

Curriculum Vitae



Sisir Kumar Garai was born in 1971 in West Bengal, India. He received the M. Sc. degree in Physics in 1994 and the M. Tech degree in Microwaves in 1998, and was awarded the Ph. D degree in Science (Physics) on 6th February, 2012 from 'The University of Burdwan', West Bengal, India. Dr Garai was the head of the Department of Physics since 2002 to 2014. His field of research interest includes Optoelectronics, Optical Computation and Communication, etc., and he has contributed more than fifty papers in different National and International Journals in his area of research. He has received the best paper presentation award in '**16th West Bengal State Science and Technology Congress-2009**' and his name is also included in **Marquis Who's Who-2010 & 2011**, and in **International Biography Centre (IBC)-Cambridge-2011**. Dr Garai is also a Reviewer of different international journals, and Editor of the books "*Selected Topics on Optical Amplifiers in Present Scenario*", ISBN 978-953-51-0391-2, InTech, March 3, 2012, and '*Some Advanced Functionalities of Optical Amplifiers*', ISBN 978-953-51-2237-1, Publisher: InTech, (Croatia). **Dr Garai is the author of the book 'Fundamentals of Frequency Encoded Optical Logic Processors', P'ublisher: LAP LAMBERT Academic Publishing, Germany, ISBN: 978-3-659-76143-0**. He is presently working as an Associate Professor of Physics of M.U.C. Women's College, Burdwan and Research Guide in the field of optical computing and optical communication. Two research scholars have already been awarded Ph.D degree in Physics under the supervision of him and from NIT, Durgapur-713209 in 2018 and 2019, respectively. Dr Garai was the Editor-in-Chief of the multidisciplinary college journal JAST (Journal of Arts ,Science and teaching) from 2015 to 2019, and presently he has been serving as the coordinator of the IQAC of the college.

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Academic profile

1. Name: Dr Sisir Kumar Garai
2. Designation: Associate Professor of Physics
3. Date of Birth: 01.01.1971
4. Academic Qualification:
 - M.Sc (Physics), B.Ed.(Science), M.Tech.(Microwaves), Ph.D(Physics)
 - Specialization in M.Sc: Radio Physics and Electronics
 - Dissertation in M Tech: Design and Development of Microstrip Antenna Array in Ka Band
5. Address:
 - (a) Residence:
 - BIJOY NIKETAN
 - KHAZAANAWAR BERH (WEST)
 - SADARGHAT ROAD, SRIPALLY, BURDWAN-713103
 - (b) Office:
 - M. U. C. Women's College
 - B.C. Road, Burdwan-713104, W.B., India
6. Received Awards:
 - (a) Received Best paper (Electronics) presentation in W.B. State Science and Technology Congress (2009)
 - (b) 100 TOP Scientist in 2011
 - (c) Name is included in International Biography Centre (IBC), Cambridge
 - (d) Name is included in MARCONI'S WHO'S WHO (2012) (AMERICA)
 - (e) Jointly received outstanding paper presentation award in 1'st Regional Science and Technology Congress in Burdwan Division (2016)
7. Experiences:
 - (a) Have been serving as an Assistant Professor of M.U.C. Women's College since 2002 to 2015, and as Associate Professor from 2015 onward.
 - (b) Served the H.O.D. of the department of Physics, M.U.C. Women's College for 12 years (2002 to 2014)
 - (c) Acting as a Referee of different International Journals such as:
 - (i) OPTIK (ii) Optical Engineering (iii) Optics and Laser Technology (iv) Applied Optics (v) Optics and Quantum Electronics (vi) Optical Fiber Technology (vii) Optics Express (viii) Indian Journal of Physics, etc.
 - (d) Acting as the Editor-in-chief of Journal of Arts, Science and Teaching (JAST) (from 2015 onward)
 - (e) Acting as the coordinator of IQAC of the College since 2019
 - (f) Research Experiences: Last 16 years
8. Research Supervision: Joint Supervision with Dr Mrinal Kanti Mandal of NIT, Durgapur
 - (a) No. of Research Scholars awarded Ph.D from NIT, Durgapur: -03,
 - (i) Sumana Mandal (Reg No. NITD/PhD/PH/2015/00694) on 22.10. 2018
 - (ii) Dhoulendra Mandal (Reg No. NITD/PhD/PH/2015/00693) on 25.07.2019
 - (iii) Manas Kumar Garai (Roll No. 20PH1504 & Regn. No. 21RPH052, NIT, Durgapur)
 - (b) Non-Registered scholars-02
9. Field of research work:
 - Nonlinear optics, opto-electronics, optical computing and optical communication
10. Publications:
 - (a) Articles in International Journals: 44
 - (b) Articles in International conferences: 09
 - (c) Articles in national Journals: 01
 - (d) Articles in national/ state level conferences: 03
 - (e) Published Book: 01
 - (f) Edited Books: 02
 - (g) Book Chapter: 02

