



# Chaudhari Harshal Rajendra

PhD - Signal Processing and Machine Learning  
Electronics and Electrical Engineering  
Indian Institute Of Technology, Guwahati

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## OBJECTIVE

- Highly motivated and organized researcher in the field of Digital holography and Deep Learning with the intent to utilize the knowledge and skills in exploring solutions to problem statements and challenges.

## EDUCATION

Degree/Certificate	Institute/Board	CGPA/Percentage	Year
Ph.D.	Indian Institute of Technology, Guwahati	9.00	2020-Present
M.Tech	National Institute of Technology, Calicut	8.01	2018-2020
B.E.	Pimpri Chinchwad College of Engineering, Pune	70.81 %	2014-2018
Higher Secondary	Abasaheb Garware College, Pune	75.38 %	2012-2014
Secondary	St. Aloysius High School, Bhusawal	86 %	2012

## PROJECTS

- Off-axis Digital Holographic Microscopy for Cell Imaging & Classification** *August. 2020 - Present*  
*Ph.D. Research under Dr. Rishikesh Kulkarni and Prof. M. K. Bhuyan*
  - Designed a label-free, cumulative learning-based segmentation approach for improved cell mixture classification.
  - To integrate a detection model into the camera sensor for real-time detection and autofocus of cells flowing through the microfluidic channel.
  - Developed an off-axis hologram reconstruction algorithm using the fractional Fourier transform for non-telecentric holographic microscopy.
  - Implemented dimensionality reduction-based phase aberration compensation and spurious fringe removal techniques.
  - To develop a compact lateral shearing-based common path off-axis digital holographic microscopy using a beam-splitter.
- Residual learning based end-to-end wireless communication system** *July 2019 - May 2020*  
*M.Tech project under Prof. Sameer S. M.*
  - To develop a residual learning based end-to-end wireless communication system under rayleigh fading and bursty noise channels
- A Secured IOT based Modern Healthcare System.** *July 2017 - May 2018*  
*B.E. project under Prof. Ajay Gaadhe*
  - To develop a secured IOT-based modern healthcare system using Arduino UNO, node MCU, and sensor modules.

## RESEARCH INTEREST

- Digital Holographic Microscopy, Microfluidics, Quantitative Phase Imaging, Biomedical Imaging and Deep learning

## SCIENTIFIC ACHIEVEMENTS

- Publications:
  - Journals: 04
  - Conferences: 04
- Manuscript under review:
  - Journals: 01
  - Conferences: 02

- Harshal Chaudhari, Pradeep Kumar Sundaravadivelu, Rishikesh Kulkarni, M.K. Bhuyan, Rajkumar P. Thummer, "**Cumulative learning based segmentation aided cell mixtures classification in digital holographic microscopy**," Optics & Laser Technology, Volume 181, Part C, 2025.
- Harshal Chaudhari, Rishikesh Kulkarni, Pradeep Kumar Sundaravadivelu, Rajkumar P. Thummer, M.K. Bhuyan, "**Digital hologram reconstruction algorithm based on the fractional Fourier transform in non-telecentric digital holographic microscopy**," Opt. Lett. 49, 182-185 2024.
- Harshal Chaudhari, Rishikesh Kulkarni, Pradeep Kumar Sundaravadivelu, Rajkumar P. Thummer, M.K. Bhuyan, "**Dimensionality reduction technique based phase aberration compensation and spurious fringe removal in off-axis digital holographic microscopy**," Optics and Lasers in Engineering, Volume 172, 2024.
- Harshal Chaudhari, Rishikesh Kulkarni, M. K. Bhuyan, Pradeep K. Sundaravadivelu, Rajkumar Thummer, "**Machine-learning-based classification of co-cultured cells from the phase images in digital holographic microscopy**," Proc. SPIE 12996, Unconventional Optical Imaging IV, 129960H, 18 June 2024.
- Harshal Chaudhari, Rishikesh Kulkarni, M. K. Bhuyan, "**Numerical Reconstruction Algorithm based on Fractional Fourier Transform and Particle Swarm Optimization in Non-Telecentric Digital Holographic Microscopy**," OPTOIN2024, October 2024.
- H. Chaudhari, R. Kulkarni, and M. K. Bhuyan, "**Weakly Supervised Learning-based Reconstruction of Planktons in Digital In-line Holography**," in Digital Holography and 3-D Imaging 2022, D. Chu, J. Park, C. Cheng, and P. Ferraro, eds., Technical Digest Series, Optica Publishing Group, 2022
- H. R. Chaudhari, C. P. Najlah and S. M. Sameer, "**A ResNet Based End-to-End Wireless Communication System under Rayleigh Fading and Bursty Noise Channels**," 2020 IEEE 3rd 5G World Forum (5GWF), Bangalore, India, pp. 53-58, 2020.
- Harshal Chaudhari, Deep Arya, Rishikesh Kulkarni and Pramod Rastogi, "**Particle localization in lens-less digital inline holography using circular Hough transform**," Asian Journal of Physics, Vol. 31, 1055-1061, 2022.

