# BRATIN GHOSH

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Indian Institute of Technology,
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## PROFILE

Accomplished researcher in the field of Electrical and Computer Engineering.

- Engaged in leading edge research in Green's function based computational techniques and design and analysis of efficient antennas, miniaturized antennas and metamaterials.
- Invited speaker, Technical Program Committee member and Session Chair in various national and international conferences.
- Serve in the review board of prominent national and international journals in Microwave Engineering. Editorial board member for the Journal of Microwave Engineering and Technologies.

## EDUCATION

**Ph. D. Electrical and Computer Engineering; Applied Electromagnetics – 1995 – 2002**
University of Manitoba – Winnipeg, Canada
Thesis topic: Modal and Transmission Line Matrix (TLM)-Based Analyses of Discontinuities in the Non-Radiating Dielectric Waveguide and Components

**Master of Technology (Electronics & Electrical Communication Engineering; Specialization: Microwave Engineering) – 1992 – 1994**
Indian Institute of Technology – Kharagpur, India
Thesis topic: Analysis of Rectangular Waveguide and Fin Line Leaky Wave Antenna

**Bachelor of Electronics & Telecommunication Engineering – 1986 – 1990**
Jadavpur University – Calcutta, India

## SKILLS

**Research**

- Full-wave Green's function analysis of low-loss and efficient antennas and antenna feeds.
- Full-wave and efficient analysis of multilayer structures.
- Design and full-wave analysis of antennas around conducting structures.

- Enhancement in the radiated power gain of electrically small antennas and arrays using metamaterials.
- Design of miniaturized and efficient planar and non-planar antennas.
- Design and multimode analysis of dual-band, multi-band and broadband antennas.
- Full-wave analysis of low-loss guided wave structures and components using the Transmission Line Matrix method interfaced with the Perfectly Matched Layer ( PhD thesis work ).
- Collaborate with national defence laboratories on several sponsored projects on the design and analysis of efficient antennas.
- Conducted research on low-loss antennas and guided structures at premier federal government research laboratories e.g. Communications Research Centre, Ottawa, Canada (Advanced Antenna Technology Group, Radio Science Branch).
- Significant experience and expertise in research at R&D divisions in the industry both in India and abroad.

**Teaching**

- Taught the following courses at the Indian Institute of Technology, Kharagpur, India :

Graduate level :
RF and Microwave Networks
Antenna Theory and Practice
Advanced Electromagnetic Engineering
Antennas and Propagation for Wireless Communication Systems
Analytical and Computational Techniques in Electromagnetics
RF and Microwave Integrated Circuits
EMI and EMC Techniques

Undergraduate level :
RF and Microwave Engineering
Electromagnetic Engineering
Basic Electronics

## PROFESSIONAL EXPERIENCE

**Associate Professor**
Indian Institute of Technology – Kharagpur, India **June 2011 – Present**

**Assistant Professor**
Indian Institute of Technology – Kharagpur, India **December 2005 – June 2011**

**Design Manager**
VXL Technologies Ltd. – Kolkata, India **June 2005 – November 2005**

**RF Consultant**
Polar Waves Consulting – Salisbury, USA **January 2004 – May 2005**

**Research Associate**
Department of Electrical and Computer Engineering,
Royal Military College of Canada – Kingston, Canada **September 2002 – December 2003**

**Research Assistant**
Advanced Antenna Technology Group, Radio Science Branch,
Communications Research Centre – Ottawa, Canada **May 1997 – August 2002**

**Research and Teaching Assistant**
Department of Electrical and Computer Engineering,
University of Manitoba – Winnipeg, Canada **September 1995 – April 1997**

**Senior Engineer**
R&D Hardware, Wipro Infotech Limited – Bangalore, India **1994**

**Lecturer**
Technology Centre – Calcutta, India **1992**

**Engineer**
R&D Hardware, Hamilton Research & Technology (P) Ltd – Calcutta, India **1991 – 1992**

## THESIS SUPERVISED

### PH. D.

[1]Anandrao Bajirao Kakade, "Modal Analysis and Mode Excitation of Multilayer Hemispherical Dielectric Resonator Antennas using an Efficient Computation Technique," 2010. (single guidance)

[2]S.K. Moinul Haque, "Conformal Loop Antennas with a Conducting Cone," 2014. (single guidance)

### MASTERS

Master of Science : Susmita Ghosh, "Gain Enhancement of Electrically Small Antennas using Metamaterials," 2008. (single guidance)
Master of Technology : 29 theses. (single guidance)

## MONOGRAPH

TLM Analysis of Non-Radiating Waveguide Structures and Components, VDM Verlag, 2010.