11. List of publication:

A. Journal papers:

Sl. No.	Title of Paper	ISSN Numbers	I.F
1.	S.K.Garai , D.Samanta, S.Mukhopadhyay, 'All-optical implementation of inversion logic operation by second harmonic generation and wave mixing character of some nonlinear material' Optics and Optoelectronic Technology, China, 6(4), August(2008), 43-46	1672-3392	N.A
2.	S.K.Garai , S. Mukhopadhyay, 'Analytical approach of developing the expression of output of all-optical frequency encoded different logical units and a way-out to implement the logic gates', Optical Fiber Technology, Elsevier, 16(4), June(2010), 250-256	1068-5200	2.050
3.	S.K.Garai , P.Ghosh, S. Mukhopadhyay, 'Analytical approach of developing wavelength encoded AND, NAND and X-OR logic operations and implementation of the theory using Semiconductor optical amplifiers', Optik- Intl. Journal for Light and Electron Optics, Elsevier, 122(7), (2011), 569-576	0030-4026	2.187
4.	S.K.Garai , S. Mukhopadhyay, ' A method of optical implementation of frequency encoded different logic operations using second harmonic& difference frequency generation techniques in non-linear material', Optik- Intl. Journal for Light and Electron Optics, Elsevier, 121(8), (2010), 715-721	0030-4026	2.187
5.	S.K.Garai , S. Mukhopadhyay, 'Method of implementing frequency encoded NOT, OR & NOR logic operations using Lithium niobate waveguide & Reflecting Semiconductor Optical Amplifiers', PRAMANA-journal of physics, 73(5), (2009), 901-912	0304-4289	1.688
6.	S. K.Garai , S. Mukhopadhyay 'Method of all-optical frequency encoded binary adder system using nonlinear waveguide and Reflecting Semiconductor Optical Amplifiers', Optik- Intl. Journal for Light and Electron Optics, Elsevier, 121(20) (2010), 1859-1862	0030-4026	2.187
7.	S.K.Garai , S.Mukhopadhyay, 'Method of implementation of all-optical frequency encoded logic operations exploiting the propagation characters of light through Semiconductor Optical Amplifiers', J. Opt. (Springer), 38(2), (2009), 88-102	0972-8821	
8.	S.K.Garai , S.Mukhopadhyay, ' A scheme of developing frequency encoded tristate logic operations exploiting non-linear character of PPLN waveguide and RSOA', Optik- Intl. Journal for Light and Electron Optics, Elsevier, 122(6) (2011), 498-501	0030-4026	2.187
9.	S.K.Garai , S. Mukhopadhyay, 'Method of implementing frequency encoded multiplexer and demultiplexer systems using nonlinear Semiconductor Optical Amplifiers', Optics and Laser Technology, Elsevier, 41(8), May(2009), 972-976	0030-4020	3.621
10.	S.K.Garai , S.Mukhopadhyay 'A novel method of developing all-optical frequency encoded memory unit exploiting nonlinear switching character of Semiconductor Optical Amplifier', Optics and Laser Technology, Elsevier, 42(7), February (2010), 1122-1127	0030-4020	3.621
11.	P.Ghosh, S.K.Garai , S. Mukhopadhyay , ' <u>Method of developing an all optical wavelength encoded single bit</u>	0030-4026	2.187

