R. Sriprabha

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https://scholar.google.com/citations?hl=en&user=4gfd0HkAAAAJ&view_op=list_works&sortby=pubdate
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https://github.com/sriprabhar   /

Current positions

Senior Engineer, Healthcare Technology Innovation Center (HTIC),
Senior Project Engineer, Industrial Consultancy and Sponsored Research, Indian Institute of Technology Madras (IITM)
Ph.D Scholar (final year, 9th semester), IITM, India
Indian Institute of Technology Research Park, Chennai, India

Professional Summary

- Overall corporate experience of 15+ years in general and medical image processing, computer vision, machine learning and deep learning, Imaging application development with programming skills in C, C++, Python, Numpy, Matlab, Scilab. 2+ years' experience in DSP assembly and C programming, FPGA CPLD programming using Verilog, hardware design
- Over 5+ years of research experience with 14 publications – both journals and conference papers and 3 pending patents
- Imaging tools - OpenCV, Matlab, SimpleITK, VTK, scikit-learn, IDE – Python VS Code, VC++, Imaging Frameworks – Slicer3D, MITK, Paraview, Philips Medical Workspot and Oncology System, Deep learning – Pytorch, Configuration management tools: Clearcase, Github.

Current Research Areas

Medical image analysis - algorithm development for 3D Medical image registration, segmentation, interactive mesh segmentation

Deep learning - multi-task learning, meta-learning, variational inference, domain adaptation and generalization, and self-supervised learning.

Inverse problems in medical imaging – image reconstruction and super-resolution, knowledge distillation, neural structure and texture transfer

Machine learning for Image processing and computer vision

Ph.D Outcomes (Guide: Dr. Mohanasankar Sivaprakasam, Professor, EE Dept., Head HTIC, IITM)

- Journal publications (3 published, 2 as first author, 1 as joint first author and 1 revision submitted and 1 to be submitted as second author),
- Conference proceedings (7 published articles, 4 as first author), and
- Patents (3 pending patents)

Research Grants Raised

My Ph.D. work has led to a successful proposal for joint funding by DST and GE Healthcare. I have prepared the core content of the GE-SERB, DST, Govt. Of India and GE Healthcare, Research Grant Proposal on Meta-learning framework for Imaging applications
https://serb.gov.in/assets/pdf/news/Call_for_applications-%20First_cycle_2022.pdf

The details of the grant are follows:
Project Number: SP23241438EESERB008429
Client Name: Science and Engineering Research Board, Govt. Of India
Start date: 14 Jul 2023
Closure date: 13 Dec 2024
Total Sanctioned Value: INR 44,23,408
Sanction Date : Tue 04 Jul 2023

Awards and Achievements

- **Lead Researcher in the core grant preparation of the GE-SERB**, DST, Govt. Of India and GE Healthcare, **Research Grant** for Dec 2022 to Dec 2024 on **Meta-learning framework for Imaging applications** for MRI.
- **Won the Prof. Malathi Veeraraghavan Fellowship Award**, 2022 to 2023 along with an all-time title "**MV Scholar**", for academic excellence. in the legacy of Prof. Malathi Veeraraghavan (one of the two selected women Ph.D. scholars shortlisted among the 8 best scholars together from EE and CS departments).
- **Runner up Best Paper Award**, MIDL 2020 for the paper MAC-ReconNet. (one of the 4 awarded papers chosen from 18 long oral papers out of 146 submissions, that is, 12.2% acceptance rate)
- **Three Indian pending patents** filed based on the Ph.D. Research work
- **Honorable mention Reviewer** for **MIDL 2021**
- **Code Reproducibility Badge** in **CodeOcean** for **KM-MAML Journal paper** in **ASOC 2023**
- The **Virtual Plate Contouring tool for Mandibular Surgery** Planning developed at HTIC is installed at the Malabar Cancer Center, Thalassery, has been **successfully used** to plan mandible surgery for over **8 cancer patients, 2014**.
- **"You did it" award twice** at Philips Healthcare for critical problem solving during release and algorithm development, 2008 - 2009
- **Presented Tech Talks in Philips Healthcare** on Surface Mesh Extraction, Medical Image Segmentation, Pharmaco kinetic modelling, 2008

Publications

1. **Sriprabha Ramanarayanan**, Arun Palla, Keerthi Ram, and Mohanasankar Sivaprakasam. Generalizing supervised deep learning MRI reconstruction to multiple and unseen contrasts using meta-learning hypernetworks. Applied Soft Computing, page 110633, 2023 (In Press). https://doi.org/10.1016/j.asoc.2023.110633

