

PERSONAL INFORMATION



Poolan Vivekananda Shanmuganathan

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Sex Male | **Date of birth** 18 January 1971 | **Nationality** Indian

JOB APPLIED FOR

Academic and research collaborations with universities and industry

WORK EXPERIENCE

January 2009 – Present

Professor (Mechatronics), Robotics Laboratory, School of Mechanical & Building Sciences

VIT University
IN-632014 Vellore (India)
<http://www.vit.ac.in>

Education and Research

Business or sector Education

22 June – 21 July 2013

Erasmus Mundus Fellow under the HERITAGE Project

Politecnico di Milano, Milan (Italy)
<http://robotics.polimi.it>

Visiting Professor with Dipartimento di Meccanica (Haptics and Robotics Group) of Politecnico di Milano

Also visited the following institutes in France:

Université de Technologie de Compiègne (July 10, 2013)
Ecole Centrale de Nantes (July 11-12, 2013)

Business or sector Education

February 2004 – December 2008

Assistant Professor

VIT University, Vellore (India)

June 2003 – February 2004

Senior Lecturer

VIT University, Vellore (India)

February 1996 – December 2002

Institute Research Scholar

Indian Institute of Technology Bombay
IN-400076 Mumbai (India)
<http://www.iitb.ac.in>

Business or sector Education

August 1994 – January 1996

Graduate Teaching Assistant

PSG College of Technology, Coimbatore (India)

Recipient of GATE Scholarship

Business or sector Education

September 1993 – July 1994

Research Associate

PSG College of Technology, Coimbatore (India)

Business or sector Education

EDUCATION AND TRAINING

1996 – 2002

Doctor of Philosophy - Robotics

Indian Institute of Technology Bombay, Mumbai (India)

Keywords: Robotics, Dynamics and Control, Legged Robots, Simulation.

Abstract: In the PhD thesis, entitled *Dynamics & Stabilization of Under-actuated Monopedal Hopping*, the hopping motion of a single-legged robot with a novel leg configuration named *Springy-Leg Offset-Mass* (SLOM) hopper is studied.

It has been demonstrated through simulations that it is possible for the SLOM configuration to exhibit passive dynamic hopping with accompanied forward movement for specific initial conditions.

The salient contribution of the thesis is the use of asymmetry in the leg geometry to achieve passive stabilization leading to the motion possibly sustained for several unpowered hops only utilizing the energy originally stored in the springy element of the leg.

This concept may be useful in the design of legged robots that can operate passively (un-actuated, uncontrolled) under steady-state conditions.

1994 – 1996

Master of Engineering (Computer Integrated Manufacturing)

PSG College of Technology (Bharathiar University), Coimbatore (India)

Dissertation: Computer-Aided Process Planning

Abstract: The dissertation was part of the initial phase of the project sponsored by the Defence Research and Development Laboratory. The aim of the project is to extract from solid models of engineering components geometric features related to machining. The features extracted from the solid models developed using the CADD5 software package will be recognised, classified, and a process plan generated for machining. The author was responsible for overall coordination of the software codes developed by other developers and integration of the same to evolve the software for computer-aided process planning. C language was used.

1988 – 1992

Bachelor of Engineering (Mechanical Engineering)

Government College of Engineering (Madurai Kamaraj University), Tirunelveli (India)

PERSONAL SKILLS

Mother tongue(s)

Tamil

Other language(s)	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken interaction	Spoken production	
English	B2	C2	C1	C2	C2
Hindi	B2	B2	B2	B1	B1
French	A1	A1	A1	A1	A1

Levels: A1/A2: Basic user - B1/B2: Independent user - C1/C2: Proficient user
[Common European Framework of Reference for Languages](#)

Communication skills Excellent communication skills in English language for day-to-day technical lectures, technical writing and interaction with students and professional visitors

Organisational / managerial skills Coordinator – International Relations (2010 onwards)
 Division Leader (Mechatronics), Sept. 2009 – Dec 2011 (2¼ years)
 Coordinator of Six Post-Graduate Programmes in Mech. and Civil Engineering, 2005 –2007 (2 years)
 Coordinator of Bachelor's Dissertations in Mechanical Engineering (2004-2005)

Job-related skills Instructor for a number of courses at Doctoral, Master's and Bachelor's level (list attached)
 Supervisor for Doctoral and Master's Dissertations
 Facilitated industrial internships with financial aid for a number of students of Master of Mechatronics Programme
 Supervision of a number of skill-oriented and innovative students projects every semester as part of the course and as part of mandatory academic requirement. Several such projects helped students win prizes, industry employment and exchange programmes with universities abroad for carrying out the Master's dissertation.
 Supervision of research projects sponsored by Department of Science and Technology, Government of India.
 Industrial consultancy on a defence-specific robotics project for mathematical modeling of a dual-arm mobile manipulator

