RAJDEEP MUKHERJEE

M.Sc. Optics and Photonics
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PROFESSIONAL SUMMARY

Dedicated professional with a B.Tech. in Mechatronics and Automation Engineering from Manipal University Jaipur, transitioning to a Physicist through an M.Sc. in Optics and Photonics, specializing in Quantum Optics, at Karlsruhe Institute of Technology. Possessing a diverse background and comprehensive experience in Optics and Photonics, Quantum Imaging, Biosensors, Biomaterials, Smart Devices, Robotics, Automation, and IoT, along with strong program and project management skills. Passionate about Quantum Computing and Communication, seeking opportunities to contribute to advancements in the field and further develop expertise.

PROFESSIONAL EXPERIENCE

Mar 2022 – Mar 2023 — **ICFO – The Institute of Photonic Sciences** — Barcelona
Postgraduate Thesis Student
Completed thesis research under the guidance of Prof. Valerio Pruneri in the Optoelectronics group, focusing on two key projects: "Supersensitive Multipass Microscopy using Single-Photon Avalanche Diodes (SPADs)" and "Multipass Imaging through Transverse Anderson Localization Optical Fibers for Quantum Imaging."

Feb 2021 – Dec 2021 — **Carl Zeiss AG** — Karlsruhe
Research Assistant
Worked in the Research and Innovation Team at Zeiss Innovation Hub @ KIT on PIC based Inertial Sensors and Biosensors.

Jun. 2020 – Feb 2021 — **InnovationLab GmbH** — Heidelberg
Research Assistant
Worked on building and optimizing an open-source 3D printer for printing Optical Photodiodes and organic electronic components.

Jan. 2020 – Jan 2021 — **KIT Institut für Technik der Informationsverarbeitung (ITIV)** — Karlsruhe
Research Assistant
Working on studying and characterizing various optical lenses for ophthalmic usage and Zemax designing of opthalmic systems.

Jan. 2016 – Sept. 2019 — **BIONAC Lab and Engineered Biomaterials Research and Innovation Center, Manipal University Jaipur** — Jaipur
Research Assistant

- Studying and development of Quantum Dot based FRET Biosensors for biological detection and combatting osteoporosis.

- Development of a smart tire-tread measuring and pressure sensor.
- BIONAC and EnBioMatRIC website development.

Sep. 2017- Jul. 2018 **Tanabe Photonics Lab, Keio University** Tokyo
Research Intern
- Working on the development of 3D- OptiFDTD techniques and calculation of Off-Diagonal Components in a Slow Light Magneto-optic Waveguide.

May 2017 – Aug. 2017 **Integrated Photonics Lab, University of Pavia** Pavia
Research Intern
- Working on the development of All- Optical Digital Circuits using Micro-Ring Resonators.

Sept. 2016 – Aug. 2019 **SPIE Student Chapter, Manipal University Jaipur** Jaipur
Research Student
- Research on the simulation of OAM modes for enabling Quantum Communication using Photonic Crystal Fibers.
- Research on using Silicon Microring Resonators for designing All-Optical Digital Circuits.

Oct. 2017- Aug. 2019 **SPIE Student Chapter, Manipal University Jaipur** Jaipur
President
- Managed various SPIE MUJ Student Chapter events.
- Presented at the ICMAT 2019 Conference, Singapore, as the SPIE MUJ Student Chapter President.
- Presented at the SPIE COS Asia 2018 Conference, Beijing, China, as the SPIE MUJ Student Chapter President.
- Presented at the IONS Scandanavia 2018 Conference at DTU and Lund Universities, Denmark and Sweden, as the SPIE MUJ Student Chapter President.
- Organized and volunteered at the OWA Conference 2018 and 2019, MNIT, Jaipur, as the SPIE MUJ Student Chapter President.

Mar. 2016 – Apr. 2018 **INNOVADERS Automation club, Manipal University Jaipur** Jaipur
Project Manager and Head of Projects Division
- Supervised project schedules to meet key milestones at every phase.
- Led strategic planning sessions for project developments, ideation, and competitions.
- Executed on-time, under-budget project management on complex issues.

Apr. 2016 - May 2017 **IEI Mechatronics Student Chapter, Manipal University Jaipur** Jaipur
Executive Member, Research and Projects
- Planned and worked on project designs, analysis, modelling and experiments.

Sept. 2014 – Jan. 2016 **Autonomous Initiative Robotics Club, Manipal University Jaipur** Jaipur
Head of Designing and Board Member
- Helped to set and maintain club procedures that streamlined operations.
- Head designer of projects.

- Lead graphic designer.

May 2016 - Dec. 2016 **PILTOVER TECHNOLOGIES** Jaipur

Research Student

Worked on reviewing and researching over novel 3D printing techniques.

