Rakshith Lokesh

Research Associate, Northeastern University

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Education

Ph.D.(Dual) Mechanical Engineering and Kinesiology — Aug., 2015 - May, 2020
Michigan State University — MI, U.S.A.

B.S. Mechanical Engineering — June, 2011 - May, 2015
National Institute of Technology Karnataka — KA, India

Research Positions

Postdoctoral Fellow — Aug., 2023 - present
Northeastern University — MA, U.S.A.
- Researching human motor control of objects having complex dynamics.

Postdoctoral Fellow — June, 2020 - May, 2023
University of Delaware — DE, U.S.A.
- Researched sensorimotor interaction mechanisms between humans.

Research Assistant — May, 2016 - May, 2020
Michigan State University — MI, U.S.A.
- Researched haptic assistance strategies to enhance human motor learning.

Journal Publications

1. **Lokesh, R.**, & Sternad, D. (2024). Human control of underactuated objects: Adaptation to uncertain nonlinear dynamics ensures stability, *IEEE Transactions on Medical Robotics and Bionics*.
   Link
2. Roth, A., Buggeln, J., Hoh, J. E., Wood, J. M., Sullivan, S., Ngo, T., Calalo, J., **Lokesh, R.**, Morton, S. M., Grill, S., Jeka, J. J., Carter, M. J., & Cashaback, J. G. A. (2024). Roles and interplay of reinforcement-based and error-based processes during reaching and gait in neurotypical adults and individuals with Parkinson's disease. *PLOS Computational Biology*.
   Link
3. Roth, A., **Lokesh, R.**, Tang, J., Buggeln, J., Smith, C., Calalo, J., Sullivan, S., Ngo, T., St. Germain, L., Carter, M.J., & Cashaback, J. G. A. (2024). Punishment leads to greater sensorimotor learning but less movement variability compared to reward. *Neuroscience*.
   Link
4. Chaudhari, A., **Lokesh, R.**, Cheang, V., Doshi, S., Barmaki, R. L., Cashaback, J. G. A., & Thostenson, E. (2024). Characterizing the sensing response of carbon nanocomposite-based wearable sensors on elbow joint using an end point robot and virtual reality. *Sensors*.
   Link
5. **Lokesh, R.**, Sullivan, S., St. Germain, L., Roth, A., Calalo, J., Buggeln, J., Ngo, T., Marchhart, V., Carter, M., & Cashaback, J. G. A. (2023). Visual acuity dominates over haptic speed for state estimation of a partner during collaborative sensorimotor interactions. *Journal of Neurophysiology*.
   Link

6. Calalo, J., Roth, A., **Lokesh, R.**, Sullivan, S., Wong, J., Semrau, J., & Cashaback, J. G. A. (2023). The sensorimotor system modulates muscular co-contraction relative to visuomotor feedback responses to regulate movement variability. *Journal of Neurophysiology*.
   Link
7. Roth, A., Calalo, J., **Lokesh, R.**, Sullivan, S., Grill, S., Jeka, J.J., van der Kooij, K. Carter, M.J., & Cashaback, J. G. A. (2023). Reinforcement-based processes actively regulate motor exploration along redundant solution manifolds. *Proceedings of the Royal Society B*.
   Link
8. Chheang, V., **Lokesh, R.**, Chaudhari, A., Wang, Q., Baron, L., Doshi, S., Thostenson, E., Cashaback, J.G.A.,& Barmaki, R.L. (2023). Immersive virtual reality and robotics for upper extremity rehabilitation. *arXiv*.
   Link
9. Ranganathan, R., Cone, S., Shin, N., **Lokesh, R.**, & Fox, B.(2023). A test of the variability vs. specificity hypotheses in the retention of a motor skill: A registered report. *Journal of Sport and Exercise Psychology*.
10. **Lokesh, R.**, Sullivan, S., Calalo, J., Roth, A., Carter, M. J., & Cashaback, J. G. A. (2022). Humans utilize sensory evidence of others' intended action to make online decisions. *Nature Scientific Reports*.
    Link
11. Ranganathan, R., Lin, M., Carey, S., **Lokesh, R.**, Lee, M. H., & Krishnan, C. (2021). Motor variability prior to learning does not facilitate the ability to adopt new movement solutions. *Neuroscience*.
    Link
12. Ranganathan, R., Tomlinson, A. D., **Lokesh, R.**, Lin, T. H., & Patel, P. (2021). A tale of too many tasks: Task fragmentation in motor learning and a call for model task paradigms. *Experimental Brain Research*.
    Link
13. **Lokesh, R.**, & Ranganathan, R. (2020). Haptic assistance that restricts the use of redundant solutions is detrimental to motor learning. *IEEE Transactions on Neural Systems and Rehabilitation Engineering*.
    Link
14. **Lokesh, R.**, & Ranganathan, R. (2019). Differential control of task and null space variability in response to changes in task difficulty when learning a bimanual steering task. *Experimental Brain Research*.
    Link

Conference Presentations

1. **Lokesh, R.**, Edraki, M., Krotov, A., & Sternad, D. (October, 2024). The Role of Preparation in the Control of Complex Objects, *Society for Neuroscience*.
2. Desabhotla, K. S., **Lokesh, R.**, Buscaglione, S., & Sternad, D. (October, 2024). Exploiting and mitigating self-generated interactive dynamics in the transport of complex objects, *Society for Neuroscience*.
3. Edraki, M., **Lokesh, R.**, Krotov, A., Ramezani, A., & Sternad, D. (September, 2024). Human-inspired control of a whip: Preparatory movements improve hitting a target, *IEEE Biomedical Robotics and Biomechatronics*.
4. Krotov, A., Edraki, M., **Lokesh, R.**, & Sternad, D. (May, 2024). Motor control beyond reach: Hitting a target with a whip, *New England Manipulation Symposium (NEMS)*.
5. Desabhotla, K. S., **Lokesh, R.**, & Sternad, D. (May, 2024). Exploiting interactive dynamics in the

manipulation of complex objects, *New England Manipulation Symposium (NEMS)*.

