# Abhijin Adiga

## Contact Information

Network Systems Science and Advanced Computing (NSSAC)

Biocomplexity Institute and Initiative

University of Virginia

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## Current Position

Research Assistant Professor Oct 2018 – present

Network Systems Science and Advanced Computing (NSSAC) University of Virginia

## Research Interests

Network science, algorithm theory, combinatorics, Computational modeling, Game theory and Machine learning

Applications: Invasive species spread, computational epidemiology, modeling and analysis of large socio-technical systems

## Education

### PhD:

Dept. of Computer Science and Automation

Indian Institute of Science, Bangalore, India

August 2006 – March 2011

### Master of Science (Engg):

Dept. of Electrical Engineering,

Indian Institute of Science, Bangalore, India

August 2001 – August 2003

### Bachelor of Engineering:

Bangalore University (B.M.S. College of Engineering) Telecommunication Engineering

1996 – 2000

## Work Experience

Research Assistant Professor Jul 2016 – Oct 2018

Senior Research Associate May 2014 – Jul 2016

Postdoctoral Associate October 2011 – May 2014

Network Dynamics and Simulation Science Laboratory Biocomplexity Institute of Virginia Tech

Research Associate March 2011 – September 2011

Dept. of Computer Science and Automation, IISc

Beceem Communications Pvt Ltd August 2004 – July 2006

Algorithm design for WiMax (802.16)

Project Associate October 2003 – April 2004

Project Associate October 2000 – August 2001

Dept. of Electrical Engineering, IISc

## Grants

* USDA NIFA Foundational and Applied Science Program: Network Models of Food Systems and their Application to Invasive Species Spread; Amount: $400,000; Duration: Sep’19–Aug’23; Role: PI
* USAID Egypt Mission: Pest Risk Assessment of the Fall Armyworm, Spodoptera frugiperda in Egypt; Amount: $18,000; Duration: Oct’17–Dec’17; Role: Co PI
* USAID IPM Innovation Labs: A High-resolution Interaction Based Approach to Modeling the Spread of Agricultural Invasive Species; Amount: $1,000,000 ($800,000 for Virginia Tech); Duration: Oct’15–Nov’20; Role: PI

## Awards

* “DSFEW Early Career Researchers Travel Fund”, KDD 2016.
* “Honorable Mention For Outstanding Novelty of Research Question” award for the paper “Sensitivity of Diffusion Dynamics to Network Uncertainty” in AAAI’13.
* Infosys Fellow: awarded to select PhD candidates in IISc by Infosys Technologies Ltd.
* Secured All India Rank of 34 in GATE 2000 (EC), a national level entrance exam for post graduate studies.
* Ranked 7th in Bangalore University in Telecommunication Engg. (Year 2000).

## Memberships

IEEE member

## News

* Virginia Tech provides key intel in U.S. and Egyptian-led battle against a major pest
* Countries get heads up about leafminer invasion thanks to Virginia Tech (also picked up by Wisconsin Farmer and Agrilinks)
* Virginia Tech awards more than $11 million to help feed people in developing countries
* Virginia Tech Research Team Fights the Spread of Invasive Pests

## Talks

1. Understanding the Role of Seasonal Food Trade Networks in Invasive Species

Spread, SIAM Network Science, Snowbird, Utah, May 2019.

2. How to stop an epidemic? Networked dynamical systems, games and near-optimal algorithms, Indian Institute of Technology, Dharwad, October 2018.

3. Multi-pathway models to assess the threat of invasive species spread, Indian Agricultural Research Institute, Delhi, October 2018 (invited).

4. Multi-pathway models to understand the spread and impact of *Tuta absoluta*, International Conference on Biological Control (ICBC), September 2018.