	comparator exploiting four wave mixing and wavelength filtering character of nonlinear semiconductor optical amplifiers , Optik- Intl. Journal for Light and Electron Optics, Elsevier, 121(124) (2010), 2230-2233		
12.	S.K.Garai, A. Pal, S.Mukhopadhyay, 'All- optical frequency encoded inversion operation with tristate logic using reflecting semiconductor optical amplifiers ', Optik- Intl. Journal for Light and Electron Optics, Elsevier, 122(17), (2011),1544-1551	0030-4026	2.187
13.	S.K.Garai, 'A scheme of developing frequency encoded tristate-optical logic operations using Semiconductor Optical Amplifier ',Journal of Modern Optics (Taylor and Francis), 57(6) March(2010), 419-428.	0950-0340	1.780
14.	S. K. Garai, 'A method of developing frequency encoded multi-bit optical data comparator using Semiconductor Optical Amplifier ', Optics and Laser Technology(Elsevier), 43(1), June(2011), 124-131	0030-4020	3.621
15.	S.K.Garai, 'Method of all-optical frequency encoded decimal to binary and BCD, binary to gray and gray to binary data conversion using semiconductor optical amplifiers ', Applied Optics, 50(21) July(2011), 3795-3807	1559-128X	1.961
16.	S.K.Garai, 'A novel method of designing all optical frequency encoded Fredkin and Toffoli logic gates using semiconductor optical amplifiers ', IET Optoelectronics, 5(6), (2011) 247-254.	1751-8768	2.118
17.	S. K. Garai 'A novel all-optical frequency encoded method to develop Arithmetic and Logic Unit (ALU) using semiconductor optical amplifiers ', IEEE Journal Of Light wave Technology, 29(23) Oct(2011), 3506-3514.	0733-8724	5.090
18.	S. K. Garai, ' A novel method of developing all optical trinary JK, D-type and T-type flip-flops using semiconductor optical amplifiers ', Applied Optics, 51(11), April(2012), 1757-1764	1559-128X	1.961
19.	P.Ghosh, S.K.Garai 'A novel all optical method of implementing an n-bit wavelength encoded complete digital data comparator using nonlinear semiconductor optical amplifiers ', Optik- Intl. Journal for Light and Electron Optics, Elsevier, 122(17), (2011), 1544-1551	0030-4026	2.187
20.	S. K. Garai,S.Mukhopadhyay, 'All-optical frequency encoded binary half subtractor using periodically poled lithium niobate waveguide and reflecting semiconductor optical amplifier ', Optics and Photonics Letters, 3(1), (2010), 15-22.	1793-7140	
21.	S. K. Garai, 'A new scheme of developing all-optical 4x4 cross-connect switch for WDM network ', J. Optics (Springer), 42(4), (2013), 376-381	972-8821	
22.	S. K. Garai, 'All-optical method of developing some fundamental and functional quaternary logic gates ', OPTIK-Intl. Journal for Light and Electron Optics, Elsevier, 125(3), (2014), 1030-1033.	0030-4026	2.187
23.	S. K. Garai, 'All-optical Quaternary Logic Gates ', , Journal of Modern Optics, Published by Taylor and Francis, 60(12) (2013),993-1005.	0950-0340	1.780
24.	S. K. Garai, 'A novel method of developing all optical frequency encoded Fredkin Gates ', Optics Communications (Elsevier), 313C, (2014), 441-447.	0030-4018	2.125
25.	S.Mandal, D.Mandal, S.K.Garai, 'An all-optical method of developing data communication system with error detection circuit ', Optical Fiber Technology (Elsevier), 20(2), (2014), 120-129.	1068-5200	2.050
26.	D.Mandal, S.Mandal, S.K.Garai, 'A new approach of developing all-optical two- bit- binary data multiplier ', Optics	0030-4020	3.621

