RAJEEV RAJARAM
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EDUCATION

- **Ph.D. Applied Mathematics,** Iowa State University, Ames, IA, July 2005
- **M.S. Applied Mathematics**, Iowa State University, Ames, IA, December 2003
- **M.S. Electrical Engineering**, Iowa State University, Ames, IA, August 2001
- **B.E. (Hons) Instrumentation Engineering**, B.I.T.S Pilani, India, August 1998

PROFESSIONAL EXPERIENCE

Associate Professor of Mathematics, Kent State University *Fall 2014-present*
- Taught a variety of courses in Math ranging from Core Mathematics to Linear Algebra, Calculus and differential equations and Theory of Interest (15 credits a semester)
- Served on the university wide Academic Hearing Committee for student appeals on academic conduct
- Served on two PhD dissertation committees at Kent State as an external member.
- Audited Theory of Interest (Spring 2019) and Actuarial Math I (Fall 2019)
- *MyLabsPlus administrator (Ashtabula)*: responsible for coordinating the delivery of Algebra for Calculus, Trigonometry, Explorations in Modern Mathematics, Modeling Algebra, Intuitive Calculus and Statistics courses using Pearson's online MyLabsPlus platform.
- Conducted research in the area of stability and control theory of partial differential equations
- Conducted research in the area of modeling complexity in health systems.
- Participated in committee work related to incorporation of online components in MATH 11012 and MATH 10041.
- Presented to the Board of Trustees on the application of active learning strategies inside the classroom in MATH 11012 (Intuitive Calculus)

Assistant Professor of Mathematics, Kent State University, *Fall 2008 – 2014*
- Taught a variety of courses in Math ranging from Core Mathematics to Linear Algebra, Calculus and differential equations (15 credits a semester)
- Conducted research in the area of stability and control theory of partial differential equations
- Conducted research in the area of modeling complexity in health systems.
- *Undergraduate research* – Mentored a student to extend the idea of synthetic division to divisors of degree larger than one. Another research project involved a study of the Self Organizing Map (SOM) and its applications to clustering methods in statistics.
- *MyLabsPlus administrator*: responsible for coordinating the delivery of Algebra for Calculus, Trigonometry, Explorations in Modern Mathematics, Modeling Algebra, Intuitive Calculus and Statistics courses using Pearson's online MyLabsPlus platform.
- Participated in committee work related to incorporation of online components in MATH 11012 and MATH 10041.

Assistant Professor of Mathematics, Shepherd University, *Fall 2005 – Summer 2008*
- Taught a variety of courses at all levels in Mathematics and Engineering (12 credits per semester)
- Advised Mathematics and Industrial Mathematics majors
- Proved new controllability results for the Rao-Nakra Sandwich Beam and collaborated with faculty at various universities to study extensions of Lyapunov Stability Theory for non-linear systems
- Served on various department and university-wide committees including the department curriculum committee

- Organized and gave presentations during Freshman Orientation
- Served as advisor for the Computer Science, Mathematics, and Engineering Student Club
- Led curriculum efforts to create new degrees and majors in Mathematics and Engineering, and articulation agreements with a local community college
- Served as faculty mentor for independent study and senior capstone projects for students in the School of Natural Sciences and Mathematics

Teaching and Research Assistant, Department of Mathematics, Iowa State University, *2002-05*
- Taught stand-alone courses in Mathematics and assisted with recitation
- Studied the preliminaries of control theory of PDEs using the moment method
- Applied the moment method to the Mead-Markus model of a sandwich beam

Hardware Engineer, Agilent Technologies, Santa Rosa, CA, *2001*
- Successfully tested and implemented a new switching circuit for optical spectrum analyzers.

