Vikas Pandey, Ph.D.

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Education

Ph.D. (Jan 2014 – Oct 2020)
Chemical Engineering, *Indian Institute of Technology (IIT)*, *New Delhi, 110016, India*

Masters & Bachelors of Technology (M. Tech. & B. Tech.) (Jul 2006 – May 2011)
Biochemical Engineering & Biotechnology, *Indian Institute of Technology (IIT)*, *New Delhi, 110016, India*

Research Experience

Research Scientist (Aug 2024 – current)
Centre for Modeling, Simulation & Imaging in Medicine & Biomedical Engineering
Rensselaer Polytechnic Institute, Troy, NY

- Working on *in vivo* non-invasive optical imaging method for drug internalization quantification in HER2+ tumour xenografts in live intact small animals (mice) through Fluorescence Lifetime Imaging (FLI).
- Development of macro- and mesoscopic set-up for FLI, Developing single-pixel imaging and light-sheet based mesoscopic imaging setups.
- Developing FLI data processing methos using Deep Learning models, and Hierarchical Bayesian inferences.
- Co-Investigator in the RPI-IBM Artificial Intelligence Research Collaboration (AIRC), focusing on neural network-accelerated hardware development for FLI.
- Forging new collaborations and nurturing existing partnerships through joint research projects and proposals.
- Mentoring 3 PhD students and guiding an undergraduate student on their research projects.

Post-doctoral Research Associate (Jan 2022 – Aug 2024)
Rensselaer Polytechnic Institute, Troy, NY

- *in vivo* non-invasive optical imaging method for drug internalization quantification in HER2+ tumour xenografts in live intact small animals (mice) through Fluorescence Lifetime Imaging (FLI).
- Development of macro- and mesoscopic set-up for FLI imaging; Single-pixel imaging and Light-sheet imaging setups.
- Machine learning model development to simplify and fast analysis of the complex ill-defined mathematical inverse problem

ERASMUS + KA107 Ph.D. (Research exchange between India & Spain)
Universidad de Santiago de Compostela, Spain

- Selected from the Chemical Engineering Department IIT Delhi for research exchange in Spain.
- Focused on waveguide development for Total Internal Reflection Fluorescence (TIRF) scattering imaging.

Co-founder, Director, Research and Product (Jun 2015 – August 2021)
Valetude Primus Healthcare Pvt. Ltd.

- Led multiple diagnostic technology developments as Principal Investigator (PI), developing prototypes and products based on deep technology.
- Conducted multi-center clinical validations and received certification from the Drug Controller General of India for various products.

Patents

- A composition for mucus or sputum liquefaction and a process thereof **(Indian Patent no. – 361905)**
- Compact evanescent wave-based fluorescence illumination **(Indian Patent no. – 382141)**

Publications

Peer-reviewed Journals

Year	Journal	Impact Factor	Detail
2024	NeurIPS 2024	**23.27**	*Compressing Recurrent Neural Networks for FPGA-accelerated Implementation in Fluorescence Lifetime Imaging*; Machine Learning and Compression Workshop; Ismail Erbas*, **Vikas Pandey***, Aporva Amarnath, Naigang Wang, Karthik Swaminathan, Stefan T. Radev, Xavier Intes
2024	Advance Science	**15.1**	*Fluorescence Lifetime Imaging for Quantification of Targeted Drug Delivery in Varying Tumor Microenvironments*; Amit Verma*, **Vikas Pandey***, Catherine Sherry, Christopher James, Kailie Matteson, Jason T. Smith, Alena Rudkouskaya, Xavier Intes, Margarida Barroso
2024	Optics Letters	**3.1**	*Deep Learning-based Temporal Deconvolution for Photon Time-of-Flight Distribution Retrieval*; **Vikas Pandey**, Ismail Erbas, Xavier Michalet, Arin Ulku, Claudio Bruschini, Edoardo Charbon, Margarida Barroso, Xavier Intes
2022	Particle & Particle Systems Characterization	**2.7**	*SNC-TIRS: Label-Free Single Nanoparticle Characterization System Based on Total Internal Reflection Scattering Signal*; Arti Tyagi, Shefali Singh, **Vikas Pandey**, Sachin Kumar, Prabhat Singh Mallik, Ravikrishnan Elangovan
2019	Scientific reports	**3.8**	*SeeTB: A novel alternative to sputum smear microscopy to diagnose tuberculosis in high burden countries* **Vikas Pandey***, Pooja Singh*, Saumya Singh, Naresh Arora, Neha Quadir, Saurabh Singh, Ayan Das, Mridu Dudeja, Prem Kapur, Nasreen Zafar Ehtesham, Ravikrishnan Elangovan, Seyed E Hasnain
2017	Methods and Applications in Fluorescence	**2.4**	*Compact 3D printed module for fluorescence and label-free imaging using evanescent excitation* **Vikas Pandey**, Shalini Gupta, Ravikrishnan Elangovan
2016	Advanced Materials Technologies	**6.8**	*Spot immunomagnetic enrichment device for rapid detection of pathogens in peripheral blood* Saurabh Singh, Mohita Upadhyay, **Vikas Pandey**, Perumal Vivekanandan, Shalini Gupta, Ravikrishnan Elangovan
2016	Scientific Reports	**3.8**	*Maximum limit to the number of myosin II motors participating in processive sliding of actin* Khushboo Rastogi, Mohammed Shabeel Puliyakodan, **Vikas Pandey**, Sunil Nath, Ravikrishnan Elangovan