	& Laser Technology, Elsevier, 64C, (2014), 292-301.		
27.	S.K.Garai 'All-optical quaternary logic gates -an extension of binary logic gates', Optics & Laser Technology, Elsevier, 67(C), (2015), 125-136.	0030-4020	3.621
28.	D.Mandal, S.K.Garai, 'All-optical binary logic unit (BLU) using frequency encoded data', Optical Fiber Technology, Elsevier, 22(C), (2015), 56-67.	1068-5200	2.050
29.	M.Garai, M.Mondal, S.K.Garai, 'An all-optical frequency encoded full adder using semiconductor optical amplifiers', Optik- International Journal for Light and Electron Optics, Elsevier, 126(7-8), (2015), 813-816.	0030-4026	2.187
30.	D.Mandal, S.Mandal, S.K.Garai 'Alternative approach of developing all-optical Fredkin and Toffoli gates', Optics & Laser Technology, Elsevier, 72(C),(2015), 33-41.	0030-4020	3.621
31.	S.K.Garai 'An all-optical frequency encoded BCD data addition', Optical and Quantum Electronics (Springer), 48(1) (2016), 1-18	0306-8919	1.610
32.	D.Mandal, M. K. Mandal, S.K. Garai, 'Frequency encoded data based optical full adder using reversible Toffoli gates', Journal of optics, 42(02), (2016), 197-207.	0972-8821	
33.	D.Mandal, S. Mandal, S. K. Garai, 'Switching action of Micro Ring Resonator in frequency encoded data processing', JAST (02(01)), 2016, 39-45.	2395-4353	
34.	S.K.Garai, 'Conversion Of Binary To Frequency Encoded And Frequency To Binary Encoded Data' JAST, 01(01), 2015, 37-43.	2395-4353	
35.	S. Mandal, D. Mandal, M. K. Mandal, S. K. Garai. 'Design of frequency-encoded data-based optical master-slave-JK flip-flop using polarization switch' Optical Engineering, 56(6), 2017, 066105-14	ISSN: 0091-3286 E-ISSN: 1560-2303	1.286
36.	S Mandal, MK Mandal, SK Garai. 'A new Approach of Developing All-Optical RS flip flop, JK flip flop and D flip flop using Semiconductor Optical Amplifier'. International Journal of Photonics and Optical Technology 3 (1), 2017, 16-24		
37.	S. Mandal, D. Mandal, M. K. Mandal, S. K. Garai, "Design of optical quaternary adder and subtractor using polarization switching", Journal of Optics, 47(3), Sept- 2018, 332-350	972-8821	
38.	S Mandal , D Mandal, M K Mandal, S K Garai, "Scheme of developing Trinary Logic Unit (TLU) using Polarization-based optical switches", Journal of Computational Electronics, 18 , pages584–618(2019)	Print ISSN 1569-8025	1.620
39.	D Mandal, S Mandal, MK Mandal, SK Garai, 'Theoretical approach of developing a frequency-encoded reversible optical arithmetic and logic unit using semiconductor optical amplifier-based polarization switches', Optical Engineering 58 (1), 2019, p.015104	ISSN: 0091-3286 E-ISSN: 1560-2303	1.286
40.	M.K.Garai, S.K.Garai, M.K.Mandal, "Alternative approach of developing frequency encoded BCD encoder and decoder with polarization switches", Journal of Optics, 2022, Vol. 51(3), pp.565-573.		
41.	M.K.Garai, D.Mandal, S.K.Garai, M.K.Mandal, "An Optical Scheme of developing Hamming Code Based Error Detection and Correction using Reversible Logic Gates with frequency encoded data", Optical Engineering		

	, 2022, Vol.61(12), pp.126102-1-23
42.	M.K.Garai, S.K.Garai, M.K.Mandal, “All-optical programmable array logic (PAL) unit utilizing semiconductor optical amplifier based polarisation switch”, Journal of Modern Optics, 2022, DOI: 10.1080/09500340.2022.2159084
43.	M.K.Garai, S.K.Garai, M.K.Mandal, “An alternative approach of developing a frequency encoded data based asynchronous Counter in C – band”, Journal of Optics,2023,doi.org/10.1007/s12596-023-01189-8.
44.	D.Mandal, M.K.Garai , M.K.Mandal, S.K.Garai, “Optical design of a frequency encoded data based synchronous counter using switching action of semiconductor optical amplifiers”, Journal of Optics, Vol 53 (2504-2517)(1 st Nov.2023)
45.	