EDUCATION

09/2021 **Karlsruhe Institute of Technology** Karlsruhe, BW

Master of Science: Optics and Photonics

Current CGPA - 1.9/1.0

05/2018 **Manipal University Jaipur** Jaipur, Rajasthan

Bachelor of Technology: Mechatronics Engineering

CGPA - 3.0/4.0

04/2014 **South End Centre** Howrah, West Bengal, India

Indian School Certificate Examinations (ISC): Mathematics and Basic Sciences

Percentage - 81%

04/2012 **South End Centre** Howrah, West Bengal, India

Indian Council for Secondary Examinations (ICSE): Mathematics and Basicc Sciences

Percentage of marks obtained - 85%

PUBLICATIONS

- **Multipass Wide-field Phase Imager** – Alvaro Cuevas, Daniel Tiemann, Iris Cusini, , Rajdeep Mukherjee, Robin Camphausen, Valerio Pruneri, ICFO – The institute of Photonic Sciences (in-review/yet to be published).

- **Quantum Dots based Biosensors for Tissue Engineering (review paper)** – Rajdeep Mukherjee, Karlsruhe Institute of Technology; Dr. Sanchita Bandyopadhyay-Ghosh, Manipal University Jaipur; Dr. Subrata Bandhu Ghosh, Manipal University Jaipur

- **SPIE COS ASIA: Efficacy of deep directed acyclic graph (DAG)-based convolutional neural network (CNN) features for robust breast cancer histopathological image classification** – Pratiher Sawon, IIT Kanpur; Rajdeep Mukherjee, Manipal University Jaipur; Subhankar Chattoraj; Techno India Salt Lake, Kolkata.

- **IEEE GlobalSIP: StationPlot: A New Non-stationarity Quantification Tool for Detection of Epileptic Seizures** - Pratiher Sawon, IIT Kanpur; Rajdeep Mukherjee, Manipal University Jaipur; Subhankar Chattoraj; Techno India Salt Lake, Kolkata.

CONFERENCE PRESENTATIONS

- **International Conference on Materials for Advanced Technologies, Singapore: Fluoroscence Resonance Energy Transfer (FRET) Responsive Hydrogel Based Optical Biosensors for Detection of Bone Degradation and Drug Delivery** – MUKHERJEE, Rajdeep; RANI, Seema; GHOSH, Subrata Bandhu; BANDYOPADHYAY-GHOSH, Sanchita – Manipal University Jaipur.

- **International Conference on Advanced Materials, New Delhi: Analysis of Bone Degradation using Optical Biosensors** - MUKHERJEE, Rajdeep; RANI, Seema; GHOSH, Subrata Bandhu; BANDYOPADHYAY-GHOSH, Sanchita – Manipal University Jaipur

- **ICFO INTERNATIONAL SCHOOL ON THE FRONTIERS OF LIGHT: New horizons in Quantum Materials: Enhanced sensitivity in phase imaging with time resolved multipass microscopy -** Rajdeep Mukherjee, Alvaro Cuevas, Daniel Tiemann, Robin Camphausen, Valerio Pruneri

RESEARCH EXPERIENCE

- **'Studying Nonlinear Effects and the Spatial and Temporal Evolution of Light in Transverse Anderson Localization Fibers for Quantum Imaging and Communication' -** Supervised by Mr. Alexander Demuth, Dr. Alvaro Cuevas, and Prof. Valerio Pruneri. (ICFO – The Institute of Photonic Sciences, Barcelona)
- **'Super High Resolution and Subpixel Resolution Multipass Microscopy using Non-resonant Cavities' -** Supervised by Dr. Alvaro Cuevas, Mr. Robin Camphausen and Prof. Valerio Pruneri. (ICFO – The Institute of Photonic Sciences, Barcelona).
- '**Confinement of OAM Modes in a PCF for Quantum Communication Purpose**'. Supervised by Prof. (Dr.) Manish Tiwari. (Manipal University Jaipur, Department of Electronics and Communication Engineering).
- ' **Development of 3D-FDTD techniques for the study of Magneto-Optical Effect in a Slow Light Waveguide**'. Supervised by Prof. (Dr.) Takasumi Tanabe. (Keio University, Department of Electronics Engineering).
- ' **Development of All- Optical Digital Circuits using Micro-Ring Resonators**'. Supervised by Dr. Paolo Minzioni and Dr. Riccardo Marchetti. (University of Pavia, Department of Electronics, Biomedical and Computer Engineering).
- '**Combating the effects of Osteoporosis by developing QD-FRET Optical Biosensors.**' Supervised by Dr. Subrata Bandhu Ghosh and Dr. Sanchita Bandyopadhyay-Ghosh (Department of Mechanical Engineering, Manipal University Jaipur).
- ' **Optical Imaging techniques for the detection of various diseases**'. Supervised by Dr. Sawon Pratiher and Mr. Subhankar Chattoraj (IIT Kharagpur).

