Momotaz Begum

Contact

Assistant Professor, Computer Science — mbegum@cs.unh.edu
University of New Hampshire — www.carl.cs.unh.edu

Research Interests

Robot learning from demonstrations, Robot perception, Assistive Robotics – *Elder care, Special education, Exercise training*, Human-Robot Interaction

Employment

Assistant Professor 2016 - Present
Computer Science, University of New Hampshire, Durham NH.

Research Assistant Professor 2015 - 2016
Computer Science, University of Massachusetts Lowell, Lowell MA.

Research Scientis 2014
Computer Science, University of Massachusetts Lowell, Lowell MA.

Postdoctoral Fellow 2012 - 2013
Toronto Rehabilitation Institute, University of Toronto, Canada.

Postdoctoral Fellow 2010 - 2011
College of Computing, Georgia Institute of Technology, Atlanta GA.

Education

Doctor of Philosophy 2010
Department of Electrical and Computer Engineering
University of Waterloo, Ontario, Canada
Dissertation: *Visual Attention for Robotics Cognition*

Master of Engineering 2005
Department of Electrical and Computer Engineering
Memorial University, Newfoundland, Canada
Thesis: *Robotic mapping using soft computing methodologies*

Bachelor of Science 2003
Department of Electrical and Electronics Engineering
Bangladesh University of Engineering and Technology, Dhaka, Bangladesh
Senior Project: *Image Compression in Wavelet Domain Using a Genetic Algorithm*

Research Funding

- NIH 1 R01 AG075892-01A1: *Effectiveness and adoption of a Smart home-based social assistive robot for care of individuals with Alzheimer's Disease*, 2022 – 2027, $2,786,512 (PI, MPI: Sajay Arthanat)

- NSF EPSCoR RII Track-2 FEC: *Explainable and Adaptable Artificial Intelligence for Advanced Manufacturing*, 2022 – 2026, UNH portion $1,359,406 (Senior Personnel for UNH, UMaine led),

- NSF 2113892: *IUCRC Preliminary Proposal Planning Grant University of New Hampshire: Center for Digital Factory Innovations (CDFI)*, 2020 – 2022, $20,000

(Co-PI, PI: Nicholas Kirsch)

◦ NSF NRI 1830597: *FND: Robust Learning of Sequential Motion from Human Demonstrations to Enable Robot-guided Exercise Training*, 2019 – 2022, $749,999 (PI, co-PIs: Dain LaRoche, Sajay Arthanat)

◦ NSF 1664554: CRII: CHS: *Human-Robot Collaboration in Special Education: A Robot that Learns Service Delivery from Teachers' Demonstrations*, 2015 – 2017, $174,987 (PI)

◦ NSF 1552228 EAGER: *Collaborative Research: Exploring Models for Conveying Imminent Robot Failures to Allow for Human Intervention*, 2015 – 2016, $184,656 (Co-PI, PI: Holly Yanco, UMass Lowell)

◦ IEEE Special Interest Group on Humanitarian Technology Award, *Home-based Rehabilitation for Children with Cerebral Palsy using Wearable Technologies*, 2016, $2,500 (PI)

◦ Air-force Research Laboratory *Transparency in Autonomous Collaboration and Teaming (TACT) Program*, 2016, $6,000 (PI)

Journal Articles

◦ Y. Song, M. Begum, S. Arthanat, and D. P. LaRoche, *Validation of smartphone accelerometry for the evaluation of sit-to-stand performance and lower-extremity function in older adults*, Journal of Aging and Physical Activity. 30(1):3-11, 2021

◦ S. Arthanat, M. Begum, T. Gu, D. P LaRoche, D. Xu, and N.Zhang, *Caregiver perspectives on a smart home-based socially assistive robot for individuals with Alzheimers disease and related dementia*, Disability and Rehabilitation: Assistive Technology, 1-10, 2020

◦ R. Wang, A. Sudhama, M. Begum, R. Huq, and A. Mihailidis, *Robots to assist daily activities: Views of older adults with Alzheimers disease and their caregivers*, International Psychogeriatrics, 23:1-13, 2016

◦ M. Begum, R. W. Serna, and H. Yanco, *Are robots ready to deliver autism interventions? A comprehensive review*, Journal of Social Robotics, 8:157181, 2016

