

## Shambhu Nath Sharma

(Professor, Electrical Engineering)

### Academic References

(1) Professor Harish Parthasarathy

(2) Professor Shiva Shankar

### Degrees

B.E. Electrical Engineering, Govt. Engineering College Rewa, Madhya Pradesh  
India.

M.Tech. Control Systems (Electrical Engineering), then Institute of Technology,  
Banaras Hindu University Uttar Pradesh, India.

Ph.D. Volterra and stochastic system theory, the University of Delhi, Delhi, India.

### Job History

(1) *NSIT Delhi (An Autonomous Institution of Govt. of NCT of Delhi, Formerly Delhi  
Institute of Technology, Kashmeri Gate, New Delhi)*

Lecturer (Instrumentation and Control Engineering Division)

July 26, 2000- December 31, 2005

(2) *NSIT Delhi (An Autonomous Institution of Govt. of NCT of Delhi, Formerly Delhi  
Institute of Technology, Kashmeri Gate, New Delhi)*

Assistant Professor (Instrumentation and Control Engineering Division)

January 1, 2006- March 31, 2009

(3) *SV NIT Surat, Gujarat (An Institution of National Importance, Govt. of India)*

Associate Professor (Electrical Engineering Department)

April 1, 2009-January 27, 2019

(4) *SV NIT Surat, Gujarat (An Institution of National Importance, Govt. of India)*

Professor (Electrical Engineering Department)

January 28, 2019- till date

## **A Visiting Academic Appointment**

(1) Department of Systems and Control, [Jozef Stefan Institute](#), Republic of Slovenia, May 20-June 20, 2018.

(An INSA-SASA Deputation: under the 2018 Indian National Science Academy-Slovenian Academy of Sciences and Arts Bilateral Exchange Program to augment the scientific collaborations between two nations).

## **Contributions to Systems Theory and Control**

(1) **Known for:** A stochastic system, '*The Sharma-Parthasarathy stochastic two-body problem*'.

The following paper, Shambhu N. Sharma and H. Parthasarathy Dynamics of a stochastically perturbed two-body problem. *Pro. R. Soc. A*, The Royal Society: London, 463, pp.979-1003, 2007. (doi: 10.1080/rspa.2006.1801), was published in a *Royal Society Journal*, the UK's National Academy of Sciences, London. A string of papers in various international Journals follows that 'Stochastics and Dynamists' described this stochastic system as '*The Sharma-Parthasarathy stochastic two-body problem*'.

<http://scitation.aip.org/content/aip/journal/jmp/56/3/10.1063/1.4906908>

(2) *On the general theory of stochastic processes, dynamical systems and Mechanics:* the results were published in *Nonlinear Dynamics, Differential Equations and Dynamical Systems*.

(3) *Introduction of Stratonovich differential into non-linear dynamic circuits:* The result was published in the *Journal of the Franklin Institute*. Interestingly, we have introduced the 'Stratonovich differential' into non-linear dynamic circuits that obeys consensus on the Itô versus Stratonovich. That was not available in literature previously.

(4) *Higher-order filtering*: We developed higher-order Kushner filter. Concerning filtering results were published in *International Journal of Control, Automatica and ASME Transactions*.

(5) *Control of non-minimum phase systems with dead time*: The novelty of the paper is to achieve the fractional filter-controller for the plant with the combined effect NMP zeros and dead time. The result is generalized and published in the *International Journal of Systems Sciences*.

(6) *Unifying mechanics, passivity-based control and switched electrical networks*: We contributed to switched electrical networks via unifying the methods of mechanics, i.e. Lagrangian and Hamiltonian, passivity-based control and switched electrical networks.

### **Research Visits**

(1) The 2019 International Graduate School on Control (IGSC) of European Embedded Control Institute (EECI) at [King Abdullah University of Science and Technology \(KAUST\)](#), Saudi Arabia, April 14, 2019 to April 18, 2019.

(A participant of the Game theory and Distributed Control Lecture series)

(2) International Centre for Theoretical Sciences-Tata Institute of Fundamental Research, ([ICTS-TIFR](#)), Bangalore Centre, August 14, 2017 to September 1, 2017.

(A participant of the Large Deviation Theory Lecture series)

(3) Graduate School of Information and Physical Sciences, *the Osaka University*, Japan, November 4, 2014.