2. **Sriprabha Ramanarayanan**, Balamurali M, Keerthi Ram, and Mohanasankar Sivaprakasam, **MAC-ReconNet: A Multiple Acquisition Context based Convolutional Neural Network for MR Image Reconstruction using Dynamic Weight Prediction**, March 2020, Medical Imaging with Deep Learning (MIDL 2020, long oral, Runner-up Best paper award (one of the 4 awarded papers chosen from 18 long oral papers out of 146 submissions (that is, 12.2% acceptance rate for oral papers)
https://proceedings.mlr.press/v121/ramanarayanan20a.html

3. **Sriprabha Ramanarayanan**, Mohammed Al Fahim, Rahul G, S, Amritkumar Jethi, Keerthi Ram and Mohanasankar Sivaprakasam, HyperCoil-Recon: A Hypernetwork-based Adaptive Coil Configuration Task Switching Network for MRI Reconstruction, ICCVW, CVAMD 2023 (Accepted)
https://arxiv.org/abs/2308.04821

4. **Sriprabha Ramanarayanan**, Balamurali Murugesan, Arun Palla, Keerthi Ram, Ramesh Venkatesan, Mohanasankar Sivaprakasam, MCI-HyperNet: A Multiple Contextual Information-based Adaptive Weight Learning Network for Controllable Image Reconstruction, Neurocomputing, Volume 554, 2023. https://doi.org/10.1016/j.neucom.2023.126606

5. Madhu mithra K K, **Sriprabha Ramanarayanan**, Keerthi Ram, and Mohanasankar Sivaprakasam, Lifting Scheme Based Wavelet Texture Transfer Network for MRI Super-Resolution, Computers in Biology and Medicine 2023 (Revise and Resubmit)

6. **Sriprabha Ramanarayanan**, Balamurali M et al, MRI Super-Resolution using Laplacian Pyramid Convolutional Neural Networks with Isotropic Undecimated Wavelet Loss April, 2020 IEEE, Engineering in Medicine and Biology Society (EMBC 2020)
    https://ieeexplore.ieee.org/document/9176100

7. **Sriprabha Ramanarayanan**, Balamurali M et al, DC-WCNN: A deep cascade of wavelet based convolutional neural networks for MR Image Reconstruction. International Symposium on Biomedical Imaging (ISBI 2020)
    https://ieeexplore.ieee.org/document/9098491

8. Rahul G. S., **Sriprabha Ramnarayanan**, Mohammad Al Fahim, Keerthi Ram, Preejith S. P and Mohanasankar Sivaprakasam, SDLFormer: A Sparse and Dense Locality-enhanced Transformer for Accelerated MR Image Reconstruction, MICCAI workshop MILLanD 2023 (Accepted)
    https://arxiv.org/abs/2308.04262

9. Matcha Naga Gayathri, **Sriprabha Ramanarayanan**, Mohammad Al Fahim, Rahul G S, Keerthi Ram, Mohanasankar Sivaprakasam, SFT-KD-Recon: Learning a Student-friendly Teacher for Knowledge Distillation in Magnetic Resonance Image Reconstruction, MIDL 2023
    https://openreview.net/pdf?id=j6GZ2IEia_E

10. Arun Palla, **Sriprabha Ramanarayanan**, Keerthi Ram, Mohanasankar Sivaprakasam, Generalizable Deep Learning Method for Suppressing Unseen and Multiple MRI Artifacts Using Meta-learning, EMBC 2023 https://arxiv.org/abs/2304.06378

11. Madhu Mithra K K, **Sriprabha Ramanarayanan**, Keerthi Ram, Mohanasankar Sivaprakasam, "Reference-based Texture transfer for Single Image Super-resolution of Magnetic Resonance images", International Symposium on Biomedical Imaging (ISBI 2021)
    https://ieeexplore.ieee.org/document/9433961

12. Balamurali Murugesan, **Sriprabha Ramanarayanan**, Sricharan Vijayarangan, Keerthi Ram, Naranamangalam R Jagannathan, and Mohanasankar Sivaprakasam A Deep Cascade of Ensemble of Dual Domain Networks with Gradient-based T1 Assistance and Perceptual Refinement for Fast MRI Reconstruction, Computerized Medical Imaging and Graphics, 2021
    https://doi.org/10.1016/j.compmedimag.2021.101942

13. Arunima Sarkar, Ayanthika Das, Keerthi Ram, **Sriprabha Ramanarayanan**, and Mohanasankar Sivaprakasam, AutoDPS: An Unsupervised Diffusion Based Model for Multiple Degradation Removal in MRI, WACV 2024 (Submitted)

14. A. Nair, **S. Ramanarayanan**, S. Ahlawat, S. Koushika, N. Joshi and M. Sivaprakasam, Axonal transport velocity estimation from kymographs based on curvilinear feature extraction and spline fitting, 2014, IEEE, EMBC 2014. DOI: 10.1109/EMBC.2014.6944560