Teaching and Research Assistant, Department of Electrical Engineering, Iowa State University, *1999-2001*
- Assisted with recitation and grading for courses in Electrical Engineering
- Used the M44 DSP card to control and monitor the movement of a microcantilever in the Scanning Probe Microscope.
- Measured the thermal characteristics of the cantilever using the spectrum analyzer

Intern, National Aeronautics Laboratories, Bangalore, India, *1998*
- Developed signal generating algorithms using digital signal processors for fatigue testing of materials using loading machines

PUBLICATIONS, PRESENTATIONS, AND CONFERENCE PROCEEDINGS

Books in Print
Dister, C., Castellani. B., Rajaram, R., *Modeling Social Complexity in Infrastructures: A Case-based Approach to Improving Reliability and Resiliency*, Edward Elgar Handbook of Research Methods in Complexity Science, London School of Economics, 2017

Castellani, B**., Rajaram**, R**., Buckwalter,** J.G**., Ball,** M**., Hafferty,** F.W. *Place and Health as Complex Systems (ISBN 978-3-319-09733-6),* Springer Briefs on Public Health, 2014

Books in Press

Castellani, B. and Rajaram. R., Data Mining Big Data: A complex and critical approach. Sage Publishing, London, 2019-20

Articles in Print

Castellani, B., Griffiths, F., Rajaram, R., Gunn, J., *Exploring comorbid depression and health trajectories: A case-based computational modelling approach*, Journal of Evaluation in Clinical Practice, 2018:1-17, doi: https://doi.org/10.1111/jep.13042

Rajaram, R., Castellani, B. and Wilson A. N. *Advancing Shannon entropy for measuring diversity in Systems*, Complexity, vol. 2017, Article ID 8715605, 10 pages, 2017. doi:10.1155/2017/8715605

Dasgupta, S., Vaidya, U.G., and Rajaram, R. *Operator theoretic framework for optimal placement of sensors and actuators for control of nonequilibrium dynamics,* Journal of Mathematical Analysis and its Applications, 2016

Castellani, B. and Rajaram, R. *Past the power law: Complex systems and the limiting law of restricted diversity*, Complexity, 2016

Rajaram, R. and Castellani, B. *An entropy based measure for comparing distributions of complexity* doi:10.1016/j.physa.2016.02.007, Physica A, 2016

Castellani, B., Rajaram R., Gunn, J., and Griffiths, F., *Cases, clusters, densities: Modeling the nonlinear dynamics of complex health trajectories*. Complexity, doi: 10.1002/cplx.21728**,** 2015

Rajaram, R. and Castellani, B. *The Utility of Non-equilibrium Statistical Mechanics, Specifically Transport Theory, for Modeling Cohort Data.* Complexity, doi: 10.1002/cplx.21512, 2014

Rajaram, R. and Vaidya, U. *Lyapunov density for coupled systems.* Applicable Analysis, doi: 10.1080/00036811.2014.886105, 2014

Rajaram, R. and Vaidya, U. *Robust stability analysis using Lyapunov density.* International Journal of Control, 86(6): 1077-1085, 2013.

Rajaram, R. and Castellani, B. *Modeling Complex Systems Macroscopically: Case/Agent-Based Modeling, Synergetics and the Continuity Equation.* Complexity. doi: 10.1002/cplx.21412**,** 2012

Vaidya, U., Rajaram, R., & Dasgupta, S. *Actuator and Sensor placement in a linear advection PDE,* J. Math. Anal. Appl. 394, pp. 213-224, 2012

Castellani, B. and Rajaram, R.*: Case-based modeling and the sacs toolkit: A mathematical outline.* Journal of Computational and Mathematical Organization Theory, 18(2): 153-174, 2012.

Castellani, B., Rajaram, R., Buckwalter, JG., Ball, M., and Hafferty, F. "*Place and Health as Complex Systems: A Case Study and Empirical Test.*" Proceedings of the Complexity in Health Group, Kent State University, 1(1):1-35, 2012.

Rajaram, R., Vaidya, U., Fardad, M., & Ganapathysubramanian, B. *Stability in the almost everywhere sense: a linear transfer operator approach*, J. Math. Anal. Appl., 368, pp. 144-156, 2010.

Rajaram, R., & Najafi, M. *Exact controllability of a system of coupled strings in parallel*, Applicable Analysis, 89(5), pp. 677-691, May 2010.

Rajaram, R., & Najafi, M. *Exact controllability of wave equations in R^n coupled in parallel*, J. Math. Anal. Appl., 356, pp. 7-12, 2009.

