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Nick Cheney

Primary Research Interests

Machine Learning, Deep Learning, Evolutionary Computation, AutoML, Precision Medicine

Appointments

2020– **Assistant Professor**, *Computer Science*, University of Vermont.
- Director, UVM Neurobotics Lab (2018–)
- Core Faculty, Vermont Complex Systems Center (2018–)
- Faculty Affiliate, GUND Institute for Environment (2019–)
- Faculty Mentor, Quantitative and Evolutionary STEM Training (QuEST) (2019–)
- Affiliate Researcher, NIH COBRE in Translational Global Infectious Diseases (2020–)
- Affiliate Researcher, MassMutual Center for Excellence in Complex Systems and Data Science (2020–)
- Founding Director, UVM Data Collider (2022–)

2023– **Co-founder**, BioBee (*research spin-off company on ML for digital biomarkers of mental health*)

2018–2020 **Research Assistant Professor**, *Computer Science*, University of Vermont.

2017–2018 **Visiting Assistant Professor**, *Computer Science*, University of Wyoming.

2015–2017 **Research Fellow**, *Columbia University*.

2014–2015 **Visiting Researcher**, *Santa Fe Institute*.

2013–2017 **Space Technology Research Fellow**, *NASA Ames Research Center*.

Education

2017 **PhD, Computational Biology, Cornell University**.
Advisors: Hod Lipson, Steve Strogatz

2012 **BS, Mathematics, University of Vermont**.

Awarded Grants

(Total participated in: **$48,491,389**; Total led as PI/Co-PI: **$12,611,474**)

2023– **UVM Innovations Spark-VT:** *BioBee: A Biological and Behavioral Digital Mental Health Assessment*, Co-Founder and Mentor (PI is my Co-Founder and PhD student, Bryn Loftness), $45,000.

2023– **NSF CAREER:** *An Embodied Intelligence Approach to Neural Architecture Search*, PI, $549,866.

2023– **NSF EPSCoR RII Track-1:** *Harnessing the Data Revolution for Vermont: The Science of Online Corpora, Knowledge, and Stories (SOCKS)*, Co-I, $20,000,000.

2022– **NSF EPSCoR RII Track-2:** *Explainable and Adaptable Artificial Intelligence for Advanced Manufacturing*, Co-PI, $6,000,000.

2021– **NSF EEID/USDA NIFA:** *Predicting Livestock Disease Transmission Dynamics under Alternate Biosecurity Risk Management Interventions and Behavioral Response of Livestock Producers*, Co-PI, $2,477,020.

2021– **NSF MRI:** *Acquisition of a Massive Database to Accelerate Data Science Discovery*, Co-I, $725,016.

2020– **NSF FW-HTF-RL:** *Testing a Responsible Innovation Approach for Integrating Precision Agriculture Technologies with Future Farm Workers and Work*, Co-I, $3,000,000.

2020– **U.S. Army Engineer Research & Development Center:** *Army Visual and Tactical Arctic Reconnaissance (AVATAR)*, Co-I, $3,700,000.

2020– **NSF RI:** *Small: Collaborative Research: Evolutionary Approach to Optimal Morpholog of Transformable Sof Robots*, PI, $229,915.

2021–2022 **DARPA AIE:** *SocialCyber: Leveraging AI to Guard Online Open Source Networks (LAGOON)*, Co-PI, $340,798.

2020–2022 **NSF AI Institute:** *Planning: The Proteus Institute: Intelligence through Change*, Co-PI, $500,000.

2019–2022 **USDA NIFA AFRI:** *Assessing climate perceptions and developing adaptation resource for small, medium and beginning farms*, Co-PI, $499,906.

2018–2022 **DARPA L2M:** *Overcoming Catastrophic Forgetting and Rapidly Adapting via Selective Plasticity Driven by Diffusion-Based Neuromodulation*, PI, $1,669,969.

2020–2021 **UVM Gund Institute:** *COVID-19 Outbreak Behavior Experimental Simulation Game and Survey: Accounting for the Heterogeneity of Human Behavior to Prevent Infection Spread Due to Socio-Environmental Factors*, Co-I, $9,899.

