Mohamed R. Amer

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RESEARCH INTEREST

Common Sense Reasoning, Knowledge Representation; Time-series Modeling. *Applications of Interest:* Robotics, video and motion capture analysis, speech and natural language processing, computational models for neuroscience and psychology.

EDUCATION

Doctor of Philosophy in Electrical and Computer Engineering Spring 2014
Location: Oregon State University, Oregon, USA *Advisor:* Sinisa Todorovic
Dissertation: Hierarchical Graphical Models for Activity Recognition in Videos

Master of Science in Electrical and Computer Engineering Spring 2011
Location: Oregon State University, Oregon, USA *Advisor:* Sinisa Todorovic
Thesis: Recognizing Human Group Activities in Video by Mining Optimal Features

Bachelor of Science in Electrical and Computer Engineering Summer 2009
Location: Oregon State University, Oregon, USA *Advisor:* Donald Heer
Project: Tele-Robotic Arm Controller

PROFESSIONAL EXPERIENCE

Founder & Chief Science Officer at Robust.AI May 2019-Current
Location: Palo Alto, CA, USA

Senior Technical Manager at SRI International April 2018-May 2019
Location: New York, New York, USA *Reference:* Ajay Divakaran
Responsibilities: Define a short- and long-term vision for my group's research interests and directions; Lead a team to research and develop systems for multiple projects;
Funding: DARPA-Machine Common Sense; SDARPA-Lifelong Learning Machines; DARPA-RF Machine Learning Systems; DARPA-Communicating with Computers; DARPA-Explainable AI; DARPA-Capturing Brain to Brain Coupling.

Senior Computer Scientist at SRI International April 2016-March 2018
Location: New York, New York, USA *Reference:* Ajay Divakaran
Responsibilities: Apply for research funding; Collaborate with academic institutes on different projects; Write conference and journal papers.
Funding: DARPA-Communicating with Computers; DARPA-Explainable AI; DARPA-Capturing Brain to Brain Coupling.

Computer Scientist at SRI International June 2014-March 2016
Location: Princeton, New Jersey, USA *References:* Ajay Divakaran and Sek Chai
Responsibilities: Setup capture systems for data collection; Developed novel approaches for representation learning in time-series data for classification and generation; Implemented a unified framework for analyzing different types of data, uni- and multi-modal, static and dynamic, with single- or multiple-tasks. Helped develop new approach for hyper parameter optimization. Publish research findings at conferences and journals.
Funding: DARPA-Cortical Processor; SRI-Unified Framework for Machine Learning.

Research Assistant at Oregon State University September 2009-May 2014
Location: Corvallis, Oregon, USA, *Reference:* Sinisa Todorovic
Responsibilities: This project focused on human activity recognition in videos. Applied graphical models to group activity recognition in videos. Developed novel models, inference, and learning algorithms, such as Sum-Product Networks and And-Or Graphs, trained in fully and weakly supervised settings. Developed a new under-budget in-

ference for large scale datasets. Setup capture and annotation systems for collecting datasets. Advised a junior Ph.D. and undergraduate students.
Funding: DARPA-Mathematics of Sensing, Exploitation and Execution.

Research Intern at SRI International March 2009-September 2014
Location: Princeton, New Jersey, USA *References:* Ajay Divakaran and Raia Hadsell
Responsibilities: This project focused on human centric computing. Developed a generative, time-series, multimodal model for event detection in motion-capture and speech.
Funding: DARPA-Strategic Social Interaction Module.

Research Intern at SONY Digital Image Lab June 2011-September 2011
Location: San Jose, California, USA *Reference:* Alexander Berestov
Responsibilities: This project focused on 3D reconstruction from a set of images. Implemented graphical models and hierarchical belief propagation. I started with a simplified version, reconstructing the scene from a pair of stereo images, and generalizing the algorithm to a variable number of images.

Research Intern at ViewPlus Technologies April 2009-September 2010
Location: Corvallis, Oregon, USA *Reference:* John Gardner
Responsibilities: The project focused on using low-level computer vision to implement an accessible system for the blind. My role was to use a low-quality webcam to: develop a real time system for detecting fingers coordinates with respect to a paper; detect barcodes and paper identifiers using optical character recognition.

TEACHING EXPERIENCE

Teaching Assistant, ENGR202 Electrical Engineering Fundamentals Spring 2010
Location: OSU, Corvallis, Oregon, USA *Reference:* Mario Eduardo Magana
Responsibilities: Held weekly problem solving sessions; Graded homework and exams.

Teaching Assistant, ECE352 Signals and Systems Winter 2010
Location: OSU, Corvallis, Oregon, USA *Reference:* Raviv Raich
Responsibilities: Held weekly problem solving sessions; Held weekly lab sessions; held help sessions before deadlines; Gave two lectures; Graded homework and exams.

