

Sonali Biswas

CONTACT INFORMATION

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Dept. of Instrumentation Engineering
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PERSONAL DETAILS

Date of Birth: December 13, 1978
Gender: Female
Marital Status: Married

OBJECTIVE

Seeking an opportunity to dedicate myself to work in an environment where I could utilize my skills in contributing to the upgrowth of the organization, our society and the nation.

EDUCATION

Ph.D, MEMS Device Design
Department of Electronics and Electrical Engineering
Indian Institute of Technology Guwahati, Assam, India

- Thesis Topic: Design And Analysis of a Wearable Piezoresistive MEMS Accelerometer With Low Cross Axis Sensitivity for Neurological Disease Diagnosis.
- Adviser: Prof. Anup Kumar Gogoi
- Thesis status: PhD Degree awarded on April 2019

M.Tech, Electronics Design and Technology, 2004
Tezpur University, Napaam, Assam, India
CGPA: 7.4/10

B.E, Instrumentation Engineering, 2002
Jorhat Engineering college, Jorhat, India
Dibrugarh University, Assam, India
Marks: 63.0 %

Intermediate, AHSEC Board, 1997
T.B.B.H.S School, Tezpur, Assam, India
Marks: 72.0 %

High School, SEBA Board, 1995
ST. Josephs Convent High School, Tezpur, Assam, India
Marks: 73.0 %

PUBLICATIONS

JOURNALS

- [1] **S.Biswas** and A.K. Gogoi, "Design Issues of Piezoresistive MEMS Accelerometer for an Application Specific Medical Diagnostic System," *J. of IETE Tech. Review*, vol. 33, no. 1, pp. 11-16, 2016 [link].
- [2] **S.Biswas** and A.K. Gogoi, "A wearable piezoresistive microaccelerometer with low cross-axis sensitivity for neurological disease diagnosis, " *AEU - International*

Journal of Electronics and Communications, vol. 99, no. 1, pp. 177-185, 2019, [link]

CONFERENCES

- [3] **S.Biswas** and A.K. Gogoi, “Design and Analysis of FEM based MEMS accelerometer for Detection of Postural Tremor in Thyrotoxicosis,” *In Proc. of International Conf on Advanced Electronics System(ICAES). IEEE Computer Society*, pp. 113-116, Sep. 2013. [link].
- [4] **S.Biswas** and A.K. Gogoi, “Design and Simulation of Piezoresistive MEMS Accelerometer for the Detection of Pathological Tremor,” *In proc. of IEEE South-eastCON*, pp.1-5, Lexington, KY, Mar 2014. [link].
- [5] **S.Biswas** and A.K. Gogoi, “Squeeze Film Damping Control of a Piezoresistive Micro Accelerometer for Neurological Disease Diagnosis,” *In Proc. of Euromech Conf. of Dynamics of micro and nano electromechanical systems: multi-field modelling and analysis* Sep.5-7, 2018. [link]
- [6] **S.Biswas** and A.K. Gogoi, “High voltage analysis of compact electron gun of the miniature helix TWT for broadband microwave power module,” *In: Proc. of ICMARS*, Jodhpur, Dec15-19, 2003.
- [7] **S.Biswas** and A.K. Gogoi, “Design and Analysis of electron gun of miniature helix TWT for X Ku band microwave power module,” *In: Proc. of CODEC 2004, Kolkata* , Jodhpur, Dec15-19, 2003.

BOOK CHAPTERS

- [8] **S.Biswas** and A.K. Gogoi, “Noise Performance and Design Optimization of a Piezoresistive MEMS Accelerometer Used in a Strapdown Medical Diagnostic System,” *In Proc. of Advanced computing and communication Technologies, Advances in Intelligent Systems and Computing*, Singapore: Springer, vol.562, pp.287-296, Jan 2018. [link]
- [9] **S.Biswas** and A.K. Gogoi, “Design of a Piezoresistive Microaccelerometer with High Sensitivity for Medical Diagnostic, ” *In Advances in Systems, Control and Automation, Lecture Notes in Electrical Engineering*, Singapore: Springer vol.442, pp.481-490, 2018. [link]

RESEARCH INTERESTS

Instrumentation systems, MEMS Devices, Transducers, Biomedical applications, Digital Electronics, Digital IC Design.