(Visited the University and delivered a talk in the graduate school of the University)

**Of Interest** (a pedagogical paper in the honor of Norbert Wiener, a celebrated American Applied Mathematician)

**Shambhu N Sharma**, and Balaji G Gawalwad, [Wiener meets Kolmogorov](#), *Norbert Wiener in the 21<sup>st</sup> Century* (Thinking machines in physical word), a historical-technical paper, IEEE-IFAC Conference, July 13-Jul 15, 2016, University of Melbourne, Australia. <http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=7547457>

## **Broader Research Interests**

- (1) Stochastic processes, filtering and control
- (2) Unified theories for linear feedback systems
- (3) The Volterra model-based control of nonlinear systems
- (4) The passivity-based control from the Lagrangian and Hamiltonian viewpoints
- (5) Contemplating significance of classic control results in contemporary research
- (6) The role of applied mathematics in shaping control in the sense of first principles
- (7) History of science

**I am looking for bright, committed PhD and Post-DoCs students aspiring for pursuing their research career in control theory. Candidates with interests in control theory and Control Engineering with Linear algebra, probability theory, and applied mathematics are encouraged to apply for the PhD program of the Department-Institute.**

## **Teaching Activities**

*Courses Taught at Undergraduate Level (NSIT Delhi)*

- (1) Control systems
- (2) Circuits and systems
- (3) Random signals
- (4) Principle of electrical engineering
- (5) Electrical measurements
- (6) Robotics

*Courses Taught at Postgraduate Level (NSIT Delhi)*

- (1) Random processes in estimation and control
- (2) Adaptive control systems
- (3) Robotics
- (4) Discrete-time control systems

*Courses Taught at Undergraduate Level (SV NIT Surat, Gujarat, India)*

- (1) State variable analysis
- (2) Discrete-time control systems
- (3) Non-linear and optimal control systems
- (4) Electrotechniques
- (5) Network analysis and systems

*Courses Taught at Postgraduate Level, (SV NIT Surat, Gujarat, India)*

- (1) System theory fundamentals
- (2) Modern control theory

My method of teaching hinges on the notion that complex, cryptic concepts, which have greater conceptual depth and universality, must be well taught with full clarity and simplicity.

### **Scholarly Achievement**

#### **Erdős, Einstein and Varadhan numbers**

I have finite collaborative distances with pioneering Researchers in control, signal processing, mathematics and physics. Some of them are as follows:

My *Erdős number* is 6. The collaborative distance trajectory to reach at legendary mathematician Paul Erdős is as follows:

0 Shambhu N. Sharma, 1 Harish Parthasarathy (MR2310133), 2 Surendra Prasad (MR0630213), 3 Arijit Mahalanabis (MR1433149), 4 Gary L. Mullen (MR1433149), 5 Stephen D. Cohen (MR1209243), 6 Paul Erdős<sup>1</sup>(MR0427255).

My *Einstein number* is 8. The collaborative distance trajectory to reach at Albert Einstein is as follows:

0 Shambhu N. Sharma, 1 Harish Parthasarathy (MR2310133), Surendra Prasad (MR0630213), 3 Arijit Mahalanabis (MR1433149), 4 Gary L. Mullen (MR1433149), 5 Joel V. Brawley Jr. (MR1164794), 6 Leonard Carlitz (MR0893074), 7 Ernst Gabor Straus (MR0139606), 8 Albert Einstein MR0012947.

My *Varadhan number* is 6. The collaborative distance trajectory to reach at Srinivasa R. S. Varadhan is as follows:

0 Shambhu N. Sharma, 1 Harish Parthasarathy (MR2310133), 2 Raman Arora (MR2789410), 3 Maryam Fazel (MR3104493), 4 Stephen P. Boyd (MR2303137), 5 B. Gopinath (MR1053842), 6 Srinivasa R. S. Varadhan (MR1039631)

### **Memberships of Professional Scientific Societies**

- (1) *Member*, Society of Industrial and Applied Mathematics (SIAM)
- (2) IFAC (International Federation of Automatic Control) *Affiliate*
- (3) *Senior Member*, IEEE (The Institute of Electrical and Electronics Engineers), a New York non-profit corporation

### **International Scientific Activities**

#### ***Session chairing***

- (1) *Questioner*, the 46th ISCIE (*The Transactions of Institute of Systems, Control and Information Engineers*) International Symposium on Stochastic Systems Theory and its Applications, Kyoto Institute of Technology (KIT), Kyoto, Japan, *November 1, 2014*.
- (2) *Questioner*, the 46th ISCIE (*The Transactions of Institute of Systems, Control and Information Engineers*) International Symposium on Stochastic Systems Theory and its Applications, Kyoto Institute of Technology (KIT), Kyoto, Japan, *November 2, 2014*.
- (3) The session *Chair*, 2013 MSC (*Multi-Conference on Systems and Control*), An IEEE Control Systems Society event, Hyderabad, India, August 28, 2013.
- (4) The session *Chair*, the 2013 SICE (*Japanese Society of Instrument and Control Engineers*), Nagoya University, Japan, September 15, 2013.

#### ***Refereeing***

- (1) Reviewer, *Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences*, the UK's National Academy of Sciences, London, UK.