## AWARDS / SCHOLARSHIPS

University of Manitoba Graduate Fellowship, 1997
Medal of Honour, Defence Electronics Applications Laboratory, 2010
Medal of Honour, Indian Navy, 2010.

## MEMBERSHIP

Senior Member, Institute of Electrical and Electronic Engineers (IEEE), USA.

## MEMBER, EDITORIAL BOARD :

Journal of Microwave Engineering and Technologies.

## PUBLICATIONS

### JOURNAL PAPERS :

1. **B. Ghosh**, and A.B. Kakade, "Mode excitation in the microstrip slot-coupled three-layer hemispherical dielectric resonator antenna" accepted for publication in the *IET Microwaves, Antennas Propag.*

2. D. Mitra, **B. Ghosh**, A. Sarkhel and S.R. Bhadra Chaudhuri, "A miniaturized ring slot antenna design with enhanced radiation characteristics," *IEEE Trans. Antennas Propag.*, vol. 64, pp. 300-305, Jan. 2016.

3. **B. Ghosh**, D. Kiranmayi and R.M. Mandal, "Arc-Monopole coupled DRA," *Progress in Electromagnetics Research B,* vol. 64, pp. 1-14, 2015.

4. **B. Ghosh**, S.K. Moinul Haque and N.R. Yenduri, "Miniaturization of slot antennas using wire loading," *IEEE Antennas and Wireless Propagation Letters,* vol. 12, pp. 488-491, 2013.

5. **B. Ghosh**, S.K. Moinul Haque and P. Halder, "Analysis of arbitrary multiple loop antennas around a conducting cone, with rotational symmetry," *IET Microwaves, Antennas Propag.*, vol. 7, pp. 111-122, Jan. 2013.

6. **B. Ghosh** and A.B. Kakade, "Guided modes in a metamaterial-filled circular waveguide," *Electromagnetics*, vol. 32, pp. 465-480, Nov. 2012.

7. A.B. Kakade and **B. Ghosh**, "Analysis of the rectangular waveguide slot coupled multilayer hemispherical dielectric resonator antenna," *IET Microwaves, Antennas Propag.*, vol. 6, pp. 338-347, Feb. 2012.

8. A.B. Kakade and **B. Ghosh**, "Mode excitation in the coaxial probe coupled three-layer hemispherical dielectric resonator antenna," *IEEE Trans. Antennas Propag.*, vol. 59, pp. 4463-4469, Dec. 2011.

9. **B. Ghosh**, S.K. Moinul Haque and D. Mitra, "Miniaturization of slot antennas using slit and strip loading," *IEEE Trans. Antennas Propag.*, vol. 59, pp. 3922-3927, Oct. 2011.

10. **B. Ghosh**, S.K. Moinul Haque, D. Mitra, and S. Ghosh, "A loop loading technique for the miniaturization of non-planar and planar antennas," *IEEE Trans. Antennas Propag.*, vol. 58, pp. 2116-2121, June 2010.

11. **B. Ghosh** and S. Ghosh, "Gain enhancement of an electrically small antenna array using metamaterials," *Applied Physics A*, vol. 102, pp. 345 – 351, Feb. 2011.

12. A.B. Kakade and **B. Ghosh**, "Efficient technique for the analysis of coaxial-probe coupled hemispherical dielectric resonator antenna," *Microwave and Optical Technology Letters*, vol. 52, pp. 1588-1591, Jul 2010.

13. **B. Ghosh**, K. Ghosh and C.S. Panda, "Coplanar waveguide feed to the hemispherical DRA," *IEEE Trans. Antennas Propag.*, vol. 57, pp. 1566-1570, May 2009.

14. A.B. Kakade and **B. Ghosh**, "Efficient technique for the analysis of microstrip slot coupled hemispherical dielectric resonator antenna," *IEEE Antennas and Wireless Propagation Letters*, vol. 7, pp. 332-336, 2008.