* Shared First Authors

Archive/ preprint/ communicated manuscripts

Year	Preprint	Journal	Detail
2024	preprint	ACM/SIGDA International Symposium on Field-Programmable Gate Arrays (FPGA 2025)	*No Time to Lose: Enabling Real-Time Fluorescence Lifetime Imaging on Resource-constrained FPGAs Through Efficient Scheduling*; Ismail Erbas, Aporva Amarnath, **Vikas Pandey**, Karthik Swaminathan, Naigang Wang, Xavier Intes
2024	arXiv preprint	TBD	*Unlocking Real-Time Fluorescence Lifetime Imaging: Multi-Pixel Parallelism for FPGA-Accelerated Processing*; Ismail Erbas, Aporva Amarnath, **Vikas Pandey**, Karthik Swaminathan, Naigang Wang, Xavier Intes
2024	Research Square	Optica	*Transformer-based Deep Learning Model for Fluorescence Lifetime Parameter Estimations using Pixelwise Instrument Response Function*;

Year			
			Ismail Erbas, **Vikas Pandey**, Navid Ibtehaj Nizam, Nanxue Yuan, Amit Verma, Margarida Barroso, Xavier Intes
2024	bioRxiv	Optica	*A Novel Technique for Fluorescence Lifetime Tomography;* Navid Ibtehaj Nizam, **Vikas Pandey**, Ismail Erbas, Jason T Smith, Xavier Intes

Book/ Book Chapter

Year	Book	Editors	Detail
2024	"Emerging Technologies for Cancer Detection and Diagnosis."	Rasooly, A., Prickril, B., Ossandon, M.R.	*"Near-infrared macroscopic and mesoscopic fluorescence lifetime FRET imaging to measure intra-tumor heterogeneity of antibody-target engagement,"* (book chapter) A Verma, S Ragab, S Gao, C Sherry, N Yuan, **V Pandey**, X Intes, M Barroso,

