

**Name**  
**Address**  
**Phone**  
**Email**

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### RESEARCH INTERESTS

Distribute Systems Control	Intelligent Control
Robust Decentralization Control	Metrology
Mechantronics and Artificial Intelligence	Automation
Optimization and Robust Control	Applied Nonlinear Control
Robotics and Control	System Identification
Precision Engineering	Vibration Analysis and Control

### TEACHING INTERESTS

Kinematics and Dynamics	Introduction to Robotics
Feedback Control	Vibration Analysis and Control
Mechatronics	Optimization and System Identification
Nonlinear Control	Robust Control

### EDUCATION

Ph.D. in Mechanical Engineering, University of Delaware, 2003  
Dissertation Title: Modeling and Control of a Flexible Cable System  
Overall GPA: 3.43/4.0. Major GPA: 3.52

M.S. in Precision Instrument Engineering, Tianjin University, 2000  
Thesis Title: A Novel Design of Highway Retroreflector Measurement Device.  
Overall GPA: 82.35/100. Major GPA: 87.1/100

B.S. in Precision Instrument Engineering, Tianjin University, 1994  
Thesis Title: Research on the Microcomputer Controlled Pressure Measuring System.

B.A. minor in Humanities and Social Sciences, Tianjin University, 1994  
Thesis Title: The Position of Futurology in the History of Western Philosophy.

### RESEARCH EXPERIENCE

**Research Assistant**, University of Delaware, 2002-2003

- Developed the model for compliant cable systems with varying cable lengths.
- Designed a Lyapunov controller to suppress the vibration of cables. The controller guaranteed the stability of the system and assured the goal of the slider.
- Designed a robust controller on the experimentally identified model using H control and LQG/miniMax methodology.
- Conducted experiments on flexible six order-of-freedom cable suspended robots using dSPACE 1103 systems with real-time workshop, where the differential flatness theory was applied to calculate the positive tension inputs.
- Designed an EKG measurement device for laboratory instruments class.

**Intern Researcher**, Australia Defense Force Academy, 2002

- Designed and successfully implemented robust controller for a flexible cable transporter system, and dramatically reduced the residual vibration.
- Derived the model of flexible cable systems using subspace identification theory.

**Research Assistant**, Tianjin University 1997-2000

- Designed an automatic retroreflector measuring device including mechanical design, electrical circuit design, and optical system for highway applications.
- Directed two undergraduate students' research and supervised their thesis.
- Composed the funding proposals which amounted to \$50,000.
- Taught undergraduate class, supervised experiments and graded assignments.

**TEACHING EXPERIENCE****Graduate Assistant**, Mechanical Engineering, University of Delaware, 2001-2001.

- Maintained the homepage for the department, using HTML/mSQL languages.
- Led group discussions, prepared the experiment instrumentation, graded their assignments, and video recording presentations for the senior design 2000 class.

**Assistant Lecturer** for introductory electronics experiment, Tianjin University

- Preparation of the experimental procedure, setup of the experimental apparatus, providing the introduction of the experiment, responding to their questions they encountered in the experiment, and grading their reports.
- Students rated my lecture 4.5 out of 5 point scale.

**INDUSTRIAL EXPERIENCE****Intern Software Engineer**, Zhongxing Communication Inc, Shanghai, 2000.

- Developed one module of switchboard software for fee-charging purpose.

**Project Leader**, Daewoo Company, Seoul, 1996-1997.

- Directed and administrated the training process of a fifteen-member group.
- Exhibited leadership while enhancing teamwork to achieve stated goals.

**Mechanical Design Engineer**, Qingdao Brown-Sharpe Inc., 1994-1996.

- Conceptualized and designed prototype of Coordinate Measuring Machine.
- Conducted FEM/FEA of the frame and the outer cover of the CMMs.
- Enhanced the frame rigidity and the measurement accuracy dramatically by proposing novel ideas and improving previous design.