15. **B. Ghosh**, S. Ghosh and A.B. Kakade, "Investigation of gain enhancement of electrically small antennas using double-negative, single-negative and double-positive materials," *Physical Review E*, vol. 78, pp. 026611-1 - 026611-13, Aug 2008.

16. A.B. Kakade and **B. Ghosh**, "Inclined slot coupled hemispherical dielectric resonator antenna," *Microwave and Optical Technology Letters*, vol. 50, pp. 1527-1530, June 2008.

17. **B. Ghosh**, N.R.S. Simons, L. Shafai, A. Ittipiboon and A. Petosa, "Analysis of NRD waveguide-based components and transitions using the TLM based modal extraction approach," *Canadian Journal of Electrical and Computer Engineering*, vol. 31, pp. 15-24, Jan. 2006.

18. **B. Ghosh**, Y.M.M. Antar, A. Petosa and A. Ittipiboon, "CPW feed to rectangular DRA," *Microwave and Optical Technology Letters*, vol. 45, pp. 210-216, May 2005.

19. **B. Ghosh**, N.R.S. Simons, L. Shafai, A. Ittipiboon and A. Petosa, "TLM-based modal-extraction approach for the investigation of discontinuities in the rectangular waveguide and the NRD," *IEEE Trans. Microwave Theory Tech.*, vol. 50, pp. 2294-2304, Oct. 2002.

**CONFERENCE PUBLICATIONS :**

1. S.K. Moinul Haque, D. Mitra and **B. Ghosh**, "Dual-band cylindrical dielectric resonator antenna excited by coplanar waveguide", *International Conference on Communication, Computers and Devices*, Kharagpur, India, pp. 1-3, 10 - 12 Dec. 2010.

2. D. Mitra, S.K. Moinul Haque and **B. Ghosh**, "Metal loaded miniaturized CPW fed DRA", *International Conference on Applied Electromagnetics Conference (AEMC)*, Kolkata, India, pp. 1-3, 14 - 16 Dec. 2009.

3. S.K. Moinul Haque, D. Mitra, **B. Ghosh**, "Miniaturized C-slot patch antenna for wireless communication", *International Conference on SPCOM2010,* IISc Bangalore, India, 18-21 July 2010.

4. **B. Ghosh**, Y.M.M. Antar, A. Petosa and A. Ittipiboon, "Feed Configurations of CPW fed DRA," *IEEE Antennas and Propagation Society International Symposium*, Monterey, USA, vol. 2, pp. 1347-1350, June 2004.

5. **B. Ghosh**, Y.M.M. Antar, S.F. Mahmoud, A. Petosa and A. Ittipiboon, "CPW fed Leaky Wave Antenna using Resonance Gain," *IEEE Antennas and Propagation Society International Symposium*, Monterey, USA, vol. 3, pp. 3225-3228, June 2004.

6. **B. Ghosh**, Y.M.M. Antar, A. Petosa and A. Ittipiboon, "CPW fed DRA," *10th International Symposium on Antenna Technology and Applied Electromagnetics and URSI Conference*, Ottawa, Canada, pp. 591-594, July 2004.

7. **B. Ghosh**, N.R.S. Simons, L. Shafai, A. Ittipiboon, A. Petosa and M. Cuhaci, "Modal Extraction for a Slot in an NRD Ground Plane using the Transmission Line Matrix Method," *U.R.S.I. National Radio Science Meeting,* Orlando, USA, pp. 99, July 1999.

8. **B. Ghosh**, N.R.S. Simons, L. Shafai, A. Ittipiboon, A. Petosa and M. Cuhaci, "Extraction of Generalized Scattering Matrix Coefficients of Waveguide Discontinuities using the TLM Method," *Symposium on Antenna Technology and Applied Electromagnetics*, Ottawa, Canada, pp. 535-538, August 1998.

9. **B. Ghosh**, N.R.S. Simons, L. Shafai, A. Ittipiboon, A. Petosa and M. Cuhaci, "Characterization of an NRD Slot for the Design of an NRD Based Slot Array," *IEEE Antennas and Propagation Society International Symposium*, Atlanta, USA, vol. 3, pp. 1405-1408, June 1998.

10. N.R.S. Simons, G.E. Bridges, **B. Ghosh** and M. Cuhaci, "Investigation of Floating-Point Round-off Errors within Time-Domain Electromagnetic Field Computations," *IEEE Antennas and Propagation Society International Symposium*, Atlanta, USA, vol. 1, pp. 260-263, June 1998.