- (2) Reviewer, *IEEE Transactions on Control of Network Systems*
- (3) Reviewer, *Automatica*, an IFAC Control Journal
- (4) Reviewer, *International Journal of Control*, UK.
- (5) Reviewer, *IEEE Control Systems Letters*
- (6) Reviewer, *Nonlinear Dynamics* (An international Journal for dynamics and control), Springer: the Netherlands
- (7) Reviewer, *Proceedings of the National Academy of Sciences* (PNAS Journal), United States of America.
- (8) Reviewer, *Neurocomputing*, an Elsevier Journal
- (9) Reviewer, *Robotics and Autonomous Systems*
- (10) Reviewer, *IET Control Theory & Applications*
- (11) Reviewer, *IEEE Access*
- (12) Reviewer, *the 21th IFAC World Congress*, International Federation of Automatic Control, Berlin, Germany, 12-17 July, 2020.
- (13) Reviewer, the 2020 *Indian Control Conference* (ICC), Indian Institute of Technology Hyderabad, India, December 18-20, 2019.
- (14) Reviewer, *The 58th IEEE Conference on Decision and Control*, Palais des Congrès et des Expositions Nice Acropolis, Nice, France during December 11-13, 2019.
- (15) Reviewer, *The 57th IEEE Conference on Decision and Control* Fontainebleau, Miami Beach, FL, USA, during, Dec. 17-19, 2018.
- (16) Reviewer, the 2019 *Indian Control Conference* (ICC), Indian Institute of Technology Delhi, India, January 9-11, 2019.
- (17) Reviewer, the 2018 *European Control Conference* (ICC), Limassol, Cyprus during June 12-15, 2018.
- (18) Reviewer, the 2018 *Indian Control Conference* (ICC), Indian Institute of Technology Kanpur, India, January 4-6, 2018.
- (19) Reviewer, *5th International Conference on Advances in Control and Optimization of Dynamical Systems* (An IFAC Conference), February 18-22, 2018, Dr. APJ Abdul Kalam Missile Complex, Hyderabad.
- (20) Reviewer, the 55th *IEEE Conference on Decision and Control* (CDC), Las Vegas, USA, December 12-14, 2016.

- (21) Reviewer, *4th International Conference on Advances in Control and Optimization of Dynamical Systems* (An IFAC Conference), February 1-5, 2016, NIT Tiruchirappalli, India
- (22) Reviewer, *the 2016 European Control Conference (ECC)*, July 15-17, 2016, Aalborg University, Aalborg, Denmark.
- (23) Reviewer, *the 2016 Indian Control Conference (ICC)*, Indian Institute of Technology Hyderabad, January 4-6, 2016.
- (24) Reviewer, *the 54th IEEE Conference on Decision and Control (CDC)*, Osaka International Convention Center, Osaka, Japan, December 15-18, 2015.
- (25) Reviewer, *the 27th Chinese Control and Decision Conference (CCDC)*, Qingdao, China during, May 23-May 25, 2015.
- (26) Reviewer, *the 2015 European Control Conference (ECC)*, Johannes Kepler University, Linz, Austria, July 15-17, 2015.
- (27) Reviewer, *9th IFAC symposium on Control of Power and Energy Systems December 9-11, 2015*. Indian Institute of Technology, Delhi, India.
- (28) Reviewer, MED'14, *22nd Mediterranean Conference on Control and Automation*, University of Palermo, Italy, July 16-19, 2014.
- (29) Reviewer, *the 19th IFAC World Congress*, International Federation of Automatic Control, Cape Town, South Africa, 24-29 August 2014.
- (30) Reviewer, *the 2013 American Control Conference (ACC)*, June 17-19, Washington, DC, United States of America.
- (31) Reviewer, *the 2012 American Control Conference (ACC)*, Montreal, Canada, June 26-28, 2012
- (32) Reviewer, *the 16<sup>th</sup> IFAC (International Federation of Automatic Control) Symposium on System Identification*, Brussels, Belgium, 2012.
- (33) Reviewer for the track 4, Dynamics, Control and Uncertainty, of *the 2012 ASME International Mechanical Engineering Congress and Exposition (IMECE 2012)*, Houston, Texas, United States of America
- (34) The “7th 2020 International Conference on Control, Decision and Information Technologies, CoDIT'20, June 29 - July 02, 2019 at Prague, Czech Republic.
- (35) Reviewer, *International Journal of Mechatronics and Automation*, Inderscience Publishers ([www.inderscience.com](http://www.inderscience.com)).
- (36) Reviewer, *IETE Journal*, India
- (37) Reviewer, *International Journal of Biomechatronics and Bio Robotics*



(38) Received numerous invitations for organizing and chairing special sessions for other international conferences as well.

(39) Invited to interact with Editors of *Control Engineering Journals*, an IFAC conference, Milan, August 31, 2011.

### **Some Selected Presentations and Invited Talks**

(1) A Slovenian Association of Automatic Control talk, Department of Systems and Control, *Jozef Stefan Institute*, Ljubljana, Republic of Slovenia, Europe, May 29, 2018.

Title of the talk: The Sharma-Parthasarathy stochastic two-body problem

*Audience: PhD students, Post DoCs, senior researchers and members of Systems and Control research group of the Institute*

(2) An invited talk, Graduate School of Information and Physical Sciences, *the Osaka University*, Japan, November 4, 2014.

Title of the talk: A Kushner-Stratonovich stochastic method for non-linear dynamical systems.

*Audience: PhD students, Post-DoC students and Faculty members*

(3) Norbert Wiener in the 21<sup>st</sup> Century (Thinking machines in physical word), July 13-Jul 15, 2016, An IEEE-IFAC Control Conference, *University of Melbourne*, Australia.