◦ M. Begum, R. Huq, R. Wang, and A. Mihailidis, *Collaboration of an assistive robot and older adults with dementia*, Gerontechnology, 13 (4), 405-419, 2015

◦ F. Rudzicz, R. Wang, M. Begum, and A. Mihailidis, *Speech interaction with personal assistive robots supporting aging-at-home for individuals with Alzheimers disease*, ACM Transaction on Accessible Computing, 7 (2):6, 2015

◦ M. Begum and F. Karray, *Robotic visual attention: A survey*, IEEE Transaction on Autonomous Mental Development (Renamed as IEEE Transaction on Cognitive and Developmental Systems), 3 (1): 92-105, 2011

◦ M. Begum, F. Karray, G. K. I. Mann, and R. G. Gosine, *A probabilistic model of overt visual attention for cognitive robots*, IEEE Transactions on System, Man, and Cybernetics B, 40 (5): 1305-1318, 2010

◦ M. Begum, G. K. I. Mann, and R. G. Gosine, *Integrated fuzzy logic and genetic algorithmic approach for simultaneous localization and mapping of mobile robots*, Journal of Applied Soft Computing, 8 (1): 150165, 2008

◦ M. Begum, G. K. I. Mann, and R. G. Gosine, *An evolutionary SLAM algorithm for mobile robots*, Advanced Robotics, 21 (9): 10311050, 2007

Refereed Conference Publications

◦ M. Hussein, Madison Clark, and M. Begum, *Detecting Incorrect Visual Demonstrations for Improved Policy Learning*, Conference on Robot Learning, CoRL 2022, New Zealand (acceptance rate: 39%)

◦ P. Gesel, D. LaRoche, S. Arthanat and M. Begum, *Learning to Optimize Control Policies and Evaluate Reproduction Performance from Human Demonstrations*, IEEE International Conference on Intelligent Robots and Systems, IROS 2021, virtual (acceptance rate: 45%)

◦ Mostafa Hussein, Brendan Crowe, Madison Clark, Marek Petrik, Momotaz Begum, *Robust Behavior Cloning with Adversarial Demonstration Detection*, International Conference on Intelligent Robots and Systems, IROS 2021, virtual (acceptance rate: 45%)

◦ I. Idrees, S. Tellex, and M. Begum, *Grounding Human-Robot Dialogue in Environment Sensors to help Elderly in Activities of Daily Living*, RoboDIAL 2020

◦ P. Gesel, F. Borsoi, D. LaRoche, S. Arthanat and M. Begum, *Learning Optimized Human Motion via Phase Space Analysis*, IEEE International Conference on Intelligent Robots and Systems, IROS 2020 (acceptance rate: 47%)

◦ E. Carpio, M. Turner, and M. Begum, *Learning Sequential Human-Robot Interaction Tasks from Demonstrations: The Role of Temporal Reasoning*, IEEE International Conference on Robot and Human Interactive Communication, RO-MAN 2019, India

◦ KJ Greenslade, MJ Pond, and M. Begum, *Practitioner Perceptions of the Benefits and Barriers to Robot-Mediated Interventions*, International Society for Autism Research annual meeting, INSAR 2019, Montreal.

◦ M. Hussein, M. Begum and M. Petrik, *Inverse Reinforcement Learning of Interaction Dynamics from Demonstrations, IEEE International Conference on Robotics and Automation*, IEEE International Conference on Robotics and Automation, ICRA 2019, Montreal (acceptance rate: 45%)

◦ P. Gesel and M. Begum, *Learning Motion Trajectories from Phase Space Analysis of the Demonstration, IEEE International Conference on Robotics and Automation*, IEEE International Conference on Robotics and Automation, ICRA 2019, Montreal (acceptance rate: 45%)

◦ E. Carpio, M. Turner, P. Gesel, and M. Begum, Leveraging Temporal Reasoning for Policy Selection in Learning from Demonstration, IEEE International Conference on Robotics and Automation, ICRA 2019, Montreal (acceptance rate: 45%)

◦ M. Turner and M. Begum, *Deep Reinforcement Learning of Abstract Reasoning from Demonstration*, ACM/IEEE International Conference on Human Robot Interaction, HRI 2018, Chicago

◦ M. Turner and M. Begum, Deep Recurrent Q-Learning of Behavioral Intervention Delivery by a Robot from Demonstration Data, IEEE International Conference on Robot and Human Interactive Communications, Ro-Man 2017, Portugal

