

# Ramgopal R. Mettu

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CONTACT INFORMATION	Department of Computer Science 303E Stanley Thomas Hall Tulane University New Orleans, LA 70118	<i>Voice:</i> (413) 313-9666 <i>E-mail:</i> rmettu@tulane.edu <i>Web:</i> www.cs.tulane.edu/~mettu
RESEARCH INTERESTS	Computational Biology and Bioinformatics; Robotics; Design, Analysis and Implementation of Algorithms; Data Mining, Clustering, Machine Learning	
EDUCATION	<b>University of Texas at Austin</b> Ph.D., Computer Science, 2002 <ul style="list-style-type: none"><li>• Dissertation: “Approximation Algorithms for <math>\mathcal{NP}</math>-Hard Clustering Problems”</li><li>• Advisor: C. Greg Plaxton</li></ul> M.S., Computer Science, 1999 B.S., Computer Science, with Departmental Honors, 1997 <ul style="list-style-type: none"><li>• Minor Subject Area: Mathematics</li><li>• Honors Thesis: “Incremental Graph Algorithms for Biconnectivity and Maintenance of Polygons for Triconnectivity”</li><li>• Honors Thesis Advisor: Vijaya Ramachandran</li></ul>	
ACADEMIC POSITIONS	<b>Department of Computer Science, Tulane University</b> <i>Associate Professor</i> , July 2012 – Present <i>Visiting Associate Professor</i> , July 2011 – July 2012	<b>2011 – Present</b>
	<b>ECE Department, University of Massachusetts Amherst</b> <i>Adjunct Faculty Member</i> , September 2012 – Present <i>Assistant Professor</i> , September 2005 – September 2012	<b>2005 – 2012</b>
	<b>Computer Science Dept., Dartmouth College</b> <i>Research Associate</i> , Advisor: Bruce Donald, August 2002 – August 2005 <i>Lecturer</i> , December 2004 – March 2005	<b>2002 – 2005</b>
	<b>Computer Science Dept., University of Texas at Austin</b> <i>Research Assistant</i> , August 1999 – July 2002 <i>Teaching Assistant</i> , August 1997 – August 1999	<b>1995 – 2002</b>
HONORS AND AWARDS	Best Automation Paper, IEEE Conference of Robotics and Automation University of Sydney International Research Collaboration Award Best Paper, IEEE BROADNETS NSF CAREER Award Lilly Teaching Fellowship Best Poster, IEEE Computer Society Bioinformatics Conference National Merit Scholar	<b>2016</b> <b>2015</b> <b>2007</b> <b>2007</b> <b>2006–2007</b> <b>2003</b> <b>1993–1997</b>

University of Texas Dedman Merit Scholarship  
University of Texas Tracor/McBee Scholarship

1993–1997  
1995–1997

## PUBLICATIONS

G. Best, O. Cliff, T. Patten, R. R. Mettu, R. Fitch, “Decentralised Monte Carlo Tree Search for Active Perception,” In *Proceedings of the 12th International Workshop on Algorithmic Foundations of Robotics (WAFR)*, December 2016.

S. Lensgraf, R. R. Mettu, “Beyond Layers: A 3D-Aware Toolpath Algorithm for Fused Filament Fabrication,” In *Proceedings of the 2016 IEEE International Conference on Robotics and Automation (ICRA)*, **Best Automation Paper Award**.

R. R. Mettu, T. Charles, S. J. Landry. “CD4+ T-cell Epitope Prediction Using Antigen Processing Constraints,” *Journal of Immunological Methods*, 2016. <http://dx.doi.org/10.1016/j.jim.2016.02.013>.

A. K. Reddy, S. Shanbag, C. Wang, R. R. Mettu, T. Wolf. “VHub: Single-Stage Virtual Network Mapping through Hub Location.” *Journal of Computer Networks*, 77(2015):169–180.

X. Jiang, R. R. Mettu, K. B. Venable, G. Parker. “Flexibility meets Variability: A multi-agent constraint-based approach for incorporating renewables into the power grid.” *Proceedings of the AAAI-15 Workshop on Computational Sustainability*, January 2015.

T. Li, N. K. Steede, H.-N. Nguyen, L. Freytag, J. B. McLachlan, R. R. Mettu, J. E. Robinson, S. J. Landry. “A comprehensive analysis of contributions from protein conformational stability and MHCII-peptide binding affinity to CD4+ epitope immunogenicity in HIV-1 envelope glycoprotein.” *Journal of Virology*, 88(17): 9605–9615, 2014.

