LASITH ADHIKARI

Philips Research North America, Cambridge, MA, USA

Email: lasiadhi @gmail.com *LinkedIn: lasiadhi*
GitHub: lasiadhi *Web: ilasith.github.io*

Research Interests

Predictive Model Building, Algorithm Design, Healthcare Analytics, Machine Learning, Deep Learning, Sparse Optimization, Medical Imaging, Simulation Modeling

Professional Experience

2019 – Present **Scientist, Philips Research Americas, Philips North America, Cambridge, USA**
Research: Design, develop and evaluate first-of-kind data analytics solutions to provide real time diagnostics using cutting-edge technologies

Educational Qualifications

2012 – 2017 **Ph.D. in Applied Mathematics, University of California, Merced, USA**
Thesis: Nonconvex Sparse Recovery Methods
Advisor: Prof. Roummel F. Marcia

2006 – 2010 **B.Sc. (Special) Degree in Mathematics,**
University of Sri Jayewardenepura (USJ), Sri Lanka
GPA: 3.50, First Class Honors

2005 – 2008 **B.Sc. (Hons) Degree in Information Technology,**
Sri Lanka Institute of Information Technology (SLIIT), Sri Lanka
GPA: 3.68, First Class Honors

1996 – 2004 **Ananda College, Colombo 10, Sri Lanka**
Passed G.C.E. Ordinary Level Examination (2001) with 10 'A's,
Completed G.C.E. Advanced Level Examination (2004) in Mathematics

Postdoctoral Training

2017 – 2019 **Postdoctoral Research Associate, PRISMA^{P} Lab, Department of Medicine, University of Florida, Gainesville, USA**
Analytic Core Lead: Building predictive models, real time systems

Peer-Reviewed Publications

1. **L. Adhikari** and R. Marcia, *Nonconvex relaxation for Poisson intensity reconstruction*, Proceedings of the 2015 IEEE International Conference on Acoustics, Speech and Signal Processing, 2015.
2. **L. Adhikari**, D. Zhu, C. Li, and R. Marcia, *Nonconvex reconstruction for low-dimensional fluorescence molecular tomographic Poisson observations*, Proceedings of the 2015 IEEE International Conference on Image Processing, 2015.
3. **L. Adhikari** and R. Marcia, *p-th power total variation regularization in photon-limited imaging via iterative reweighting*, Proceedings of the 2015 European Signal Processing Conference, 2015.
4. A. Orkusyan, **L. Adhikari**, J. Valenzuela and R. Marcia, *Analysis of p-norm regularized subproblem minimization for sparse photon-limited image recovery*, Proceedings of the 2016 IEEE International Conference on Acoustics, Speech and Signal Processing, 2016.
5. **L. Adhikari**, A. Kim and R. Marcia, *Sparse reconstruction for fluorescence lifetime imaging microscopy with Poisson noise*, Proceedings of the 2016 IEEE Global Conference on Signal and Information Processing, 2016.
6. **L. Adhikari**, A. Kim and R. Marcia, *Nonconvex sparse Poisson intensity reconstruction for time-dependent bioluminescence tomography*, Proceedings of the 2016 International Symposium on Information Theory and Its Applications, 2016.
7. **L. Adhikari**, J. B. Erway, R. Marcia and R. J. Plemmons, *Trust-region methods for nonconvex sparse recovery optimization*, Proceedings of the 2016 International Symposium on Information Theory and Its Applications, 2016.
8. **L. Adhikari** and R. Marcia, *Bounded sparse photon-limited image recovery*, Proceedings of the 2016 IEEE International Conference on Image Processing, 2016.
9. M. Banuelos, R. Almanza, **L. Adhikari**, R. Marcia and S. Sindi, *Constrained variant detection with SPaRC: Sparsity, Parental Relatedness, and Coverage*, Proceedings of the International Conference of the IEEE Engineering in Medicine and Biology Society, 2016.
10. M. Banuelos, R. Almanza, **L. Adhikari**, R. Marcia and S. Sindi, *Sparse genomic structural variant detection: exploiting parent-child relatedness for signal recovery*, Proceedings of the 2016 IEEE Workshop on Statistical Signal Processing, 2016.
11. M. Banuelos, R. Almanza, **L. Adhikari**, S. Sindi and R. Marcia, *Sparse signal recovery methods for variant detection in next-generation sequence data*, Proceedings of the 2016 IEEE International Conference on Acoustics, Speech and Signal Processing, 2016.
12. M. Banuelos**, L. Adhikari**, R. Almanza, A. Fujikawa, J. Sahag, K.Sanderson, M. Spence, S. Sindi and R. Marcia, *Sparse diploid spatial biosignal recovery for genomic variation detection*, Proceedings of the 2017 IEEE International Symposium on Medical Measurements and Apps, 2017.
13. M. Banuelos**, L. Adhikari**, R. Almanza, A. Fujikawa, J. Sahag, K.Sanderson, M. Spence, S. Sindi and R. Marcia, *Nonconvex regularization for sparse genomic variant signal detection*, Proceedings of the 2017 IEEE International Symposium on Medical Measurements and Applications, 2017.
14. F. Wen, **L. Adhikari**, L. Piu, R. Marcia, P.Liu and R. Qiu, *Nonconvex regularization based sparse recovery and demixing with application to color image inpainting*, IEEE Access Journal, 5, pp. 11513-11527, 2017.

