

Lakshminarayan C.V.

Department of Mechanical Engineering, 15 Dineen Drive,
University of New Brunswick, P.O. Box 4400,
Fredericton, New Brunswick, E3B 5A3, Canada
Phone: 1-506-447 3271[O]
Email: lakshminarayan.c@unb.ca

OBJECTIVE To pursue a challenging research career in the field of advanced control systems, with an emphasis on their applications to real world engineering problems.

EDUCATION

- 01/02-Present **M.Sc.E in Mechanical Engineering (Model Predictive Control and Tuning)**
University of New Brunswick (UNB), Fredericton, NB.
Graduated on – April 29th 2004
Thesis: Development of Characteristic Equation and Robust Stability Analysis for Move suppressed and Shifted Dynamic Matrix Control.
Supervisor: Dr.Rickey Dubay
- 08/95 – 08/99 **B.E. (First Class with Distinction) in Mechanical Engineering**
Malnad College of Engineering, University of Mysore, Hassan, Karnataka, India.
Project: Design and Fabrication of a Drill Jig for High Tensile Bolts.
Advisor: Dr.D.V.Girish

WORK EXPERIENCE

- 01/02- 04/04 **Research Assistant** – Laboratory for Advanced Plastics Manufacturing, Department of Mechanical Engineering, University of New Brunswick, Fredericton, NB, Canada. (Natural Sciences and Engineering Research Council of Canada Grant Scholarship offered by Dr.Rickey Dubay)
- Developed research experience in different advanced process control systems and tuning techniques (Conventional/Predictive controllers). Robust Stability and Performance Analysis of MPC.
- 01/02-12/03 **Teaching Assistant** – Department of Mechanical Engineering, University of New Brunswick, Fredericton, NB, Canada.
- ME 3352: Optimization and Computer Aided Design (Winter 2002)
 - ME 3703: Mechanical Engineering Measurements Lab (Fall 2002, Fall 2003)
 - ME 1003: Engineering Graphics (Winter 2003)
- 09/99 – 10/01 **Production Engineer** – D-PACK (Manufacturers of Corrugated Boxes), Chennai, India.
- Assisted in the Production Planning and Control Department in co-coordinating the shop floor and quality inspection of the manufactured goods.
 - Gained valuable practical understanding of manufacturing processes.
 - Developed good communication and organizational skills.
- 12/98 – 02/99 **Project Trainee** – TVS Sundaram Fasteners Ltd., Chennai, India.
- Designed and Fabricated a Drill Jig for High Tensile Bolts used in Suzuki Motor cycles.

12/95 – 08/97 **Part-Time Tennis Instructor and Coach** – Funten School of Tennis in Chennai, India for 5 months.

RESEARCH EXPERIENCE

- 01/02- Present **M.Sc.E Research** – University of New Brunswick, Fredericton, Canada
- Closed loop transfer functions were derived for move suppressed λ and m -shifted Dynamic matrix control (DMC) for plants that can be generally approximated to first order plus dead time (FOPDT).
 - The characteristic polynomials allow the evaluation of the closed loop poles in the z -plane as λ and m varies.
 - Using the derived transfer functions, robust analysis has demonstrated that m -shifted DMC is more robust with respect to all plant and controller parameter variations.
 - The derived transfer functions also provide an analytical approach to investigate the stability of the two algorithms in the frequency domain.
 - SISO cascade control systems were designed for move suppressed and shifted DMC using the discrete controller transfer functions.
 - The shifted DMC forms the most viable control strategy in either the primary or secondary loop or both than the move suppressed DMC in both the loops in terms of robustness. The shifted DMC is more suited in a cascade system that is required to overcome wide-ranging uncertainties in the plant.
 - In MIMO, theoretical derivation of MIMO controller transfer functions for move suppressed and shifted DMC have been developed. Robust Stability analysis was investigated for the MIMO processes using the derived transfer functions.
- 12/98 – 02/99 **B.E. Project** – TVS Sundaram Fasteners Ltd., Chennai, India.
- Drill Jig was designed according the specification and dimension of the bolt to be drilled.
 - The designed Jig was fabricated to evaluate the effectiveness of the design and the production profitability.