◦ A. Lydakis, Y. Meng, C. Munroe, Yi-Ning Wu, M. Begum, A Learning-based Agent for Home Neurorehabilitation, IEEE International Conference on Rehabilitation Robotics, ICORR 2017, London-UK

◦ A. Lydakis, Pei-Chun Kao, and M. Begum, *Irregular Gait Detection using Wearable Sensors*, PErvasive Technologies Related to Assistive Environments, PETRA 2017, Greece

◦ Y. Meng, C. Munroe, Y. Wu, and M. Begum, *Learning from Demonstration Framework to Promote Home-based Neuromotor Rehabilitation*, IEEE International Symposium on Robot and Human Interactive Communication, Ro-Man 2016, New York

◦ D. J Brooks, M. Begum, and H. A Yanco, *Analysis of Reactions Towards Failures and Recovery Strategies for Autonomous Robots*, IEEE International Symposium on Robot and Human Interactive Communication, Ro-Man 2016, New York

◦ M. Begum, R. Serna, D. Kontak, J. Allspaw, J. Kuczynski, J. Suarez, and H. Yanco, *Measuring the efficacy of robots in ASD therapy: How informative are standard HRI metrics?*, ACM/IEEE International Conference on Human-Robot Interaction, HRI 2015, Oregon

◦ M. Begum, R. Wang, R. Huq, and A. Mihailidis,*Performance of Daily Activities by Older Adults with Dementia: The Role of an Assistive Robot*, IEEE International Conference on Rehabilitation Robotics, ICORR 2013, Washington

◦ C. Chao, J. Lee, M. Begum, and A. Thomaz, *Simon plays Simon says: The timing of turn-taking in an imitation game*, IEEE International symposium on robot and human interactive communication, Ro-Man 2011, Atlanta

◦ M. Begum and F. Karray, *Integrating visual exploration and visual search for robotic visual attention: The role of human-robot interaction*, IEEE International Conference on Robotics and Automation, ICRA 2011 (nominated for the Best Cognitive Robotics Paper Award) (acceptance rate: 49%)

◦ M. Begum, F. Karray, G. K. I. Mann, and R. G. Gosine, *A Probabilistic Approach for Attention-Based Multi-Modal Human-Robot Interaction*, IEEE International Symposium on Robot and Human Interactive Communication, Ro-Man 2009

◦ M. Begum, F. Karray, G. K. I. Mann, and R. G. Gosine, *Re-mapping of Visual Saliency in Overt Attention: A Particle Filter Approach for Robotic Systems*, IEEE International Conference on Robotics and Biomimetics, 2008

◦ M. Begum, G. K. I. Mann, R. Gosine, and F. Karray, *Object- and space-based visual attention: An Integrated Framework for Autonomous Robots*, IEEE/RSJ International Conference on Intelligent Robots and Systems, IROS 2008

◦ M. Begum, G. K. I. Mann, and R. G. Gosine, *A biologically inspired Bayesian model of visual attention for humanoid robots*, IEEE-RAS International Conference on Humanoid Robots, Humanoids 2006

◦ R. Huq, M. Begum, G. K. I. Mann, and R. G. Gosine, *Biased competitive model of humanoid visual attention using fuzzy discrete event system*, IEEE International Conference on Robotics and Biomimetics, 2006

◦ M. Begum, G. K. I. Mann, and R. G. Gosine, *An evolutionary algorithm for simultaneous localization and mapping (SLAM) of mobile robots*, IEEE/RSJ International Conference on Intelligent Robots and Systems, IROS 2006

◦ M. Begum, G. K. I. Mann, and R. G. Gosine, *A fuzzy-evolutionary algorithm for simultaneous localization and mapping of mobile robots*, IEEE Congress on Evolutionary Computation, CEC 2006

◦ M. Begum, G. K. I. Mann, and R. G. Gosine, *Concurrent mapping and localization for mobile robot using soft computing techniques*, IEEE/RSJ International Conference on Intelligent Robots and Systems, IROS 2005 (acceptance rate: 55%)

◦ M. Begum, N. Nahar, K. Fatimah, and M. K. Hasan, *An efficient wavelet-VQ method for image coding*, IEEE International Symposium on Circuits and Systems, 2003

◦ M. Begum, N. Nahar, K. Fatimah, and M. K. Hasan, *A new initialization technique for LBG algorithm*, IEEE International Conference on Electrical and Computer Engineering, 2002

Peer-reviewed Workshop

◦ T. Gu, M. Begum, N. Zhang, D. Xu, S. Arthanat and D. LaRoche, *Adaptive Software Framework for Dementia-care Robots*, Workshop on Planning and Robotics, International Conference on Automated Planning and Scheduling, ICAPS 2020

◦ M. Hussein, B. Crowe, M. Petrik , M. Begum, *Robust Maximum Entropy Imitation Learning*, Robot learning workshop, Neural Information Processing Systems, NeurIPS 2020.