Paper title: Wiener meets Kolmogorov

*Audience: Conference presenters, i.e. International young and senior Control Researchers*

### **A Compiled List of Journals, Selected Conferences and Symposia Contributed**

(1) *Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences*

(A Journal of the Royal Society London, the UK's National Academy of Sciences, the *oldest Science Academy* of the world in continuous existence, that published the Schrodinger wave equations, Maxwell's equations of electromagnetics as well)

(2) *The ASME (American Society of Mechanical Engineers) Transactions: Journal of Computational and Non-linear Dynamics*

- (3) *Automatica*, a Journal of International Federation of Automatic Control (IFAC),  
(Ranked as the highest impacted among the control Journals of the IFAC)
- (4) *Transactions of the Institute of Systems, Control and Information Engineers (ISCIE)*
- (5) *International Journal of Control*
- (6) *Journal of the Franklin Institute (JFI)*  
(The *second oldest* peer reviewed science Journal of the United States of America.  
Past Authors are Rudi Kalman, Norbert Wiener, Max-Planck, and Albert Einstein)
- (7) *International Journal of Systems Science, UK*
- (8) *Transactions of the Institute of Measurement and Control*
- (9) *Circuits, Systems and Signal Processing (CSSP) Journal*
- (10) *Differential Equations and Dynamical Systems*
- (11) *Nonlinear Dynamics*, an International Journal of Dynamics and Control
- (12) *Electronics Letters, UK*
- (13) *Archives of Control Sciences (The Journal of Polish Academy of Sciences)*
- (14) *IET Control Theory & Applications*
- (15) *IET Power Electronics*
- (16) *CPSS Transactions on Power Electronics and Applications*
- (17) *International Journal of E-Health and Medical Communications*
- (18) *International Journal of Power Electronics*
- (19) *Applied Mathematics and Computations*
- (20) *Fluctuation and Noise Letters*, an Interdisciplinary Scientific Journal on Random Processes in Physical, Biological and Technological Systems
- (21) *System Sciences and Control Engineering*
- (22) *International Journal of Dynamics and Control*
- (23) *IFAC-Papers OnLine* (An IFAC Journal)
- (24) *Nova Science Publishers, USA*
- (25) 2016 IEEE (CSS) and IEEE (SSIT) IFAC Conference on *Norbert Wiener in the 21<sup>st</sup> Century* (one paper)
- (26) *The 2012 Multi-Conference on Systems and Control (MSC)*, An IEEE Control Systems Society Conference
- (27) *The 2013 Multi-Conference on Systems and Control (MSC)*, An IEEE Control Systems Society Conference

- (28) *3rd International Conference on Systems and Control*, An IEEE Control Systems Society Conference
- (29) *The SICE (The Japanese Society of Instrumentation and Control Engineers) Annual Conference 2013*, Nagoya University, Nagoya, Japan.
- (30) *The 45th ISCIE (the Institute of Systems, Control and Information Engineers) International Symposium on Stochastic Systems Theory and its Applications*, *University of the Ryukyush, Okinawa, Japan*, November 2, 2013.
- (31) *The 19th World Congress of International Federation of Automatic Control (IFAC)*, Cape Town South Africa, August 24-28, 2013.
- (32) *The 46th ISCIE (the Institute of Systems, Control and Information Engineers) International Symposium on Stochastic Systems Theory and its Applications*, Kyoto Institute of Technology (KIT), Kyoto, *Japan*, November 1-2, 2014.
- (33) *The 27th Chinese Control and Decision Conference (CCDC)*, Qingdao, China during, May 23-May 25, 2015.
- (34) *20th International Conference on System Theory, Control and Computing*, 13-15 October 2016, Sinaia, Romania.
- (35) *The Fifth International Conference on Advanced Control and Optimization in Dynamical Systems (an IFAC Conference)*, Dr. APJ Abdul Kalam Missile Complex, Hyderabad, February 18-22, 2018.
- (36) *The 2020 Advances in Control & Optimization of Dynamical Systems*
- (37) *The 21<sup>st</sup> World Congress of International Federation of Automatic Control (IFAC)*, Berlin, Germany, July 12-17, 2020.

## Publications

Some of our papers can be found at the MathSci Net resources (American Mathematical Society). <http://www.ams.org/mathscinet/MRAuthorID/790318>

- (1) **Shambhu N. Sharma**, H. Parthasarathy and J.R.P. Gupta, Third-order approximate Kushner filter for a non-linear dynamical system, *International Journal of Control*, 79(9), pp. 1096-1106, 2006. (doi: 10.1080/00207170600800124). *MR 2242909*
- (2) **Shambhu N. Sharma** and H. Parthasarathy, Dynamics of a stochastically perturbed two-body problem. *Pro. R. Soc. A*, The Royal Society: London, 463, pp.979-1003, 2007. *MR 2242909*