2020–2021 **NIH COBRE TGIR:** *Pilot: A Natural Language Processing Pipeline to Automatically Predict Human Behavioral Response to Viral Epidemics like Ebola and COVID-19*, PI, $50,000.

2019–2021 **Google:** *Open-source Complex Ecosystems and Networks (OCEAN)*, Co-I, $1,000,000.

2019–2021 **NASA EPSCoR:** *Enabling Rapid Robot Design for Planetary Exploration*, PI, $10,000.

2015–2020 **USDA NIFA AFRI:** *A human behavioral approach to reducing the impact of livestock pest or disease incursions of socio-economic importance*, Co-I (2018-2020), $7,400,000.

2015–2017 **NASA STMD:** *Advanced Supercomputing High End Computing Award*, PI, 4,730,400 processor hours.

2013–2017 **NASA Space Technology Research Fellowship:** *Design Automation Algorithm for Soft Robots*, Fellow, $284,000.

2012–2017 **MSU BEACON Center:** *Mighican State University Distinguished Fellowship (declined)*, Fellow, $225,000.

2012–2017 **NSF IGERT:** *The Dynamics of Brain-Body-Environment Systems in Behavior and Cognition Traineeship at Indiana University (declined)*, Trainee, $190,000.

Honors and Awards

2023 ACM SIGEVO Impact Award (for a seminal GECCO paper with high 10-year impact on the field)

2023 NSF CAREER Award

2023 Inventor Hall of Fame Award, University of Vermont Invention2Venture

2023 Outstanding Reviewer Award, Genetic and Evolutionary Computation Conference (GECCO)

2020 Best Paper Award, American Association of Clinical Directors Perioperative Leadership Summit ($500)

2018 Outstanding Reviewer Award, Nature

2016 Most Aesthetic Appeal, Virtual Creatures Competition, Genetic and Evolutionary Computation Conference (GECCO)

2015 Winner, Virtual Creatures Competition, Genetic and Evolutionary Computation Conference (GECCO)

2015 Most Entertaining Video Award, International Joint Conference on Artificial Intelligence (IJCAI)

2014 Winner, Virtual Creatures Competition, Genetic and Evolutionary Computation Conference (GECCO)

2015 Three Minute Thesis Competition, Cornell University ($1,000 second prize)

2014 Finalist, Science Visualization Competition, ALIFE14: The Fourteenth International Conference on the Synthesis and Simulation of Living Systems (ALife)

2013 Most Entertaining Video "Shakey" Award, Association for the Advancement of Artificial Intelligence (AAAI) Video Competition

2013 NASA Space Technology Research Fellowship

2013 National Science Foundation Graduate Research Fellowship Program (NSF GFRP), Honorable Mention

2012 Magna Cum Laude, University of Vermont

2012 Omicron Delta Epsilon International Honors Society for Economics

2010 Award for Outstanding Achievement at the Highest Level of Excellence in Mathematics, University of Vermont College of Engineering & Mathematical Sciences

2010 University of Vermont ALANA (African, Latino, Asian, Native American) Junior Award

2008 Vermont Scholar Award, University of Vermont

Selected Awards to Supervised Students:

2022-2024 NIH F99/K01: Improving the Generalizability of Deep Neural Networks by Teaching them Lung Cancer Pathophysiology (Axel Masquelin, $64,880)

2023 Young Alumni Who's Who Award, Colorado Mesa University (Bryn Loftness)

2023 NSF Graduate Research Fellowship Program (Bryn Loftness; $147,000)

2023 Collegiate Award Finalist, National Center for Women & Information Technology (Bryn Loftness)

2021-2022 NIH F31: Leveraging prior knowledge to classify Indeterminate Lung Nodulesin CT images using Deep Neural Networks (Axel Masquelin; $42,352)

2022 Society for Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS) Chapter of the Year (Ollin Langle-Chimal, UVM SACNAS Executive Board)