Conference Papers

Year	Conference	Session	Detail
2025	SPIE Photonics West 2025	Accepted 25-28 Jan 2025	*AI-enhanced rapid lifetime determination method for fast macroscopic and mesoscopic fluorescence lifetime imaging* **Vikas Pandey**, Ismail Erbas, Luis Chavez, Claudio Bruschini, Edoardo Charbon, Margarida Barroso, Stefan Radev, Xavier Michalet, Xavier Intes
2025	SPIE Photonics West 2025	Accepted 25-28 Jan 2025	*Integrating time-resolved NIR and SWIR imaging for high-resolution mesoscopic fluorescence lifetime imaging using deep learning* **Vikas Pandey**, Stefan Radev, Luis Chavez, Ismail Erbas, Claudio Bruschini, Edoardo Charbon, Xavier Intes
2025	SPIE Photonics West 2025	Accepted 25-28 Jan 2025	*Mesoscopic light-sheet imaging set-up for 3D SWIR fluorescence intensity and NIR fluorescence lifetime imaging* Luis Chavez, Ismail Erbas, **Vikas Pandey**, Catherine Sherry, Isaiah Crosbourne, Claudio Bruschini, Edoardo Charbon, Margarida Barroso, Xavier Intes
2025	SPIE Photonics West 2025	Accepted 25-28 Jan 2025	*Confidence in NLSF-based lifetime estimation through LUT in time-gated ICCD-based macroscopic fluorescence lifetime imaging* Nanxue Yuan, **Vikas Pandey**, Xavier Intes, Xavier Michalet
2025	SPIE Photonics West 2025	Accepted 25-28 Jan 2025	*Design and characterization of a single-pixel light sheet mesoscope for fluorescence imaging* Navid Ibtehaj Nizam, Luis Chavez, **Vikas Pandey**, Ismail Erbas, Xavier Intes
2025	SPIE Photonics West 2025	Accepted 25-28 Jan 2025	*Characterization and validation of a phantom design for multimodal mesoscopic fluorescence lifetime and optical coherence elastography* Luis Chavez, Shan Gao, **Vikas Pandey**, Nanxue Yuan, Saif Ragab, Jiayue Li, Matt S. Hepburn, Percy Smith, David T. Corr, Brendan F. Kennedy, Xavier Intes
2025	SPIE Photonics West 2025	Accepted 25-28 Jan 2025	*FPGA implementation of sequence-to-sequence encoder-decoder deep learning model for real-time fluorescence parameter estimation through SwissSPAD2 camera* Ismail Erbas, Paul Mos, **Vikas Pandey**, Claudio Bruschini, Edoardo Charbon, Xavier Intes
2025	SPIE Photonics West 2025	Accepted 25-28 Jan 2025	*Antibody-to-imaging pipeline to monitor target engagement in breast tumors* Margarida M. Barroso, Amit Verma, Cay Sherry, Nanxue Yuan, **Vikas Pandey**, Tynan Young, John Williams, Xavier Intes
2024	NeurIPS 2024	Poster	*Compressing Recurrent Neural Networks for FPGA-accelerated Implementation in Fluorescence Lifetime Imaging*; Machine Learning and Compression Workshop

			Ismail Erbas, **Vikas Pandey**, Aporva Amarnath, Naigang Wang, Karthik Swaminathan, Stefan T. Radev, Xavier Intes
2024	IBM/IEEE AI Compute Symposium 2024 (AICS'24)	Poster	*A Leap Forward in Cancer Imaging: Optimizing Recurrent Neural Networks for Real-Time Fluorescence Lifetime Imaging on Resource-Constrained FPGAs* Ismail Erbas, **Vikas Pandey**, Aporva Amarnath, Naigang Wang, Karthik Swaminathan, Xavier Intes
2024	Optica Biophotonics Congress 2024	Optical Tomography and Spectroscopy, OM1D. 4	*Temporal Point Spread Function Deconvolution in Time-resolved Fluorescence Lifetime Imaging using Deep Learning Model;* **V Pandey**, I Erbas, X Michalet, A Ulku, C Bruschini, E Charbon, X Intes
2024	Optica Biophotonics Congress 2024	Optical Tomography and Spectroscopy, OM1D. 3	*Deep Learning Aided Fluorescence Lifetime Tomography;* NI Nizam, I Erbas, **V Pandey**, JT Smith, X Intes
2024	Optica Biophotonics Congress 2024	Clinical and Translational Biophotonics, TS3B. 2	*Fluorescence lifetime parameters estimation with transformer based deep learning model;* I Erbas, **V Pandey**, NI Nizam, N Yuan, X Intes
2024	Optica Biophotonics Congress 2024	Clinical and Translational Biophotonics, TM5B. 4	*Experimental study of Fluorescence Lifetime Uncertainty in Time-Gated ICCD-based Macroscopic Fluorescence Lifetime Imaging* N Yuan, **V Pandey**, X Michalet, X Intes
2024	Optica Biophotonics Congress 2024	Clinical and Translational Biophotonics, TS3B. 1	*Multimodal Fluorescence Lifetime Imaging and Optical Coherence Elastography for Mesoscopic Structural, Biomechanical, and Molecular Imaging;* Luis Chavez, Shan Gao, **Vikas Pandey**, Nanxue Yuan, Jiayue Li, Matt S Hepburn, Percy Smith, Caroline Edelheit, David T Corr, Brendan F Kennedy, Xavier Intes
2024	Optica Biophotonics Congress 2024	Optical Coherence Tomography, JS4A. 27	*Monte-Carlo Based Data Generator for Fluorescence Lifetime Applications* NI Nizam, I Erbas, **V Pandey**, X Intes
2024	Optica Biophotonics Congress 2024	Optics and the Brain, JS4A. 26	*Multimodal Data-fusion in Fluorescence Lifetime Imaging using Deep Learning* **V Pandey**, I Erbas, X Intes
2024	Optica Biophotonics Congress 2024	Microscopy Histopathology and Analytics, MM5A. 5	*Quantifying Drug-Receptor Engagement using Macroscopic Fluorescence Lifetime FRET in vivo Imaging* A Verma, **V Pandey**, N Yuan, C Sherry, T Humphrey, C James, Tynan Young, John C Williams, Xavier Intes, Margarida Barroso
2024	SPIE Photonics West 2024	Multimodal Biomedical Imaging XIX, PC128340P	*Deep Learning model for efficient instrument response function deconvolution in fluorescence lifetime imaging* **V Pandey**, X Michalet, A Ulku, C Bruschini, E Charbon, X Intes
2024	SPIE Photonics West 2024	Multiphoton Microscopy in the Biomedical Sciences XXIV, PC128470S	*Using meditope-based antibody labeling to improve fluorescence lifetime FRET imaging* A Verma, C Sherry, N Yuan, **V Pandey**, J Williams, X Intes, MM Barroso
2024	SPIE Photonics West 2024	Multimodal Biomedical Imaging XIX, PC128340H	*Fluorescence lifetime tomography via deep learning* NI Nizam, **V Pandey**, JT Smith, I Erbas, X Intes
2024	SPIE Photonics West 2024	Multimodal Biomedical Imaging XIX, PC1283407	*3D fluorescence molecular tomography utilizing a novel SPAD camera* NI Nizam, **V Pandey**, I Erbas, A Ulku, C Bruschini, E Charbon, Xavier Michalet, Xavier Intes