Y. Lei and R. R. Mettu. “A confidence measure for model fitting with X-ray crystallography data,” In *Proceedings of the 4th ACM Conference on Bioinformatics, Computational Biology and Biomedical Informatics*, September 2013.

M. Segall, E. Champness, C. Leeding, R. Lilien, R. R. Mettu, B. Stevens. “Applying medicinal chemistry transformations to guide the search for high quality leads and candidates.” *Journal of Chemical Information Modeling*, 51(11): 2967–2976, 2011.

Ö. Sümer, U. A. Acar, A. T. Ihler, and R. R. Mettu. “Adaptive Exact Inference in Graphical Models,” *Journal of Machine Learning Research*, 12(2011): 3147–3186.

Ö. Sümer, U. A. Acar, A. T. Ihler, and R. R. Mettu. “Fast parallel and adaptive updates for dual-decomposition solvers,” In *Proceedings of the 25th AAAI Conference on Artificial Intelligence*, August 2011.

T. Langlois, R. R. Mettu, and R. W. Vachet. “Protein Identification using Receptor Arrays and Mass Spectrometry.” in *Advances in Computational Biology*; Arabnia, H. R., Ed.; Springer, New York, 2010, pages 343–351.

U. A. Acar, A. T. Ihler, R. R. Mettu, and Ö. Sümer (alphabetical author order). Adaptive updates for maintaining MAP configurations with applications to Bioinformatics. In *Proceedings of the 15th IEEE Workshop on Statistical Signal Processing*, pages 413–416, August 2009. (Selected for oral presentation).

S. Jaiswal, A. Ganz, and R. R. Mettu. “An Optimization Framework for Demand-based Fair Stream Allocation in MIMO Ad Hoc Networks.” *Journal of Mobile Networks and Applications (MONET)*, 14(4):451469, 2009.

U. A. Acar, A. T. Ihler, R. R. Mettu, and Ö. Sümer (alphabetical author order). Adaptive Bayesian inference in general graphs. In *Proceedings of the 24th Conference on Uncertainty in Artificial Intelligence*, pages 1–8, August 2008.

U. A. Acar, A. T. Ihler, R. R. Mettu, Ö. Sümer (alphabetical author order). “Adaptive Bayesian Inference.” In *Proceedings of the 20th Neural Information Processing Systems Conference*, pages 1441–1448, December 2007.

S. Jaiswal, A. Ganz, and R. R. Mettu. An optimization framework for demand-based fair stream allocation in MIMO ad hoc networks. In *Proceedings of the 4th Annual IEEE Conference on Broadband Communications, Networks, and Systems*, pages 780–788, September 2007. **Best Paper Award.**

S. Raman, A. Ganz, and R. R. Mettu. A scheduling framework for fair bandwidth allocation in heterogeneous multi-radio wireless mesh networks. In *Proceedings of 4th Annual IEEE Conference on Broadband Communications, Networks, and Systems*, pages 898–907, September 2007.

L. Wang, R. R. Mettu, and B. R. Donald. “A Polynomial-Time Algorithm for *de novo* Protein Backbone Structure Determination from NMR Data.” *Journal of Computational Biology*, 13(7):1267–88, 2006.

R. R. Mettu, R. H. Lilien, and B. R. Donald. “High-Throughput Inference of Protein-Protein Interaction Sites from *Unassigned* NMR Data.” *Bioinformatics* 21 (Suppl. 1):i292–i301, 2005. Presented at the *13th Annual Meeting of the International Society for Computational Biology*

L. Wang, R. R. Mettu and B. R. Donald. “An algebraic geometry approach to protein structure determination from NMR data.” In *Proceedings of the 4th Annual Meeting of the IEEE Computer Society Bioinformatics Conference*, August 2005.

R. R. Mettu and C. G. Plaxton. “Optimal Time Bounds for Approximate Clustering.” *Machine Learning Journal* 56(1/2/3):35–60, 2004. *Special Issue on Theoretical Advances in Data Clustering.*

R. R. Mettu and C. G. Plaxton. “The Online Median Problem.” *SIAM Journal On Computing*, 32:816–832, 2003.

R. R. Mettu and C. G. Plaxton. “Optimal time bounds for approximate clustering.” In *Proceedings of the 18th Conference on Uncertainty in Artificial Intelligence*, pages 344–351, July 2002.

R. R. Mettu and C. G. Plaxton. “The online median problem.” In *Proceedings of the 41st Annual IEEE Symposium on Foundations of Computer Science*, pages 339–348, November 2000.

