Nikhil Kumar Singh

CONTACT INFORMATION

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IIT Kanpur

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GitHub: https://github.com/ciniks117

RESEARCH INTERESTS

Formal Methods, Reinforcement Learning, Optimization, Control Theory.

EDUCATION

Indian Institute of Technology, Kanpur,
PhD, Computer Science and Engineering, Jan 2020 - Present (9.50/10)
Thesis : Specification Guided Automated Synthesis of Feedback Controllers.
Advisor: Dr. Indranil Saha

Indian Institute of Technology, Kanpur,
MS, Computer Science and Engineering, Dec 2019 (9.0/10)
Thesis : Specification guided Automated Debugging of CPS Models.
Advisor: Dr. Indranil Saha

National Institute of Technology, Jamshedpur,
B.Tech(Hons), Computer Science and Engineering, May 2014 (8.70/10)
Project: Intelligent Web Search Engine.

TECHNICAL ABILITIES

- **Languages**: Python, C, C++, Scala.
- **Tools/Fwk** : MATLAB, Simulink/Stateflow, SpaceEx, BREACH, S-TALIRO, RTAMT, PyTorch, Gym etc.
- **Relevant Courses Completed**: Machine Learning; Data Mining; Program Analysis, Verification and Testing; Designing Verifiably Secure Systems; Formal Methods for Robotics and Automation; Embedded and Cyber-Physical Systems; Maths for Computer Science etc. .

PUBLICATIONS

- **Nikhil Kumar Singh**, Indranil Saha. *"Specification Guided Synthesis of Feedback Controllers."* ACM SIGBED International Conference on Embedded Software (EMSOFT 2021), ACM/IEEE, virtual conference, October 08-15, 2021.
Published in ACM Transactions on Embedded Computing Systems (2021) `https://dl.acm.org/doi/10.1145/3477011`.
Code at `https://github.com/iitkcpslab/SCoSyn`
- **Nikhil Kumar Singh**, Indranil Saha. *"Specification Guided Automated Debugging of CPS Models."* International Conference on Embedded Software (EMSOFT2020), ACM/IEEE, virtual conference, September 20-25, 2020.
Published in IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (2020) `https://ieeexplore.ieee.org/document/9211574/`.
Code at `https://github.com/iitkcpslab/Blars`

PROJECTS

Geo-Spatial Analysis of Twitter Data. Prof. Arnab Bhattacharya
As course project for Data mining course (CS685A)   **Aug'20 - Dec'20**

Star-based Abstractions for Outside-the-Box framework. Prof. Subhajit Roy
As course project for Program Analysis, Verification and Testing (CS639A)   **Aug'20 - Dec'20**

MENTORED PROJECTS

Reinforcement Learning based Falsification
Sudhanshu Mishra, Niskarsh Kumar
As course project for Autonomous Cyber-Physical Systems (CS659A)   **Jan'21 - May'21**

Adaptive Cruise Control Verification Using NNV toolbox
Areeb Ahmad, Deepanker Mishra, Himanshu Singh
As course project for Autonomous Cyber-Physical Systems (CS659A)   **Jan'21 - May'21**

Controller Synthesis for LTI systems
Raju Roy, Shashank
As course project for Autonomous Cyber-Physical Systems (CS659A)   **Jan'21 - May'21**

WORK EXPERIENCE **Tutor** Introduction to Computing (ESC101)
Indian Institute of Technology, Kanpur   **May'22 - Jun'22**

Teaching Assistant Software Development (CS253)
Indian Institute of Technology, Kanpur   **Jan'22 - May'22**

Teaching Assistant Autonomous Cyber-Physical Systems (CS659A)
Indian Institute of Technology, Kanpur   **Jan'21 - May'21**

Teaching Assistant Embedded and Cyber-Physical Systems (CS637A)
Indian Institute of Technology, Kanpur   **Sept'20 - Dec'20**

Teaching Assistant Formal Methods for Robotics and Automation (CS638A)
Indian Institute of Technology, Kanpur   **Jan'20 - May'20**

Senior Student Research Associate FMSAFE Project, IIT Kanpur
Sponsor: MHRD IMPRINT   **Jan'18 - Dec'19**
- Developed an Automated Tool **BLARS** for Debugging CPS Models.

Software Engineer OptumSoft, Bangalore   **June'14 - Jun'16**
- Software Development in the domain of Distributed Systems. This involved a high-level TACC Compiler Framework.
- Projects related to development and maintenance of Dashboard Software.
- Working with the build servers.

Intern HPES-IIIT Allahabad   **May'13 - June'13**
- Worked on Digital Library using PHP and MySQL.

AWARDS AND
CERTIFICATES
- **Prime Minister's Research Fellowship** (Dec-2020).
- Nominated by the Department of CSE, IIT Kanpur for **Cadence Gold Medal** and **SIIC Student Innovation Award** for MS thesis.
- **First** prize in Data structure & algorithm based event *CODATHON* in OJASS'13.
- **Third** prize in Coding based event *CODEMANIA* in Ojass' 13.
- **Second** prize in the event *CODESTORM* conducted by the Computer Society of India at NIT-Jamshedpur held in March-2012.
- **First** prize in the event *LET US C* conducted by the Computer Society of India at NIT-Jamshedpur held in April-2011.

ACTIVITIES   **Coordinator** CODATHON @ OJASS'14
- Organised the flagship Data structure and Algorithms based event in OJASS - the technical fest of NIT Jamshedpur. More than 300 candidates from all over India participated in this event.