

Nikhil Kumar Singh

CONTACT INFORMATION

D-215 Hall-8
IIT Kanpur

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GitHub: <https://github.com/ciniks117>

RESEARCH INTERESTS

Reinforcement Learning, Formal Methods, Control Theory, Optimization.

EDUCATION

Indian Institute of Technology, Kanpur,

PhD, Computer Science and Engineering, Jan 2020 - Present (9.50/10)

Thesis : Synthesis of Safe and Efficient Feedback Controllers for Complex Dynamical Systems.

Advisor: Dr. Indranil Saha

Indian Institute of Technology, Kanpur,

MS, Computer Science and Engineering, Jan 2018 - Dec 2019 (9.0/10)

Thesis : Specification guided Automated Debugging of CPS Models.

Advisor: Dr. Indranil Saha

National Institute of Technology, Jamshedpur,

B.Tech, Computer Science and Engineering, Aug 2010 - May 2014 (8.70/10)

Project: Intelligent Web Search Engine.

PUBLICATIONS

- **Nikhil Kumar Singh**, Indranil Saha. “*Frugal Actor-Critic: Sample Efficient Off-Policy Deep Reinforcement Learning Using Unique Experiences.*” International Conference on Autonomous Agents and Multiagent Systems (AAMAS 2024), Auckland, New Zealand, May 06-10, 2024. <https://dl.acm.org/doi/10.5555/3635637.3663037>.
Code at <https://github.com/iitkcpslab/FAC>
- **Nikhil Kumar Singh**, Indranil Saha. “*STL-Based Synthesis of Feedback Controllers Using Reinforcement Learning.*” AAAI Conference on Artificial Intelligence (AAAI 2023), Washington D.C., February 07-14, 2023. <https://ojs.aaai.org/index.php/AAAI/article/view/26764>.
Code at <https://github.com/iitkcpslab/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/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>

AWARDS

- **Fellowship for Academic and Research Excellence** (Jan’25 - Present).
- **Prime Minister’s Research Fellowship** (Dec’20 - Dec-23).
- 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.

HONORS	<ul style="list-style-type: none"> Invited to Google Research Week 2024. Invited to Google Research Week 2023. 	
TALKS	<p>Frugal Actor-Critic: Sample Efficient Off-Policy Deep Reinforcement Learning Using Unique Experiences <i>AAMAS-24, Auckland, New Zealand,</i> May'24</p> <p>Specification Guided Controller Synthesis Using RL <i>CSE Dept. IIT Kanpur</i> Oct'23</p> <p>Learning-based Controller Synthesis <i>Ericsson AI Research</i> Mar'23</p> <p>STL-Based Synthesis of Feedback Controllers Using Reinforcement Learning <i>AAAI-23, Washington D.C.</i> Feb'23</p> <p>Introduction to Controller Synthesis <i>CSE Dept. IIT Kanpur</i> Oct'21</p> <p>Specification Guided Automated Synthesis of Feedback Controllers <i>EMSOFT-21, Online</i> Oct'21</p> <p>Specification-Guided Automated Debugging of CPS Models <i>EMSOFT-20, Online</i> Sep'20</p>	
TEACHING	<p>Instructor Introduction to PyTorch (PMRF Lecture series) <i>Institute of Smart Structures and Systems (ISSS)</i> Sep'23 - Dec'23</p> <p>Instructor Controller Synthesis using Python (PMRF Lecture series) <i>Institute of Smart Structures and Systems (ISSS)</i> Mar'23 - Jul'23</p> <p>Instructor Introduction to Controller Synthesis (PMRF Lecture series) <i>Institute of Smart Structures and Systems (ISSS)</i> Sep'22 - Dec'22</p> <p>Tutor Introduction to Computing (ESC101) <i>Indian Institute of Technology, Kanpur</i> May'22 - Jun'22</p> <p>Teaching Assistant Software Development (CS253) <i>Indian Institute of Technology, Kanpur</i> Jan'22 - May'22</p> <p>Teaching Assistant Autonomous Cyber-Physical Systems (CS659A) <i>Indian Institute of Technology, Kanpur</i> Jan'21 - May'21</p> <p>Teaching Assistant Embedded and Cyber-Physical Systems (CS637A) <i>Indian Institute of Technology, Kanpur</i> Sept'20 - Dec'20</p> <p>Teaching Assistant Formal Methods for Robotics and Automation (CS638A) <i>Indian Institute of Technology, Kanpur</i> Jan'20 - May'20</p>	
EXPERIENCE	<p>Visiting Researcher, Max Planck Institute for Software Ssystems, Germany Nov'24 - Present - Development of Safe DRL Controllers using Barrier Functions.</p> <p>Senior Student Research Associate FMSAFE Project, IIT Kanpur <i>Sponsor: MHRD IMPRINT</i> Jan'18 - Dec'19 - Developed an Automated Tool BLARS for Debugging CPS Models.</p> <p>Software Engineer OptumSoft, Bangalore June'14 - Jun'16 - Software Development in the domain of Distributed Systems. This involved a high-level TACC Compiler Framework.</p>	
ACTIVITIES	<p>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.</p>	