- (3) **Shambhu N. Sharma**, and H. Parthasarathy, A two-body continuous-discrete filter, *Nonlinear Dynamics*, 51(nos. 1-2), 155-170, 2008. [MR2310133](#)
- (4) **Shambhu N. Sharma**, and H. Parthasarathy, Volterra series arising from the discrete Schrodinger wave equation in Hilbert space, *Applied Mathematics and Computation*, 196, pp. 563-569, 2008.  
[MR2388712](#)
- (5) **Shambhu N. Sharma**, Non-linear filtering for a dust-perturbed two-body model, *Nonlinear Dynamics*, 55, pp.221-238, 2009 [MR2466116](#)
- (6) **Shambhu N. Sharma**, A Kolmogorov-Fokker-Planck approach for a stochastic Duffing-van der Pol system, *Differential Equations and Dynamical Systems*, 16(4), pp. 351-377, October, 2008. [MR2534592](#)
- (7) **Shambhu N. Sharma**, A Kushner approach for small random perturbations of a stochastic Duffing-van der Pol system, *Automatica*, 45, pp. 1097-1099, 2009.  
[MR2535935](#)
- (8) **Shambhu N Sharma**, A connection between multi-linear and Volterra systems, *Applied Mathematics and Computation*, 216 (7), 1918-1922, 2010. [MR2647059](#)
- (9) Hiren G Patel and **Shambhu N. Sharma**, Some evolution equations for an Ornstein-Uhlenbeck process-driven dynamical system, *Fluctuation and Noise Letters*, 11(4), 1250020-39, 2012.
- (10) Hiren G Patel and **Shambhu N. Sharma**, "Third-order continuous-discrete filtering equations for a non-linear dynamical system," *The ASME Transactions: Journal of Computational and Nonlinear Dynamics*, 9(3), 034502-9, July 2014.
- (11) Hiren G Patel and **Shambhu N. Sharma**, "Filtering for a Duffing-van der Pol stochastic differential equation," *Applied Mathematics and Computation*, 226, 386-397, 2014. [MR3144318](#).
- (12) Nanasaheb S Patil and **Shambhu N Sharma**, A prediction theory for a coloured noise-driven stochastic differential system, *System Sciences and Control Engineering* (a Taylor and Francis Journal), 2 (1), 342-350, 2014.
- (13) Nanasaheb S Patil and **Shambhu N Sharma**, Some new results on bilinear stochastic systems, *Journal of Decision and Control*.
- (14) Nanasaheb S Patil and **Shambhu N Sharma**, On the theory of a time-varying bilinear Stratonovich stochastic differential system and its application to a dynamic

circuit, *Proceedings of the ISCIE International Symposium on Stochastic Systems Theory and its Applications*, Vol. 2014, pp. 312-318, 2014.

(15) Nanasaheb S Patil and **Shambhu N Sharma**, On the mathematical theory of a time-varying bilinear Stratonovich stochastic differential system and its application to two dynamic circuits, *Transactions of the Institute of Systems, Control and Information Engineers*, vol 27, no.12, 485-492, 2014.

(16) Ravish H. Hirpara and **Shambhu N. Sharma**, On a wind turbine-generator system in the presence of wind speed noise and Fokker-Planck equations, *IFAC Proceedings Volumes*, Vol.47, issue 1, pp. 928-935, 2014.

(17) **Shambhu N. Sharma** and Ravish H. Hirpara, An underwater vehicle dynamics in the presence of noise and Fokker-Planck equations, *IFAC Proceedings Volumes*, vol 47, issue 3, pp. 8805-8811, 2014.

*(The IFAC Foundation extended a 1000 Euro support to the first Author of the paper)*

(18) Nanasaheb S Patil and **Shambhu N. Sharma**, On a non-linear stochastic dynamic circuit using Stratonovich differential, *Journal of the Franklin Institute* volume 352, issue 8, 2999–3013, August 2015. [MR3369913](#)

(19) Ravish H Hirpara and **Shambhu N Sharma**, An Ornstein-Uhlenbeck Process-Driven Power System Dynamics, *IFAC-Papers On Line*, vol 48, issue 30, pp. 409–414, 2015.

(20) Ravish H Hirpara and **Shambhu N Sharma**, On the stochasticity of a machine swing equation using Itô differential, *Proceedings of the ISCIE International Symposium on Stochastic Systems Theory and its Applications*, Vol. 2015, pp. 142-148, 2015.

(21) Balaji G Gawalwad and **Shambhu N Sharma**, Coloured noise analysis of a phase-locked loop system: beyond Itô and Stratonovich stochastic calculi, *Differential Equations and Dynamical Systems*, vol 24 (2), 231-245, 2016. [MR 2242909](#)

(22) Balaji G Gawalwad and **Shambhu N Sharma**, On a non-linear electronic circuit filtering, *Circuits, Systems and Signal Processing (CSSP) Journal*, vol 35, issue 2, pp 459-480, February 2016.

(23) Ravish H Hirpara and **Shambhu N Sharma**, On the stochastic filtering theory of a power system dynamics, *Transactions of the Institute of Systems, Control and Information Engineers*, vol 29, no 1, 09-17, 2016.

