PRITPAL DANG
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Objective

A full time position in System Modeling, Control System Design, Signal Processing, Automation, Robotics and Sensor Networks.

Professional Experience

Research Associate (Aug. 2004- Present)
Automation & Robotics Research Institute, The University of Texas at Arlington

- Working on distributed actuation and sensing using potential fields and neural networks.
- Designing and developing efficient algorithms for optimal placement and control of embedded actuators in a flexible surface for shape morphing and vibration control.

Consultant (Aug. 2005 - May2006)
Nissan Training Center, Canton, MS

- Designed and implemented a wireless accessible architecture for the control of industrial robots.

Internship (Jan. 2005 - May 2006)
Department of Advanced Technologies, Alcorn State University, MS

- Developed control systems and robotics laboratory for undergraduate studies.

Teaching/Lab Assistant (Jan. 2003 – Jan. 2005)
Department of Electrical Engineering, The University of Texas at Arlington

- Teaching Assistant for Control System Design, Linear Systems and Electronic Circuit Design
- Lab Assistant for control system design, involving design and implementation of a controller for dc motor using active RC filters.

Project Intern (Aug. 2001 – Nov. 2001)
Harjee Foods, India

- Designed and developed a controller for a food manufacturing unit using a PLC.

Education

PhD in Electrical Engineering (GPA: 4.0/4.0)
2004-Present (Expected: December 2007) The University Of Texas at Arlington

MS in Electrical Engineering (GPA: 3.9/4.0)
2002-2004 The University Of Texas at Arlington

BS in Electrical Engineering (GPA: 3.7/4.0)
1998-2002 R.K.N.E. College, Nagpur, India

Research

In my years of research in Advanced Controls, and Sensors (ARRI, UTA) group, I was involved in research for distributed sensing and actuation using potential fields and neural networks. Neural networks combined with potential fields hold the key to providing efficient nonlinear feedback control for complicated systems.

I worked on the development of novel approaches for dynamic localization (position determination) of a network of randomly deployed wireless sensor nodes using potential fields. Also, based on potential fields and neural networks, a novel method (Extended Orthogonal Least

Square) is developed for optimal placement and control of microactuators for shape morphing and vibration control. The research was focused on developing a mathematical foundation which is easy to be implemented in real-time situations.

I was particularly involved in the following research grants:

- National Instruments Lead User Grant
- ARO M-47928-CI-RIP-05075-1
- ARO W91NF-05-1-0314
- NSF IIS-0326505, CNS-0421282

Projects

Control System Design –

- Modeling, controller design and implementation for underactuated electro-mechanical systems for e.g. inverted pendulum, ball balancer. The controllers were designed using energy based methods, state-dependent riccati equation (SDRE), LQR design methods and tuned PID methods using Simulink RTW and dSPACE DAQ. The project also involved hardware in the loop testing.
- Path planning of nonholonomic mobile robots using potential field methods, anti-windup controllers.
- Speed control of DC Motors using PID controller. Modeling and design of discrete-time compensators for position control of a cart and one link arm to meet the performance specifications.
- Elevator control and cool mist roof cooling system design using PLCs.

Intelligent Control Systems –

- Decision making systems and discrete event control design for Intelligent Material handling (IMH) cell for conflict resolution and resource assignment.
- Condition based monitoring of machines for fault detection, prognosis and diagnosis.

Nonlinear and Adaptive Control –

- Nonlinear adaptive control of robotic manipulators using feedback linearization, neural networks, sliding control and backstepping.

Power Electronics –

- Modeling and controller design of dc/dc buck-boost converter using frequency based methods and sliding control.
- Design of feedback linearization controller for transient voltage stability.

Kalman Filter –

- Design and implementation of optimal estimation methods for linear and nonlinear systems.
- Design of Extended Kalman Filter for parameter estimation of 747 aircraft model, position and attitude estimation of 3D objects using visual feedback, orbit determination from range and line of sight measurements.

Robotics –

- Design and implementation of master-slave robot configuration based on forward and inverse kinematics.
- Internet based control of robots using LabVIEW and IMAQ.
- Computer based torque control design of robotic manipulators.

Structure Analysis –

- Finite element analysis modeling of flexible plate for 2D actuation using embedded actuators and sensors.

Digital Signal Processing –

- Projects dealing with the basics of convolution, filtering and smoothing of digital data using MATLAB, LabVIEW, C/C++.
- Various projects for optimal estimation, FFT, Wiener filtering and statistical signal processing. Design of adaptive linear filter (ADALINE) for noise cancellation using neural network.

Digital Image Processing –

- Image compression, enhancement, circle/line detection, probability based color detection using, MATLAB and C/C++.

