# Manish Goyal


**Contact Information**

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**Education**

**Ph.D., Computer Science** 01/2017 – Exp. 12/2021
Advisor: Parasara **Sridhar** Duggirala
University of North Carolina at Chapel Hill, USA

**M.Tech, Computer Science and Engineering** 07/2008 – 06/2010
Indian Institute of Technology Guwahati, India

**Employment**

[**E.7**] Graduate Assistant, Department of Computer Science
University of North Carolina, Chapel Hill, USA 01/2019 – Present
[**E.6**] Research Internship, TCS Innovation Labs, Pune, India 05/2019 – 07/2019
[**E.4**] Senior Software Engineer, Synopsys India Pvt. Ltd., NOIDA, India 06/2012 – 12/2016
[**E.3**] Research Engineer, Verimag Research Lab, Grenoble, France 02/2011 – 05/2012
[**E.2**] Associate Software Engineer, IBM India Labs, Bangalore, India 07/2010 – 01/2011
[**E.1**] Research Internship, Verimag Research Lab, Grenoble, France 05/2009 – 07/2009

**Peer reviewed Conference/ Journal Publications**

[**RTS'20**] C. Nemitz, T. Amert, **M. Goyal**, J. Anderson, "Concurrency Groups: A New Way to Look at Real-Time Multiprocessor Lock Nesting", *Real-Time Systems*, special issue of outstanding papers from the International Conference on Real-Time Networks and Systems 2019, to appear.

[**ATVA'20**] **M. Goyal**, P. S. Duggirala, "NeuralExplorer: State Space Exploration of Closed Loop Control Systems Using Neural Networks", *International Symposium on Automated Technology for Verification and Analysis*, 10/2020.

[**AUT'20**] **M. Goyal**, P. S. Duggirala, "Extracting Counterexamples Induced by Safety Violation in Linear Hybrid Systems", *Automatica*, 07/2020.

[**ACC'20**] **M. Goyal**, D. Bergman, P. S. Duggirala, "Generating Longest Counterexample: On the Cross-roads of Mixed Integer Linear Programming and SMT", *American Control Conference*, 07/2020.

[**L4DC'20**] **M. Goyal**, P. S. Duggirala, "NeuralExplorer: State Space Exploration of Closed Loop Control Systems Using Neural Networks", *Learning for Dynamics and Control*, 06/2020.

[**RTNS'19**] C. Nemitz, T. Amert, **M. Goyal**, J. Anderson, "Concurrency Groups: A New Way to Look at Real-Time Multiprocessor Lock Nesting", *Real-Time Networks and Systems*, 11/2019. **Outstanding Paper Award**.

[**ADHS'18**] **M. Goyal**, P. S. Duggirala, "On Generating a variety of unsafe counterexamples for Linear Dynamical Systems", *Analysis and Design of Hybrid Systems*, 07/2018.

[**IJMO'12**] **M. Goyal**, "Reachability Analysis of Hybrid Systems: An Experience Report". *International Journal of Modeling and Optimization*, Vol. 2(6), pp 681-686, 12/2012.

**Other/ Workshop Artifacts**

[**DARS'19**] **M.Goyal**, P. S. Duggirala, "Learning Robustness of Nonlinear Systems Using Neural Networks", *Design and Analysis of Robust Systems*, 07/2019.

[**CMACS'11**] G. Frehse, A. Donzé, S. Cotton, R. Ray, O. Lebeltel, **M. Goyal**, R. Ripado, T. Dang, O. Maler, C. Le Guernic, A. Girard, "Safety Analysis of Hybrid Systems with SpaceEx", *Computational Modeling and Analysis for Complex Systems*, 07/2011.

[**MULTI'11**] **M. Goyal**, G. Frehse, "Translation between CIF and SpaceEx/PHAVer", MULTIFORM Deliverable D1.3.1, VERIMAG, 05/2011.

**Travel Grants/ Awards**

[**F.7**] **NSF Travel Grant** for *VMCAI Winter School*, New Orleans, Louisiana, 2020.
[**F.6**] **John Lof Leadership Academy Fellowship** by UConn School of Engineering, 2018.
[**F.5**] **UTC-IASE Graduate Fellowship** by United Technologies Corporation, 2017 & 2018.
[**F.4**] **FLEFF Travel Grant** for *Finger Lakes Environmental Film Festival*, Ithaca, NY, 2018.
[**F.3**] **SREB Travel Grant** for *Institute on Teaching and Mentoring*, Atlanta, Georgia, 2017.

**[F.2] NSF Travel Grant** for *Computer Aided Verification*, Heidelberg, Germany 2017.
**[F.1] NSF Travel Grant** for *Hybrid Systems Computation and Control*, Pittsburgh, PA, 2017.

## Other Honours

**[H.4]** TarHeels@UNC secured **poll position** $1^{st}$ in F1Tenth, a racing competition for autonomous vehicles, conducted at Cyber-Physical Systems Week (CPSWeek) 2019.
**[H.3]** RacingHuskies secured **poll position** $2^{nd}$ in F1Tenth, a racing competition for autonomous vehicles, conducted at Cyber-Physical Systems Week (CPSWeek) 2017.
**[H.2]** *Department Rank holder* during Master's and Bachelor's degrees.
**[H.1]** *KUDOS Award* and *STAR Award* at Synopsys India Pvt. Ltd.

## Talks

**[T.6] NeuralExplorer: State Space Exploration of Closed Loop Control Systems Using Neural Networks**, International Symposium on Automated Technology for Verification and Analysis (remotely), 10/2020.
**[T.5] Generating Longest Counterexample: On the Cross-roads of Mixed Integer Linear Programming and SMT**, American Control Conference (remotely), 07/2020.
**[T.4] Extracting Counterexamples for Safety Property in Linear Hybrid Systems**
SouthEast Control Conference, Georgia Tech, Atlanta, 11/2019.
**[T.3] Extracting Counterexamples Induced by Safety Violation in Linear Hybrid Systems**, TCS Innovation Labs, Pune, 07/2019.
**[T.2] On Generating a Variety of Unsafe Counterexamples for Linear Dynamical Systems**, Analysis and Design of Hybrid Systems, Oxford University, 07/2018.
**[T.1] Translation between CIF and SpaceEx/PHAVer**
MULTIFORM meeting, Sonderberg, Denmark, 07/2011.

## Reports

**[R.4] M. Goyal**, A. Karimi, "Sensing and Homography: A different outlook", Term Project Report, University of North Carolina at Chapel Hill, 05/2019.
**[R.3] M. Goyal**, F. Zare, "Towards Falsification of Nonlinear Dynamical Systems", Term Project Report, University of Connecticut, 05/2018.
**[R.2] M. Goyal**, J. Huang, L. Asselin, "Spam Detection Using Probabilistic Graphical Models", Term Project Paper, University of Connecticut, 04/2017.
**[R.1] M. Goyal**, G. Frehse, "Automata Library: A User Guide", VERIMAG, France, 04/2012.

## Graduate Courses

Probabilistic Graphical Models, Computational Geometry, Intelligent Embedded Systems, Machine Learning, Formal Methods, Computational Photography, Robotics, Programming Intelligent Physical Systems, Safe Autonomy, Algorithm Analysis

## Extra Curricular

**Member At-large**, STEM Pride club, UNC@Chapel Hill, 2019-2020.
**Treasurer**, South Asian cultural group, Tarang, UConn, 2018-2019.
**Graduate Fellow**, John Lof Leadership Board, UConn, 2018-2019.
**Member**, Student Association of Graduate Engineers (SAGE), UConn, 2018-2019.

## References

Available upon request