2021 Angela Batista Award (for students of color who has demonstrated a commitment to social justice and change through anti-racist work), UVM Mosaic Center for Students of Color (Ollin Langle-Chimal)

Journal Publications

(Google Scholar: https://scholar.google.com/citations?user=gwpqf8sAAAAJ&hl=en)

(29) Prutzer, E., Gardezi, M., Rizzo, D. M., Emery, M., Merrill, S., Ryan, B. E., Oikonomou, P. D., Alvez, J. P., Adereti, D. T., Anjum, R., Badireddy, A. R., Bhattarai, D., Brugler, S., Cheney, N., Clay, D., Clay, S., Dadkhah, A., Faulkner, J. W., Joshi, D. R., ... Zia, A. (2023). Rethinking responsibilityin precision agriculture innovation: Lessons from an interdisciplinary research team. *Journal of Responsible Innovation*, 1–24

(28) VanDyk, T., Meyer, B., DePetrillo, P., Donahue, N., O'Leary, A., Fox, S., Cheney, N., Ceruolo, M., Solomon, A. J., & McGinnis, R. S. (2023). Digital phenotypes of instability and fatigue derived from daily standing transitions in persons with multiple sclerosis. *IEEE Transactions on Neural Systems and Rehabilitation Engineering*

(27) Meyer, B. M., Cohen, J. G., Donahue, N., Fox, S. R., O'Leary, A., Brown, A. J., Leahy, C., VanDyk, T., DePetrillo, P., Ceruolo, M., Cheney, N., Solomon, A. J., & McGinnis, R. S. (2023). Chest-based wearables and individualized distributions for assessing postural sway in persons with multiple sclerosis. *IEEE Transactions on Neural Systems and Rehabilitation Engineering*

(26) Koretsky, M. J., Brovman, E. Y., Urman, R. D., Tsai, M. H., & Cheney, N. (2023). A machine learning approach to predicting early and late postoperative reintubation. *Journal of Clinical Monitoring and Computing*, *37*(2), 501–508

(25) Minot, J. R., Cheney, N., Maier, M., Elbers, D. C., Danforth, C. M., & Dodds, P. S. (2022). Interpretable bias mitigation for textual data: Reducing genderization in patient notes while maintaining classification performance. *ACM Transactions on Computing for Healthcare*, *3*(4), 1–41

(24) Meyer, B. M., Depetrillo, P., Franco, J., Donahue, N., Fox, S. R., O'Leary, A., Loftness, B. C., Gurchiek, R. D., Buckley, M., Solomon, A. J., Ng, S. K., Cheney, N., Ceruolo, M., & McGinnis, R. S. (2022). How much data is enough? a reliable methodology to examine long-term wearable data acquisition in gait and postural sway. *Sensors*, *22*(18), 6982

(23) Masquelin, A. H., Alshaabi, T., Cheney, N., Estépar, R. S. J., Bates, J. H., & Kinsey, C. M. (2022). Perinodular parenchymal features improve indeterminate lung nodule classification. *Academic Radiology*

(22) Gramling, C. J., Durieux, B. N., Clarfeld, L. A., Javed, A., Matt, J. E., Manukyan, V., Braddish, T., Wong, A., Wills, J., Hirsch, L., Straton, J., Cheney, N., Eppstein, M. J., Rizzo, D. M., & Gramling, D. (2022). Epidemiology of connectional silence in specialist serious illness conversations. *Patient Education and Counseling*, *105*(7), 2005–2011

(21) Kudithipudi, D., Aguilar-Simon, M., Babb, J., Bazhenov, M., Blackiston, D., Bongard, J., Brna, A. P., Chakravarthi Raja, S., Cheney, N., Clune, J., Daram, A., Fusi, S., Helfer, P., Kay, L., Ketz, N., Kira, Z., Kolouri, S., Krichmar, J. L., Kriegman, S., ... Siegelmann, H. (2022). Biological underpinnings for lifelong learning machines. *Nature Machine Intelligence*, *4*(3), 196–210