11. **B. Ghosh**, L. Shafai, A. Ittipiboon and D.J. Roscoe, "Slot Array in Non-Radiating Dielectric Waveguide," *IEEE Antennas and Propagation Society International Symposium*, Montreal, Canada, vol. 4, pp. 2508-2511, July 1997.

## INVITED SPEAKER AT THE FOLLOWING CONFERENCES / SHORT-TERM COURSES :

1. Millimeter -wave Technology, IIT Kharagur, 2016.
2. Design of Microwave Filters and Passive Components, IIT Kharagpur, 2016.
3. National Conference on Innovative Engineering Technologies (NCIET 2016), Christ University, Bangalore, 2016.
4. International Workshop on Antenna Innovations and Modern Technologies (iAIM-2015) for Communications, Navigations & Remote Sensing Systems, Ahmedabad, 2015.
5. Summer Workshop on RF and Microwave Engineering, St. Thomas' College of Engineering and Technology, Kolkata, 2015.
6. Antennas and Microwave Passive Components - Design and Measurements, IIT Kharagpur, 2015.
7. Diverse Applications on Microwave Engineering, RCC Institute of Information Technology, Kolkata, 2015.
8. Electromagnetic Theory and Applications, NIT Durgapur, 2015.
9. RF and Microwave-cum-Advanced RF CMOS Design, IIT Kharagpur, 2014.
10. 3rd International Conference and Exhibition on Biosensors & Bioelectronics, San Antonio, USA, 2014.
11. Refresher Program on Basic Theoretical Topics of RF and Microwaves, IIT Kharagpur, 2013.
12. Microwave Fundamentals & its Application in Radar & Avionics, IIT Kharagpur, 2012.
13. 31st Progress in Electromagnetics Research Symposium (PIERS), Kuala Lumpur, Malaysia, 2012.
14. RF and Microwave Engineering with Emphasis on Hands-on Lab Exercises, Ambedkar Institute of Technology, Delhi, 2010.
15. Electromagnetic Environmental Effects (E3) Management Course, INS Valsura, Jamnagar, 2010.
16. Co-Chair for the session on Antenna and Electromagnetic Propagation - II at the International Conference on Communication, Computers and Devices, IIT Kharagpur, 2010.
17. Fundamentals and Recent Advances in RF and Microwave Communication, IIT Kharagpur, 2009.
18. Microwave Conference, University of Rajasthan, Jaipur, 2008.
19. Microwave Laboratory Experiments for Faculties and Laboratory Technicians, Asansol Engineering College, 2007.
20. Microwave & EMI Measurement, IETE, Kolkata, 2007.
21. Electromagnetic Interference (EMI), Electromagnetic Compatibility (EMC) and Electromagnetic Pulse (EMP), IIT Kharagpur, 2006.
22. Microwave Conference, University of Rajasthan, Jaipur, 2006.

23. Session Chair for the session on Diverse Antenna Applications at the IEEE AP-S International Symposium on Antennas and Propagation and USNC/URSI National Radio Science Meeting, Monterey, California, 2004.

## SHORT-TERM COURSES ORGANIZED :

1. Efficient Antennas and Guided Systems, IIT Kharagpur, 2016.
2. Design and Analysis of Efficient Antennas and Guided Systems, IIT Kharagpur, 2016.
3. Dielectric Resonator Antennas- Analysis and Design, IIT Kharagpur, 2015.
4. Design & Analysis of Efficient Antennas for Wireless Communication, IIT Kharagpur, 2015.
5. Design & Analysis of Efficient Systems for Microwave Transmission & Radiation, IIT Kharagpur, 2015.
6. Current Trends in the Design and Analysis of Microwave Antennas and Guided Systems, IIT Kharagpur, 2014.
7. Current Trends in Microwave Design and Applications, IIT Kharagpur, 2012.
8. Efficient Systems for Microwave Transmission and Radiation, IIT Kharagpur, 2010.

## REVIEWER/INVITED REVIEWER FOR THE FOLLOWING JOURNALS :

1. IEEE Transactions on Antennas and Progagation.
2. IEEE Antennas and Wireless Propagation Letters.
3. IET Microwaves, Antennas and Propagation.
4. Progress in Electromagnetics Research.