15. M. Banuelos, R. Almanza, **L. Adhikari**, S. Sindi, and R. Marcia, *Biomedical signal recovery: Genomic variant detection in family lineages*, Proceedings of 2017 IEEE 5th Portuguese Meeting on Bioengineering, 2017.
16. **L. Adhikari**, J. Erway, S. Lockhart, and R. Marcia, *Limited memory trust-region methods for sparse relaxation*, Proceedings of SPIE: Wavelets and Sparsity XVII, 2017.
17. **L. Adhikari**, R. Baikejiang, O. DeGuchy, and R. Marcia, *Non-convex Shannon entropy for photon-limited imaging*, Proceedings of SPIE: Wavelets and Sparsity XVII, 2017.
18. O. DeGuchy, **L. Adhikari**, A. Kim, and R. Marcia, *Photon-limited fluorescence lifetime imaging microscopy signal recovery with known bounds*, Proceedings of 2017 IEEE International Workshop on Computational Advances in Multi-Sensor Adaptive Processing, 2017.
19. **L. Adhikari**, *Non-convex sparse optimization for photon-limited imaging*, Proceedings of M.Sc./Ph.D. Forum in the 2017 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), 2017
20. B. Shickel, T.J. Loftus, **L. Adhikari**, T. Ozrazgat-Baslanti, A. Bihorac, and P. Rashidi, DeepSOFA: A Continuous Acuity Score for Critically Ill Patients using Clinically Interpretable Deep Learning. Nature Scientific reports, 9(1), p.1879, 2019.
21. **L. Adhikari**, T. Ozrazgat-Baslanti, M. Ruppert, R.W.M.A. Madushani, S. Paliwal, H. Hashemighouchani, F. Zheng, M. Tao, J.M. Lopes, X. Li, P. Rashidi and A. Bihorac, Improved predictive models for acute kidney injury with IDEA: Intraoperative Data Embedded Analytics. PloS one, 14(4), p.e0214904, 2019.
22. S. Bandyopadhyay, N. Lysak, **L. Adhikari**, L. M. Velez, L. Sautina, R. Mohandas, M. Lopez, R. Ungaro, Y. Peng, F. Kadri, P. Efron, S. Brakenridge, L. Moldawer, F. Moore, H. V. Baker, M. S. Segal, T. Baslanti, P. Rashidi, A. Bihorac, Discovery and Validation of Urinary Molecular Signature of Early Sepsis, Critical care explorations, Volume 2, Issue 10, Oct 2020.
23. A. I. Wong, M. Charpignon, H. Kim, C. Josef, A. A. de Hond, J. J. Fojas, A. Tabaie, X. Liu, E. Mireles-Cabodevila, L. Carvalho, R. Kamaleswaran, RWMA Madushani, **L. Adhikari**, A. L. Holder, E. W. Steyerberg, T. G. Buchman, M. E. Lough, L. A. Celi, Analysis of Discrepancies Between Pulse Oximetry and Arterial Oxygen Saturation Measurements by Race and Ethnicity and Association with Organ Dysfunction and Mortality, JAMA network open 4, no. 11, 2021.
24. C. M. Sauer, T. A. Dam, L. A. Celi, M. Faltys, M. A. de la Hoz, **L. Adhikari**, K. A. Ziesemer, A. Girbes, P. J. Thoral, P. Elbers. Systematic Review and Comparison of Publicly Available ICU Data Sets – A Decision Guide for Clinicians and Data Scientists. Critical care medicine. 2022.
25. A. I. Wong, H. Kim, M. Charpignon, E. Mireles-Cabodevila, L. Carvalho, E. Monares-Zepeda, R. W. M. A. Madushani, **L. Adhikari**, Ryan D. Kindle, M. E. Lough, L. A. Celi, Analysis of the ventilator associated condition (VAC) in large open ICU datasets, 2021 [submitted]