5. Webinar: New Approaches to Control the South American Tomato Leaf Miner *Tuta absoluta*, April 2018

6. Monitoring the spread of *Tuta absoluta* using a multi-layered network based modeling framework, 9th International IPM Symposium, Baltimore, March 2018

7. Modeling the Spread of Fall Armyworm, Fall Armyworm Workshop, Adis Ababa, 2017

8. Understanding the role of human-mediated pathways in pest spread: Case study of Tuta absoluta, 12th Arab Congress of Plant Protection, Hurghada, 2017

9. Monitoring spread of T. absoluta using a multi-layered network based modeling framework, Symposium on Global Spread and Management of the South American Tomato Leafminer, *Tuta absoluta*. International Congress of Entomology, Orlando, 2016

10. How to stop an epidemic? Games and near-optimal algorithms, Dept. of Computer

Science and Automation, Indian Institute of Science, Bangalore, 2014

11. Sensitivity of Dynamical Properties to Network Uncertainty, Dept. of Computer Science and Automation, Indian Institute of Science, Bangalore, 2013

## Selected publications

### Journal articles

1. J McNitt, Y Y Chungbaek, H Mortveit, M Madhav, R C Mateus, D Nicolas, B Thierry, M Rangaswamy, and A Adiga. Assessing the Multi-pathway Threat from an Invasive Agricultural Pest: *Tuta absoluta* in Asia. Proc. R. Soc. B, 2019
2. S Maharjan, B B Shrestha, M D Joshi, A Devkota, R Muniappan, A Adiga, and P K Jha. Predicting suitable habitat of an invasive weed *Parthenium hysterophorus* under future climate scenarios in Chitwan Annapurna Landscape, Nepal. Journal of Mountain Science, 2019
3. S Venkatramanan, S Wu, B Shi, A Marathe, M Marathe, S Eubank, LP Sah, AP Giri, LA Colavito, KS Nitin, V Sridhar, R Asokan, R Muniappan, G Norton, and A Adiga. Modeling commodity flow in the context of invasive species spread: Study of *Tuta absoluta* in Nepal. Crop Protection, 2019
4. Abhijin Adiga, Shuyu Chu, Stephen Eubank, Christopher J Kuhlman, Bryan Lewis, Achla Marathe, Madhav Marathe, Eric K Nordberg, Samarth Swarup, Anil Vullikanti, et al. Disparities in spread and control of influenza in slums of Delhi: findings from an agent-based modelling study. BMJ Open, 8(1):e017353, 2018
5. Mateus R Campos, Antonio Biondi, Abhijin Adiga, Raul NC Guedes, and Nicolas Desneux. From the western palaearctic region to beyond: *Tuta absoluta* 10 years after invading europe. Journal of Pest Science, 90(3):787–796, 2017
6. Yao Zhang, Abhijin Adiga, Sudip Saha, Anil Vullikanti, and B Aditya Prakash. Near-optimal algorithms for controlling propagation at group scale on networks. IEEE Transactions on Knowledge and Data Engineering, 28(12):3339–3352, 2016
7. Abhijin Adiga, Chris Kuhlman, Henning S Mortveit, and Anil Kumar S Vullikanti. Sensitivity of diffusion dynamics to network uncertainty. Journal of Artificial Intelligence Research, 51:207–226, 2014. (invited: best papers in AAAI’13)
8. Abhijin Adiga and L. Sunil Chandran. Representing a cubic graph as the intersection graph of axis-parallel boxes in three dimensions. SIAM Journal on Discrete Mathematics, 28(3):1515–1539, 2014
9. Abhijin Adiga, L.Sunil Chandran, and Naveen Sivadasan. Lower bounds for boxicity. Combinatorica, pages 1–25, 2014
10. Abhijin Adiga, Diptendu Bhowmick, and L Sunil Chandran. Boxicity and poset dimension. SIAM Journal on Discrete Mathematics, 25:1687, 2011
11. Abhijin Adiga, Diptendu Bhowmick, and L Sunil Chandran. The hardness of approximating the boxicity, cubicity and threshold dimension of a graph. Discrete Applied Mathematics, 158(16):1719–1726, 2010
12. Abhijin Adiga and L Sunil Chandran. Cubicity of interval graphs and the claw number. Journal of Graph Theory, 65(4):323–333, 2010
13. Abhijin Adiga. Cubicity of threshold graphs. Discrete Mathematics, 309(8):2535– 2537, 2009