- (24) Nanasaheb S Patil and **Shambhu N Sharma**, A half-wave rectifier circuit as a bilinear stochastic differential system, *IFAC-Papers On Line*, vol 49, issue 1, pp. 272–277, 2016.
- (25) Sandhya Rathore and **Shambhu N Sharma**, Effect of switching uncertainty on a boost converter under a coloured noise influence, *International Journal of Dynamics and Control*, a Springer Journal, vol 5, Issue 2, pp 274–286, June 2017. [MR3656598](#)
- (26) Sandhya Rathore, and **Shambhu N. Sharma**, Consensus on Itô vs Stratonovich Dilemma Revisited, *IFAC-Papers On Line*, Volume 51, Issue 1, 2018, Pages 719-724.
- (27) Shaival Nagarsheth, **Shambhu N. Sharma**, “Control of non-minimum phase systems with dead time: a fractional system viewpoint” *International Journal of Systems Science*, Vol.51, No. 11, 1905-1928, 2020. [MR4128541](#)
- (28) Shaival Nagarsheth, **Shambhu N. Sharma**, “The combined effect of fractional filter and Smith Predictor for enhanced closed-loop performance of integer order time-delay systems: some investigations”, *Archives of Control Sciences (The Journal of Polish Academy of Sciences)*, Vol. 30, No. 1, 47-76, 2020. [MR 4090330](#)
- (29) Dhruvi S. Bhatt and **Shambhu N. Sharma**, “Carleman linearisation based estimation technique for a noise influenced electronic circuit”, *Electronics Letters*, 56 (12), 589-592, 2020.
- (30) Sandhya Rathore, **Shambhu N. Sharma**, Dhruvi S. Bhatt, Shaival Nagarsheth, “Non-linear filtering for bilinear stochastic differential systems: a Stratonovich perspective”, *Transactions of the Institute of Measurement and Control*, Vol. 42, No. 10, 1755-1768, 2020.
- (31) Dhruvi S. Bhatt, Shaival Nagarsheth, and **Shambhu N. Sharma**, “On the theory of a non-linear dynamic circuit filtering”, *Fluctuations and Noise Letters*, Vol. 19, No. 3, 2020.
- (32) Shaival Nagarsheth, **Shambhu N. Sharma**, “The impact of fractional-order control on blood pressure regulation”, *International Journal of E-Health and Medical Communications*, vol. 12(3), 38-54, 2021.
- (33) Shaival Nagarsheth, Dhruvi Bhatt, Ravish H. Hirpara, **Shambhu N. Sharma**, “Non-linear filter design for a counter-flow heat exchanger: some investigations”, *International Journal of Dynamics and Control*, 2021.

- (34) Shaival H Nagarsheth, Dhruvi Bhatt and **Shambhu N. Sharma**, “Filtering theory for a weakly coloured noise process”, *Differential Equations and Dynamical Systems*, 2020.
- (35) Shipra Kumari, Rakesh Maurya and **Shambhu N. Sharma**, Port-controlled Hamiltonian-based controller for an interleaved boost PFC converter, *IET Power Electronics*, 13 (16), 3627-3636.
- (36) Shipra Kumari, **Shambhu N. Sharma** and Rakesh Maurya, Passivity-based controllers for ZVS quasi resonant boost converter, *IET Control Theory & Applications*, 2020.
- (37) Kumari Shipra, Rakesh Maurya, and **S.N. Sharma**, Brayton-Moser passivity-based controller for electric vehicle battery charger, *CPSS Transactions on Power Electronics and Applications*, 2020.
- (38) Kumari Shipra, Rakesh Maurya, and S.N. Sharma, “A passivity-based controller for an interleaved boost PFC converter,” *International Journal of Power Electronics* 2020.
- (39) Shaival Nagarsheth, **Shambhu N. Sharma**, “Sensitivity integrals and related inequalities: a control viewpoint”. <https://arxiv.org/abs/1910.13083>
- (40) Dhruvi S. Bhatt, **Shambhu N. Sharma**, “Estimation of the van de Vusse reactor via Carleman embedding”. <https://arxiv.org/abs/1909.13042>.
- (41) Dhruvi Bhatt, Shambhu N Sharma, “Volterra model-based control of non-linear systems via Carleman embedding. <https://arxiv.org/abs/2101.00495>

**Book Chapters** (all chapters are *solicited*)

- (1) **Shambhu N. Sharma**, The Itô calculus for a noisy dynamical system, *Stochastic Control* (Chris Myers, Ed.), Sycio Science publisher, Vienna, Rizeka, August 2010, pp. 21-40.
- (2) **Shambhu N. Sharma** and Hiren G Patel, The Fokker-Planck equation, *Stochastic Control* (Chris Myers, Ed.), Sycio Science publisher, Vienna, Rizeka, August 2010, pp. 1-20.
- (3) **Shambhu N. Sharma**, Some appealing classical and stochastic evolution equations, *Evolution Equations* (Arthur L Cleys, Ed.), Nova Science publisher, Hauppauge, New York, May 2012, pp. 153-164.