Computer skills **Scientific Computing**
 Scilab, MATLAB, Maxima (symbolic computing), C/C++ Programming
Dynamic Analysis of Mechanical Systems
 MSC.Adams, Adams/Controls co-simulation with MATLAB
Technical Writing
 LaTeX, Microsoft Office Tools

ADDITIONAL INFORMATION

Ambition *"To provide academic, research and entrepreneurial leadership by imparting advanced education and the analytical and computational skill-set necessary for Technology Research."*

Publications - Books / Edited Volumes P.V. Shanmuganathan, K. Raja and P. Kuppan, Eds. (2005; 21st AIMTDR Conference) *Innovating the future through manufacturing*. Narosa Publishing House, New Delhi.
 W. Rehwald and K. Luck (2006) *KOSIM: Computer Aided Linkage-Simulation*. Vellore Institute of Technology. [Assistance in publication of the book.]

Publications - Journals K. Divakaran and P.V. Shanmuganathan, "Development of a prototype sensor for measuring ground reaction force on a walking robot," *International Journal of Current Research*, Vol. 3(11):119-122, Nov. 2011.
 B. Seth, P. Seshu, P.V. Shanmuganathan, V.V. Vichare, and P. Raj, "Search for Initial Conditions for

Sustained Hopping of Passive Springy-Leg Offset-Mass Hopping Robot," *ASME Journal of Dynamics Systems, Measurements & Control*, July 2007. (Listed among the top-10 articles downloaded of the month.)

B. Seth, P. Seshu, P.V. Shanmuganathan, "Passive Dynamics of Kangaroo-like Hopping Robot," *Journal of Institution of Engineers (India)*, 87:39-45 (Sept. 2006).

K.P. Karunakaran, A. Kheerwal, P.V. Shanmuganathan, and R. Shringi, "Splitting of a Box and Its Applications in Engineering", *International Journal of CAD/CAM*, 3(2):85-95 (2003).

K.P. Karunakaran, S. Dibbi, P.V. Shanmuganathan, K. Srinivasarao and D.S. Raju, "Efficient Stock Cutting in Laminated Object Manufacturing," *Computer-Aided Design*, 34(4): 281-298 (2002).

K.P. Karunakaran, P.V. Shanmuganathan, S.J. Jadhav, P. Bhadauria and A. Pandey, "Rapid Prototyping of Metallic Parts and Moulds," *Journal of Materials Processing Technology*, 105:371-381 (2000).

K.P. Karunakaran, P.V. Shanmuganathan, N. Gupta and M. Issac, "Swept Volume of a Generic Cutter," *IMechE Journal of Engineering Manufacture*, 214(B8):915-937 (2000).

K.P. Karunakaran, S. Dibbi, P.V. Shanmuganathan, D.S. Raju and K. Srinivasarao, "Optimal Stock Removal in LOM-RP", *IMech E Journal of Engineering Manufacture*, 214(B8):947-951 (2000).

Publications - International Conferences

P. Geethanjali, P.V. Shanmuganathan, and K.K. Ray, "Actuation of Prosthetic Drive using EMG Signal," *IEEE TENCON 2009*, Nov. 2009, Singapore.

P.V. Shanmuganathan and A.A. Reddy, "Modular Testrig For Underactuated Legged Locomotion," *22nd International Conference on CAD/CAM, Robotics, and Factories of the Future*, Vellore, July 19-22, 2006.

A.Shome, M.D. Patel, S.S. Thakur, P.V. Shanmuganathan, "To develop a GUI based controller for coordination of two manipulators," 2nd VIT SET, April 2011.

S. Srivastava, M. Shabeer, S. Thilepan, and P.V. Shanmuganathan, "Development of an anthropomorphic force-measuring foot for walking robots," *3rd VIT SET*, Nov. 2011.

F.J. Jospeh, P.V. Shanmuganathan, and G. Boopalan, "Vision-based ball-playing robot," *3rd VIT SET*, Nov. 2011.

V.V.L.T. Nandigam, B.K. Varghese, P.V. Shanmuganathan, M.P. Manuel, N. Sangeetha, and D. Ashok, "Development of energy-harvesting system using piezoelectric materials," *3rd VIT SET*, Nov. 2011.

V. Chawda, R. Shah, P.M.A. Raj, and P.V. Shanmuganathan, "Design and development of motor controller for customized robotic applications," *3rd VIT SET*, Nov. 2011.