Teaching Assistant, ECE473 Microprocessor System Design Fall 2009
Location: OSU, Corvallis, Oregon, USA *Reference:* Roger Traylor
Responsibilities: Held weekly lab sessions; helped students with their code, hardware, and lab reports; held help sessions before deadlines; Graded homework and exams.

FUNDING RECEIVED

Principal Investigator, DARPA-Machine Common Sense 2019-2023
Project: CogSim: An Intuitive Physics Simulator for Training and Evaluating Cognitive AI Agents,
Collaborator: Co-PI, Nick VanderValk (SRI International), Denis Zorin (NYU), Daniele Panozzo (NYU), Moira Dillon (NYU), Brenden Lake (NYU), Rob Fergus (NYU), Yann LeCun (NYU), Sanja Fidler (UT), Antonio Torralba (MIT), Wojciech Matusik (MIT) and Emmanuel Dupoux (ENS) *Budget:* $Under Negotiations

Co-Investigator, Private-Commercial 2018-2019
Project: Artificial Intelligent for Building Design Assistance,
Collaborator: PI, Eric Yeh (SRI International) *Budget:* $Undisclosed

Co-Investigator, DARPA-Lifelong Learning Machines 2018-2020
Project: Multi-Stage, Multi-Task Memory Transfer (M3T),
Collaborator: PI, Sek Chai (SRI International) *Budget:* $2.5M

Co-Investigator, DARPA-RF Machine Learning Systems 2018-2021
Project: Adversarial Learning of Complex Unitary RNNs for RF Signal Classification,
Collaborator: PI, Sek Chai (SRI International) *Budget:* $1.8M

Principal Investigator, DARPA-Brain to Brain Coupling 2017-2018
Project: Brain-to-Brain Coupling using Temporal Representation Learning,
Collaborator: Uri Hasson (Princeton University) *Budget:* $600K

Principal Investigator, DARPA-Explainable AI 2017-2021
Project: Multimodal Q&A using Explainable Generative Adversarial Networks,
Collaborator: Graham Taylor (U. of Guelph) *Budget:* $6.4M

Principal Investigator, DARPA-Communicating with Computers 2015-2020
Project: Visual Storytelling in Collaborative Composition,
Collaborator: Mark Riedl (Georgia Institute of Technology) *Budget:* $3.9M

Principal Investigator, SRI-Internal Research and Development 2016
Project: Machine Learning Framework for Time-Series Analytics,
Collaborator: Co-PI, Timothy Shields (SRI International) *Budget:* $40K

Co-Investigator, DARPA-Communicating with Computers 2015-2020
Project: Interpretation of Nonverbal Communication,
Collaborator: PI, Amir Tamrakar (SRI International) *Budget:* $2.3M

Co-Investigator, DARPA-Cortical Processor Seedling 2015-2016
Project: Deep Temporal Models,
Collaborators: Roland Memisevic, Yoshua Bengio (U. of Montreal), and Graham Taylor (U. of Guelph) *Budget:* $970K

JOURNAL PUBLICATIONS

T. J. Meo, C. Kim, A. Raghavan, A. Tozzo, D. A. Salter, A. Tamrakar, M. R. Amer, **Aesop: A Visual Storytelling Platform for Conversational AI and Commonsense Grounding**, AI Communications Journal, 2019.

D. Ramachandram, M Lisicki, TJ Shields, M.R. Amer, GW Taylor, **Bayesian optimization on graph-structured search spaces: Optimizing deep multimodal fusion architectures**, Neurocomputing, 2018.

M. R. Amer, T. J. Shields, B. Siddiquie, A. Tamrakar, A. Divakaran, S. Chai, **Deep Multimodal Fusion: A Hybrid Approach**, International Journal of Computer Vision, 2017.

M. R. Amer and S. Todorovic, **Sum Product Networks for Activity Recognition in Videos**, IEEE Transactions on Pattern Analysis and Machine Intelligence, 2016.

M. R. Amer, S. Yousefi, R. Raich, and S. Todorovic, **Monocular Extraction of 2.1D Sketch using Constrained Convex Optimization**, International Journal of Computer Vision, 2015.

CONFERENCE PUBLICATIONS

X. Lin, I. Sur, N. Nastase, U. Hasson, A. Divakaran, M.R. Amer, **Data-Efficient Mutual Information Neural Estimator**, arXiv, 2019.

X. Lin and M. R. Amer, **Human Motion Generation from Text using Dense Validation Adversarial Networks**, arXiv, 2018.

D. Ramachandram, T. J. Shields, M. Lisicki, M. R. Amer, G. W. Taylor, **Structure Optimization for Deep Multimodal Fusion Networks using Graph-Induced Kernels**, European Symposium on Artificial Neural Networks, 2017.

