

# Nikhil Kumar Singh

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## CONTACT INFORMATION

D-215 Hall-8  
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, Py-Torch, 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 AAI 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

	<i>As course project for Autonomous Cyber-Physical Systems (CS659A)</i>	<b>Jan'21 - May'21</b>
	<b>Adaptive Cruise Control Verification Using NNV toolbox</b> Areeb Ahmad, Deepanker Mishra, Himanshu Singh	
	<i>As course project for Autonomous Cyber-Physical Systems (CS659A)</i>	<b>Jan'21 - May'21</b>
	<b>Controller Synthesis for LTI systems</b> Raju Roy, Shashank	
	<i>As course project for Autonomous Cyber-Physical Systems (CS659A)</i>	<b>Jan'21 - May'21</b>
WORK EXPERIENCE	<b>Instructor</b> Introduction to Controller Synthesis (PMRF Lecture series) <i>Institute of Smart Structures and Systems (ISSS)</i>	<b>Sep'22 - Present</b>
	<b>Tutor</b> Introduction to Computing (ESC101) <i>Indian Institute of Technology, Kanpur</i>	<b>May'22 - Jun'22</b>
	<b>Teaching Assistant</b> Software Development (CS253) <i>Indian Institute of Technology, Kanpur</i>	<b>Jan'22 - May'22</b>
	<b>Teaching Assistant</b> Autonomous Cyber-Physical Systems (CS659A) <i>Indian Institute of Technology, Kanpur</i>	<b>Jan'21 - May'21</b>
	<b>Teaching Assistant</b> Embedded and Cyber-Physical Systems (CS637A) <i>Indian Institute of Technology, Kanpur</i>	<b>Sept'20 - Dec'20</b>
	<b>Teaching Assistant</b> Formal Methods for Robotics and Automation (CS638A) <i>Indian Institute of Technology, Kanpur</i>	<b>Jan'20 - May'20</b>
	<b>Senior Student Research Associate</b> FMSAFE Project, IIT Kanpur <i>Sponsor: MHRD IMPRINT</i>	<b>Jan'18 - Dec'19</b>
	- Developed an Automated Tool <b>BLARS</b> for Debugging CPS Models.	
	<b>Software Engineer</b> OptumSoft, Bangalore	<b>June'14 - Jun'16</b>
	- 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.	
	<b>Intern</b> HPES-IIIT Allahabad	<b>May'13 - June'13</b>
	- Worked on Digital Library using PHP and MySQL.	
AWARDS AND CERTIFICATES	<ul style="list-style-type: none"> <li>● <b>Prime Minister's Research Fellowship</b> (Dec-2020).</li> <li>● Nominated by the Department of CSE, IIT Kanpur for <b>Cadence Gold Medal</b> and <b>SIIC Student Innovation Award</b> for MS thesis.</li> <li>● <b>First</b> prize in Data structure &amp; algorithm based event <i>CODATHON</i> in OJASS'13.</li> <li>● <b>Third</b> prize in Coding based event <i>CODEMANIA</i> in Ojass' 13.</li> <li>● <b>Second</b> prize in the event <i>CODESTORM</i> conducted by the Computer Society of India at NIT-Jamshedpur held in March-2012.</li> <li>● <b>First</b> prize in the event <i>LET US C</i> conducted by the Computer Society of India at NIT-Jamshedpur held in April-2011.</li> </ul>	
ACTIVITIES	<b>Coordinator</b> 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.	