Nikhil Kumar Singh

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Research Interests

Controller Synthesis, Formal Verification, Deep Reinforcement Learning, Cyber Physical Systems, Machine Learning.

Education

Indian Institute of Technology, Kanpur,
PhD, Computer Science and Engineering, Jan 2020 - Present (9.50/10)
Thesis : Specification Guided Automated Controller Synthesis for CPSs.
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.
Advisor: Dr. Sanjay Kumar

Technical Abilities

- **Languages**: Python, C, C++, Scala, PHP, MySql.
- **Machine Learning Frameworks**: Scikit-learn, OpenCV, Keras, Tensorflow, gym.
- **Tools/Fwk** : MATLAB, Simulink/Stateflow, SpaceEx, BREACH, S-TALIRO, dReach.

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.
To be Published in ACM Transactions on Embedded Computing Systems (2021) 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	**Indian Institute of Technology, Kanpur** Teaching Assistant *Autonomous Cyber-Physical Systems (CS659A)*	**Jan'21 - May'21**
	Indian Institute of Technology, Kanpur Teaching Assistant *Embedded and Cyber-Physical Systems (CS637A)*	**Sept'20 - Dec'20**
	Indian Institute of Technology, Kanpur Teaching Assistant *Formal Methods for Robotics and Automation (CS638A)*	**Jan'20 - May'20**
	FMSAFE Project, IIT Kanpur Senior Student Research Associate *Sponsor: MHRD IMPRINT*	**Jan'18 - Dec'19**

- Developed an Automated Tool **BLARS** for Debugging CPS Models.

	OptumSoft, Bangalore Member Of Technical Staff	**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.

	HPES-IIIT Allahabad, Intern	**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.