D. A. Salter, A. Tamrakar, B. Siddiquie, M. R. Amer, A. Divakaran, B. Lande , D. Mehri, **The Tower Game Dataset: A Multimodal Dataset for Analyzing Social Interaction Predicates**, Affective Computing and Intelligent Interactions, 2015.

M. R. Amer, L. Peng, S. Todorovic, **HiRF: Hierarchical Random Field for Collective Activity Recognition in Videos**, European Conference on Computer Vision, 2014.

M. R. Amer, B. Siddiquie, S. Khan, A. Divakaran, H. Sawhney, **Multimodal Fusion using Dynamic Hybrid Models**, Winter Conference on Applications of Computer Vision, 2014.

M. R. Amer, B. Siddiquie, C. Richey, A. Divakaran, **Emotion Detection in Speech using Deep Networks**, International Conference on Acoustics, Speech, and Signal Processing, 2014.

M. R. Amer, A. Fern, S. Todorovic, S. Zhu, **Monte Carlo Tree Search for Scheduling Activity Recognition**, International Conference on Computer Vision, 2013

M. R. Amer, D. Xie, M. Zhao, S. Todorovic, S.-C. Zhu, **Cost-Sensitive Top-down/Bottom-up Inference for Multiscale Activity Recognition**, European Conference on Computer Vision, 2012 *Oral presentation.*

M. R. Amer and S. Todorovic, **Sum Product Networks for Modeling Activities with Stochastic Structures**, IEEE Conference on Computer Vision and Pattern Recognition, 2012.

M. R. Amer and S. Todorovic, **A Chains Model for Localizing Participants of Group Activities in Videos**, International Conference on Computer Vision, 2011.

W. Brendel, M. R. Amer, S. Todorovic, **Multiobject Tracking as Maximum-Weight Independent Set**, IEEE Conference on Computer Vision and Pattern Recognition, 2011 *Oral presentation.*

M. R. Amer, R. Raich, S. Todorovic, **Monocular Estimation of 2.1D Sketch**, International Conference on Image Processing, 2010 *Oral presentation.*

WORKSHOP PUBLICATIONS

B. Knyazev, G. W. Taylor, M. R. Amer, **Understanding attention in graph neural networks**, International Conference on Learning Representations Workshops, 2019 *Oral Presentation*

B. Knyazev, G. W. Taylor, X. Lin, M. R. Amer, **Spectral Multigraph Networks for Discovering and Fusing Relationships in Molecules**, Neural Information Processing Systems Workshops, 2018.

A. Tozzo, D. Jovanovic, M. R. Amer, **Neural Event Extraction in Movies**, North American Association for Computational Linguists Workshops, 2018.

T. J. Shields*, M. R. Amer*, M. Ehrlich, A. Tamrakar, **Action-Affect-Gender Classification using Multi-Task Representation Learning**, IEEE Conference on Com-

puter Vision and Pattern Recognition Workshops, 2017. *Oral presentation.*

M. Ehrlich, T. J. Shields, T. Almaev, M. R. Amer, **Facial Attributes Classification using Multi-Task Representation Learning**, IEEE Conference on Computer Vision and Pattern Recognition Workshops, 2016. *Oral presentation..*

A. Raghavan, M. R. Amer, T. J. Shields, D. Zhang, S. Chai, **GPU Activity Recognition using Representation Learning**, International Conference on Machine Learning Workshops, 2016.

J. Selman, M. R. Amer, A. Fern, S. Todorovic, **PEL-CNF: Probabilistic Event Logic Conjunctive Normal Form for Video Interpretation**, International Conference on Computer Vision Workshops, 2011.

M. R. Amer, E. Bilgazyev, S. Todorovic, S. Shah, I. Kakadiaris, and L. Ciannelli, **Fine-grained Categorization of Events in Underwater Videos by Tracking Fish**, International Conference on Computer Vision Workshops, 2011.

DEMO PUBLICATIONS

C. Kim, T. Meo, B. Knyazev, G. W. Taylor, C. Collins, M. R. Amer, **A Modular Interface for Multimodal Data Annotations and Visualization**, Intelligent User Interfaces, 2019 (To be Submitted).

X. Lin, C. Kim, T. Meo, and M. R. Amer, **Learn, Generate, Rank: Generative Ranking of Motion Capture**, European Conference on Computer Vision, 2018.

