

## EDUCATIONAL BACKGROUND

- 2017** **Doctor of Philosophy**, Indian Institute of Science, Bangalore, India. (July 2012 – July 2017)  
Thesis Title: “Development of Fiber Bragg Grating Sensor based Devices for Force, Flow and Temperature Measurement for Emerging Applications in Biomedical Domain”.
- 2010** **M.Tech**, Indian Institute of Technology, Roorkee, India. (Aug 2008 - July 2010).  
Specialization: Measurements and Instrumentation, Electrical Engg. Dept.,  
Dissertation Title: “Development of IEEE 1451.1/1451.4 Compatible NCAP”.
- 2008** **B.Tech** Electronics & Instrumentation Engineering, West Bengal University of Technology, Kolkata, India.  
Specialization: Electronics & Instrumentation Engineering

## PROFESSIONAL EXPERIENCE

**Aug 2010-Till Date** **Central Mechanical Engineering Research Institute (CSIR-CMERI)**, Durgapur, WB,  
Designation: Scientist.  
R&D Domain: Robotics & Sensors, Embedded Systems. Training PG students  
Department: Robotics & Automation Division.

## TEACHING EXPERIENCE

<b>Aug 2010-July 2012 &amp; Sept 2016 - Till Date</b>	<b>Assistant Professor at AcSIR-CSIR-CMERI.</b>
<b>PG- Courses:</b>	1. Electrical and Electronic Circuits & Devices, 2. Microcontrollers & Embedded System Design, 3. Instrumentation & Industrial Control, 4. Sensors Laboratory

## RESEARCH PROJECTS

### CSIR-CENTRAL MECHANICAL ENGINEERING RESEARCH INSTITUTE, DURGAPUR (2012 - 2016)

- **Research in Human Centered Robotics with Special Emphasis on Field and Bio-Medical Rehabilitation** (Indo-Korea Joint Network Centre on Robotics) (DST Project: Ongoing April 2018)  
**Role:** Co-Investigator
- **Development of Compliant Actuator with Mechanical Impedance Variability** (DRDO Project – Ongoing 2017)  
**Role:** Member
- **Robotic Intervention for Industrial and Strategic Applications** (CSIR Project: Completed)  
**Role:** Co-PI of the sub-module.
- **Development of Autonomous Underwater Vehicle (operating Depth 150m)** (Completed) **Role:** Member
- **Design and Development of a Mobile Robotic System for Visual Inspection** (Completed) **Role:** Member

### INDIAN INSTITUTE OF SCIENCE, BANGALORE (2012 - 2016)

- **Projects on device design and implementation using FBG sensors (Completed)**
  - **Underwater Hydrophone**  
Role: Student Member. Design and development of Fiber Bragg Grating (FBG) based Hydrophone for underwater acoustic sensing. Project funded by Naval Physical & Oceanographic Laboratory (NPOL), Kochi under Contract for Acquisition of Research Services (CARS).
  - **Displacement, Vibration Sensing & Surface Profilometry**  
Design and development of a real time dynamic monitoring Fiber Bragg Grating sensor based Tunable sensitivity Displacement measurement Device (FBGDD) for varying applications of displacement and vibration measurements. And an enhanced device Fiber Bragg Grating Profilometer (FBGP) utilized as a surface profilometer to acquire the two dimensional surface roughness of any structure with sub-micrometers resolution.

➤ **Seismic Vibration Sensing & Elephant intrusion Monitoring System**

Real time dynamic monitoring of seismic vibrations, using a novel Fiber Bragg Grating Seismic Sensor (FBGSS) device. A methodology involving cost-effective FBGSS as an efficient concept for elephant intrusion monitoring system (EIMS) which can be used to avoid human-elephant conflicts.

➤ **Biomedical Applications**

Design and development of devices FBGFD, FBGS, FBGTS for force, flow, and temperature measurements for application in biomedical domain.

FBGFD – Fiber Bragg Grating Force Device - Device having the capability of measuring force during spinal needle puncturing which in turn indicates the tissue layers punctured during its penetration.

FBGS – Fiber Bragg Grating Spirometer – A spirometer device to monitor respiratory parameters using FBG based flow sensing, during pulmonary function tests.