(20) Bucini, G., Clark, E. M., Merrill, S. C., Langle-Chimal, O., Zia, A., Koliba, C., Cheney, N., Wiltshire, S., Trinity, L., & Smith, J. M. (2022). Connecting livestock disease dynamics to human learning and biosecurity decisions. *Frontiers in Veterinary Science*, *9*

(19) Meyer, B. M., Tulipani, L. J., Gurchiek, R. D., Allen, D. A., Solomon, A. J., Cheney, N., & McGinnis, R. S. (2022). Open-source dataset reveals relationship between walking bout duration and fall risk classification performance in persons with multiple sclerosis. *PLOS Digital Health*, *1*(10), e0000120

(18) Clark, E. M., Merrill, S. C., Trinity, L., Liu, T.-L., O'Keefe, A., Shrum, T., Bucini, G., Cheney, N., Langle-Chimal, O. D., Koliba, C., Zia, A., & Smith, J. M. (2022). Comparing behavioral risk assessment strategies for quantifying biosecurity compliance to mitigate animal disease spread. *Frontiers in Veterinary Science*, *9*

(17) Howard, D., Glette, K., & Cheney, N. (2022). Evolving robotic morphologies. *Frontiers in Robotics and AI*, *9*

(16) Gramling, R., Javed, A., Durieux, B. N., Clarfeld, L. A., Matt, J. E., Rizzo, D. M., Wong, A., Braddish, T., Gramling, C. J., Wills, J., Arnoldy, F., Straton, J., Cheney, N., Eppstein, M. J., & Gramling, R. (2021). Conversational stories & self organizing maps: Innovations for the scalable study of uncertainty in healthcare communication. *Patient Education and Counseling*, *104*(11), 2616–2621

(15) Van Den Broek-Altenburg, E., Atherly, A., Cheney, N., & Fama, T. (2021). Understanding the factors that affect the appropriateness of rheumatology referrals. *BMC Health Services Research*, *21*(1), 1–8

(14) Masquelin, A. H., Cheney, N., Kinsey, C. M., & Bates, J. H. (2021). Wavelet decomposition facilitates training on small datasets for medical image classification by deep learning. *Histochemistry and Cell Biology*, *155*, 309–317

(13) Clark, E. M., Merrill, S. C., Trinity, L., Bucini, G., Cheney, N., Langle-Chimal, O., Shrum, T., Koliba, C., Zia, A., & Smith, J. M. (2021). Emulating agricultural disease management: Comparing risk preferences between industry professionals and online participants using experimental gaming simulations and paired lottery choice surveys. *Frontiers in Veterinary Science*, *7*, 556668

(12) Merrill, S. C., Koliba, C., Bucini, G., Clark, E., Trinity, L., Zia, A., Cheney, N., Langle-Chimal, O., Shrum, T., Sellnow, T., Sellnow, D. D., & Smith, J. M. (2020). A systems approach to understanding biosecurity decision-making. *Journal of Animal Science*, *98*(Suppl 4), 43

(11) Cheney, N., Mtuke, F., Dominick, T. S., Benoit, M. Y., & Tsai, M. H. (2020). Operating room tardiness following staffing changes at an ambulatory surgical center. *Journal of Clinical Anesthesia*, *68*, 110092–110092

(10) Meyer, B. M., Tulipani, L. J., Gurchiek, R. D., Allen, D. A., Adamowicz, L., Larie, D., Solomon, A. J., Cheney, N., & McGinnis, R. S. (2020). Wearables and deep learning classify fall risk from gait in multiple sclerosis. *IEEE Journal of Biomedical and Health Informatics*, *25*(5), 1824–1831

(9) Clark, E. M., Merrill, S. C., Trinity, L., Bucini, G., Cheney, N., Langle-Chimal, O., Shrum, T., Koliba, C., Zia, A., & Smith, J. M. (2020). Using experimental gaming simulations to elicit risk mitigation behavioral strategies for agricultural disease management. *PloS ONE*, *15*(3), e0228983