Patents

1. Inventors: Vij, Shruti; Boverman, Gregory; Noren, David; **Adhikari, Lasith**; Weichert, Jochen, *Model to dynamically predict patient's discharge readiness in general ward*, Patent number: WO2021009088A1, Date published: 2021-01-21.

2. Inventors: **Adhikari, Lasith**; Noren, David; Boverman, Gregory; Li, Qianxi, *Dynamic Workload Balancing in Central Monitoring Unit Based on Predictive Analytics*, Patent number: US 2021/0391063 A1, Date published: 2021-12-16.
3. Inventors: Noren, David; **Adhikari, Lasith**; Boverman, Gregory, *An automated framework to identify low clinical value telemetry cases*, Patent number: US2022/0020478 A1, Date published: 2022-01-20.
4. Inventors: Chang, Yale; Vij, Shruti; **Adhikari, Lasith**, *Personalized Triage with Survival Modeling and Constrained Optimization*, Patent number: US2022/0037026 A1, Date published: 2022-02-03.

Selected Presentations

1. *Introduction to the mathematics of medical imaging*, Applied Math Optimization Seminar at UC Merced, **Merced, CA, USA** on Dec 1 and Dec 8, 2014.
2. *Nonconvex optimization for photon-limited imaging*, SAMPLe talk at UC Merced SIAM student chapter, **Merced, CA, USA** on March 18, 2015.
3. *Nonconvex relaxation for photon-limited sparse optimization*, SAMPLe talk at UC Merced SIAM student chapter, **Merced, CA, USA** on July 8, 2015.
4. *Nonconvex relaxation for photon-limited sparse optimization*, International Symposium on Mathematical Programming (ISMP 2015), **Pittsburgh, USA** on July 16, 2015.
5. *p-th power total variation regularization in photon-limited imaging via iterative reweighting*, European Signal Processing Conference (EUSIPCO 2015), **Nice, France** on Sep 03, 2015.
6. *Nonconvex reconstruction for low-dimensional fluorescence molecular tomographic Poisson observations*, SAMPLe talk at UC Merced SIAM student chapter, **CA, USA** on Sep 23, 2015.
7. *Nonconvex reconstruction for low-dimensional fluorescence molecular tomographic Poisson observations*, 2015 IEEE International Conference on Image Processing (ICIP 2015), **Quebec City, Canada** on Sep 29, 2015.
8. *Time-independent and time-dependent fluorescence optical tomography*, Applied Math Optimization Seminar at UC Merced, **Merced, CA, USA** on Nov 16, 2015.
9. *Nonconvex relaxation for Poisson intensity reconstruction*, Central Valley SIAM Regional Conference at UC Merced, **Merced, CA, USA** on April 29, 2016.
10. *Fluorescence-lifetime imaging microscopy (FLIM) with Poisson noise*, Applied Math Optimization Seminar at UC Merced, **Merced, CA, USA** on May 11, 2016.
11. *Analysis of p-norm regularized subproblem minimization for sparse photon-limited image recovery*, IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP 2016), **Shanghai, China** on March 22, 2016.
12. *Limited-memory trust-region methods for sparse reconstruction*, International Conference on Continuous Optimization (ICCOPT 2016), **Tokyo, Japan** on August 8, 2016.
13. *Bounded sparse photon-limited image recovery*, IEEE International Conference on Image Processing (ICIP 2016), **Phoenix, Arizona, USA** on September 28, 2016.

