

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, SpaceX, 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. “*STL-Based Synthesis of Feedback Controllers Using Reinforcement Learning.*” Accepted at AAAI Conference on Artificial Intelligence (AAAI 2023), February 07-14, 2023.
Code at <https://github.com/ciniks117/RLSTL>
- **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/iitkcplab/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/iitkcplab/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 Controller Synthesis (PMRF Lecture series) <i>Institute of Smart Structures and Systems (ISSS)</i>	Sep'22 - Present
	Tutor Introduction to Computing (ESC101) <i>Indian Institute of Technology, Kanpur</i>	May'22 - Jun'22
	Teaching Assistant Software Development (CS253) <i>Indian Institute of Technology, Kanpur</i>	Jan'22 - May'22
	Teaching Assistant Autonomous Cyber-Physical Systems (CS659A) <i>Indian Institute of Technology, Kanpur</i>	Jan'21 - May'21
	Teaching Assistant Embedded and Cyber-Physical Systems (CS637A) <i>Indian Institute of Technology, Kanpur</i>	Sept'20 - Dec'20
	Teaching Assistant Formal Methods for Robotics and Automation (CS638A) <i>Indian Institute of Technology, Kanpur</i>	Jan'20 - May'20
	Senior Student Research Associate FMSAFE Project, IIT Kanpur <i>Sponsor: MHRD IMPRINT</i> - Developed an Automated Tool BLARS for Debugging CPS Models.	Jan'18 - Dec'19
	Software Engineer OptumSoft, Bangalore - 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.	June'14 - Jun'16
	Intern HPES-IIIT Allahabad - Worked on Digital Library using PHP and MySQL.	May'13 - June'13
AWARDS AND CERTIFICATES	<ul style="list-style-type: none"> • 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 <i>CODATHON</i> in OJASS'13. • Third prize in Coding based event <i>CODEMANIA</i> in Ojass' 13. • Second prize in the event <i>CODESTORM</i> conducted by the Computer Society of India at NIT-Jamshedpur held in March-2012. • First prize in the event <i>LET US C</i> 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.	