Magazine coverage

The MIDL 2020 paper is featured in the RSIP vision magazine at
https://www.rsipvision.com/ComputerVisionNews-2020August/26/)

Manuscript Reviewing

Medical Image Analysis (MeDIA) - 2021

Medical Imaging with Deep Learning (MIDL) – 2021, 22 and 23

Winter Conference on Computer Vision – 2024

Pending Patents

Title of the Patent	Application No.	Provisional Filing Date	Name of Inventor(s)
Method and apparatus for enhancing the diagnostic quality of magnetic resonance scans	Indian Patent Application No. 202341051465	31-Jul-23	Dr. Mohanasankar Sivaprakasam, Mr. Arun Palla, Mrs. Sriprabha Ramanarayanan, Mr. Keerthi Ram
Improving the diagnostic quality of magnetic resonance (MR) scans affective by undersampling for multiple MRI contrasts	Indian Patent Application No. 202341051068	28-Jul-23	Dr. Mohanasankar Sivaprakasam, Mrs. Sriprabha Ramanarayanan, Mr. Arun Palla, Mr. Keerthi Ram
A multiple contextual information-based adaptive weight learning neural network for controllable magnetic resonance (MR) image reconstruction	Indian Patent Application No. 202341050919	29-Jul-23	Dr. Mohanasankar Sivaprakasam, Mrs. Sriprabha Ramanarayanan, Mr. Keerthi Ram

Education

- Final year (9th semester) **Ph.D** in Dept. Of Electrical Engineering, **IIT, Madras**, since July 2019.
  Course work and grades: **Overall CGPA in course work: 9.29**

Fundamentals of Linear Optimization	S (10)
Deep Learning for Computer Vision	B (8)
Digital Video Processing	S (10)
Probability Foundations	A (9)

- M.S (Elect. Engg., Specialization – Digital signal Processing): 8.7 (CGPA) , IITM (2004 to 2007)
- B.E (ECE): 75% St.Joseph's College of Engineering, Madras University, Chennai (1996-2000)

Technical Talks

- Technical Talk in Philips Healthcare on Surface Mesh Extraction and deformable model based segmentation for radiation treatment planning in CT volumes
- Technical Talk in Philips Healthcare on Pharmaco kinetic modelling.

Corporate and Research Experience

- **Working** as a **Senior Project Engineer** in **Healthcare Technology Innovation Center (HTIC), IIT, Chennai** from **Sep 2013** to **till date (Medical Image Processing)**

- Worked as a **Senior Technical Specialist** in **HCL Technologies, Chennai Jan 2011** to **Aug 2013. (General and Medical Image processing)**

- Worked as a **Technical Specialist** in **Philips Healthcare, Philips Innovation Campus, Bangalore** from **Sep '07** to **Dec 2010 (Medical Image processing)**
- Worked as a **Design Engineer** in **Vortex Engineering Pvt. Ltd, IIT Research Park Chennai** from **Sep '05** to **August '07 (Image processing)**
- Worked as a **Project Associate**, Industrial Consultancy and Sponsored Research (ICSR), **IITM, April 2002** to **Aug 2005 (Signal and Image processing)**

List of Projects at HTIC (Present Employer)

Project Description	Customer name	Nature of work	Programming tools	Duration
GE-SERB Prostate DCE MRI using Deep learning	SERB, Govt. of India	Proposal preparation, literature survey, data collection and curation, training and validation of neural network architectures, project management.	Pytorch, ITk, VTK	April 2022 to present
Meta-learning for MRI Reconstruction	Research work, SERB	Data collection and curation, training and validation of neural network architectures and image visualization	Pytorch, Python, SciPy	Jan 2020 to present
EMR - CI - robotic system for skull base surgery procedures such as cochlear implant, mastoidectomy, and trans-labyrinthine procedures	Eindhoven Medical Robotics	Algorithm development for atlas based segmentation of CT temporal bone structures	SimpleITK, python, numpy, Jupyter Notebook	Aug 2020 to Dec 2021
EMR SpineBot - an automated robotic system for precision bone drilling of the vertebrae and pedicle screw placement.	Eindhoven Medical Robotics	Algorithm development for MRI spine segmentation and super-resolution	MITK workbench, C++, Pytorch, python, numpy, Jupyter Notebook	Feb 2020 to July 2020
MRI reconstruction	GE Healthcare	Development of Deep learning based architectures for MRI reconstruction	MITK workbench, Pytorch, python, numpy, Jupyter Notebook	Feb 2019 to June 2020
Machine Vision in Life Sciences workflow - detection of equipments and sensors in workflow	GE Life Sciences	Development of clamp detection algorithm using SVM and data	Matlab	Dec 2017 to April 2018