CURRENT AREA OF RESEARCH

Design And Analysis of a Wearable Piezoresistive MEMS Accelerometer With Low Cross Axis Sensitivity for Neurological Disease Diagnosis: My PhD work is to design an Inertial MEMS (micro electro mechanical system) sensor and making it suitable for neurological disease diagnosis. Tremor (2 Hz–12 Hz) and seizure (0.5 Hz–29 Hz) are the symptoms of neurological disorders which require wearable sensors for continuous monitoring, specially for capturing feeble tremor. Therefore the sensors must have low mass, small size, high sensitivity and precision. Sensors which are very small, usually suffer poor resolution and sensitivity. Usually, a single axis MEMS accelerometer if placed normal to the surface of the skin mainly the dorsum of the hand, can capture such feeble signals. It may be mentioned that the geometry of the structure may be responsible for slight rotation or tilt in the device. This gives rise to off axis acceleration being picked up by the accelerometer, which is responsible for cross axis sensitivity. The cross axis sensitivity must be as low as possible specially for detecting tremor jerks of the feeble type. The reduction of cross axis sensitivity has been done in two ways, first by geometric optimization and second by Wheatstone bridge scheme.

The noise reduction scheme has been proposed and the damping analysis has been done. An attempt has been made to design a low g wearable piezoresistive MEMS accelerometer of quad beam type of pure silicon, for the diagnosis of neurological disorders. The accelerometer designed here is to be used in strap-down medical diagnostic purpose for capturing feeble tremor having intensity which may be as low as 0 g signifying fall to maximum ± 6 g signifying jerks. The sensitivity obtained for a dynamic range of ± 6 g is 0.33 mV/V/g, noise floor is $7.65 \mu\text{g}/\sqrt{\text{Hz}}$ and cross axis sensitivity is 0.48%.

ACADEMIC
PROJECTS

M.Tech Project: Design and Analysis of electron gun for X-Ku band for MPM module.

Supervisor: Dr. R.K Sharma, Central Electronics Engineering Research Institute (CEERI), Pilani

EXPERIENCE

Teaching,

- Presently working as Assistant Professor in the Department of Instrumentation Engineering, Jorhat Engineering college, Dibrugarh University since March 14, 2007 (Govt of Assam, appointed through APSC).
- Worked as Lecturer in the department of Telecommunication Engineering in Dayanand Sagar college of Engineering, Bangalore from July 2006- February 2007.
- Worked as guest lecturer in the department of Electronics in Assam Engineering college, Guwahati from August 2004 to December 2005.

Industrial Experience,

One year research experience in Central Electronics Engineering Research from May2003 to June2004.

ACTIVITIES

- Organized one week FDP program on Trends in Photonics in the department of Jorhat Engineering college, Jorhat on December 2018.
 - Experience on Hands-on session on training conducted by INUP centre Indian Institute of Science Bangalore, November 2015
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ACHIEVEMENTS

Best Paper award in IEEE International conference ICEE 2014 in the Indian Institute of Science (IISC), Bangalore held on Dec 3-6, 2014.

The MEMS device design proposed for the application of neurodegenerative diseases has been approved for fabrication in the Semi-conductor laboratory Chandigarh, ISRO centre.

SKILLS

Software skill: COMSOL, Microsim, EGUN, TRAK

Scripting/Programming: MATLAB, C & C++

Desktop Editing: L^AT_EX, Microsoft Office

Operating Systems: Microsoft Windows family

REFERENCES
AVAILABLE TO
CONTACT

Prof. Anup Kumar Gogoi (Ph.D Thesis Supervisor)
(e-mail: akg@iitg.ac.in; phone: +91-361-258-3456)
Professor, Dept. of Electronics and Electrical Engineering,
Indian Institute of Technology Guwahati
Guwahati, Assam, India-781039 [[Homepage](#)]

Prof. Prabin Bora (Doctoral Committee Chairperson)
(e-mail: prabin@iitg.ac.in, Phone: +91-361-258-2502 (Office))
Professor, Dept. of Electronics and Electrical Engineering,
Indian Institute of Technology Guwahati
Guwahati, Assam, India-781039 [[Homepage](#)]

Dr. R.K.Sharma (M.Tech Project Supervisor)
(e-mail: rks@ceeri.res.in; phone: +91-1596-252345)
Senior Principal Scientist, Area Coordinator,
Group Head Vacuum Microelectronic Devices,
Central Electronics Engineering Research Institute, pilani
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