◦ D.P. LaRoche, Begum, M., Gesel, P., Arthanat, S., Bandera, V.M., Gesel, F.J., Girouard, L.M., Mayer, S.M., Poirier, C.L., Surman, B.M. *Quantifying kinematic fidelity of demonstrated therapeutic shoulder exercises between therapist and patient*, American College of Sports Medicine, Annual Meeting, May 2020

◦ M. Turner and M. Begum, *Learning to Deliver Robot-Mediated Behavioral Intervention*, Workshop on Human-centered Robotics, Robotics Science and Systems, RSS 2017

◦ C. Munroe, Y. Meng, H. Yanco, and M. Begum, *Augmented Reality Eyeglasses for Promoting Home-Based Rehabilitation for Children with Cerebral Palsy*, Video publication in ACM/IEEE International Conference on Human-Robot Interaction, HRI 2016

◦ M. Begum, H. Yanco, R. Serna, D. Kontak, *Robots in clinical settings for therapy of individuals with autism: Are we there yet?*, IEEE IROS Workshop on Rehabilitation and Assistive Robotics, IROS 2014

◦ F. Rudzicz, R. Wang, M. Begum and A. Mihailidis, *Speech recognition in Alzheimer's disease with personal assistive robots*, Annual workshop on Speech and Language Processing for Assistive Technologies, 2014

Book Chapter

◦ M. Begum and F. Karray, *Computational intelligence techniques in bio-inspired robotics*, Computational Intelligence in Autonomous Robotic Systems, 1-29, Springer 2008

Invited Talks

◦ Momotaz Begum, *Robot Learning from Humans in the Wild: Challenges and Opportunities*, Tufts University HRI Colloquium Series, November 2022.

◦ Momotaz Begum, *Robot Learning from Humans in the Wild: Challenges and Opportunities*, Invited Speaker, Northeast Robotics Colloquium 2022, University of Massachusetts, Lowell, October 2022.

◦ Momotaz Begum, *When HRI Meets AI*, University of Massachusetts, Lowell, April 2022.

◦ Momotaz Begum, *Robust Learning of Sequential Motion from Human Demonstrations to Enable Robot-guided Exercise Training*, NSF NRI PI meeting (virtual), April 2022.

◦ Momotaz Begum *This is how you do it: Teaching Robots New Skills from Human Demonstrations*, AIx Teen Summit at Phillips Exeter Academy (Virtual), April 2020

◦ Momotaz Begum *Robust Learning of Sequential Motion from Human Demonstrations to Enable Robot-guided Exercise Training*, NSF NRI PI meeting, Washington, 2020.

◦ Momotaz Begum *Robot-Guided Exercise Training*, McAuliffe-Shepard Discovery Center, Concord NH. The Steller Friday event, 2019

◦ Momotaz Begum *Sequential Robotic Task Learning from Demonstrations*, 16th Annual Governors Advanced Manufacturing and High Technology Summit, 2018

◦ Momotaz Begum *Sequential Robotic Task Learning from Demonstrations*, UNH Workshop on Smart Factories: Revolutionizing Manufacturing through Industry 4.0, 2018

◦ Momotaz Begum *This is how you do it: Learning Concepts from Human Demonstrations*, Worcester Polytechnic Institute, Robotics Seminar Series, 2018

◦ Momotaz Begum *This is how you do it: Learning Concepts from Human Demonstrations*, Washington State University Pullman, NIH / Smart Environment Research Center (SERC) Distinguished Speaker Series on Health-Assistive Smart Environments, 2018

◦ Momotaz Begum *Socially Assistive Robots: From Tele-operation toward Autonomy*, Annual Convention of American Psychology Association, 2018

◦ Momotaz Begum *Learning Concepts from Demonstrations*, Bangladesh University of Engineering and Technology, 2017