V. Vennishmuthu, P. Anbu, and P.V. Shanmuganathan, "Link angle measurement in robot," *3rd VIT SET*, Nov. 2011.

K.A.R. Kumar, P. Karthik, B.N. Sagar, and P.V. Shanmuganathan, "Dynamic simulation of cooperative manipulators using MSC.ADAMS and MATLAB," *3rd VIT SET*, Nov. 2011.

B.Rahul, S. Manda, R. Motamarri, R.Vasudevan, and P.V. Shanmuganathan, "Sensor data synthesis and wireless data acquisition," *3rd VIT SET*, Nov. 2011.

K.P. Karunakaran, P.V. Shanmuganathan, N. Gupta, P. Modani, S. Garg and D. Fichtner, "Octree-Based Volumetric NC Simulation System", *FAIM 2002*, Dresden, July, 2002.

K. P. Karunakaran, D. S. Raju, K. Srinivasarao, P. V. Shanmuganathan and S. Dibbi, "Optimization of Decubing in LOM-RP," *8th European Conference on Rapid Prototyping*, Paris, May 3-4, 2000 pp. 1-7 in the session "From Pattern Making to Prototyping".

K. P. Karunakaran, P. V. Shanmuganathan, S. Roth-Koch and K. K. Uwe, (1998): "Direct Rapid Prototyping of Tools," *9th Solid Freeform Fabrication Symposium*, Austin, pp. 105-112 (August 10-12).

K. P. Karunakaran, P. V. Shanmuganathan, S. Roth-Koch and K. K. Uwe, (Jul. 1998): "A Two-step RP Process for Direct and Accurate Manufacture of Tools," *7th European Conf. of Rapid Prototyping & Manufacture*, Aachen, Germany.

K. P. Karunakaran, P. V. Shanmuganathan, "Octree Based Volumetric NC Simulation," *World Manufacturing Congress WMC-96*, Canada, (Nov. 1997).

Rm. Muthumanickam, S. Ganesh, P. V. Shanmuganathan and P. Radhakrishnan, "Two-dimensional image reconstruction from the perspective views of a polyhedron," In *International Conference on Robotics, Vision & Parallel Processing for Industrial Applications (ROVPIA '94)*, Malaysia, 1994.

Publications - National Conferences

D.Kiran, P.V. Shanmuganathan, "Development of sensor to measure ground reaction force on a walking robot," *RAET 2011*, KGF, March 2011.

D.Kiran, G.G. Manideep, P.V. Shanmuganathan, "Analysis of aspects affecting stability for effective walking," *RAET 2011*, KGF, March 2011.

V.K. Singh, P.V. Shanmuganathan, T. Patel, Y. Nathan, and A. Siravuru, "Development of a hybrid quadrupedal robot", *Proceedings of National conference on Robotics and Intelligent Manufacturing*

2009, p.45-VIT.

P. Geethanjali, P.V. Shanmuganathan, and K.K. Ray, "A Low-Cost EMG signal Acquisition System for Robotic Prosthetic Applications", *Proceedings of National conference on Robotics and Intelligent Manufacturing 2009*, p.44-VIT.

P. Geethanjali, P.V. Shanmuganathan, and K.K. Ray, "Bionic Technology in Artificial Limbs – A Review", *Proceedings of the AICTE sponsored National conference on Recent Trends in IT Applications to Engineering Problems*, November 2008, pp. 71-74.

R. Medatwal, R. Malhotra, R.D. Naik, F.S. Harrison and P.V. Shanmuganathan, "Design of a 5-bar mechanism robot manipulator," 21st AIMTDR Conference, Dec 2004.

R. Medatwal, R. Malhotra, R.D. Naik, F.S. Harrison and P.V. Shanmuganathan, "Design of a 5-bar mechanism robot manipulator," 21st AIMTDR Conference, Dec 2004.

P.V. Shanmuganathan, B. Seth and P. Seshu, "Single-link springy leg in passive hopping," In *National Conference on Machines and Mechanisms*, IIT Bombay, Dec. 1999.

K.P. Karunakaran, P.V. Shanmuganathan, S. Roth-Koch and K. K. Uwe, "Direct Rapid Prototyping of Tools," *AIMTDR*, IIT Kharagpur (December 21-23, 1998) pp. 334-339.

K.P. Karunakaran, S. Bhadade and P.V. Shanmuganathan, "Off-line Adaptive Control," *AIMTDR*, IIT Kharagpur (December 21-23, 1998) pp. 53-58.