**COMPUTER SKILLS**

<i>Operating Systems:</i>	MSDOS, Windows 95/98/NT, Windows XP, UNIX.
<i>Computer Languages:</i>	C/C++, Visual Basic, Visual C++, FORTRAN.
<i>Scientific Applications:</i>	MATLAB/Simulink, Maple, dSPACE, ControlDESK.
<i>Technical Drawing:</i>	AutoCAD, Microsoft Visio, PhotoShop.
<i>Office Applications:</i>	Microsoft PowerPoint, Access, Excel, Word, Lotus Notes.
<i>Internet Development:</i>	HTML, MSQL, Java, TCP/IP.
<i>Database:</i>	Sybase, Oracle, ODBC, Microsoft Access.

**AWARDS**

- Graduate Assistantship, University of Delaware, 2000-2001.
- Research Assistantship, University of Delaware, 2001-2003.

**AFFILIATIONS**

- Member of the American Association of Mechanical Engineering (ASME).
- Member of the Institute of Electrical and Electronics Engineers (IEEE).

**PUBLICATIONS**

1. Pota, H. R., Agrawal, S. K., and (Name), A Flatness Based Approach to Trajectory Modification of Residual Motion of Cable Transporter Systems, accepted in Journal of Vibration and Control.
2. (Name), Agrawal, S. K. and Hagedorn, P., Modeling and Control of Flexible Transporter System with Arbitrarily Time-Varying Cable Lengths. Submitted to Journal of Vibration and Control.
3. Pota, H. R., Agrawal, S. K. and (Name) and Petersen, I. R., Robust Control of Residual Motion of Cable Transporter Systems. Submitted to Journal of Dynamic System, Measurement and Control in April, 2003.
4. (Name), Agrawal, S. K. and Hagedorn, P., Modeling and Control of Flexible Transporter System with Arbitrarily Time-Varying Cable Lengths ASME 2003 Design Engineering Technical Conferences and Computers and Information in Engineering Conference, Chicago, Illinois USA, September 2-6, 2003.
5. Pota, H. R., Agrawal, S. K. and (Name), and Petersen, I. R., Robust Control of Residual Motion of Cable Transporter Systems, Proceedings of American Control Conference in Denver, Colorado USA, pp. 1446-1451, June 4-6, 2003.
6. (Name), Pota, H. R., and Agrawal, S. K., Suppression of Residual Vibration in Elevators with Time Varying Cable Lengths, Proceedings of American Control Conference, Alaska, pp. 4962-4966, 2002.
7. Pota, H. R., Agrawal, S. K. and (Name). A Flatness Based Approach to Trajectory Modification of Residual Motion of High-rise Elevators, Proceedings of American Control Conference, Arlington, VA, pp. 1587-1592, 2001.
8. (Name), The Application of Blurring Mode Identification & Artificial Neural Network in Coordinate Measuring Machine, Proceedings of China Machine Engineering Association, 1998.

**PRESENTATIONS**

1. (Name), Agrawal, S. K., and Hagedorn, P., Modeling and Control of Flexible Transporter System with Arbitrarily Time-Varying Cable Lengths ASME 2003 Design Engineering Technical Conferences and Computers and Information in Engineering Conference, Chicago, Illinois USA, September 5, 2003.

**REVIEWER**

1. ASME International Design Engineering Technical Conferences, Nineteenth Biennial Conference on Mechanical Vibration and Noise in 2002 and 2003.
2. IEEE International Control and Robotics Automation (ICRA) in 2003.
3. IEEE Conference on Decision and Control (CDC) in 2003.
4. ASME Mechanisms and Robotics Conference in 2002.
5. American Control Conference in 2004.

**REVIEWED PAPERS**

1. A Semi-Autonomous Replicating Robotics System, by Jackrit Suthakom, Yong T. Kwon, Gregory S. Chirikjian.
2. Torsional Buckling and Writhing Dynamics of Elastic Cables and DNA, by S. Goyal, N. C. Perkins, and Christopher L. Lee.
3. An Object-Oriented Graphical Interface for Dynamic Finite Element Modeling of Belt-Drives, by Tamer M. Wasfy and Michael J. Leamy.
4. Mechanical Design of a Robotic System for Automatic Installation of Magnetic Markers on the Roadway, by Randy James, Basar Ozkan and Bahram Ravani.
5. On the Stability of Coupled Delay Differential and Continuous Time Difference Equations, by Pierdomenico Pepe, and Erik I. Verriest.
6. A Distributed and Optimal Motion Planning Approach for Multiple Mobile Robots, by Yi Guo and Lynne E. Parker.
7. Trajectory Planning Using Reachable-State Density Functions, by Richard Mason and Joel W. Burdick.
8. Robust Observer Backstepping Neural Network Control of Flexible Joint Manipulator, by Withit Chatlatanagulchai, Hyuk Chul Nho, and Peter H. Meckl, Member of IEEE.