R. R. Mettu, J. Qin, R. H. Lilien. “Nonparametric regression for iterative experimental

compound screening.” *248th Annual Chemical Society Meeting*, August 2014.

R. R. Mettu, S. J. Landry. “CD4+ T-cell Epitope Prediction using Antigen Structure.” *21st Annual International Conference on Intelligent Systems for Molecular Biology*, July 2013.

Y. Lei and R. R. Mettu. “A Maximum-Likelihood Approach to Local Real-Space Model Fitting.” *PDB 40: A Symposium Celebrating the 40th Anniversary of the Protein Data Bank*, October 2011.

J. Pater, D. Smith, R. Staubs, K. Jesney, R. R. Mettu. “Learning Hidden Structure with a Log-Linear Model of Grammar,” Linguistic Society of America Meeting, January 2010.

L. Wang, R. R. Mettu, R. H. Lilien and B. R. Donald. “An Exact Algorithm For Determining Protein Backbone Structure From NH Residual Dipolar Couplings.” In Proceedings of the *2nd IEEE Computer Society Bioinformatics Conference*, Stanford University, Palo Alto CA, August 2003, pages 611–612. **Best Poster Award.**

L. Wang, R. R. Mettu, R. H. Lilien, A. Yan and B. R. Donald. “Exact Solutions for Vectors and Dihedral Angles from Two RDCs and Their Application in a Systematic Search Algorithm for Determining Protein Backbone Structure.” *Computational Aspects of Biomolecular NMR (Gordon Research Conference)*, January 2004.

“An Exact Algorithm For Determining Protein Backbone Structure From NH Residual Dipolar Couplings.” L. Wang, R. R. Mettu, R. H. Lilien and B. R. Donald. In Proceedings of the *2nd IEEE Computer Society Bioinformatics Conference*, Stanford University, Palo Alto CA, August 2003, pages 611–612. *Best Poster Award.*

#### PATENTS

“Method for CD4+ T-cell prediction using antigen structure,” U. S. Provisional Patent Application No. 62/212,827.

“An improved method and system for rapid and efficient three-dimensional printing,” U. S. Provisional Patent No. 62/329,303.

#### GRANTS

“CAREER: Algorithms for Experimental Structural Biology,” National Science Foundation, Award IIS-0643768. January 2007– July 2014, \$518,888. Role: Principal Investigator.

“Antigen Structure-Based Supervised Learning for CD4+ T-cell Epitope Prediction,” National Institutes of Health, Award 1R21AI122199. March 2016–February 2018, \$413,875. Role: Principal Investigator.

#### INVITED LECTURES

“Novel Computational Methods for Modeling Protein Structure,” Department of Biochemistry, LSU Health Sciences Center, November 2013.

“Sequence and Structure in MHC Class II Immunodominance,” New Orleans Protein Folding Intergroup, November 2012.

“Recent Progress in Computational Methods for Structural Biology,” Department of Biochemistry, Tulane Medical School, March 2012. Also presented at the School of Public Health in October 2012.

“Optimization and Data Interpretation in Computational Structural Biology,” Department of Mathematics, Tulane University, December 2010.

“Machine Learning Methods in Molecular Modeling,” Bio-IT World 2010, Boston, MA.

“Adaptive Inference with Applications to Bioinformatics,” University of Toronto, July 2008; Machine Learning Friends Seminar, University of Massachusetts Amherst, October 2008; Australia Field Centre for Robotics, University of Sydney, January 2009; Tufts University, November 2009.

“Geometric Problems in NMR Structural Biology: Using RDCs for Resonance Assignments and to Identify Protein-Protein Interfaces,” Invited talk at American Mathematical Society Eastern Regional Meeting, 2004; Rider College, Lawrence, New Jersey.

“Practical Approximation Algorithms for Clustering.” Department of Computer Science, University of Massachusetts at Amherst, Amherst, Massachusetts, September 2002.

“Optimal Time Bounds for Approximate Clustering.” 1st Annual Workshop on Integrated Logistics, Princeton University, Princeton, New Jersey, October 2002.

“Optimal Time Bounds for Approximate Clustering.” 18th Conference on Uncertainty in Artificial Intelligence, Edmonton, Alberta, Canada, August 2002.

“The Online Median Problem.” 41st Annual Symposium on Foundations of Computer Science, Redondo Beach, California, November 2000.

“Experimental Evaluation and Comparison of Algorithms for Incremental Graph Connectivity and Biconnectivity.” DIMACS Implementation Challenge Workshop V, October 1996.

