Jonathan Sprinkle, Ph.D.

Executive Director
Center for Hybrid and
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Education

Ph.D. 2003
Doctor of Philosophy in Electrical Engineering
Vanderbilt University

· Dissertation: Metamodel Driven Model Migration

· Committee:
  – Gábor Karsai (Chair)
  – Ákos Lédeczi
  – Greg Nordstrom
  – Doug Schmidt
  – Janos Sztipanovits

M.Sc.
2000
Master of Science in Electrical Engineering
Vanderbilt University

· Thesis: Model-Integrated Program Synthesis of Agent Negotiation Protocols

· Readers:
  – Gábor Karsai
  – Ted Bapty

B.S. 1999
Bachelor of Science in Electrical Engineering
Tennessee Technological University
cum laude, in cursu honorum
Majors: Computer Engineering and Electrical Engineering
Minor: Mathematics

──────────── EMPLOYMENT HISTORY ────────────

9/2005—   Executive Director

Center for Hybrid and Embedded Software Systems—Chess (http://chess.eecs.berkeley.edu/)

Department of Electrical Engineering and Computer Sciences (http://www.eecs.berkeley.edu/)

University of California, Berkeley (http://www.berkeley.edu/)

9/2003—   Visiting Postdoc

Department of Electrical Engineering and Computer Sciences (http://www.eecs.berkeley.edu/)

University of California, Berkeley (http://www.berkeley.edu/)

7/1999–   Research Assistant
8/2003

Institute for Software Integrated Systems (http://www.isis.vanderbilt.edu/)

Vanderbilt University (http://www.vanderbilt.edu/)

──────────── SELECTED PUBLICATIONS ────────────

RECENT   J.-P. Tolvanen, J. Sprinkle, and M. Rossi, Eds., *5th OOPSLA Workshop on Domain-Specific Modeling (DSM'05)*, OOPSLA. Jyvävaskylä, Finland: University of Jyvävaskylä, Oct. 2005.

JOURNALS   J. Sprinkle, "Generative Components for Hybrid Systems Tools," *J. of Obj. Tech.*, vol. 4, no. 3, pp. 35–40, Apr. 2005, Special Issue.

J. Sprinkle and G. Karsai, "A Domain-Specific Visual Language for Domain Model Evolution," *J. Vis. Lang. and Comp.*, vol. 15, no. 2, Apr. 2004.

J. Sprinkle, "Model-Integrated Computing," *IEEE Potentials*, vol. 23, no. 1, pp. 28–30, Feb. 2004.

G. Karsai, A. Agrawal, F. Shi, and J. Sprinkle, "On the Use of Graph Transformation in the Formal Specification of Model Interpreters," *Journal of Universal Computer Science*, vol. 9, no. 11, pp. 1296–1321, Nov. 2003.

A. Lédeczi, A. Bakay, M. Maroti, P. Vőlgyesi, G. Nordstrom, J. Sprinkle, and G. Karsai, "Composing Domain-Specific Design Environments," *IEEE Computer*, pp. 44–51, Nov. 2001.

PROCEEDINGS   J.-P. Tolvanen, J. Sprinkle, and M. Rossi, Eds., *4th OOPSLA Workshop on Domain-Specific Modeling (DSM'04)*, OOPSLA. Jyvävaskylä, Finland: University of Jyvävaskylä, Oct. 2004, iSBN: 951-39-1947-1.

CONFERENCES   J. M. Eklund, J. Sprinkle, and S. S. Sastry, "Implementing and Testing a Nonlinear Model Predictive Tracking Controller for Aerial Pursuit Evasion Games on a Fixed Wing Aircraft," in *Proceedings of American Control Conference (ACC) 2005*, June 2005, pp. 1509–1514.

J. Sprinkle, J. M. Eklund, and S. S. Sastry, "Deciding to Land a UAV Safely in Real Time," in *Proceedings of American Control Conference (ACC) 2005*, June 2005, pp. 3506–3511.

J. Sprinkle, J. M. Eklund, H. J. Kim, and S. S. Sastry, "Encoding Aerial Pursuit/Evasion Games with Fixed Wing Aircraft into a Nonlinear Model Predictive Tracking Controller," in *Proceedings of the 43rd IEEE Conference on Decision and Control*, vol. 3, Dec. 2004, pp. 2609–2614.