14. *Nonconvex sparse Poisson intensity reconstruction for time-dependent bioluminescence tomography*, International Symposium on Information Theory and Its Applications (ISITA 2016), **Monterey, CA, USA** on November 1, 2016.
15. *Trust-region methods for nonconvex sparse recovery optimization*, International Symposium on Information Theory and Its Applications (ISITA 2016), **Monterey, CA, USA** on November 1, 2016.
16. *Sparse reconstruction for fluorescence lifetime imaging microscopy with Poisson noise*, IEEE Global Conference on Signal and Information Processing (GlobalSIP), **Washington, DC, USA** on December 8, 2016.
17. *Non-convex sparse optimization for photon-limited imaging*, IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), **New Orleans, LA, USA** on March 6, 2017
18. *Improved predictive models for acute kidney injury using intraoperative physiological data*, 2017 Celebration of Research, Department of Medicine, University of Florida, **Gainesville, FL, USA** on October 12, 2017
19. *Improved predictive models for acute kidney injury with IDEAs: Intraoperative Data Embedded Analytics*, 5th International Conference on Computational Biomedicine, **Gainesville, FL, USA** on February 8, 2018
20. *Machine learning for acute kidney injury with IDEAs: Intraoperative Data Embedded Analytics*, 2018 Symposium on Data Science & Statistics, **Reston, VA, USA** on May 17, 2018
21. *Predicting hypoxemia trend in critical care patients*, Artificial Intelligence /Machine Learning Symposium, Beth Israel Deaconess Medical Center/ Harvard Medical School, **Boston, MA, USA** on Feb 27, 2020

Work Experiences

2016 Summer	**Industrial Mathematical and Statistical Modeling Workshop** at Statistical and Applied Mathematical Sciences Institute (SAMSI), NCSU, NC
2014 - 2016	**Graduate Student Researcher** at Applied Mathematics, UC Merced in Spring 2014 and Summer 2014, 2015, 2016
2012 - 2015	**Teaching Assistant** at Applied Mathematics, UC Merced Calculus 1 – Fall 2012, Math 32: Probability and Statistics – Spring 2013, Mathematical Methods for Optimization – Fall 2013, Introduction to Linear Algebra & Differential Eq. – Fall 2014, Numerical Analysis I – Spring 2015
2011 Sep - 2012 April	**Computer Technology Instructor** at Department of Mathematics, University of Sri Jayewardenepura, Nugegoda, Sri Lanka Computer Programming (C++), Visiting Lecturer to conduct Mathematics Lab session, Faculty of Medical Sciences, USJ, Sri Lanka
2010 Sep – 2011 Aug	**Instructor at Department of Mathematics**, University of Sri Jayewardenepura, Nugegoda, Sri Lanka

	Calculus I/II, Numerical Methods I/II, Abstract Algebra, Optimization 1, Applicable Mathematics
2009	Underwent **one-month training at Ansell Lanka (Pvt) Ltd**, Biyagama Export Processing Zone, Sri Lanka

Mentoring Experiences

- Mentoring **OPS-staff members of Prisma^{P} lab**, Department of Medicine, University of Florida on data preprocessing, predictive model building and real time systems, Fall 2017 to Winter 2019

- Mentoring Sabyasachi Bandyopadhyay, **PhD student**, Department of Biomedical Engineering, University of Florida, Fall 2017 to Winter 2019

- Mentored participants in **Sparse Optimization** for the **Research Experience for Undergraduates (REU) ARCHIMEDES** program at UC Merced, Summer, 2016

- Mentored Joanna Valenzuela in **MATLAB programming and medical imaging** for the **Undergraduate Research and Mentoring (URM)** program, 2014

- Mentored participants in **Medical Imaging** for the **Research Experience for Undergraduates (REU) ARCHIMEDES** program at UC Merced, Summer, 2014

Project Experiences

- *Title:* **Clinical operational research**: A Philips project to design and implement predictive models to reduce unnecessary bed occupancy and improve hospital throughput. Tools: Python 3, PySpark, Simulation modeling, Machine learning, 2019-present.

- Title: **Improving CDC definition of Ventilator Associated Condition**: A datathon project at the Critical Care Congress 2020 – SCCM, working with several data scientist and clinicians, 2020.

- *Title:* **Predicting Hypoxemia Trend in Critical Care Patients**: A machine learning model to predict the hypoxemia trend within the first 24 hours following the start of mechanical ventilation using the last 24 hours of electronic medical records – demographics, vitals, laboratory, etc., MIT group project 2019 - 2020.

- *Title:* **MySurgeryRisk**: The world's first intelligent perioperative real time risk prediction system, Apache Spark, Kafka, Python, Cassandra, 2017-2019.

- *Title:* **Dynamic postoperative complication prediction using deep learning**, Tools: Python 3, Keras, TensorFlow, 2018.