(8) Skrip, L. A., Bedson, J., Abramowitz, S., Jalloh, M. B., Bah, S., Jalloh, M. F., Langle-Chimal, O. D., Cheney, N., Hébert-Dufresne, L., & Althouse, B. M. (2020). Unmet needs and behaviour during the ebola response in sierra leone: A retrospective, mixed-methods analysis of community feedback from the social mobilization action consortium. *The Lancet Planetary Health*, *4*(2), e74–e85

(7) Gurchiek, R. D., Cheney, N., & McGinnis, R. S. (2019). Estimating biomechanical time-series with wearable sensors: A systematic review of machine learning techniques. *Sensors*, *19*(23), 5227

(6) Kriegman, S., Cheney, N., & Bongard, J. (2018). How morphological development can guide evolution. *Scientific Reports*, *8*(1), 13934

(5) Corucci, F., Cheney, N., Giorgio-Serchi, F., Bongard, J., & Laschi, C. (2018). Evolving soft locomotion in aquatic and terrestrial environments: Effects of material properties and environmental transitions. *Soft Robotics*, *5*(4), 475–495

(4) Cheney, N., Bongard, J., SunSpiral, V., & Lipson, H. (2018). Scalable co-optimization of morphology and control in embodied machines. *Journal of The Royal Society Interface*, *15*(143), 20170937

(3) Lehman, J., Clune, J., Misevic, D., Adami, C., Altenberg, L., Beaulieu, J., Bentley, P. J., Bernard, S., Beslon, G., Bryson, D. M., Chrabaszcz, P., Cheney, N., Cully, A., Doncieux, S., Dyer, F. C., Ellefsen, K. O., Feldt, R., Fischer, S., Forrest, S., ... Yosinksi, J. (2020). The surprising creativity of digital evolution: A collection of anecdotes from the evolutionary computation and artificial life research communities. *Artificial Life*, *26*(2), 274–306

(2) Corucci, F., Cheney, N., Kriegman, S., Bongard, J., & Laschi, C. (2017). Evolutionary developmental soft robotics as a framework to study intelligence and adaptive behavior in animals and plants. *Frontiers in Robotics and AI*, *4*, 34

(1) Cheney, N., & Lipson, H. (2016). Topological evolution for embodied cellular automata. *Theoretical Computer Science*, *633*, 19–27

Peer-Reviewed Conference Publications

(30) Beaulieu, S., Clune, J., & Cheney, N. (2023). Continual learning under domain transfer with sparse synaptic bursting. *AutoML Conference Workshop*

(29) Meyer-Lee, G., & Cheney, N. (2023a). Evaluating supernets for neural architecture search. *AutoML Conference Workshop*

(28) Meyer-Lee, G., & Cheney, N. (2023b). On the selection of neural architectures from a supernet. *AutoML Conference Workshop*

(27) Frati, L., Traft, N., & Cheney, N. (2023). Omnimage: Evolving 1k image cliques for few-shot learning. *Proceedings of the Genetic and Evolutionary Computation Conference*, 476–484

(26) Mertan, A., & Cheney, N. (2023). Modular controllers facilitate the co-optimization of morphology and control in soft robots. *Proceedings of the Genetic and Evolutionary Computation Conference*, 174–183

(25) Dean, J., & Cheney, N. (2023). Many-objective optimization via voting for elites. *Proceedings of the Genetic and Evolutionary Computation Conference Companion*, 131–134

(24) Petak, C., Frati, L., Pespeni, M. H., & Cheney, N. (2023). Coping with seasons: Evolutionary dynamics of gene networks in a changing environment. *Proceedings of the Genetic and Evolutionary Computation Conference Companion*, 163–166

(23) Chawla, A., & Cheney, N. (2023). Neighbor-hop mutation for genetic algorithm in influence maximization. *Proceedings of the Genetic and Evolutionary Computation Conference Companion*, 187–190

(22) Thompson, W., Friedrichsen, A., Danfroth, C., Dodds, P., & Cheney, N. (2023). Evolving robust facility placements. *Proceedings of the Genetic and Evolutionary Computation Conference Companion*, 775–778