Rajaram, R., & Najafi, M. *Analytical treatment and convergence of the Adomian Decomposition Method for a system of coupled damped wave equations.* Applied Mathematics and Computation, 212, pp. 72-81, 2009.

Rajaram, R. *Exact boundary controllability of the linear advection equation.* Applicable Analysis, 88(1), pp. 121-129, January 2009.

Rajaram, R. *Exact boundary controllability results for a Rao-Nakra sandwich beam.* Systems and Control Letters, *56*(7-8), pp. 558-567, 2007.

Rajaram, R. & S.W. Hansen *Null controllability of a damped Mead-Markus sandwich beam.* Discrete and Continuous Dynamical Systems (*Supplemental Volume*), pp: 746-755, 2005.

Hansen, **S.W., & Rajaram, R.** *Riesz basis property and related results for a Rao-Nakra Sandwich Beam.* Discrete and Continuous Dynamical Systems (*Supplemental Volume*), pp.365-375, 2005.

Presentations

Rajaram R. *An entropy based measure for comparing distributions*, Invited presentation, School of Mathematics and Physics, University of Queensland, St. Lucia, Australia, June 11th, 2018

Rajaram R. *An introduction to flipped pedagogy,* Presentation to the board of Trustees at Kent State University, Kent, May 2018.

Rajaram R. *Case-based entropy as a measure of diversity in systems,* Invited presentation, Department of Mathematics and Statistics, University of Otago, Dunedin, New Zealand, Feb 7th, 2017

Rajaram R. *Differential Equations as a modeling technique in health sciences* Annual Research Meeting (Academy of Health) – invited presentation as a systems science scholar, New Orleans, 2017

Rajaram R. and Castellani B. *Health services research can be improved by modeling it as a complex system.* Cincinnati Children's Hospital (invited talk). 2016.

Rajaram R. and Castellani B. *Case Based Entropy.* ESRC Seminar – Center for Interdisciplinary Methodologies (invited talk), University of Warwick, Coventry, UK, 2016.

Rajaram R. *Risk based compliance: A complex systems and network perspective.* IEEE Energy Tech 2014 conference, Cleveland Convention Center, July 30, 2014.

Rajaram R. *Modeling trajectories and densities across time.* ESRC (Economic and Social Research Council) invited talk, University of Warwick, Coventry, UK, May 9, 2014.

Rajaram R. *Almost Everywhere Uniform Stability of an Invariant set.* 33rd South East Atlantic Regional Conference on Differential Equations, University of Tennessee, Knoxville, Sep 21-22, 2013.

Castellani, B., Rajaram, R., & Uprichard, E. *A vector field based description for dynamical evolution of cases with time.* Centre for Interdisciplinary Methodologies, University of Warwick, Coventry, U.K., August 4-7, 2013.

Rajaram R. *A density based approach to stability and control.* AMS Spring Central Sectional Meeting, Ames, IA, April 2013.

Rajaram, R. and Vaidya, U. *Robust stability analysis using Lyapunov density.* IEEE Conference on Decision and Control, Maui, December 2012.

Rajaram, R. *Exact Controllability of the Linear Advection Equation with interior controls*, Society of Industrial and Applied Mathematics Annual Meeting, Minneapolis, July 2012.

Vaidya, U., Rajaram, R., & Dasgupta, S. *Gramian based approach for actuator and sensor placement,* IEEE Conference on Decision and Control, Orlando, December 2011.

Castellani, B. and Rajaram, R. *Social Complexity Theory: A Mathematical Outline.* Eighth International Conference on Complex Systems, Boston, July 2011.

Rajaram, R. *The use of a density based approach in study of complex non-equilibrium dynamics.*

Eighth International Conference on Complex Systems, Boston, July 2011.

Rajaram, R. *Almost everywhere stability.* Invited lecture at the Math Colloquium at Virginia Polytechnic University, October 2008.

Rajaram, R. *Almost everywhere stability*. Standup presentation at the 46th IEEE Conference on Decision and Control, New Orleans, LA, December 2007.

Rajaram, R. *Exact controllability of a Rao-Nakra sandwich beam.* Standup presentation at the 2005 Fall Southeast Sectional Meeting of the AMS, Eastern Tennessee State University, Johnson City, TN, October 2005.