2024	SPIE Photonics West 2024	Multimodal Biomedical Imaging XIX, PC128340C	*Transformer based deep learning model for fluorescence lifetime parameters estimation using pixelwise instrument response function* I Erbas, **V Pandey**, NI Nizam, N Yuan, X Intes
2024	SPIE Photonics West 2024	Visualizing and Quantifying Drug Distribution in Tissue VIII, PC128210F	*Macroscopy fluorescence lifetime FRET monitors drug-target engagement in tumors in vivo* A Verma, C Sherry, **V Pandey**, N Yuan, J Williams, X Intes, MM Barroso
2024	SPIE Photonics West 2024	Visualizing and Quantifying Drug Distribution in Tissue VIII 12821, 17-20	*Antibody-target binding quantification in living tumors using macroscopy fluorescence lifetime Forster resonance energy transfer imaging (MFLI FRET)* N Yuan, **V Pandey**, A Verma, JC Williams, X Intes, M Barroso
2023	SPIE Photonics West 2023	Visualizing and Quantifying Drug Distribution in Tissue VII 12357, 123570D	*Impact of tumor microenvironment in antibody-HER2 binding using macroscopy fluorescence lifetime FRET in vivo imaging* A Verma, **V Pandey**, JT Smith, X Intes, M Barroso
2023	SPIE Photonics West 2023	Multiphoton Microscopy in the Biomedical Sciences XXIII 12384, 162-167	*Near infrared fluorescence lifetime FRET microscopy to evaluate antibody drug binding in various HER2 positive cancer cell lines* Catherine Sherry, Amit Verma, Jason Smith, **Vikas Pandey**, Tynan Young, John Williams, Xavier Michalet, Xavier Intes, Margarida Barroso
2019	4th WHO Global Forum on Medical Devices	Poster	*A novel portable device and thinning reagent for highly sensitive TB detection at low resource settings:* **Vikas Pandey**, Seyed E Hasnain & Ravikrishnan Elangovan
2019	5th Global Forum on TB Vaccines	Poster	*Miniaturized Fluorescence adapter for Fluorescence Sputum Smear Microscopy using bright-field microscope;* **Vikas Pandey**, Pooja Singh, Mamta Rani, Saumya Singh, Nasreen Z Ehtesham, Seyed E Hasnain & Ravikrishnan Elangovan
2017	Biophysical Journal	Poster	*Minimum and Maximum Limit to Number of Myosin II Motors Participating in an Ensemble Motility;* Khushboo Rastogi, **Vikas Pandey**, Sunil Nath, Ravikrishnan Elangovan
2016	OWLS FCS	Poster	*Compact waveguide-based large area evanescent excitation for label-free and fluorescent imaging of very small bio-molecules;* **Vikas Pandey**, Shalini Gupta & Ravikrishnan Elangovan