- *Title:* Improved Predictive Models for Acute Kidney Injury with **IDEAs: Intraoperative Data Embedded Analytics**, Tools: Python 2.7, R, SAS, 2017 to 2019

- Designed and implemented **7 novel sparsity-promoting algorithms** with applications to medical imaging and signal processing during the PhD program using Matlab, 2012-2017.

- *Title:* **Inverting for Near Shore Bathymetry from Surface Wave Properties.** IMSM 2016 program group project at NCSU with U.S. Army Corps of Engineers using Matlab, Git, 2016.

- *Title:* **Fourier Transform based Image Reconstruction using Filtered Back-Projection Formula.** Numerical Analysis course project using Matlab at UC Merced.

- *Title:* **Discrete Image Reconstruction using Parallel Beam Geometry**. Scientific Computing course project using C++ at UC Merced and UC Berkeley.

- *Title:* **Apartment Complex Surveillance Investigator:** an innovative system to ensure security of an apartment complex using wireless technology with a group of five members. Selected for the National Best Quality Software Awards Competition. 4th year group project at SLIIT, 2008.

- *Title:* **Student Attendance System** for SLIIT. The project was implemented using C#.Net 2005 and Microsoft Access. 3rd Year group project at SLIIT, 2007.

- *Title:* **Hotel Reservation and Management System.** This system was developed using C#.net, ASP.net and SQL Server 2000. 2nd year group project at SLIIT, 2006.

- *Title:* **Face Recognition using Eigenfaces and Fisherfaces.** This tool was developed using image processing techniques in MATLAB® 7.6 and C#.net. Final year project in USJ, 2009 - 2010.

- *Title:* **Study of Management Practices in a Real-World Organization**: Hatton National Bank, Sri Lanka

Fellowships and Awards

2017 January	SIAM Student Travel Award for SIAM Conference on Optimization
2017 Spring	School of Natural Sciences Dean's Distinguished Scholars Fellowship 2017, UC Merced
2016 October	Student Travel Fellowship, U.S. NSF
2016 Summer	Summer Research Fellowship, Applied Mathematics, UC Merced
2016 Spring	Applied Mathematics Research Travel Fellowship, UC Merced
2016	Artist of the Year (Photography) – 2nd Place, Bobcat Art Show, UC Merced
2015 Spring	Applied Mathematics Research Travel Fellowship, UC Merced
2015 – 2016	Graduate Student Opportunity Program Fellowship, UC Merced

2012	Fulbright Opportunity Grant Scholarship, US – Sri Lanka Fulbright Commission
2005 – 2009	Five Scholarships in recognition of superior academic performance during B.Sc. (Hons) Degree in IT

Certification

- HL7 FHIR Fundamentals by Health Level Seven International in 2018.
- Introduction to Bioconductor in R by Harvard University through edX. Certificate earned in 2018.
- Neural Networks for Machine Learning by University of Toronto on Coursera. Certificate earned in 2017.
- PC Hardware, Department of Computer Science & Engineering, University of Moratuwa, Sri Lanka, 2004.

Professional Memberships

2018 - Present	American Statistical Association (ASA), Member
2015 - Present	Institute of Electrical and Electronics Engineers (IEEE), Member
2018 - Present	National Postdoctoral Association (NPA), Affiliate Individual Member
2016 - 2017	Institute of Electrical and Electronics Engineers (IEEE), SPS Member
2015 - 2017	Society for Industrial and Applied Mathematics (SIAM), Student Member

Reviewer for

- Applied Sciences Journal
- Algorithms Journal
- Entropy Journal
- IEEE Journal of Biomedical and Health Informatics
- PLOS ONE Journal
- IEEE Transactions on Image Processing (as a PhD candidate)
- IEEE Transactions on Signal Processing (as a PhD candidate)
- IEEE International Conference on Acoustics, Speech, and Signal Processing (as a PhD candidate)

Symposium Co-Organizer

"Nonconvex Optimization for Imaging Analysis", May 22, 2017. Society for Industrial and Applied Mathematics Conference on Optimization, Vancouver, Canada.

Extra Curricula Activities

2009	Student Exhibition Committee Member, 50th Anniversary Exhibition of University of Sri Jayewardenepura.
2004	Committee Member of the Ananda College Mathematics Society and Chemistry Club.
2002 – 2003	Assistant Secretary of the Ananda College Electronics Society.