11. B. Conference papers:

- [1] D. Mandal, S.Mandal, M. K. Mandal, S.K. Garai, “Design of all-optical binary adder using reversible Peres gates”, Science congress, 2017, Kolkata, India
- [2] D. Mandal, S.Mandal, M. K. Mandal, S.K. Garai, “Design of all-optical binary half and full subtractor with Frequency encoded data”, The International Conference on Fiber Optics and Photonics 2016,OSA, 4-8 Dec, 2016, IIT Kanpur, India.
- [3] D. Mandal, S.Mandal, M. K. Mandal, S.K. Garai, “Design of optical reversible Feynman gate and optical parity generator and checker circuits”, NSCMPLA 2017, 8-9, March, 2017, Burdwan, west Bengal, India.
- [4] D. Mandal, S.Mandal, M. K. Mandal, S.K. Garai, “Design of all-optical one bit binary comparator using reversible logic gates” International Conference on Electronics, Materials Engineering and Nano-Technology (IEMENTech), 2017, 28-29 April 2017, Kolkata, India
- [5] S Mandal, D Mandal, M K Mandal, S K Garai, “A scheme of developing all-optical frequency encoded ternary half adder using polarization switch”, The International Conference on Fiber Optics and Photonics 2016,OSA, 4-8 Dec, 2016, IIT Kanpur, India. DOI: [10.1364/PHOTONICS.2016.Th3A.34](https://doi.org/10.1364/PHOTONICS.2016.Th3A.34)
- [6] S Mandal, D Mandal, M K Mandal, S K Garai, “A scheme of developing optical frequency encoded quaternary NMIN gate and D flip flop”, NSCMPLA 2017, 8-9 March, 2017, Burdwan, west Bengal, India.
- [7] S Mandal, D Mandal, M K Mandal, S K Garai, “Design of all-optical T-gate and Quaternary subtractor circuit”, International Conference on Electronics, Materials Engineering and Nano-Technology (IEMENTech), 2017, 28-29 April 2017, Kolkata, India, DOI: [10.1109/IEMENTECH.2017.8076948](https://doi.org/10.1109/IEMENTECH.2017.8076948)
- [8] S Mandal, D Mandal, M K Mandal, S K Garai, “Design of optical Quaternary Multiplier Circuit using Polarization Switch”, International Conference on Optical and Wireless Technologies (OWT-2018), 10-11 Feb, 2018, Jaipur, India.
- [9] **M.K.Garai**, S.K.Garai, M.K.Mandal, “Scheme of developing an Optical Encoder using Switching and Frequency Conversion Properties of Semiconductor Optical Amplifiers”, International Conference on Physics (ICOP-21), 5th June, 2021, Guntur, India.
- [10] **M.K.Garai**, M.K.Mandal, S.K.Garai, “An alternating approach of developing frequency encoded data based optical packet switching scheme”, 5th International online Conference on Electronics, Material Engineering & Nano-Technology (IEMENTech-2021), September 24-26, 2021, Kolkata, India.
- [11] **M.K.Garai**, M.K.Mandal, S.K.Garai, “Implementation of three input AND gate using polarization switch”, 2nd IEEE International Conference on Communication, Computing and Industry 4.0(C2I4-2021), 16-17 Dec., 2021, Bengaluru, India
- [12] **M.K.Garai**, M.K.Mandal, S.K.Garai, “A novel method of developing SOA based full subtractor”, International Conference(Online Mode) on Signal Processing and Machine Learning Applications (ICSPMLA-2022), 11-12 March, 2022, Hyderabad, India.

11.C. Book Chapters:

1. *‘A Novel Method of Developing Frequency Encoded Different Optical Logic Processors Using Semiconductor Optical Amplifier’*, Chapter.3, pp.47-66, ISBN 978-953-51-0391-2 (**by S.K.Garai**)
2. S. Mandal, D.Mandal, M. K.Mandal, **S. K.Garai**, “A scheme of developing optical frequency encoded quaternary NMIN gate and D flip flop”, in “Advances in Laser Applications and Condensed Matter Physics: Collected Contributions”, A. Chakraborty and A. Choudhuri (Ed.), Levant Books, West Bengal, India, ISBN: 978-81-936036-9-7.

11.D. BOOKS EDITED

1. *‘Some Advanced Functionalities of Optical Amplifiers’*, ISBN 978-953-51-2237-1, 178 pages, Publisher: InTech, (Croatia): Edited by **Sisir Kumar Garai**
2. *“Selected Topics on Optical Amplifiers in Present Scenario”* ISBN 978-953-51-0391-2, InTech, March 3, 2012 (Croatia), Edited by **Sisir Kumar Garai**

11.E. Bookswith ISBN/ISSN numbers with details of publishers

1. Title: *Fundamentals of Frequency Encoded Optical Logic Processors*

Publisher: LAP LAMBERT Academic Publishing, Germany. Editor: KPhillips

ISBN: 978-3-659-76143-0, Date of Publication: 23.07.2015. Pages:149, **Author: Sisir Kumar Garai**