(4) Nanasaheb S. Patil and **Shambhu N. Sharma**, Master equations in the theory of stochastic processes, *Evolution Equations* (Arthur L Cleys, Ed.), Nova Science publisher, Hauppauge, New York, May 2012, pp.419-432.

**Selected Refereed ‘Conference and Symposium Papers’ and Extended Abstract publication**

(1) Dhruvi S. Bhatt, and **Shambhu N Sharma**, The Carleman linearization and the Fokker-Planck based state estimation of a benchmark two-tank problem, *21st IFAC World Congress*, Berlin, Germany, July 12-17, 2020.

**(The paper was adjudged for the IFAC foundation YAS award and Dr. A P J Abdul Kalam Memorial International Travel Award of the ACOGS to the first Author of the paper).**

(2) Shaival Nagarsheth, and **Shambhu N Sharma**, Smith predictor embedded analytical fractional-order controller design: A delayed Bode’s ideal transfer function approach, *21st IFAC World Congress*, Berlin, Germany, July 12-17, 2020.

**(The paper was adjudged for the IFAC-YAS award to the first Author of the paper)**

(3) Ravish H. Hirpara and **Shambhu N. Sharma**, On the Stratonovich approach for a satellite dynamics, *21st IFAC World Congress*, Berlin, Germany, July 12-17, 2020.

(4) Shaival Nagarsheth, **Shambhu N Sharma**, “On the RNGA based interaction indicator for non-square multivariable control systems: properties and application, *the 21st IFAC World Congress*, Berlin, Germany, July 12-17, 2020.

**(The paper was adjudged for the IFAC-YAS award to the first Author of the paper)**

(5) **Shambhu N Sharma** and Balaji G Gawalwad, Wiener meets Kolmogorov, *Norbert Wiener in the 21<sup>st</sup> Century* (Thinking Machines in the Physical World), 2016 IEEE (CSS) and IEEE (SSIT) IFAC Conference, , Jul 13-Jul 15, University of Melbourne, Australia



- (5) Ravish H Hirpara and **Shambhu N Sharma**, A hybrid non-linear filter for an Unmanned Aerial Vehicle (UAV) dynamics, *20th International Conference on System Theory, Control and Computing*, 13 - 15 October 2016, Sinaia, Romania.
- (6) Ravish H Hirpara and **Shambhu N Sharma**, On a phase tracking problem: continuous-discrete filtering approaches, *the 27 th Chinese Control and Decision Conference (CCDC)*, Haiqing Hotel, Qingdao, China, May 23-25, 2015.
- (7) Balaji G Gawalwad and **Shambhu N Sharma**, On a perturbed phase-locked loop system: a simple physical model, *the 2013 Multi-Conference on Systems and Control : IEEE Control Systems Society Conference*, Hyderabad, India, August 28, 2013.
- (8) Ravish H Hirpara and **Shambhu N Sharma**, On a phase tracking problem: non-linear filtering approaches, *3rd International Conference on Systems and Control: an IEEE Control Systems Society Conference*, Algiers, Algeria, October 29-31, 2013.
- (9) Sandhya Rathore and **Shambhu N Sharma** A non-linear switched system, the Lagrangian method and Itô theory, *The SICE (The Japanese Society of Instrumentation and Control Engineers) Annual Conference 2013*, Nagoya University, Nagoya, Japan, September 15, 2013.
- (10) Sandhya Rathore and **Shambhu N Sharma** A Fokker-Planck model for a non-linear switched system, *3rd International Conference on Systems and Control*, an IEEE Control Systems Society Conference, Algiers, Algeria, October 29-31, 2013.
- (11) Nanasaheb S Patil and **Shambhu N Sharma**, A note on a sampling mixer under the coloured noise influence, *the 2012 Multi-Conference on Systems and Control (MSC)*, an IEEE Control Systems Society Conference, Dubrovnik Palace Hotel, Dubrovnik, Croatia, October 3, 2012.
- (12) Balaji G Gawalwad and **Shambhu N Sharma**, Noise analysis of a CMOS inverter using Itô stochastic Differential Equation, *the 2012 Multi-Conference on Systems and Control (MSC)*, an IEEE Control Systems Society Conference, Dubrovnik Palace Hotel, Dubrovnik, Croatia, October 3, 2012.

### ***PhD Theses Supervised***

- (1) Dr. Prashant K Shah (D16ECE 002), *co-supervised*.
- (2) Dr. Sandhya Rathore (D11EL 001), *single supervision*.

- (3) Dr. Ravish H Hirpara (D11EL002), *single supervision*
- (4) Dr. Nanasaheb S. Patil (D10EL704), *single supervision*.
- (5) Dr. Balaji Ganapatrao Gawalwad (DS10EL704), *single supervision*
- (6) Dr. Hiren G. Patel (D09EL 702), *single supervision*
- (7) Dr. Hardik Desai (D06EL702), *co-supervised*

### **A CSIR Research Project**

(1) **Shambhu N Sharma** (Principal Investigator), Development of stochastic filtering algorithms for coloured noise processes: control-theoretic perspective, CSIR research grant scheme, Engineering Sciences, New Delhi, CSIR, No. 22(0679)/14/EMR-II, date of commencement, January 1, 2015, completion date, December 31, 2016, two-year duration.