J. Sprinkle, A. Agrawal, T. Levendovszky, F. Shi, and G. Karsai, "Domain Translation Using Graph Transformations," in *Tenth IEEE International Conference and Workshop on the Engineering of Computer-Based Systems*, Apr. 2003, pp. 159–168.

J. Sprinkle, G. Karsai, A. Lédeczi, and G. Nordstrom, "The New Metamodeling Generation," in *Eighth Annual IEEE International Conference and Workshop on the Engineering of Computer Based Systems*, Apr. 2001, pp. 275–279.

Invited Papers	J. Sprinkle, A. D. Ames, J. M. Eklund, I. Mitchell, and S. S. Sastry, "Online Safety Calculations for Glideslope Recapture," Invited unreviewed article in *Innovations in Systems and Software Engineering*, vol. 1, no. 2, p. 157–175, Sep. 2005.

J. Sprinkle, O. Shakernia, R. Miller, and S. S. Sastry, "Using the Hybrid Systems Interchange Format to Input Design Models to Verification & Validation Tools," in *IEEE Aerospace Conference*, Mar. 2005.

Workshops	J. Sprinkle, J. Davis, and G. Nordstrom, "A Paradigm for Teaching Modeling Environment Design," in *OOPSLA'04 Educators Symposium, Poster Session*, ACM. (Poster session), Oct. 2004.

J. Sprinkle, "Managing Intent: The Driving Forces of Model Transformations," in *UML 2003 Workshop in Software Model Engineering*, October 2003.

G. Karsai, A. Agrawal, F. Shi, and J. Sprinkle, "On the Use of Graph Transformations in the Formal Specification of Computer-Based Systems," in *IEEE TC-ECBS and IFIP10.1 Joint Workshop on Formal Specifications of Computer-Based Systems*, April 2003, pp. 19–27.

J. Sprinkle, A. Agrawal, T. Levendovszky, F. Shi, and G. Karsai, "Domain Evolution in Visual Languages using Graph Transformations," in *2nd ACM OOPSLA Workshop on Domain-Specific Languages*, November 2002.

Technical Reports	C. van Buskirk, B. Dawant, G. Karsai, J. Sprinkle, G. Szokoli, K. Suwanmongkol, and R. Currer, "Computer-aided Aircraft Maintenance Scheduling," Vanderbilt University, Tech. Rep. ISIS-02-303, November 2002.

A. Lédeczi, M. Maroti, A. Bakay, G. Nordstrom, J. Garrett, C. Thomason IV, J. Sprinkle, and P. Völgyesi, *GME 2000 Users Manual (v2.0)*, December 2001.

Academic	J. Sprinkle, "Metamodel Driven Model Migration," Ph.D. dissertation, Vanderbilt University, Nashville, TN, August 2003.

J. Sprinkle, "Model Integrated Program Synthesis of Agent Negotiation Protocols," Master's thesis, Vanderbilt University, Nashville, TN, August 2000.

PUBLICATION ACTIVITIES

REGULAR REVIEWER	*IEEE Potentials*
ORGANIZATION	Fifth OOPSLA Workshop on Domain-Specific Modeling (2005, co-organizer)
	Fourth OOPSLA Workshop on Domain-Specific Modeling (2004, co-organizer)
	Third International Symposium on Information Processing in Sensor Networks (IPSN '04) (publications chair)
2006	The 21st Annual ACM Symposium on Applied Computing, special track on Model Transformation (reviewer)
	ECBS 2006 Workshop on Model-Based Development (PC)
	International Conference on Software Engineering, workshop on "Global Integrated Model Management" (PC)
2005	International Workshop on Graph and Model Transformation (GRAMOT), in conjuction with the International Conference on Generative Programming and Component Engineering (GPCE) (TPC)
	Control Engineering Practice, a Journal of International Federation of Automatic Control (IFAC), (reviewer)
	The 9th International IEEE Enterprise Distributed Object Computing Conference (EDOC '05) (TPC)
	American Control Conference (ACC) (reviewer)
	IEEE International Conference on Distributed Computing Systems (ICDCS), Sensor Networks and Embedded Systems Track (TPC)
2004	*Simulation: Transactions of the Society for Modeling and Simulation International* (reviewer)
	Workshop on Model-Driven Evolution of Legacy Systems (MELS) in conjunction with EDOC '04 (TPC)
	International Conference on the Unified Modeling Language (reviewer)
	Fourth OOPSLA Workshop on Domain-Specific Modeling (TPC)
	Frontiers in Education 2004 (FIE 2004) (reviewer)
	The 8th International IEEE Enterprise Distributed Object Computing Conference (EDOC '04) (TPC)
2003	International Conference on the Unified Modeling Language (reviewer)
	Third OOPSLA Workshop on Domain-Specific Modeling (TPC)