PROFESSIONAL  
SERVICE

I have refereed articles for the following conferences (with peer-reviewed proceedings): *Scandinavian Workshop on Algorithms and Theory (SWAT)*, *ACM Symposium on Discrete Algorithms (SODA)*, *International Conference on Automata, Languages, and Programming (ICALP)*, *Latin American Theoretical Informatics Conference (LATIN)*, *ACM Symposium on Theory of Computation (STOC)*, *ACM Symposium on Parallel Architectures and Algorithms (SPAA)*, *IEEE Computational Systems Bioinformatics Conference (IEEE CSB)*, *International Conference on Intelligent Systems for Molecular Biology (ISMB)*, *ACM Symposium on Computational Geometry (ACM SoCG)*.

I have refereed articles for the following journals: *Information Processing Letters*, *SIAM Journal on Computing*, *International Journal on Computational Geometry and Applications*, *Theoretical Computer Science*, *IEEE/ACM Transactions on Computational Biology and Bioinformatics*, *PROTEINS: Structure, Function and Bioinformatics*, *Bioinformatics* (Oxford University Press), *PLoS One*, *PLoS Computational Biology*, and *Journal of Computer and System Sciences*.

I have served on bioinformatics review panels for the NSF CISE Directorate’s Information Integration and Informatics program (2010, 2011).

I have served on technical program committees ISMB 2009, ACM-BCB 2012, ACM-BCB 2013, and ACM-BCB 2015.

I am a Newcomb Fellow at Tulane; this program supports the higher education of women and participates in activities of the Newcomb College Institute that foster faculty-student interaction and research. At the state level, I was on the Louisiana Optical Network Initiative (LONI) Management Council (July 2014–July 2016).

#### ADVISING

Mark Gorelik, CS Capstone, AY 2016  
Peter Riser, CS Capstone, AY 2016  
Wilson Jeter, CS Capstone, AY 2016  
Zachary Nelson, CS Capstone, Spring 2016  
Sarah Lohmeier, CS Capstone, Spring 2016  
Christian Rios, CS Capstone, Spring 2016  
Lucianna Kiffer, CS Capstone, Spring 2016 (Ph.D., Northeastern University)  
Samuel Lensgraf, CS Capstone, , Spring 2016  
Peter Bull, Mathematics Capstone, Spring 2014  
Jordan Bodzin, Mathematics Capstone, Spring 2014  
Özgür Sümer (co-advised, Ph.D., Computer Science, University of Chicago), Summer 2011  
Yang Lei, M.S., Summer 2010 (Ph.D., UMass Amherst)  
Gokhan Tezcan, M.S., Summer 2010.  
Fadi Zoghoghly, B.S., Spring 2010 (Ph.D., ECE, Stanford University)  
Yi Zhang, M.S., Fall 2009  
Bo Jiang, M.S., Fall 2008  
Timothy Langlois, B.S., Spring 2009 (Ph.D., Computer Science, Cornell University)  
Christos Tsiokos, B.S., Spring 2007 (Ph.D., Biomedical Engineering, UCLA)

#### Committee Member

Hani Nakhoul (M.D./Ph.D., Biochemistry, Tulane, Chair: Erik Flemington)  
Blake Rust (Ph.D., 2016, Biochemistry, Chair: Samuel Landry)  
Tyler Barker (Ph.D., 2016, Mathematics, Tulane, Chair: Michael Mislove)  
Michael Pepper (B.S., 2013, Music, Tulane, Chair: Barbara Jazwinski)  
Nathan Eisemann (B.S., 2012, Music, Tulane, Chair: Barbara Jazwinski)  
Kedar Bellare (Ph.D., Computer Science, UMass-Amherst, Chair: Andrew McCallum)  
Yuangdong Yang (Ph.D., Computer Science, UMass Amherst, Chair: Oliver Brock)  
Witold Witkowski (Ph.D., 2011, Chemistry, UMass Amherst, Chair: Jeanne Hardy)  
Nadnudda Rodthongkum (Ph.D., 2011, Chemistry, UMass Amherst, Chair: Richard Va-  
chet)  
Vidit Jain (Ph.D., Computer Science, UMass Amherst, 2010, Chair: Erik Learned-Miller)  
Manjunatha Jagalur (Ph.D., 2010, Computer Science, UMass Amherst, Chair: David Kulp)  
Qiang Wu (Ph.D., 2010, UMass Amherst, Chair: Tilman Wolf)  
Jinghua Hu (Ph.D., 2008, UMass Amherst, Chair: Weibo Gong)