FBGTS – Fiber Bragg Grating Thermal Sensor - A novel technique for locating brain tumor during intraoperative surgery, based on FBG based temperature monitoring.

## PATENTS

### Patent:

- Title: Spinal Needle Force Monitoring during Lumbar Puncture using Fiber Bragg Grating Force Device.  
Inventors: Dr. Shikha, Dr. Sharath Umesh, Prof. S Asokan, Dr. D C Sundaresh  
Status: Application Filed

## AWARDS & RECOGNITIONS

### Awards:

- Recipient of **CSIR Young Scientist Award 2019 in Physical Science Discipline (including Instrumentation)** presented by Dr Harsh Vardhan, Hon'ble Minister of Science & Technology, Govt. of India on 26<sup>th</sup> Sept. 2019.
- Recipient of “**Young Scientist**” award in “**Instrumentation**” - VIRA 2017 held by Venus International Foundation November 11, 2017 in Chennai, India. <http://viraw.info/2017/engineering/shikha.html>

### Grants Received:

- MHRD Scholarship Full Time Master research – IIT Roorkee (July 2008 – June 2010)
- MHRD Scholarship Full Time PhD Research – IISc Bangalore (Aug. 2012 – Aug. 2016)
- GARP Fund for paper presentation in Singapore – IISc Bangalore (14 – 16 April 2015)
- CSIR Young Scientist Fellowship – CSIR, New Delhi. (Jan 2020 – Continuing)

### Newspaper Article:

- “Pressure sensors can be operated remotely”, *Bangalore Mirror*, Aug 18 2015, Pg 6.
- “President Ram Nath Kovind confers prestigious Science and Technology awards”, *Jagran Josh*, Oct 1 2019.

## OTHER PROFESSIONAL ACTIVITIES

### Guest/Invited Lectures:

- Expert guest lecture on “Robotics & Automation” delivered on 24<sup>th</sup> March 2017 for Exclusive Faculty Development programme on “Automation in Manufacturing ” at CMTI, Bangalore during 20-24 March.2017.
- Invited lecture on “Emerging Biomedical Applications with FBG Sensing”, delivered on 5<sup>th</sup> January 2020 for Workshop on Recent Trends in Biomedical Engineering 2020, National Institute of Technology, Durgapur

### Technical Presentation:

- Technical Presentation on Application of FBG for endoscopy, delivered on 8<sup>th</sup> July 2019 in the Workshop for Indo Korea Joint Network Center on Robotics, 8-9 July 2019, CSIR Complex, Chennai.
- Research Presentation on “FBG based device development of biomedical and industrial applications”, Electrical Engg. Dept., Indian Institute of Technology, Roorkee, India, 23<sup>rd</sup> August 2019.