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─────────────────────── RESEARCH EXPERIENCE ───────────────────────

CURRENT/ RECENT PROJECTS

I am listed as Co-PI or serve as a major project manager (along with the other listed personnel) for the following current and recent projects:

Certification of Flight Critical Systems (CerTA FCS)

Period of Performance: 3/2006–6/2007; *With Prof. Shankar Sastry, Prof. Claire Tomlin*
Brief project description: Development of distributed decision protocols for autonomous vehicles.
Funded under subcontract to Boeing Phantom Works, as part of the CerTA FCS project in Air Force Office of Scientific Research.

The Embedded Open Control Platform (EOCP)

Period of Performance: 6/2005-3/2006; *With Prof. Shankar Sastry*
Brief project description: Maturation of open platform/testbed control interfaces to work with embedded Linux computers.
Funded under subcontract to Boeing Phantom Works, as part of the ESCHER Research Institute.

BearLand: Autonomous Rotorcraft Landing Using Computer Vision

Period of Performance: 5/2004–3/2006; *With Dr. Christopher Geyer, Prof. Shankar Sastry. Mr. Todd Templeton*
Brief project description: Successful flight of an autonomous helicopter, using computer vision techniques to recover terrain elevation from a single camera, and landing at an appropriate location determined by the helicopter autonomy.
Funded under subcontract to Boeing Phantom Works, as a continuation of the DARPA Software Enabled Control project.

Foundations of Hybrid and Embedded Software Systems

Period of Performance: 3/2006–6/2007; *With Prof. Shankar Sastry, Prof. Edward A. Lee, Prof. Alberto Sangiovanni-Vincentelli, Prof. Thomas A. Henzinger, Prof. Janos Sztipanovits*
Brief project description: Investigation of new techniques to better understand the nature of building heterogeneous systems from the perspective of computer science and electrical engineering.
Funded by the National Science Foundation, Computer and Information Science and Engineering (CISE) Directorate, as an Information Technology Research (ITR) award.

PREVIOUS MAJOR PROJECTS

I have served as a responsible manager or main technical lead on these major research projects.

Pursuit/Evasion Games of UAVs using Model Predictive Control

Period of Performance: —9/2004; *With Prof. Shankar Sastry, Dr. J. Mikael Eklund, Prof. H. Jin Kim*
Brief project description: We designed algorithms based on game theory and implemented through model predictive control, to compete against Air Force test pilots in aerial combat. During the experiments over several days in the Mojave Desert during June 2004, we successfully targeted the Air Force "enemy" under the guise of a low-observability vehicle tracking a target.
Funded by the DARPA Software Enabled Control program.

Safe Landing of UAVs

Period of Performance: —9/2004; *With Prof. Shankar Sastry, Dr. J. Mikael Eklund, Prof. Ian M. Mitchell*
Brief project description: Using computed sets obtained from reachability analysis to generate decision controllers to allow UAVs to determine feasibility of glideslope re-capture despite communications lag, we landed a 2-person jet on a logical runway (at 10 000 [ft]) in the Mojave Desert during June 2004.
Funded under subcontract to Northrop Grumman, as part of the DARPA Software Enabled Control program.