*Outcomes:* The CSIR is credited to the following publications:

1. Balaji G Gawalwad and **Shambhu N Sharma**, On a non-linear electronic circuit filtering, *Circuits, Systems and Signal Processing (CSSP) Journal*, vol 35, issue 2, pp 459-480, February 2016. <http://link.springer.com/article/10.1007/s00034-015-0070-0>
2. **Shambhu N Sharma** and Balaji G Gawalwad, Wiener meets Kolmogorov, *Norbert Wiener in the 21<sup>st</sup> Century* (Thinking Machines in the Physical World), 2016 IEEE (CSS) and IEEE (SSIT) IFAC Conference, , Jul 13-Jul 15, University of Melbourne, Australia. <http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=7547457>

### **An MHRD Pedagogy Project**

(1) **Shambhu N Sharma (Principal Developer)** , Probability Theory and Stochastic Processes , National Mission Project on Education through ICT under the aegis of IIT Khargpur, Sponsored by Ministry of Human Resource Development (MHRD), Govt. of India, *Course released*.

*Intended Audience:* Core Course, seventh semester, Electronics and Communication Engineering

(With Dr. Satish Chand (**Co-Developer**), Professor, Department of Computing and Information Sciences, Jawaharlal Nehru University, New Delhi, India)

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### ***'Self-financed' Dissemination Programs***

(1) A week short term course on '*Recent Trends in Control and Instrumentation*' Electrical Engineering Department, SVNIT Surat, India, January 28- February 1, 2013.

(Role: Main Teacher and Co-ordinator)

(2) A week short term course on '*Advances in Control and Instrumentation Education*', Electrical Engineering Department, SVNIT Surat, India, February 24-28, 2014.

(Role: Main Teacher and Co-ordinator)

### ***AICTE-QIP Short Term Courses***

(1) A week short term course on *Advances in Control and Instrumentation Education and their Implementation*, SV NIT Surat, India, December 12-16, 2016.

(Role: One of the Teachers and Co-ordinator)

### ***TEQIP III'-Sponsored' Courses/Workshops***

(1) A week short term course on '*Advances in Control and Instrumentation Education*' and *Implementations*, Electrical Engineering Department, S V NIT Surat, India, December 9-13, 2019.

(Role: One of the Co-ordinators and one of the Teachers)

(2) A week short term course on '*Power Electronics for Distributed Generation and Electrical Drives*, Electrical Engineering Department, S V NIT Surat, India, March 2-6, 2020.

(Role: One of the Co-ordinators and one of the Teachers)

(3) Rahul Radhakrishnan, Gangireddy Sushnigdha, Hiren G. Patel and **Shambhu Nath Sharma**, *Advances in Control Systems Engineering and Applications*, September 23, 2020 to September 27, 2020.

(Role: One of the Co-ordinators and Teacher)

(4) Rahul Radhakrishnan, Gangireddy Sushnigdha, Hiren G. Patel and **Shambhu Nath Sharma**, *Advances in Control Systems Engineering and Applications*, February 24, 2021 to February 28, 2021.

(Role: One of the Co-ordinators and Teacher)

### ***TEQIP II'-Sponsored' Courses***

(1) A week short term course on '*Power electronic circuits and control*', Electrical Engineering Department, SVNIT Surat, India, December 14-18, 2015.

(Role: One of the Co-ordinators and one of the Teachers).

(2) A week short term course on '*Power filter technology and control*', Electrical Engineering Department, SVNIT Surat, India, June 2-6, 2014.

(Role: One of the Co-ordinators and one of the Teachers).

(3) A week short term course on '*Power electronic systems and control*' Electrical Engineering Department, SV NIT Surat, India, scheduled, December 8-12, 2014.

(Role: One of the Co-ordinators and One of the Teachers)

(4) A week short term course on '*Advances in control and instrumentation education*', Electrical Engineering Department, SVNIT Surat, India, May 18-22, 2015.

(Role: One of the Co-ordinators and one of the Teachers)

### **Invited talks Co-ordinated**

(i) An invited talk on 'Path planning and minimum time grabbing of tumbling satellites' by *Professor Issac Kurien*, Indian Institute of Space Sciences and Technology, July 7, 2016, at Electrical Engineering Department, SV National Institute of Technology, Surat, India.

(Role: The Co-ordinator)

(ii) An invited talk on 'Option pricing and Credit risk' by *Professor M K Ghosh*, Indian Institute of Science, Bangalore, November 22, 2016, at Electrical Engineering Department, SV National Institute of Technology, Surat, India.

(Role: The Co-ordinator)

### **Institutional Duty**

Dean (Academic), SV National Institute of Technology.

*Declaration:* The contents of the CV are completely true to the best of knowledge of the undersigned. Date April 4, 2021.



Dr. S N Sharma