◦ Momotaz Begum *Learning from Demonstration in Rehabilitation Robotics*, Bedford Vetern Affairs, 2017

◦ Momotaz Begum *Assistive Robotics and Human Robot Interaction*, Boston University Compute Vision Research Group, 2016

◦ Momotaz Begum *Are Robots Ready for Autism Intervention?*, NAO Congress, University of Massachusetts, Lowell, 2016

◦ Momotaz Begum *Home-based Rehabilitation for Children with Cerebral Palsy using Wearable Technologies*, IEEE IROS PI meeting for IEEE-SIGHT grant, 2016

Professional Services

◦ *Guest Editor*

Autonomous Robots, Special issue on Assistive and Rehabilitation Robotics, 2015

◦ *Workshop Organization*

1. Momotaz Begum and Mike Radice *Robot Mediated Autism Intervention: Hardware, Software and Curriculum*, Robotics Science and Systems, 2018
2. Momotaz Begum and Selma Sabanovic *All for One and One for All: Systematic Data Collection and Sharing to Advance Socially Assistive Robots*, ACM/IEEE Conference on Human Robot Interaction, 2017
3. H. Park, Momotaz Begum, and C. Park, *Assistive robots for Individuals with Disabilities: HRI Issues and Beyond*, IROS 2014

◦ *Program Committee*

1. IEEE/ACM International Conference on Human Robot Interaction (HRI) 2023
2. International Joint Conference on Artificial Intelligence (IJCAI) 2020
3. International Conference on Autonomous and Intelligent Systems, 2011

◦ *Journal and Conference Reviewer*

1. ACM Transaction on Human Robot Interaction 2021
2. Journal of Social Robotics 2016
3. Paladyn Journal of Behavioral Robotics 2020
4. IEEE Transaction on Cybernatics 2015
5. The Autism Journal, 2017
6. Autonomous Robot 2016 (Editorial board)
7. Robotics Science and Systems 2011, 2021
8. IEEE IROS 2007-2020
9. IEEE ICRA 2011-2020
10. IJCAI 2019 2020
11. AAAI 2021 2022
12. IEEE Ro-MAN 2009, 2018 – 2021
13. ACM/IEEE HRI 2015 – 2021
14. IEEE RA-L 2018, 2019

15. IEEE SMC B 2008 – 2014
16. IEEE T-RO 2007

◦ *Grant Reviewer*

1. NSF CISE panel 2021
2. NSF CISE panel 2021
3. NSF Engineering panel 2019
4. NSF EPSCoR panel 2018
5. NSF CISE panel 2018
6. NSF Engineering panel 2018
7. NSF CISE panel 2016
8. NSF CISE panel 2016
9. Natural Science and Engineering Research Council of Canada 2020
10. Veteran Health Administration RRD9 2016, 2017,2018
11. External reviewer for the UW-Milwaukee Research Growth Initiative Program, 2019
12. UNH CoRE Program 2018, 2019

Awards

◦ Appointed by the Under Secretary for Health of the Department of Veteran Affairs as a Board Member for the Rehabilitation Research and Development Service (RRD9) Scientific Merit Review board for a 3-year term (2017-2020).

◦ Nominated for the Best Cognitive Robotics Paper award, ICRA 2011

◦ Ontario Graduate Scholarship, 2010

◦ President's Graduate Scholarship, University of Waterloo (Canada), 2007-2010

◦ NSERC Canada Graduate Scholarship, 2007-2009

◦ Graduate School Fellowship, Memorial University (Canada), 2003-2006

Teaching

◦ *CS 733/833 Mobile Robotics* *Fall*
◦ *CS 755/855 Computer Vision* *Spring*
◦ *CS 933 Human Robot Interaction* *Spring*

PhD Committee (Supervisor)

◦ *Madison Clark-Turner* *2016 – 2021*
◦ *Mostafa Hussein* *2017 –*
◦ *Paul Gesel* *2018 –*
◦ *Noushad Sojib* *2022 –*
◦ *Palash Agarwal* *2022 –*
◦ *Abishek Muralikrishna* *2022 –*

PhD Committee (Member)

- Bence Cserna (UNH CS)
- Tiany Gu (UNH CS)
- Devin Thomas (UNH CS)
- William Doyle (UNH CS)
- Reazul Hasan Russel (UNH CS)
- Jia Lin Hau (UNH CS)
- Ifrah Idrees (Brown CS)