6. Edraki, M., **Lokesh, R.**, Krotov, A., Ramezani, A., & Sternad, D. (April, 2024). Striking a target with a whip: from human to robot control, *IEEE Robosoft*.
7. Sullivan, S., **Lokesh, R.**, Peters, C., Calalo, J., Roth, A., Buggeln, J., Ngo, T., Carter, M. J., & Cashaback, J. G. A. (2023). Humans make an excessive number of indecisions under time constraints, *Journal of Exercise, Movement, and Sport*.
8. Calalo, J., Roth, A., Sullivan, S., **Lokesh, R.**, Carter, M. J., & Cashaback, J. G. A. (2022). Online movements reflect the ongoing decision-making processes, *Journal of Exercise, Movement, and Sport*.
9. Calalo, J., **Lokesh, R.**, Roth, A., Sullivan, S., Wong, J., Semrau, J. J., & Cashaback, J. G. A. (2022). Greater muscular co-contraction but no changes in visuomotor feedback gains in response to visually amplified movement variability, *Neural Control of Movement*.
10. **Lokesh, R.**, Calalo, J., Roth, A., Carter, M. J., & Cashaback, J. G. A. (2021). Rapid decision-making during human-human sensorimotor interactions, *Society for Neuroscience*.
11. Calalo, J., **Lokesh, R.**, Roth, A., Sullivan S., Wong J. D., Semrau, J. A., & Cashaback, J. G. A. (2021). The sensorimotor system increases muscular co-contraction, but not visuomotor feedback gains, in response to visually amplified movement variability, *Society for Neuroscience*.
12. Roth, A., Calalo, J., **Lokesh, R.**, Sullivan S., Carter, M. J., & Cashaback, J. G. A. (2021). Reward feedback leads to exploratory random-walk behaviour, *Society for Neuroscience*.
13. **Lokesh, R.**, & Ranganathan, R. (2017). Influence of haptic feedback on the exploration of movement variability during motor learning, *Society for Neuroscience*.
14. **Lokesh, R**., Chittawadigi, R. G., & Saha, S. K. (2015). MechAnalyzer: 3D Simulation software to teach kinematics of machines. In P. *2nd International and 17th National Conference on Machines and Mechanisms*.

Teaching Experience

Course Instructor May, 2016 - May, 2019
Michigan State University MI, U.S.A.
- KIN 330 - Biomechanics of Physical Activity

Lab Instructor Jan., 2017 - May, 2019
Michigan State University MI, U.S.A.
- KIN 251 - Principles of Human Movement

Lab Instructor Sep., 2015 - Dec., 2016
Michigan State University MI, U.S.A.
- ME 451 - Control Systems Laboratory

Seminars and Talks

1. Guidelines for effective data visualization and presentation (May, 2023). *MOTRE lab seminar*. Michigan State University, East Lansing, Michigan.
2. Sensorimotor learning and control perspectives for human-robot and human-human interactions: Potential implications for neurorehabilitation (March, 2023). *BIOMS seminar series*. Department of Biomedical Engineering, University of Delaware, Newark, Delaware.

Invited Reviewer

- Neural Networks
- Nature Scientific Reports
- Neuroscience and Biobehavioral Reviews
- Human Movement Science
- Motor Control

Mentoring and Outreach

- Guiding Ph.D. students (Mahdiar Edraki, Mechanical Engineering and Vani Desabhotla, Electrical and Electronics Engineering) in their dissertation research (2023 - present). Northeastern University.
- Mentored a Ph.D. student (Seth Sullivan, Biomedical Engineering) in his dissertation research (2021 - 2023). University of Delaware.
- Presented biomechanical measurement tools to high school students (2019). *MSU Science Festival*, Michigan State University.
- Conducted research lab tours for high school students (April, 2018). *High School Engineering Institute (HSEI)*, Michigan State University.
- Conducted research lab tours for primary school kids and their grandparents (2018 - 2019). *Grandparents University Event*, Michigan State University.
- Mentored undergraduate student teams in research projects (2018 - 2019). *University Undergraduate Research and Arts Forum*, Michigan State University.

Awards and Recognitions

- Postdoctoral Research Award of $25,000, College of Science, Northeastern University. 2024
- Dean's Postdoctoral Travel Award, College of Science, Northeastern University. 2024
- Arctic Code Vault contributor in the GitHub 2020 Archive Program. 2020
- Graduate Dissertation Completion Fellowship, Michigan State University. 2020
- Conference Travel Award, Dept. of Kinesiology, Michigan State University. 2017
- Summer Research Fellowship, Dept. of Mechanical Engineering, Michigan State University. 2016
- Indian Central Government Merit Scholarship, awarded to top 0.2% of 1000000 candidates. 2012

Professional Organizations

- Neural Control of Movement (NCM)
- Society for Neuroscience (SfN)
- Institute of Electrical and Electronics Engineers (IEEE)