Rajaram, R. *Controllability of the Mead-Markus sandwich beam model*. Standup presentation at the 5th AIMS International Conference on Dynamical Systems and Differential Equations, California State Polytechnic University, Pomona, CA, July 2004.

Conference Proceedings

Sinha, S., Vaidya, U., and Rajaram, R. *Optimal placement of actuators and sensors for control of non-equilibrium dynamics.* European Control Conference, Zurich, 2013.

Rajaram, R. and Vaidya, U. *Robust stability analysis using Lyapunov density.* IEEE Conference on Decision and Control, Maui, December 2012.

Vaidya, U., Rajaram, R., & Dasgupta, S. *Gramian based approach for actuator and sensor placement,* IEEE Conference on Decision and Control, July 2011.

Rajaram, R., Vaidya, U., & Fardad, M. *Connection between almost everywhere stability of an ODE and the advection PDE.* IEEE Conference on Decision and Control, pp. 5880-5885, July 2007.

Hansen, **S.W., & Rajaram, R.** *Simultaneous boundary control of a Rao-Nakra sandwich beam.* CDC, pp.3146-3151, December 2005.

Hansen, **S.W., & Rajaram, R.** *Exact boundary controllability of a Rao-Nakra sandwich beam.* Proceedings of the SPIE, (5757), pp.97-107, 2005.

Rajaram, R., Salapaka, M.V., Basso, M., & Dahleh, **M.** *Experimental Study of Stochastic Resonance in Atomic Force Microscopes.* Proceedings of the American Control Conference, 2000.

GRANTS
Kent State University

2014-15	NTT Professional Development Award for research presentation on *Organizing and presenting at the Economic and Social Research Council (ESRC) seminar at the University of Warwick, U.K* ($8383 – 3 separate awards - Awarded)
2013-2014	(Co-PI) NSF Grant on *Modeling complex trajectories of cases and densities across time* ($67,535 – denied)
	NTT Professional Development Award for research presentation on *Organizing and presenting at the Economic and Social Research Council (ESRC) seminar at the University of Warwick, U.K* ($3495.8 – Awarded)
	(PI) NSF grant on *Analysis and control of the linear advection PDE* ($104,005.00-denied)

2012-2013   University Teaching Council Teaching Development grant for using Bamboo Create tablet as a smartboard platform for synchronous delivery of lectures in online courses ($200 - awarded)

(PI) James S. McDonnell Foundation Scholar Award on *Modeling Emergence in Complex Phenomena.* ($450,000 – denied)

(PI) John Templeton Foundation Award on *The use of continuity equation to study emergence in complex phenomena* ($150,000 – denied)

NTT Professional Development Award for converting Probability and Statistics course into an online offering ($6500 – denied)

University Teaching Council *Flipping the classroom* mini-grant proposal for attending workshops on the use of Camtasis for screencasting and funding for obtaining a high definition headset and ziggi camera equipment (awarded)

(PI) NSF Research grant on *Control design analysis for the linear advection PDE* ($96,491.75 – denied)

2012-2013   (Co-PI) Controlling Community Health across Time: Cases, Regions and Densities versus Nodes, Sub-graphs and Networks) *Strategic Award, the Warwick Research Development Fund, Warwick University,* (PI) Emma Uprichard, Centre for Interdisciplinary Methodologies, Warwick University, (£9,709 – awarded)

2012-2013   (Co-PI) Complexity and Case Based Methods Research *Development Award, Warwick Research Development Fund, Warwick University,* (PI) Emma Uprichard, Centre for Interdisciplinary Methodologies, Warwick University, (£2,647 – awarded)

(Co-PI) Complexity and Method in the Social Sciences: An Interdisciplinary Approach. Research Seminars Competition 2012-2013. Economic and Social Research Council, (PI) Emma Uprichard, Centre for Interdisciplinary Methodologies, Warwick University, (£29,603- awarded)

NTT Professional Development Award – Online course design for Elementary Probability and Statistics ($6500 – denied)

University Research Council Equipment grant for buying five Matlab licenses to use in research work ($1500 – awarded)

2011-12   NTT Professional Development Award for attending the SIAM Annual Meeting at Minneapolis (July 9-13) ($2325 - awarded)

University Research Council Grant for *FlexPDE* software used to do finite element simulations to solve partial differential equations ($1795 – awarded).