**HIGHLIGHTS OF QUALIFICATIONS**

- Two years industrial experiences in design and control of coordinate measuring machine (CMM), including mechanical design and control algorithm design.
- One year **project manager** experience in Daewoo Company
- **Interns** both in industrial and academic environment.
- **Familiar with Modal and Vibration Analysis and Control.**
- Strong background in **sensor theory** and design, **analog and digital** circuit.
- Flexible distributed parameter systems (**cable systems**) modeling & design.
- Strong background in **MATLAB/Simulink, S function, dSPACE, and LabView.**
- Comprehensive knowledge on feed-forward, **feedback control**, non-linear control.
- Computer Programming (**C/C++, Visual C/Basic, Maple, Mathcad, Mathematica**).
- Familiar with **Finite Element Method** and Analysis software (**ANSYS, Nastran**).
- Passive and Active **Vibration Control** of cable suspended robots, tether satellites.
- **Optimization**, dynamics, **mechatronics**, **robust control** and **robotics**.
- Expertise in metrology and precision measurement, **precision instrument design**.
- Excellent public speaking and communication skills, **self-motivated team player**.

**RELEVANT COURSES****Ph.D. Courses:**

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|------------------------------------|---------------------------------------|
| • Structural Dynamics and Control  | Methods of Optimization               |
| • Applied Nonlinear Control        | Introduction to Laboratory Instrument |
| • Linear System Theory             | Advanced Engineering Mathematics      |
| • Advanced Topics in Robotics      | Introduction in Computer Science      |
| • Planning and Control of Dynamics | Advanced Topics in Dynamics           |
| • Intermediate Dynamics            | Intermediate Heat Transfer            |
| • Robotics                         | Intermediate Solid Mechanics          |
| • Intermediate Fluid Mechanics     | Intermediate Engineering Mathematics  |

**Previous Courses:**

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|---|-------------------------------|
| • Modern Sensing Technique                | Auto-Control Theory           |
| • Basics of Analog Electronic Techniques  | Numerical Calculation         |
| • Mechanics of Materials                  | Mechanical Principles         |
| • Basics of Digital Electronic Techniques | Engineering Optics            |
| • Design of Precision Instruments         | Sensor Technology             |
| • Precision Instrument Circuit            | Advanced Mathematics          |
| • Algorithmic Language                    | General Chemistry             |
| • Metallic Materials & Heat Treatment     | Error Theory                  |
| • Theoretical Mechanics                   | Linear Algebra                |
| • Complex Functions                       | Probability & Statistics      |
| • Field Theory                            | Experiment of Physics         |
| • Basics of Circuits                      | Dimensional Measurements      |
| • Fundamentals of Microcomputer           | Computer Vision & Application |
| • Microcomputer Interface Principles      | Nanotechnology                |
| • Computer Network                        | IBM-PC Interface Technique    |
| • Technique of Multimedia                 | Java Computer                 |

**REFERENCES****Prof. Sunil K. Agrawal Ph. D.**

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Prof. Agrawal is my Ph. D. dissertation advisor.

**Prof. Michael J. Piovoso Ph. D.**

Penn State Great Valley  
30 E. Swedesboro Road  
Malvern, PA 19355-1443

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Fax: 610-648-3377

I took Dr. Piovoso's Linear Theory class and he is also a member of my dissertation committee.

**Prof. Michael M. Greenberg Ph. D.**

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Fax: 302-831-3619

Dr. Greenberg taught me Advanced Engineering Mathematics class, member of my dissertation committee.

**Prof. Jianqiao Sun Ph. D.**

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Newark, DE 19716-3140

Email: [sun@me.udel.edu](mailto:sun@me.udel.edu)

Telephone: 302-831-8686

Fax: 302-831-3619

Dr. Sun taught me Applied Nonlinear Control class, member of my dissertation committee.