and [Dr. Ali Dorri](#)

Research Assistant, Queensland University of Technology

- **BlockTorrent**: Developed an overlay network for off-chain communications in a system incorporating Blockchain & BitTorrent to analyse the impact of packet size on performance of the framework
- **Vericom**: Implemented an IoT-based blockchain to improve its performance by optimizing the number of packets shared and mathematically proved the security of the algorithm
- **Treechain**: Implemented and tested an efficient consensus algorithm to reduce the delay & overhead during transactions in IoT networks; built the ledger formation and consensus code range allocation in Solidity

**Smart Contract Generation from Natural Language** [\[Repository\]](#)

Feb 2020 - Oct 2021

Supervised by [Prof. Mohammad Hamdaqa](#)

Research Assistant, Reykjavik University

- Built an interactive 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 Secure Image Regeneration** [Repository]

Supervised by **Prof. Sanand Dilip Amita Athalye**

Aug 2021 - Present  
Master's Thesis, IIT Kharagpur

- Designed an efficient leader selection algorithm to achieve consensus for distributed image regeneration
- Integrated & tested data splitting schemes for improving data privacy & for enhancing the performance of the network by reducing packet size while taking into account the quality of final image regenerated
- Incorporated RPCA & matrix completion for enabling regeneration of image from less image data

### **Privacy preservation in decentralised identities using selective disclosure** [Repository]

Supervised by **Prof. Salil Kanhere**

May 2022 - July 2022  
Research Assistant, UNSW

- Implemented a DID system on Hyperledger Fabric for enhancing privacy preservation using selective disclosure
- Integrated the system with Google Drive and evaluated its overall performance

### **Blockchain-based Intrusion Detection System(IDS) for IoT networks**

Supervised by **Prof. Sathya Peri and Prof. Salil Kanhere**

May 2021 - Present  
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**

Supervised by **Prof. Mainack Mondal**

Jan 2021 - July 2022  
Research Assistant, 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
- Analyzed 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)

## **WORK EXPERIENCE**

### **Blockchain Research & Development**

Supervised by **Michal Zajac, Joel Kahil and Marcos Maceo**

Jun 2022 - Aug 2022  
Engineering internship, Nethermind

- **Research:** Designed a identity management system using blockchain and IPFS based on [CanDID](#) for operators in liquid staking; proposed a solution for tackling the issue of non-accountability in Ethereum2.0
- **Trantor:** Analyzed the various components of AAVE [GHO](#) & the performance of various stablecoins on AAVE
- **Juno:** Build the metric measurement framework using Prometheus for Juno, the Go client for Starknet

### **Deca-ARCADE, A Decentralized Marketplace** [Report]

Supervised by **Prof. Uday B. Desai and Prof. Sathya Peri**

May 2019 - Jul 2019  
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**

Supervised by **Prof. Ashok K. Pradhan**

Oct 2019 - Jun 2020  
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

### **Programmable and Embedded Systems**

Supervised by **Prof. A. Routray**

Sep 2020 - Nov 2020  
Term Project, IIT Kharagpur

- **Noise filtering of EEG data on STM :** Filtered the EEG data using Assembly Language on STM using Notch Filter; obtained the coefficients by implementing Notch Filter & Particle Swarm Optimization on MATLAB
- **Android Application for Activity Detection :** Implemented Kalman Filter on Android Studio(Java) for noise reduction of real-time acceleration sensor data & integrated Jensen Shannon divergence for classifying motion

### **DyslexHelp: An application to help kids with dyslexia** [Repository]

Supervised by **Prof. Manjira Sinha**

Jan 2020 - Jun 2020  
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 and a tutorial module for enhancing the learning process

## 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 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 & 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

<b>Software</b>	Truffle, Ganache, IPFS, web3, Hyperledger Fabric, NS3, AndroidStudio, $\text{\LaTeX}$ , MATLAB
<b>Libraries</b>	Flask, Pandas, Socket, Scrapy, NumPy, Matplotlib, scikit-learn
<b>Languages</b>	C, C++, Java, Python, Go, HTML, CSS, JavaScript, Solidity, ReactJS, Arduino

## RELEVANT COURSEWORK

<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, Big Data Processing, Machine Learning Foundations & Applications
<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

<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

## TEACHING ACTIVITIES

- Electrical Technology, Fall 2021
- Measurements and Electronic Instruments Lab, Spring 2022

## 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
- Guided over **70 undergraduate students** as **Vice-Captain** of RK Hall Product Design & OpenSoft Team