**Professional Membership:** SPIE Student Member: 29.08.2016 – 28.08.2017

## RECENT RESEARCH PUBLICATIONS

### JOURNAL PUBLICATIONS

- J1. Feasibility study on Thermography of Embedded Tumor using Fiber Bragg Grating Thermal Sensor**  
Shikha Ambastha, Shweta Pant, Sharath Umesh, Vikas V, and S Asokan  
*IEEE Sensors Journal*, 20(5), 2452 – 2459 (2020) DOI: [10.1109/ISEN.2019.2950973](https://doi.org/10.1109/ISEN.2019.2950973)
- J2. A novel methodology for Spark Gap monitoring in Micro-EDM using fiber Bragg gratings**  
Arjita Das, Shikha Ambastha\*, Saurav Halder, Sudip Samanta, and Nagahanumaiah  
*IEEE Transactions on Instrumentation & Measurement*, 69(7), 4387–4393 (2020). DOI: [10.1109/TIM.2019.2941291](https://doi.org/10.1109/TIM.2019.2941291)
- J3. Fibre Bragg grating sensors for measuring spark gap in Micro-EDM in real-time.**  
Arjita Das, Shikha Ambastha, Saurav Halder, Sudip Samanta, Nagahanumaiah  
*Manufacturing Technology Today Special Issue 2*, 18(7), 3-9 (July 2019).
- J4. Comparison of Lumbar Puncture Force Requirement with Different Gauges of Spinal Needle using FBG Force Device**  
Shikha Ambastha, Sharath Umesh, D C Sundaresh, and S Asokan,  
*IEEE Sensors Journal*, 18(19), 8028-8033 (October 1, 2018). DOI: [10.1109/ISEN.2018.2864608](https://doi.org/10.1109/ISEN.2018.2864608)
- J5. Spinal Needle force monitoring during lumbar puncture using Fiber Bragg Grating Force Device**  
Shikha Ambastha, Sharath Umesh, D C Sundaresh, and S Asokan  
*SPIE Journal of Biomedical Optics*, 21(11), 117002 (Nov 2016). DOI: [10.1117/1.JBO.21.11.117002](https://doi.org/10.1117/1.JBO.21.11.117002)
- J6. Pulmonary Function Test using Fiber Bragg Grating Spirometer**  
Shikha A, Sharath U, Uma Maheshwari K, and S Asokan,  
*IEEE Journal of Lightwave Technology*, 34(24), 5682-5688 (Dec 2016). DOI: [10.1109/JLT.2016.2627017](https://doi.org/10.1109/JLT.2016.2627017)
- J7. Pulse transit time differential measurement by fiber Bragg grating pulse recorder**  
Sharath U, Srivani P, Shikha A, Anand K and Asokan S  
*Journal of Biomedical Optics*, 20(5), 057005 (May 2015). <http://dx.doi.org/10.1117/1.JBO.20.5.057005>
- J8. Underwater Terrain Mapping with a 5-DOF AUV**  
Shikha, S K Das, D Pal, S Nandy, S N Shome and Soma Banerjee  
*Indian journal of Geo-Marine Sciences*, 43(1), 106-110 (Jan 2014). <http://nopr.niscair.res.in/handle/123456789/26419>

### CONFERENCE PUBLICATIONS

- C1. Fiber Bragg Grating based Haptic Force Sensing Device**  
Shikha Ambastha, Sharath Umesh, and Sundarrajan Asokan  
*IEEE ICATICE 2019*, Bangalore, India.
- C2. Spinal needles insertion and navigation based on fiber Bragg gratings – From conceptual approach to prototype development**  
Shikha Ambastha, Sharath Umesh, Sundarrajan Asokan  
4<sup>th</sup> International and 19<sup>th</sup> National Conference on Machines and Mechanisms (*iNaCoMM*) 2019, IIT Mandi, India.
- C3. Fibre Bragg Grating Sensors for measuring spark gap in Micro-EDM in real-time**  
Arjita Das, Shikha Ambastha, Sudip Samanta, Nagahanumaiah  
*National conference on Smart Manufacturing & Industry 4.0 (NCSMI4) 2019*, CMTI Bangalore, India.
- C4. Fiber Bragg Grating Differential Pressure Sensor**  
Shikha Ambastha, Sharath Umesh, AV Arunbabu and Sundarrajan Asokan  
*IEEE CRALT 2016*, Bangalore, India. DOI: [10.1109/CRALT.2016.8066050](https://doi.org/10.1109/CRALT.2016.8066050)
- C5. Non – Invasive Pressure Sensing by Hoop Strain using Fiber Bragg Grating Sensor**  
Shikha A, Sharath U and S Asokan  
*SPIE IcOPEN 2015*, Singapore Expo, Singapore. <http://dx.doi.org/10.1117/12.2189663>
- C6. Fiber Bragg Grating Sensors for Strain Monitoring Applications**  
Jineesh Thomas, Kumar Saurabh, Shikha Ambastha, Ravi Kumar, S Asokan, TR Rajanna  
*HAL National Seminar on Indigenous Technology Base for Growth of Aerospace Ecosystem*, 2015, Bangalore.
- C7. Fiber Bragg Grating Tiltmeter**  
Sharath U, Shikha A and S Asokan  
*IEEE ICEE*, Indian Institute of Science, 2014, Bangalore, India. DOI: [10.1109/ICEmElec.2014.7151142](https://doi.org/10.1109/ICEmElec.2014.7151142)
- C8. Underwater Terrain Mapping with a 5-DOF AUV**  
Shikha, S K Das, D Pal, S Nandy, S N Shome and Soma Banerjee  
*OSICON 2011*, NIOT, Chennai, India.