Judgement/Guest Lecture/Expert in Panel

- **Session Chair (Deep Learning):** SPIE Photonics West 2024, Multimodal Biomedical Imaging XIX, Conference 12834, January 27, 2024, San Francisco, CA, USA.
- **Invited participant:** webinar - Deep learning techniques enhance fluorescence imaging by Electro Optics
- **Research Judge:** Research Symposium – Poster Session for the Centre for Materials, Devices, and Integrated Systems (CMDIS), Rensselaer Polytechnic Institute, Troy, New York, USA, 2023.
- **Invited participant:** Geneva Health Innovation Fair for innovation in tuberculosis (TB) diagnostics technology.
- **Invited Guest Lecture:** Grassroots innovation at the Indian Institute of Management (IIM) Ahmedabad, Gujarat, India, 2019.
- **Panelist:** Discussed the role of Artificial Intelligence in Healthcare at Intel Research, Bengaluru, India, 2018.

- **Panelist:** Addressed infectious disease innovative technologies at the Biotechnology Industry Research Assistance Council (BIRAC), New Delhi, India, 2018.
- **Panelist:** Discussed strengthening the innovation ecosystem for biopharmaceuticals at an Invest India, Government of India meeting, 2018.
- **Panelist:** Addressed antimicrobial resistance at the Biotechnology Industry Research Assistance Council (BIRAC), Government of India, 2017.
- **Panelist:** Spoke on innovation in healthcare at the Indian Institute of Technology (IIT) Delhi, 2017.

Honors
- **National Cancer Institute (NCI/NIH), USA:** Junior Investigator podium presentation with financial coverage, July 2024.
- **Lifetime Member (Optics & Photonics societies, USA):** Optica (formerly OSA) www.optica.org , and SPIE (https://www.spie.org/)
- **Invited Member:** Sepsis Innovation Collaborative, California, USA, 2022.
- **Central Drugs Standard Control Organisation (CDSCO):** Certificate from the Drug Controller General of India for the SeeTB device implementation in resource-poor settings, 2020.
- **Gandhian Young Technology Innovation Award:** Awarded by the President of India for the development of an effective tuberculosis diagnostics method in resource-limited settings, 2018.
- **Social Alpha Impact Innovation Award**, **Grand Challenge Exploration Award** from BIRAC, Bill & Melinda Gates Foundation, and IKP, **Biotechnology Ignition Grant (BIG)** from BIRAC, 2018.
- **Longitude Prize Discovery Award: Royal** Society London for innovation in Antimicrobial Resistance (AMR) detection, 2016.
- **Elected House Secretary**: Represented 800 students of Udaigiri House at IIT Delhi in 2015, addressing their internal and external affairs and advocating their concerns with the IIT Delhi administration.

Grants and Awards

Name		Type	Year	Amount
IBM-RPI Future of Computing Research Collaboration (FCRC) (**Co-PI**)	USA	Grant	2025	**100,000 USD**
IBM-RPI AI Research collaboration (AIRC) (**Co-I**)	USA	Grant	2024	**200,000 USD**
Biotechnology Ignition Grant (**PI**)	India	Grant	2019	**5,000,000 INR**
India Health Fund (**Co-I**)	India	Grant	2019	**19,000,000 INR**
President Award (Gandhian Young Technology Innovation Award) (**PI**)	India	Award	2018	**1,500,000 INR**
Grand Challenge Exploration (Bill & Melinda Gates Foundation & BIRAC) (**PI**)	India	Grant	2018	**5,000,000 INR**
Social Alpha – Quest for Innovation (**PI**)	India	Grant	2018	**2,500,000 INR**
Tech Planter (**Co-PI**)	Japan	Award	2016	**200,000 YEN**
Longitude Prize Discovery Award (**PI**)	UK	Grant	2016	**1,150,000 INR**
Pfizer – IIT Delhi Innovation Award (**Co-PI**)	India	Grant	2016	**5,000,000 INR**
IIT Delhi Innovation Award & Seed Funding (**Co-PI**)	India	Award	2015	**200,000 INR**