K.P. Karunakaran, S. Kumar, T. Karthikeyan, P.V. Shanmuganathan and S. Roth-Koch, "Photogrammetric Object Synthesis for Reverse Engineering," *AIMTDR*, IIT Kharagpur (December 21-23, 1998) pp. 351-356.

K.P. Karunakaran, P.V. Shanmuganathan, N. S. Tappe and K. Bapu, "NC Program Simulation Using Octree Solid Modeling for Verification and Optimization of Cutting Parameters," *UG User Meet 1996*, Madras, (September 1996).

P.V. Shanmuganathan, P. Radhakrishnan, A.I. Edinbarough and K. Natarajan, "3-D Camera calibration for machine vision applications," In *18th National Systems Conference*, Agra, 1995.

P.V. Shanmuganathan, P. Radhakrishnan, A.I. Edinbarough and K. Natarajan, "Closed form inverse kinematics solution for a 5-axis articulated robot manipulator," In *18th National Systems Conference*, Agra, 1995.

Projects - International Linkages

I am the academic coordinator from my University for INTERWEAVE (2013-2016), which is an Erasmus Mundus Action 2 Asia-Europe Partnership Project coordinated by Ecole Centrale, Nantes, France and University of Malaya, Malaysia

I am the initiator and a key person from my University for HERITAGE (2012-2015), which is an Erasmus Mundus Action 2 India-Europe Partnership Project coordinated by Ecole Centrale, Nantes, France and Indian Institute of Technology Madras

Projects - Completed

Funded Research Project - Principal Investigator II for the project entitled *Multi-channel Myoelectric Signal Studies for Actuation of Robotic Prosthetic Devices*, 2009-2011. (Sponsored by DST, Government of India; Rs 2.167 Million)

Contributed to MSC.ADAMS-based modeling of control surfaces, 2005-2006. (Sponsored by Defence R&D Organisation, Government of India).

Graduate Student Dissertation on the project *Computer Aided Process Planning*, PSG College of Technology, 1994-1996. (Sponsored by DRDO).

Research Associate employed for the Project *Recognition & measurement of geometric parameters through robot vision*: PSG College of Technology, 1993-1994. (Sponsored by Bhabha Atomic Research Centre, India).

Memberships

Association of Machines and Mechanisms. Also served as Zonal Vice President (India South Zone) for 3 years during 2009-2012

IEEE Robotics & Automation Society

IEEE Control Systems Society

IEEE Vehicular Technology Society

Institution of Engineers (India)

Indian Society of Technical Education

Courses Taught - Doctoral Level

Nonlinear Control

Research Methodology

Courses Taught - Master's Level

Robot Dynamics & Analysis
Machine Vision Systems

Micro Electro-Mechanical Systems
Vehicle Dynamics

Mechatronics Systems

Tribology

Industrial Robots and Innovative Robotics Laboratory
Advanced Computer Programming Laboratory

Courses Taught - Bachelor's Level

Fundamentals of Mechatronics Systems
Industrial Robotics
Robotics & Automation

Engineering Mechanics – Dynamics
Instrumentation & Control

Engineering Drawing / Computer-Aided Drafting
C-Programming (Beginners)

Honours and awards

Awarded *Erasmus Mundus Fellowship for Staff Mobility to visit Politecnico di Milano, Italy under HERITAGE India-Europe Partnership Programme (June 2013 - July 2013)*

Expert Member, Selection Committee for Appointment of Professors, Rajasthan Technical University (June 2013)

Expert Member, Selection Committee for Appointment of Assistant Professors, Kongu Engineering College, Erode, Tamil Nadu (April 2012)

Member, Technical Committee of FIRA World Congress (twice, 2010 and 2012).

Member, Organising Committee of IPROMM 2010, NIT Jaipur, Dec 2010.

Invited as Reviewer by the journals:
ASME Journal of Machine Design, Journal of Mechanism and Machine Theory, International Journal of CAD/CAM

Editor-in-Chief – AMM News Bulletin (Once a year on rotation; April 2009 – April 2011).
www.ammindia.org

Reviewer for Conferencens:
FIRA World Congress (twice; Bangalore, 2010 and Bristol, 2012) NaCoMM 2011, IIT Madras NPDC 2009, IIT Madras 21st AIMTDR Conference, Vellore, 2004 CARs&FoF, Vellore 2006

Member of Organising Committee for NPDC 2009, Dec. 2009, IIT Madras.

External Examiner for BE Project Dissertations for the following institutions:
PSG College Technology, April 2007 JNTU College of Engg, Pulivendula, May 2010.