PUBLICATIONS

- Dubay, R., Kember, G., **Lakshminarayan, C.V.**, Pramujati, B., Development of Characteristic Equations and Robust Stability Analysis for SISO Move Suppressed and Shifted DMC, ISA Transactions (Submitted).
- **Lakshminarayan, C.V.**, Dubay, R., Investigation of Cascade Control and Robust Stability for SISO Move Suppressed and Shifted DMC, ISA Expo 2004, Houston, Texas, U.S.A. (Accepted).
- Dubay, R., Kember, G., **Lakshminarayan, C.V.**, Pramujati, B., Development of Characteristic Equations and Robust Stability Analysis for MIMO Move Suppressed and Shifted DMC, ISA Transactions (Manuscript in Preparation).

COMPUTER SKILLS

<u>Languages</u>	C, Matlab 6.1, Lab-windows 6, Java, JSP, Java scripts, VB 6.0
<u>Packages</u>	Matlab toolboxes: - Control System, Robust Control, Optimization, Model Predictive Control, System Identification and Symbolic Math. Scientific word
<u>RDBMS</u>	Oracle8i

ACTIVITIES AND HONORS

- Ranked **top 5 %** in the outgoing undergraduate mechanical engineering student at Malnad College of Engineering, Hassan, Karnataka, India.
- Award of **merit** for topping the mechanical engineering department in CAD/CAM-University Examination (Seventh Semester).
- **Topped** the mechanical engineering department in **Undergraduate Project** during the academic year 1998-1999 (Advisor: Professor D.V. Girish, Head of Mechanical Engineering, MCE, Hassan, Karnataka, India).
- **State-Ranked Tennis player.** Represented school, university and state in numerous tennis championships (approx 50-60 tournaments).
- **Vice President-Administration** of Mechanical Engineering Graduate Student Association, University of New Brunswick (2002-2003).
- **Student member** of **TAPPI, ISA** (Instrumentation, Systems and Automation Society), **AIAA** (American Institute of Aeronautics and Astronautics).
- **Member** of **MEGSS** (Mechanical Engineering Graduate Student Association) and **ISS** (Indian Student Society) of University of New Brunswick.
- **Active participation** in **classical music** (Mirdangam), **science talent contests** and other cultural events in school.
- **Certificate in Safety Start and First Aid/CPR** course (May 2002).
- **Participated** in **Etiquette Survival course Winter 2003** conducted by University of New Brunswick Alumni Society.
- **Certificate in Advanced Research Techniques** –Mechanical Engineering Library Pilot Project, University of New Brunswick.
- **Classical Music-Mirdangam** performed **Arangatram** (May 1991).
- **Proficient** in **English, Tamil, Telegu and Hindi. Knowledge of French and Russian.**

RELEVANT COURSES

- **MSc.E** – Model Predictive Control and Intelligent Sensors, Topics in Optimization (Linear Programming), Linear Control Systems and Topics in Control (Industrial Control Systems).
- **B.E.** – Automatic Control Engineering, Operations Research, FORTRAN 99, Engineering Mathematics.

REFERENCES

Dr. Rickey Dubai

Associate Professor,
Department of Mechanical Engineering,
15 Dineen Drive, University of New Brunswick,
P.O. Box 4400, Fredericton, NB, E3B 5A3, Canada
E-mail: dubayr@unb.ca

Dr. Hossam A. Kishawy

Associate Professor,
Department of Mechanical Engineering,
15 Dineen Drive, University of New Brunswick,
P.O. Box 4400, Fredericton, NB, E3B 5A3, Canada
E-mail: kishawy@unb.ca

Dr. D.V. Girish

Professor and Head,
Department of Mechanical Engineering,
Malnad College of Engineering,
Hassan, Karnataka - 573 201
India