INR – Indian Currency; **YEN** – Japanese Currency; **USD** – USA Currency

Teaching and Workshops
- **Co-Instructor:** Department of Biomedical Engineering, Rensselaer Polytechnic Institute, co-teaching with Prof. Xavier Intes
  - Biophotonics: Spring 2023, Spring 2024
  - Bio-Imaging and Bio-Instrumentation: Fall 2022, Fall 2023, Fall 2024
- **Workshop Attendee:** American Institute for Medical and Biological Engineering (AIMBE) Public Policy Institute, Washington, DC, October 2023
  - Focused on the role of researchers in public policy and advocacy.
- **Participant:** SwissSPAD User Group Meeting and Workshop by Advanced Quantum Architecture Laboratory (AQUA), École Polytechnique Fédérale de Lausanne (EPFL), Switzerland
  - Creativity Meeting: March 2023, Les Diablerets, Switzerland
  - User Group Meeting: May 2024, Les Diablerets, Switzerland
- **Organizer:** Antimicrobial Resistance (AMR) Workshop, Indian Institute of Technology (IIT) Delhi, India, November 2018

Scientific Journal & Grant Reviews

Reviewer for scientific journals	
Year	**Journals**
2024	Nature Communications Engineering IEEE Transactions on Biomedical Engineering Journal of Biomedical Optics Biomedical Optics Express
2023	Nature Communications IEEE Transactions on Biomedical Engineering Optica (Optics Letters) Optica (Applied Optics) Biomedical Optics Express Journal of Biomedical Optics
2022	Journal of Biomedical Optics Frontier Sciences
Reviewer for grants	
Year	**Grants/Awards**
2022	Co-reviewed grant with Prof. Xavier Intes for Swiss National Science Foundation
2020	Gandhian Young Technology Innovation Award (SRISTI)
2019	Gandhian Young Technology Innovation Award (SRISTI)

Industry Experience

Board member (Jan 2022 – Sept 2024)
Valetude Primus Healthcare Pvt Ltd
- Participate in strategic financial and operational planning for the company.
- Provide scientific expertise in technology and product development.

Co-founder, Managing Director (May 2015 – Dec 2021)
Valetude Primus Healthcare Pvt Ltd
- Established the company, building a team of young professionals, aligning business objectives with the company's mission, and developing patented technologies.
- Collaborated on integrated strategies to drive business growth, managing relationships with stakeholders, including investors, manufacturers, customers, regulators, and academics.
- Developed an executive team focused on achieving ambitious targets with well-structured plans.
- Led strategic initiatives to enhance operational efficiency and streamline organizational processes.
- Set and optimized internal policies to ensure responsiveness and scalability.
- Secured patents in the US, UK, South Africa, and India for four innovative technologies developed for commercialization.

Business Analyst (June 2011 – Dec 2012)
Evalueserve Pvt Ltd
- Developed statistical models for forecasting and prediction in data science projects.
- Performed competitive benchmarking to identify cost-saving opportunities and potential product enhancements.
- Analyzed data from primary and secondary sources to inform business strategy and optimize workflows.

Internship

- *AstraZeneca India*, Bangalore, Karnataka **(May 2009 – August 2009)**
- *Wake Forest University*, Winston-Salem, North Carolina, USA **(May 2008 – August 2008)**

Extra-Curricular Activities

- **Meditation**: Regularly practice meditation for mindfulness and mental well-being.
- **Traveling**: Passionate about exploring new places, especially beach destinations.
- **Reading**: Avid reader of articles across various domains, staying updated on new trends and insights.
- **Games**: Enthusiastic about playing pool and chess, which help sharpen strategic thinking.
- **Coding**: Enjoy coding as a hobby to solve problems and explore new technologies.
- **Movies and Music**: Enjoy a wide range of films and music genres for relaxation and inspiration.