Wireless Sensor Network –

- Design and implementation of dynamic relative and absolute localization of wireless sensors using LabVIEW and Crossbow Technologies MICA2 sensors.
- Design of range measurement algorithm using RSSI methods.

Embedded Microcontroller –

- Projects in PC based device control embedded system using microchip PIC 18F452.

MicroElectroMechanicalSystems (MEMS) –

- Design and simulation of electrostatic comb drives in MEMSPro.

Publications

Book Chapter:

- P. Dang, F.L. Lewis, D. Popa, *"Dynamic localization of air-ground wireless sensor networks"*, in Advances in Unmanned Aerial Vehicles: State of the art and road to autonomy, ed. K. Valavanis, Springer-Verlag, Berlin, 2007

Journal Papers:

- P. Dang, P. Ballal, F.L. Lewis, D. Popa, *"Real Time Relative and Absolute Dynamic Localization of Air-Ground Wireless Sensor Networks"*, Accepted in the Journal of Intelligent and Robotic Systems, 2007.
- P. Dang, F.L. Lewis, H. Stephanou, K. Subbarao, *"Optimal Placement of Microactuators for Distributed Control using Neural Networks"*, Submitted to the IEEE Transactions of Neural Network, 2007.
- P. Dang, F.L. Lewis, H. Stephanou, F. Ham, *"A Two Stage Neural Network for Expression Classification"*, Submitted to IEEE SMC part B, 2007

Peer Reviewed Conferences:

- P. Dang, J, Rajruangrabin, D. Popa, F.L. Lewis, H. Stephanou, *"Simultaneous Visual Tracking and Pose Estimation with Applications to Robotic Actors"*, submitted to ACC, 2008
- P. Dang, F.L. Lewis, H. Stephanou, F. Ham*, "Facial Expression Recognition using a Two Stage Neural Network"*, Proc. Mediterranean Conf. Control & Automation, Athens, Greece, June 2007.
- P. Dang, F.L. Lewis, D. Popa, *"Dynamic Localization of Air-Ground Wireless Sensor Networks"*, Proc. Mediterranean Conf. Control & Automation, Ancona, Italy, June 2006.
- P. Ballal, V. Giordano, P. Dang, S. Gorthi, F. Lewis, *"A LabView based test-bed with off-the-shelf components for research in mobile sensor networks"*, Proc. ISIC, Munich, Germany, October 2006.
- P. Dang, F.L. Lewis, *"Controller for Swing-Up and Balance of Single Inverted Pendulum Using SDRE-Based Solution"*, 31st Annual conference of the IEEE Industrial Electronics society, November 6-8, 2005.

- P. Dang, F.L. Lewis, J. Mireles, *"Virtual Places for the Development and Implementation of Modified Matrix-Based Discrete Event Controller",* 12th Mediterranean conference in Control & Automation (IEEE),2004.
- R. Campos, P. Dang, F.L. Lewis, J. Mireles, *"Implementing a Multiple Specification Regulation Controller: A Case Study"*, International Conference on Systems, Man and Cybernatics, 2004.
- G. Gabriel, P. Dang, F.L. Lewis, J. Mireles, R. Campos, A. Ramirez*,"On the Development of MatrixC, a Discrete Event Controller Supervisor for Advanced manufacturing Simulation and Control. A Case study: Implementation of a Fuzzy Logic Dispatching Approach"*, 2nd IFAC Symposium on System, Structure and Control, 2004.

Software Skills

Environment: UNIX, MS Windows, Sun Microsystems, CYGWIN.
Electronic Design: Cadence, Pspice.
Mathematics: MATLAB, Mathematica.
Structure Analysis: ANSYS.
Data Acquisition: LabVIEW/LabWindows, MATLAB, Simulink, dSPACE control desk, Quanser WinCon, ECP.
Robotics: CRS robot programming kits, ADEPT, PUMA.
Programming Languages: C/C++, C#, BASIC, PASCAL, FORTRAN, PLC Ladder logic, Assembly (Intel 8086 family, Intel 8085).

Hardware Skills

Basic Lab. equipment: Oscilloscopes, voltmeters, function generators, analyzers, etc.
Data acquisition boards and interfacing: National Instruments, dSPACE, Qaunser, ECP.
Wireless Sensors: crossbow technologies (Mica, Mica2, Cricket).
Robots: CRS, ADPET, PUMA.

Awards Received

- Recipient of Rudolf Hermans Doctoral Fellowship
- Recipient of Graduate Dean's Fellowship
- Second Prize winner for paper presentation on "Voice Recognition Using Artificial Neural Network" at National Level Technical Conference, India, 2001

Invited Talks and Workshops

Lectures on "Modeling and Control System" during the Engineering Week held at the University of Juarez, Mexico, 2004.

References

Professor Frank L. Lewis, IEEE Fellow, PE Texas
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