

# CRAIG L. ROBINSON

Graduating with a PhD in control systems, I would like a full time position in a Research and Development type role which utilizes my diverse theoretical and implementation experience.

## EDUCATION

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<b>Ph.D. in Systems and Control Engineering</b> <i>Department of Industrial and Enterprise Systems Engineering</i>	University of Illinois at Urbana-Champaign, U.S.A. Expected Graduation: December '07
<b>M.S. in Robotics and Control Systems</b> <i>Department of Industrial and Enterprise Systems Engineering</i>	University of Illinois at Urbana-Champaign, U.S.A. 2001-2003
<b>5-Day MBA Program</b> <i>Chicago, IL.</i>	American Management Association, U.S.A. 2004
<b>B.S. Civil Engineering</b> <i>Department of Civil Engineering</i>	University of the Witwatersrand, South Africa 1997-2001

## HONORS AND AWARDS

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- Lemelson-Illinois \$30k Prize:** Finalist 2007: Candidates for this award are nominated from University of Illinois students who have illustrated outstanding innovation and invention.
- Fulbright Scholar:** 2001-2003: This is a prestigious full scholarship for study in the U.S.A. The award recognizes professional qualifications and research ability as well as interpersonal and communication skills.
- University Student Scholarship:** '99,'00,'01: Financial scholarship for top undergraduate students.

## INDUSTRIAL EXPERIENCE

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- Toyota Technical Center** Summer 2005  
*Summer Internship* Ann Arbor, Michigan, USA.
- Developed a system architecture for wireless vehicle-to-vehicle safety applications communication. The "Message Dispatcher" (MD) is flexible and extensible and solves many real world problems. It has been adopted as an industry standard [9], received academic publication [2] and created great industrial interest.
  - Retrofitted vehicles with sensors, micro-controller boards and GPS receivers to measure vehicle parameters which we used to deploy an emergency brake warning system between wirelessly interconnected vehicles.
  - Conceived, initiated and coordinated a seminar series to identify interests, skills and the knowledge base within the department. I invited speakers, identified topics and arranged logistics.
- Thuthuka Project Managers** January - August 2001  
*Site Engineer* Durban, South Africa.
- Project Management of a \$1.9m turnkey project. Managed mechanical, electrical and civil contractors (40 people), hired equipment, approved completed work and reported to management. I installed and commissioned process control instrumentation and read, issued and amended P&IDs and civil work drawings.
- University of Illinois at Urbana Champaign** 2002-2003  
*Teaching Assistant* Urbana, Illinois, USA.
- Proposed, authored and compiled a new laboratory session for control systems class. Tutored students.

## RESEARCH

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- Optimal Performance in Networked Control Systems** 2003-Present  
*Advisor: Prof. P. R. Kumar* University of Illinois
- Derived bounds on optimal system performance for the intractable problem of packet drops in networked control systems [1]. Using a novel assumption I established an unimprovable benchmark for other algorithms, and developed necessary and sufficient conditions for stability in such networked systems [8].
  - Developed optimal policies for state estimation with limited bandwidth which gave important insights into control and Kalman filtering policies over lossy channels. Identified a new design paradigm for network transport protocols for networked control systems which modifies untransmitted packet contents [3].
  - Developed system architecture and design patterns for networked control systems [4][5]. I developed control system middleware services [7], managed the IT Convergence Lab at UIUC and collaborated with academic and industry colleagues from computer science, electrical and mechanical engineering.

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## RESEARCH

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### Distributed Sonar Sensor Based Exploration and Coverage

2001-2003

*Advisor: Prof. F. Bullo*

University of Illinois

- Proposed, implemented and validated methods improving wide-angle sonar readings by up to 60%. [6]
- Interfaced DSPs, microcontrollers, sonar, infrared distance sensors, rate gyros, CCD cameras, ADCs, DACs, compass, LCD display screens, optical encoders, DC motors and several servomotors.
- Implemented course work and research theory related to distributed control theory, forward and inverse kinematics, motion planning, machine vision, map-building, digital and state space control.

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## COURSE WORK

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- Control:* Classical, Digital, Non-linear, Adaptive, Multivariable, Distributed, Optimal, Stochastic.  
*Robotics:* Motion Planning, Introduction to Robotics, Mechatronics, Non-linear Systems.  
*Business:* Management of Engineering Projects, Entrepreneurial Engineering.  
*Civil:* Fluid Mechanics, Channel Hydraulics, Steel and Concrete Structural Design, Materials.  
*General:* Object Oriented Programming, Computer Networks, Optimization, Real Analysis.

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## COMPUTER SKILLS

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- Languages:* MATLAB, Simulink, C, Java, C++, Visual C, Basic, Bash scripts, HTML.  
*Applications:* Mathematica, AutoCAD, MS Office, OpenOffice, L<sup>A</sup>T<sub>E</sub>X, Pro/E.  
*Oper. Sys.:* Linux, Windows and RT Linux.  
*Platforms:* Embedded x86, DSP, microcontrollers.

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## PUBLICATIONS

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Selected Papers: (See my website for a complete list)

- [1] **Control over Networks of Unreliable Links: Location of Controllers, Control Laws and Bounds on Performance**,  
C. L. Robinson and P. R. Kumar, *Control over Communication Channels (ConCom)*, 2007.
- [2] **Efficient coordination and transmission of data for vehicular safety applications**,  
C. L. Robinson, L. Caminiti, D. Cavney and K. Laberteaux, *The Third ACM International Workshop on Vehicular Ad Hoc Networks (VANET)*, 2006.
- [3] **Sending the Most Recent Observation is not Optimal in Networked Control: Linear Temporal Coding and Towards the Design of a Control Specific Transport Protocol**,  
C. L. Robinson and P. R. Kumar, *IEEE Conference on Decision and Control*, 2007.
- [4] **Architecture and Algorithm for a Laboratory Vehicle Collision Avoidance System**,  
C. L. Robinson, H.-J. Schütz, G. Baliga and P. R. Kumar, *IEEE Multi Conf. on Systems and Control*, 2007.
- [5] **Design Patterns for Robust and Evolvable Networked Control**,  
C. L. Robinson, G. Baliga and P. R. Kumar, *3<sup>rd</sup> Annual Conf. on Systems Engineering Research*, 2005.
- [6] **Nonsmooth analysis and sonar-based implementation of distributed coordination algorithms**,  
C. L. Robinson, D. Block, S. Brennan, F. Bullo and J. Cortes, *Int. Conf. on Robotics and Automation*, 2004.
- [7] **Prevention of Failures due to Assumptions made by Software Components in Real-Time System**,  
A. Tirumala, T. Crenshaw, L. Sha, G. Baliga, S. Kowshik, C. L. Robinson and W. Witthawaskul, *The Second Workshop on High Performance, Fault Adaptive, Large Scale Embedded Real-Time Systems*, 2005.

Book Chapters:

- [8] **Necessary and Sufficient Conditions for Stabilizability of Networked Control Systems with Packet Drops**,  
C. L. Robinson and P. R. Kumar, *Networked Sensing Information and Control.*, Springer-Verlag, 2007.
- [9] **SAE J2735 Dedicated Short Range Communications (DSRC) Message Set Dictionary**,  
Society of Automotive Engineers (SAE), *SAE International*, 2006.

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## GENERAL

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*Visa Status:* J1 Exchange Visa

*Languages:* English and Afrikaans.

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## OTHER INTERESTS

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- Founder and Treasurer, University of Illinois Triathlon Club.
- ‘Honourable Mention’ in US. National Triathlon rankings.