### Refereed conference proceedings

1. A Adiga, C Barrett, S Eubank, C J Kuhlman, M V Marathe, H Mortveit, S S Ravi, D J Rosenkrantz, R E Stearns, S Swarup, and A K Vullikanti. Validating agent-based models of large networked systems. In Winter Simulation Conference, 2019
2. Zhihao Hu, Xinwei Deng, Abhijin Adiga, Gizem Korkmaz, Chris J. Kuhlman, Machi Dustin, Madhav V. Marathe, S. S. Ravi, Yihui Ren, Vanessa Cedeno-Mieles, Saliya Ekanayake, Brian J. Goode, Naren Ramakrishnan, Parang Sarif, and Nathan Self. On the modeling and agent-based simulation of a cooperative group anagram games. In Winter Simulation Conference, 2019
3. Abhijin Adiga, Chris J Kuhlman, Madhav V Marathe, SS Ravi, and Anil Vullikanti. PAC learnability of node functions in networked dynamical systems. In International Conference on Machine Learning (ICML), 2019
4. Abhijin Adiga, Chris J. Kuhlman, Madhav V. Marathe, S. S. Ravi, Daniel J. Rosenkrantz, and Richard E. Stearns. Learning the behavior of a dynamical system via a “20 questions" approach. In Thirty second AAAI Conference on Artificial Intelligence, 2018
5. Abhijin Adiga, S Venkataramanan, and Anil Vullikanti. To delay or not: temporal vaccination games on networks. INFOCOM, 2016
6. Abhijin Adiga and Anil Vullikanti. Temporal vaccination games under resource constraints. In Thirtieth AAAI Conference on Artificial Intelligence, 2016
7. Yao Zhang, Abhijin Adiga, Anil Vullikanti, and B Aditya Prakash. Controlling propagation at group scale on networks. In Data Mining (ICDM), 2015 IEEE International Conference on, pages 619–628. IEEE, 2015
8. Sudip Saha, Abhijin Adiga, B. Aditya Prakash, and Anil Kumar S Vullikanti. Approximation algorithms for reducing the spectral radius to control epidemic spread. In Proc. 15th SIAM International Conference on Data Mining (SDM), 2015
9. Sudip Saha, Abhijin Adiga, and Anil Kumar S Vullikanti. Equilibria in epidemic containment games. In Twenty-Eighth AAAI Conference on Artificial Intelligence (AAAI), 2014
10. Abhijin Adiga, Anil Kumar S Vullikanti, and Dante Wiggins. Subgraph enumeration in dynamic graphs. In Data Mining (ICDM), IEEE 13th International Conference on, pages 11–20. IEEE, 2013
11. Abhijin Adiga and Anil Kumar S Vullikanti. How robust is the core of a network? In Machine Learning and Knowledge Discovery in Databases (ECML/PKDD), pages 541–556. Springer Berlin Heidelberg, 2013
12. Abhijin Adiga, Chris Kuhlman, Henning S Mortveit, and Anil Kumar S Vullikanti. Sensitivity of diffusion dynamics to network uncertainty. In Twenty-Seventh AAAI Conference on Artificial Intel ligence (AAAI ), 2013. (invited to Journal of Artificial Intelligence Research)
13. Abhijin Adiga and L. Sunil Chandran. Representing a cubic graph as the intersection graph of axis-parallel boxes in three dimensions. In Symposium on Computational Geometry (SoCG), pages 387–396, 2012

## Students Current/Past

### PhD

Sichao Wu (Thesis adviser: Henning Mortveit)

### Masters

Daniel Perez Lazarte (project)

Joseph McNitt (Thesis adviser: Henning Mortveit)

### Undergraduates

Surbhi Singh (Fall’19), Ethan Choo (Summer’19), Katie Liu (Summer’19), Bryan Kaperick (Spring’16–Spring’17), and Amleshwar Kumar (Intern: Fall’16)

## PhD Committees

Sudip Saha (NDSSL, VBI, Virginia Tech)

## Professional Service

### Technical Program Committee member

AIKE (2019, 2018), INFOCOM (2019), CSoNet (2016), CONECCT (2015), SDM- Networks (2015), SIAMNS (2015)

### Grant Review

NSF (2018) (Grant review panelist)

National Fund for Scientific and Technological Development (FONDECYT), Chile

### Reviewer

Applied Network Science (2019), International Journal of epidemiology (2019), Pest Management Science (2019), Journal of Parallel and Distributed Computing (2019), Journal of Pest Science (2018), Australasian Journal of Combinatorics (2018, 2015), FPSAC (2017), ACM Transactions on Algorithms (2017), Journal of Royal Society Interface (2017), INFOCOM (2016, 2015), Order (2015), Algorithmica (2014), Journal of Autonomous Agents and Multi-Agent Systems (2013), Information Processing Letters (2012), Graphs and Combinatorics (2011), CATS (2011)