FUNDING & COLLABO- RATION

Experience with writing and submitting grants to NSF, DARPA, NASA, AFOSR, AFRL

Liaison experience with EU-IST, and various major/minor US Government and Industry

─── Research interests ───

Modeling	Domain-Specific Languages
	Domain-Specific Modeling Environments (DSMEs)
	Model-Integrated Computing
	Modeling and Metamodeling
	Model Transformations, Model-Driven Development
Controls & Systems	Hybrid Systems (Theory and Implementation, Verification)
	Embedded Systems
	Model-Predictive Control (MPC)
Systems Engineering	Software Engineering through Systems Modeling
	Executable Model Generation from DSMEs
	Actor-Oriented Design/Implementation

─── Leadership roles ───

CHESS Center	I was named Executive Director of the Center for Hybrid and Embedded Software Systems at UC Berkeley in September 2005 by the Board of Directors. This was in recognition of the work which I have done for CHESS, and leadership roles which I have taken on in the absence of faculty availability, or as a result of personal initiative.
CHESS Seminars	I am the coordinator for the Center for Hybrid and Embedded Software Systems (CHESS) sponsored weekly seminar. This meeting showcases local and national research in hybrid and embedded systems. Responsibilities include

- attracting speakers,
- ensuring speakers connect with students and researchers whose interests overlap,
- coordinating a full semester of topics that complement the overall goals of CHESS,
- keeping faculty up-to-date on progress, and
- providing refreshments.

ISIS GSC	Faced with a burgeoning graduate student population (essentially doubling every year) I formed, with help from two other Ph.D. students, the ISIS Graduate Student Committee. Its purpose was to familiarize students with one another's research (and one another) and to reduce the likelihood of a student getting "lost" in their first few years of graduate study. I served as chair of this committee in its first year of existence (AY 2002–2003), with responsibilities of

- weekly seminar organization;
- monthly organizational meetings;
- refreshments scheduling for social outings;
- solicitation of graduate student sponsors to manage weekly meetings focusing on publications, research topics, etc.; and
- liaison between graduate students and ISIS staff/faculty, and also VU staff/faculty.

——————————— SUPERVISORY ROLES ———————————

SUPERB   I will serve as the active faculty mentor for three undergraduate students participating in the Summer Undergraduate Program in Engineering Research at Berkeley (SUPERB) during the summer of 2006. I selected the three undergraduate students and hand-picked their graduate mentors, for this, my third year to serve as mentor for the Berkeley Chess group. The program is sponsored by the NSF in a supplemental Research Experience for Undergraduates (REU) award through the NSF ITR Foundations for Hybrid and Embedded Systems at the Center for Hybrid and Embedded Software Systems (CHESS). You can see the results from this and previous years at

- · http://chess.eecs.berkeley.edu/superb/,
- · http://chess.eecs.berkeley.edu/projects/ITR/2005/superb/, and
- · http://chess.eecs.berkeley.edu/projects/ITR/2004/superb.htm.

——————————— COURSES TAUGHT ———————————

HYBRID SYSTEMS: COMPUTATION & CONTROL (UNIVERSITY OF CALIFORNIA, BERKELEY)

SPRING 2005   A graduate level course which introduces mechanical, civil, and electrical engineers with nonlinear systems and/or controls backgrounds to the topic of hybrid systems (i.e., systems with discrete and continuous components). The course consists of weekly lectures by the instructor, homework assignments, and an individual or team project. My responsibilities include occasional lectures, and full management of the projects component of the course: assigning students to other project mentors, supervising the content of the projects, as well as aiding students in their modeling and simulation questions. I also serve as liaison between the students and instructor for project matters, and in ways through which their extra-curricular research can be integrated into the project.

ADVANCED TOPICS IN SYSTEMS THEORY (UNIVERSITY OF CALIFORNIA, BERKELEY)

SPRING 2004   A revised version of the Model-Integrated Computing course (taught at Vanderbilt University) adapted for the University of California, Berkeley. Modifications accounted for the students' relatively advanced modeling experience (none of the students were in their first year as a graduate) and enhanced through in-depth research topic discussions relating to state-of-the-art modeling practices. I served as the sole instructor, overseeing lecture, grading, homework, project, and student presentations.

ADVANCED SOFTWARE ARCHITECTURE (VANDERBILT UNIVERSITY)

SPRING 2003   Taught as a fourth-year undergraduate software design course, although also open to graduate students. Fundamentals of data abstraction and object-oriented methodology, as well as in-depth exploration of the C++ object model through rigorous homework assignments, and a capstone group project. I served as one of three instructors, with duties of project management, regular lecture, devising homework assignments, as well as homework and project grading and course management.