ENGINEERING PROJECTS

- **Development of Smart Tire-Tread measurement systems for INDAG Rubber Ltd.** Supervised by Dr. Subrata Bandhu Ghosh & Mr. Anil Sharma.
- **Development of Smart Toll-Systems and Parking Spaces**. Supervised by Dr. Manoj Bohra (Department of Computer Science Engineering).
- **Making a Smart Watch with inertial sensors using Raspberry Pi Zero W** - Supervised by Mr. Kumar Gaurav.
- **Worked on 'Development of Low-Power Wireless Protocol using NS-3 network simulation project – Supervised by Dr. Rajveer Singh Shekhawat.**
- **RC Plane using 8 channel 2.4GHz RF mechanism.**
- **Worked on an UBLECK based sound system and Ferrofluid**
- **Worked on a project on Propeller display and Robotic Arm.**

TECHNICAL SKILLS

- Simulation Softwares - COMSOL Multiphysics, Ansys LUMERICAL, MATLAB, Ansys ZEMAX, Ansys HFSS, Ansys Maxwell (Beginner), OptiFDTD, Wolfram Mathematica, GNU Octave.
- Programming Languages - Python, Java, C++, HTML, Arduino, Android Studio, CSS.
- IoT based Platforms – Onion Omega 2+ SoC, myRIO, Raspberry Pi 3, Intel Galileo, Texas Tiva C Launchpad, ST Nucleo, etc.
- Graphic Designing – Adobe Illustrator, Adobe Photoshop, Adobe After Effects, Corel Draw, Adobe Premier Pro, Adobe XD etc.
- Website and App development
- Certified Google Data Analyst (2016 and 2017).

KEY COURSES TAKEN

- Quantum Optics at the Nanoscale: Fundamentals and Applications (KIT)
- Fundamentals of Optics and Photonics (KIT)
- Introduction to Quantum Computing (KIT)
- Photonic Integrated Circuits: Design and Applications (KIT and MOOC)
- Nonlinear Optics
- Machine Learning (MOOC)
- Quantum Machine Learning (MOOC)
- Laser Physics
- Theoretical Optics
- Optoelectronic Components
- Adaptive Optics
- Optical Engineering
- Fabrication and Characterization of Optoelectronic Devices
- Spectroscopic Methods
- Quantum Mechanics
- Nanoscience & Nanotechnology

- Synchrotrons and X-Ray Free Electron Lasers – Techniques and applications (MOOC)
- Modern Control Systems
- Plasma Science and Engineering
- Microprocessors and Microcontrollers
- Signal & Systems
- Basic Molecular Cell Biology

EXTRA-CURRICULARS

- Visited MAX IV Synchrotron facility at Lund University and obtained a deep understanding of the 'BALDER AND NanoMAX' and the 'MAXPEEM and 1.5GeV' facilities.
- Attended the CLEO Europe 2017 conference, Munich, Germany.
- Certified Google Data Analyst, June 2016.
- Attended 5 Model United Nations summits and won High Commendation in 1, Special Mention in 2 and Verbal Mention in the rest.
- Attended a 2 days' Workshop on Android App Development.
- Attended a 3 days' Workshop on Home Automation and Control Systems.
- Attended a 2 days' Workshop by ICTIEE on COMSOL, National Instruments and Quanser.
- Attended Workshops on IPR & GI, Intern Fair etc.

REFERENCES

- Dr. Robin Camphausen – robin.camphausen@icfo.eu
- Dr. Alvaro Cuevas – alvaro.cuevas@icfo.eu
- Dr. Max Riedel – max.riedel@zeiss.com
- Dr. Heiner Zwickel – heiner.zwickel@zeiss.com
- Dr. Manish Tiwari – manish.tiwari@jaipur.manipal.edu
- Dr. Subrata Bandhu Ghosh - subratab.ghosh@jaipur.manipal.edu
- Dr. Sanchita Bandyopadhyay-Ghosh -sanchitab.ghosh@jaipur.manipal.edu
- Dr. Gerardo Hernandez-Sosa - gerardo.sosa@kit.edu
- Dr. Paolo Minzioni – paolo.minzioni@unipv.it
- Dr. Princy Randhawa – princy.randhawa@jaipur.manipal.edu
- Dr. Kumar Gaurav - kumar.gaurav@jaipur.manipal.edu
- Dr. Anil Sharma - anil.sharma@jaipur.manipal.edu
- Dr. Takasumi Tanabe – takasumi@elec.keio.ac.jp