T. Meo, A. Raghavan, D. Salter, A. Tozzo, A. Tamrakar, and M. R. Amer, **Aesop: A Visual Storytelling Platform for Conversational AI**, International Joint Conference on Artificial Intelligence, 2018. *Best demo award.*

S. Kim, D. Salter, L. DeLuccia, K. Son, M. R. Amer and A. Tamrakar, **SMILEE: Symmetric Multi-modal Interactions with Language-gesture Enabled AI Embodiment**, North American Association for Computational Linguists, 2018

PATENTS

S. M. Chai, D. C. Zhang, M. R. Amer, T. J. Shields, A. N. Raghavan, B. Ramamurthy, **Systems and Methods for Optimizing Operations of Computing Devices using Deep Neural Networks**, US20170364792, 2017.

M. R. Amer, T. Shields, M. Ehrlich, A. Tamrakar, **Unified Multi-task Representation Learning Framework**, PCT/US17/2290, 2017.

M. R. Amer, B. Siddiquie, A. Divakaran, C. Richey, S. Khan, H. S. Sawhney, **Dynamic hybrid models for multimodal analysis**, US20160071024, 2016.

ORGANIZED WORKSHOPS

Organizer, ACM-MM Workshop on **Computational Models of Social Interactions and Behaviors: Human-Computer-Media Communication**, 2015.

Organizer, CVPR Workshop on **Computational Models of Social Interactions and Behaviors: Scientific Grounding, Sensing, and Applications**, 2014.

Co-organizer, ICCV Workshop on **Understanding Human Activities: Context and Interactions**, 2013.

REVIEWING

International Joint Conference on Artificial Intelligence 2018

	IEEE Conference on Computer Vision and Pattern Recognition	2014-Current
	Neural Information Processing Systems	2014-Current
	International Conference Machine Learning	2015-Current
	European Conference on Computer Vision	2016-Current
	International Conference on Learning Representations	2017-Current
	IEEE Transactions on Pattern Analysis and Machine Intelligence	2016
	International Journal on Computer Vision	2015-2016
TALKS	Generative Adversarial Networks for Vision at SRI	02/2017
	Unified framework for machine learning at SRI	06/2016
	Social interaction modeling using hybrid models at SRI	12/2015
	Hybrid models for event detection in time-series data at Amazon	04/2014
	Sum-Product networks for activity recognition in videos at SRI	09/2013
	Cost-Sensitive inference for multi-scale activity recognition at ECCV	10/2012
	Monocular extraction of 2.1D Sketch at SONY	06/2011
	Useful Tools for Computer vision at OSU	10/2010
ADVISING & MENTORING	Ioannis Agadakos, Advanced Computer Scientist, SRI International	2018-2019
	Julia Kruk, Computer Scientist, SRI International	2019
	Xiao Lin, Advanced Computer Scientist, SRI International	2017-2019
	Indranil Sur, Computer Scientist, SRI International	2017-2019
	Anirban Roy, Advanced Computer Scientist, SRI International	2017-2019
	Alex Tozzo, Advanced Computer Scientist, SRI International	2017-2019
	Tim Meo, Computer Scientist, SRI International	2017-Current
	Boris Knyazev, Student Associate, SRI International	2018
	Chris Kim, Student Associate, SRI International	2018
	Timothy Shields, Computer Scientist, SRI International	2015-2016
	Max Ehrlich, Computer Scientist, SRI International	2016-2017
	Andy Zhang, Student Associate, SRI International	2017
	Timur Almaev, Student Associate, SRI International	2016
	Sameh Khamis, Student Associate, SRI International	2014
	Peng Lei, PhD Student at OSU, advised by Sinisa Todorovic	2013-2014
	Jin Yi, Research Experience for Undergraduates, OSU	2012
	Antonio DiMicco, Research Experience for Undergraduates, OSU	2012
	Katherine Maack, Research Experience for Undergraduates, OSU	2012
AWARDS	IJCAI-Best Demo Award	2018
	SRI-Most Creative Talk	2017
	SRI-Most Helpful Technical Person	2015
	OSU-EECS Teaching Assistant of the year	2010
	INRIA-Best Poster Award	2010
	OSU-McDaniel Engineering Scholarship	2010
	OSU-EECS Research and Teaching Assistantships	2009-2014
	OSU-International Cultural Scholarship	2008-2009

PRESS COVERAGE

Robust.AI launches to build an industrial-grade cognitive platform for robots, TechCrunch, 06/2019

5 of the smartest people in AI teamed up to make awesome robots, TNW, 06/2019

Teaching bots how the world works, AXIOS, 06/2019

The Military And Corporate America Want To Make AI Explain Itself, Fast Company Magazine, 06/2017

PROGRAMMING SKILLS	C++ (OpenCV, PCL), Python (Pytorch, TensorFlow), and Matlab.	
EXTRA-CURRICULAR	*Vice President of The Flying Club at Oregon State*	2013-2014