		augmentation for deep learning based detection.		
Endoscopic image super-resolution	Internal project	LapSRN neural network for super-resolution method of endoscopic images	Pytorch, python	Oct 2018 to Dec 2018
Endoscopic Imaging	Mitra Ottomed	Algorithm and application development for image processing	OpenCV, C++	Jan 2017 to Jan 2018
CT Lung Nodule detection	Kaggle Challenge	Algorithm development	ITK, C++, Python	April 2017
Interactive Segmentation of structures in CT Knee for partial knee replacement	Styker	Development, testing and validation of surface patch and surface drag interaction utilities for wired mesh editing on MITK Viewers	MITK workbench, C++	July 2016 to Feb 2017
Mandibular reconstruction	Malabar Cancer Center, Kerala	Development of Virtual Plate Contouring tool that involves computation of patient-specific plate bend angles for preoperative planning of mandibulectomy.	Slicer, C++	April 2014 to March 2015
Axonal velocity estimation from kymograph images	National Center for Biological Sciences, Bangalore	Algorithm development for post processing curvilinear structures in kymograph images and estimating axonal velocities by spline-fitting of curves.	Matlab	Jan 2014 to March 2014
Development of verification and validation process for Ultrasound liver vessel segmentation	Perfint Healthcare	Literature survey, documentation		Sep 2013 to Dec 2013

Work done at Imaging Center of Excellence, HCL (Previous Employer)

Project Description	Customer name	Nature of work	Programming tools	Duration
WBC Blood Separation System using Image feature extraction	Therakos	Algorithm development, testing	Visual Studio C++	Feb 2013 to July 2013
Project proposal activity for a laparoscope based hernia repair surgery	Covedien	Literature survey and documentation		
Development of multimodality CT-PET rigid registration algorithm using powell's optimization and Particle Swarm Optimization and Principal Component Analysis Direct volume rendering algorithm development for CT brain image	In-house project	Algorithm development, testing	Visual Studio C++	Jan 2012 to Jan 2013
Optical Frequency Domain Imaging System	Terumo	Algorithm testing, validation and documentation	Visual Studio C++	Jan 2011 to Dec 2011

Work done at Philips Healthcare (Previous Employer)

Project Description	Nature of work	Programming tools	Duration
Development of contour reordering algorithm for surface mesh generation	Algorithm development, Invention disclosure documentation	ITK, VTK, C++	June 2010 to Nov 2010
Development of ITK registration framework for Imalytics, a translational research work station	Algorithm and application development, verification, validation and release	ITK, VTK, C#.Net, C++, Philips Medical Workspot Framework	June 2009 to Sept 2010
Development of surface mesh editing and paint brush editing for Pinnacle - Philips Radiation Oncology System	Algorithm and application development, verification, validation	ITK, VTK, C#.Net, C++, Philips Medical Workspot Framework	July 2008 to Dec 2008
Development of deformable model based segmentation technique for Philips Pinnacle software, Philips	Algorithm development	ITK, VTK, C#.Net, C++, Philips Medical Workspot Framework	April 2008 to June 2008

Radiation Oncology System			
Testing and validation of registration and segmentation algorithms for Pre-clinical imaging system (PCIS)	Algorithm testing, validation and documentation	PCIS - Philips Medical Workspot Framework	Sep 2007-Oct 2007, Dec 2007 to March 2008

Work done at TeNeT Group IITM (First Employer)

Project Description	Nature of work	Programming tools	Duration
Design of biometric fingerprint authentication system for ATMs (June 2006 to July 2007)	MS Thesis work	C++, Matlab, Visual DSP ++	June 2006 to July 2007
Development of Automatic Teller Machine Controller for Rural India	Hardware design, embedded C programming testing.	C++, Matlab, Visual DSP ++, Microcontroller and assembly language programming	Sep 2003 - April 2006
Linux based access terminal	Llightweight file system development and kernel compilation	C programming, shell scripting in Linux,	April 2002 to July 2003

Short Training programs

1. OpenGL programming and applications at HCL Technologies, Chennai.
2. As a part of the internal training, underwent a one month course on Philips Medical Workspot, for Image Visualization, a platform developed by Philips for developing healthcare applications.
3. Workshop on Mathematical morphology at Indian Statistical Institute Bangalore.
4. Certified in Short Term course under Continuing Education program on 'Digital Signal Processor and Applications' conducted at Analog Devices-IIT Madras DSP Learning Center at Indian Institute of Technology Madras, Chennai.
5. Undergone 6 months industry based training on ASIC VLSI front and back end design at Advanced Training Institute For Information Technology Private Limited.

Course work Projects

1. Design of vending machine controller using ASIC design tools.
2. Design of Systolic array multiplier using Verilog HDL
3. Library Information system using mySQL and PHP.
4. Design and development of Optical Communication System (BE project)