Model-Integrated Computing (Vanderbilt University)

Fall 2000–2002 — A graduate course taught only at Vanderbilt University (at the time), MIC is a fundamental class in the theory and application of the science of modeling. Students define their own modeling language(s) and create domain-specific modeling environments to solve specific software problems. Meta-level thinking is introduced and given foundation through homework assignments, in-class presentations of related research, and a significant individual project. I served as one of four instructors, with duties of project management and grading, and for the past three years have lectured the course material on metamodeling.

Multimedia Programming (Vanderbilt University)

Spring 2000 — An undergraduate software course designed around Java and graphical programming using Java. Students learned the concepts of graphical programming in Java through homeworks that progressively built on each other, and a capstone group project. I served as the teaching assistant, with responsibilities of lab supervision, student consultations, and devising and grading all homeworks and projects.

Introduction to Circuits (Tennessee Technological University)

Spring 1998 — Introduction to electronic circuit analysis and design, taught during the undergraduate second-year. Students learn the properties of current and potential, as well as fundamental design concepts required for more advanced courses such as electronics and control systems. While a third-year undergraduate, I served as the instructor for the recitation session, with duties of grading all homeworks and tests, as well as devising interesting and instructive problems to solve during recitation.

Teaching Workshops

Appointments within Universities in the USA and Abroad

(*Subtitle: Different Positions, Joint Appointments*). This workshop is designed for mid-tenure graduate students who are only beginning to wonder where they will find employment upon graduation. The workshop examined the different types of appointments available within universities and colleges in the US, as well as providing nomenclature (and potentially, definition) differences between appointments in the US and abroad.

Establishing a Publications Record in Engineering and the Sciences

In conjunction with the Vanderbilt University Center for Teaching and GradSTEP. This workshop focuses on exposing engineering and science graduate students to the types of publications available to their discipline. Descriptions of how ideas map to publications help graduate students understand which ideas they have belong in which type of publication (e.g., workshop vs. journal).

Understanding the Complex University Hierarchy

This workshop helps students understand the complex roles (and names) of administration hierarchy from a variety of perspectives, including statewide higher education from Tennessee and other states. After attending this workshop, graduate students were more capable of selecting schools whose administration style suited their academic preferences.

Strategies for Effective Lectures

In conjunction with the Center for Teaching and TA Orientation. This workshop focused on developing an archetype for an effective lecture. Important realizations for participants revolved around the effective use of humor, as well as determining the level of knowledge of your audience. Possible problems and topics to avoid were also discussed.

TA Orientation

Three days of workshops and sessions to help incoming graduate assistants learn their responsibilities at Vanderbilt University. These workshops ranged from ethical considerations (improper relationships, etc.) and understanding of personal role (recognizing when an advisor asks too much of you) to basic teaching skills and legal obligations as an instructor. I was responsible for 25 students for three days and about 24 hours of total instruction.

Honors

White House Fellow

I was selected as a regional finalist for the 2005–2006 White House Fellows Program—self described as "one of the Nation's most prestigious programs for leadership and public service." The webpage denotes that "[s]election as a White House Fellow is highly competitive and based on a record of remarkable professional achievement early in one's career, evidence of leadership skills, a strong commitment to public service, and the knowledge and skills necessary to contribute successfully at the highest levels of the Federal government." I participated in a regional interview of 12 regional finalists, two of whom were selected as fellows for the 2005–2006 year. For more information, see http://www.whitehouse.gov/fellows/news/20050228.html.

Nobel Meeting

I was selected as one of nine young researchers in the United States by the Oak Ridge Associated Universities to participate in the 52nd Meeting of Nobel Laureates in Lindau, Germany, July 2002. The meeting consists of small group discussions and informal talks between students and laureates, as well as meals with distinguished scientists such as Sir Harry Kroto and Rudolf Mössbauer. For more information, see http://www.orau.gov/orise/edu/lindau2002/.

Master Teaching Fellow

Master Teaching Fellow in the Center for Teaching at Vanderbilt University. This position was conferred on me for the 2002–2003 academic year. In my appointment, I (along with nine other graduate students selected from all graduate and professional schools at Vanderbilt University)

· served as counselor to teaching assistants (TAs) in all disciplines;

· played a formative role in the integration of new TAs into Vanderbilt by leading workshops at TA Orientation, a mandatory event for TAs during their tenure at Vanderbilt;

· gave consultations to TAs concerned with their performance, or as required by their supervisor;

· sponsored and organized graduate student workshops dealing with academia-related topics;

· served as liaison between TAs and their students when providing mid-term feedback regarding course dynamics;

For more information, see http://www.vanderbilt.edu/cft/.