Summer Research Appointment for academic year 2011-12 ($6500 - awarded)

(PI) NSF Research grant on *Linear PDE approach for the analysis and control of non-equilibrium dynamics for nonlinear systems*, ($97,510 – scored at the level of "fund if possible" and denied because of lack of funds)

2010-11   (PI) NSF Research grant on *Linear PDE approach for the analysis and control of non-equilibrium dynamics for nonlinear systems*, ($180,000 - denied)

NTT Professional Development Award for learning enhancement using Wimba and Smartboard Systems, ($6018 - awarded)

UNDERGRADUATE RESEARCH

- Mentored a student (Lori Mayfield) to *extend the synthetic division method for divisors with degree larger than one*. Lori has completed the research work and has presented her research at the Pi Mu Epsilon club meeting at the Kent Campus.
- Obtained $5000 for an undergraduate NASA WVSGC research fellowship for a project titled "Harvesting Natural Resources" for Amine Benkiran (Fall 2007)
- Published an extended abstract titled "On the proof of the RSA public key cryptography scheme" as part of an undergraduate project in the Abstract Algebra (MATH 312) class for publication in the SIGSAM journal. The students presented this research in the form of a poster in the East Coast Computer Algebra Day 2007 (ECCAD 2007) held at Washington College, Maryland (April 2007).
- Participated in the IEEE "Systems and Software Week" along with nine undergraduate students held in Loyola College, Maryland (March 2007).

OTHER RESEARCH ACTIVITIES

Reviewer, *Discrete and Continuous Dynamical Systems, Journal of Mathematical Analysis and its Applications*, *IEEE Transactions Decision and Control*, *Ocean Engineering*

Reviewer of research grants, Research Executive Agency – Horizon 20-20 – European Innovation Council, External Grants committee.

TEACHING EXPERIENCE

Kent State University – Department of Mathematical Sciences
MATH 12001 (Algebra and Trigonometry)
MATH 12002 (Calculus and Analytical Geometry I)
MATH 21001 (Linear Algebra with Applications)
MATH 11009 (Modeling Algebra)
MATH 11012 (Intuitive Calculus)
MATH 14001 & 14002 (Basic Math Concepts)
MATH 11008 (Explorations in Modern Mathematics)
MATH 30055 (Theory of Interest)

Shepherd University – Department of Computer Science, Mathematics, and Engineering
MATH 307 (Linear Algebra)
MATH 154 (Finite Mathematics)
MATH 207 (Calculus I), MATH 208 (Calculus II), MATH 309 (Calculus III)
MATH 314 (Statistics)
MATH 329 (Mathematical Modeling)
MATH 310 (Differential Equations)
MATH 312 (Abstract Algebra)
ENGR 326 (Linear Systems), ENGR 221 (Introduction to Electric Circuits)

Iowa State University – Department of Mathematics
MATH 166 (Calculus II)
MATH 265 (Calculus III)

MATH 166 (Calculus II)
MATH 150 (Finite Mathematics)

Iowa State University – Department of Electrical Engineering
EE 441 (Introduction to Circuits, Instruments and Electronics)
EE 333 (Intermediate Electronics)

UNIVERSITY SERVICE

Kent State University
2019-present   Member, University wide academic hearing committee

2016-present   Member, Intuitive Calculus course meetings to decide on curriculum and pedagogy.

2012-2016   Coordinator, MyLabsPlus Mathematics courses

2013   Co-organized a Regional Campus Research Meeting at the Kent State Twinsburg Research Center which was attended by faculty members from all regional campuses.

2008-2016   Member, Enrollment and recruitment committee

2008-2010   Founder and Faculty advisor, Mathematics Club

HONORS & AWARDS

Kent State University

2017   Recipient, Teaching recognition award by the University Teaching Council for "making a difference in the life of student"

2017   Recipient, Systems Science Scholarship, Robert Wood Johnson Foundation – Academy Health.