#### JOURNALS AND CONFERENCES (UNDER REVIEW)

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- Harshal Chaudhari, Arnab Das, Harsh Singh, Anik Ghosh, Rishikesh Kulkarni, M. K. Bhuyan, Rajkumar P. Thummer, "**Lateral shearing common path digital holographic microscopy with iteration reconstruction**," Applied Optics.
- Harshal Chaudhari, Arnab Das, Harsh Singh, Anik Ghosh, Rishikesh Kulkarni, M. K. Bhuyan, Rajkumar P. Thummer, "**Common path off-axis digital holographic flow cytometry based on lateral shearing using beam splitter**," SPIE Optical Metrology 2025.
- Harshal Chaudhari, Rishikesh Kulkarni, M. K. Bhuyan, "**Label-Free Cell Death Assessment using Digital Holographic Microscopy by Integrating CNNs and Vision Transformers**," SPIE Optical Metrology 2025.

#### JOURNALS REVIEWED

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- Optics letters.
- Optics and laser in engineering.
- Applied optics.
- Optics continuum.

## TECHNICAL SKILLS

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- **Programming:** Python, Matlab, HTML, CSS\*.
- **Academic:** Latex, MS-Office, Inkspace, draw.io
- **Tools/Frameworks:** Keras, Tensorflow, PyTorch, OpenCV, Git
- **Operating Systems:** Windows, Linux\*

\* Elementary proficiency

## KEY COURSES TAKEN

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- **Course work:** Linear Algebra, Probability & Random Processes, Machine Learning and Image Processing.

## TEACHING ASSISTANT, EEE, IIT GUWAHATI

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- EE101: Basic Electronics (Theory).
- EE102: Basic Electronics (Laboratory).
- EE646: Optical Measurement Technique and Applications.
- EE322M: Signal Processing.

## POSITIONS OF RESPONSIBILITY

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- **Event Manager**, Research Scholar Forum (RSF-EEE), IIT Guwahati *Apr. 2021 - Apr. 2022*
- **Management Head**, Institute Social Responsibility (ISR) Cell, PCCOE, Pune *Apr. 2017 - Apr. 2018*

## EXTRA-CURRICULAR ACTIVITIES

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- Volunteered at the 29<sup>th</sup> National Conference on Communications (NCC) 2023, held at IIT Guwahati.
- Volunteered at the 8th National Conference on Industry-Institute Interaction 2016 at PCCOE, Pune, in association with NASSCOM, MIDC, BOAT, MIDC (R&D), SME Chamber of India, and S. P. Pune University.
- Participated in the DST & Texas Instruments India Innovation Challenge Design Contest 2017, anchored by IIM Bangalore.
- Participated in Communique 15 – 5th International Telecom Seminar at Symbiosis Institute of Telecom Management, Pune.

## ACHIEVEMENTS

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- **Research Fellowship**, Ministry of Education, Govt. of India for Ph.D. *2020-2025.*
- **Bronze Medal**, Intra-department badminton competition, RSF-EEE, IIT Guwahati *2022*
- **Fellowship**, AICTE, Govt. of India GATE fellowship for M.Tech. *2018-2020*

## LANGUAGE

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- English (Full professional proficiency), Marathi (Native or bilingual proficiency), Hindi (limited professional proficiency).

## DECLARATION

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I hereby do testify that the above information is correct to the best of my knowledge. References will be made available upon request.

Date: **24/03/2025**

Name: **Chaudhari Harshal Rajendra**

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