F2P2	I was an F2P2 graduate in May 2004. The Future Faculty Preparation Program (F2P2) is a voluntary program for graduate students at Vanderbilt University to provide a structure that will facilitate their integration into academia upon completion of the Ph.D. Graduates must perform service, leadership, and participatory roles in each of the categories of

· World of the University

· Teaching & Learning

· Professional Development, and

· Technological Initiatives.

Emphasis in the F2P2 program is placed on *reflection*, i.e., the immediate evaluation of your performance at some task or learning session through peer meetings or personal journaling. There were 4 F2P2 graduates in May 2004 from Vanderbilt University.

IBM Fellow	Recipient of the IBM Fellowship for graduate study at Vanderbilt University. This was an incentive-based monetary award, which provided a non-employment stipend in addition to my research assistantship.

Undergraduate	TTU Student Body President
	Campus Leader of the Year 1997–98
	Student Government Legislator of the Year, 1997–98
	Derryberry Award Finalist
	TTU nominee for Rhodes Scholar

Various	United States Skills Olympics (National), 4th place, Extemporaneous Speech (1994)
	Eagle Scout with six Eagle Palms (1993)

Presentations

Invited Presentations	"Networked Embedded Systems: Sensor Nets and Beyond"—Keynote Speech given 3 April 2006 for SASIMI (Synthesis And System Integration of Mixed Information technologies), at Nagoya, Japan.

"System Design by Engineers for Modeling and Simulation"—given 12 December 2005 at the IEEE Conference on Decision and Control; panel presentation during lunch session on Modeling and Simulation sponsored by The Mathworks.

"Information Technology for Assisted Living at Home—ITALH"—given 8 July 2005, for my colleague Dr. J. Mikael Eklund, at the CITRIS in Europe Meeting, Munich, Germany.

"Pusuit/Evasion of Fixed-wing Aircraft through Model Predictive Control"—given 6 October 2004 at the NASA/Goddard Space Flight Centers Information Science and Technology (IS&T) Colloquium Series.

"Forgetting UML (A Useful Guide to Formal Modeling)"—given 14 September 2004 in the Berkeley CHESS Seminar Series.

"Domain-Specific Modeling (or 'how I learned to stop worrying and love the metamodel')"—given November 2003 in the Berkeley CHESS Seminar Series.

''Metamodel Driven Model Migration''—given 7 May 2003 at the CHESS NSF Site Review.

''Graduate School—You Can't Believe It's Not Butter''—given 1 April 2003 at the monthly HKN meeting at Tennessee Technological University.

''Graduate Research (or 'how I learned to stop worrying and love the 25 hour day')''—given March 2002 at the monthly IEEE meeting at Tennessee Technological University.

Memberships

Professional   Institute of Electrical and Electronics Engineers

IEEE Computer Society

Association for Computing Machinery

Engineer in Training (EIT), tested May 1999

Elected Honors   Mortarboard National Honor Society

Omicron Delta Kappa (OΔK) Honor Society

Tau Beta Pi (TBΠ) Engineering Honor Society

Eta Kappa Nu (HKN) National Electrical and Computer Engineering Honor Society

The Honor Society of Phi Kappa Phi (ΦKΦ)

Kappa Mu Epsilon (KME) Mathematics Honor Society

Education   Future Faculty Preparation Program (F2P2) graduate (VU)

IEEE Education Society

Community   Boy Scouts of America

United States Tennis Association

───────────────── Hobbies and Interests ─────────────────

Photography Amateur photography (B&W and Slide developing, printing)

Cushy delights Espresso coffee. I am intimately familiar with the science and art of creating excellent espresso coffee, and I happily admit that I make a personal effort to train colleagues to acquire a palate for this delicious beverage.

Sports Golf

Tennis

Backpacking

Board and card games I host a regular neighborhood poker game, at which no money changes hands, but interesting variations on poker are played (note that attending this game is much more enjoyable than watching boring Texas Hold 'em).

Euchre, Rook

Crosswords, Sudoku

Mind-stretching games, e.g., Set, Scrabble, and chess.

/etc Acoustic and electric guitar

My Erdős number is 4 (see http://www.oakland.edu/enp for more information).