(21) Loftness, B. C., Bernstein, I., McBride, C. A., Cheney, N., McGinnis, E. W., & McGinnis, R. S. (2023). Preterm preeclampsia risk modelling: Examining hemodynamic, biochemical, and biophysical markers prior to pregnancy. *Proceedings of the IEEE Engineering in Medicine and Biology Society Conference*

(20) Loftness, B. C., Rizzo, D. M., Halvorson-Phelan, J., O'Leary, A., Lunna, S., Bradshaw, C., Brown, A.-J., Cheney, N., McGinnis, E. W., & McGinnis, R. S. (2023). Toward digital phenotypes of early childhood mental health via unsupervised and supervised machine learning. *Proceedings of the IEEE Engineering in Medicine and Biology Society Conference*

(19) Loftness, B. C., Halvorson-Phelan, J., O'Leary, A., Bradshaw, C., Prytherch, S., Torous, J., Copeland, W. L., Cheney, N., McGinnis, R., & McGinnis, E. (2023). The champ app: A scalable mhealth technology for detecting digital phenotypes of early childhood mental health. *Proceedings of the IEEE Engineering in Medicine and Biology Society Conference*

(18) Loftness, B. C., Halvorson-Phelan, J., O'Leary, A., Cheney, N., McGinnis, E. W., & McGinnis, R. S. (2022). Uvm kid study: Identifying multimodal features and optimizing wearable instrumentation to detect child anxiety. *2022 44th Annual International Conference of the IEEE Engineering in Medicine & Biology Society*, 1141–1144

(17) Merrill, S. C., Bucini, G., Clark, E. M., Koliba, C. J., Trinity, L., Zia, A., Langle-Chimal, O., Cheney, N., Shrum, T. R., Sellnow, T. L., Sellnow, D. D., & Smith, J. M. (2021). Why we need to account for human behavior and decision-making to effectively model the non-linear dynamics of livestock disease

(16) Meyer-Lee, G., & Cheney, N. (2020). Towards an understanding of stochastic differentiable neural architecture search. *ICLR Workshop on Neural Architecture Search*

(15) Beaulieu, S., Frati, L., Miconi, T., Lehman, J., Stanley, K. O., Clune, J., & Cheney, N. (2020). Learning to continually learn. *Proceedings of the 2020 European Conference on Artificial Intelligence*, 992–1001

(14) Powers, J., Grindle, R., Kriegman, S., Frati, L., Cheney, N., & Bongard, J. (2020). Morphology dictates learnability in neural controllers. *The 2020 Conference on Artificial Life*

(13) Wolf, S., Cooley, R., Borowczak, M., & Cheney, N. (2018). Evo-schirp: Evolved secure swarm communications. *2018 IEEE International Smart Cities Conference*, 1–4

(12) Kriegman, S., Cheney, N., Corucci, F., & Bongard, J. C. (2018). Interoceptive robustness through environment-mediated morphological development. *Proceedings of the Genetic and Evolutionary Computation Conference*, 109–116

(11) Bongard, J., Cheney, N., Mahoor, Z., & Powers, J. (2018). The role of embodiment in open-ended evolution. *OOE3: The Third Workshop on Open-Ended Evolution*

(10) Kriegman, S., Cappelle, C., Corucci, F., Bernatskiy, A., Cheney, N., & Bongard, J. C. (2017). Simulating the evolution of soft and rigid-body robots. *Proceedings of the Genetic and Evolutionary Computation Conference Companion*, 1117–1120

(9) Kriegman, S., Cheney, N., Corucci, F., & Bongard, J. C. (2017). A minimal developmental model can increase evolvability in soft robots. *Proceedings of the Genetic and Evolutionary Computation Conference*, 131–138

(8) Stanley, K. O., Cheney, N., & Soros, L. (2016). How the strictness of the minimal criterion impacts open-ended evolution. *Artificial Life Conference Proceedings*, 208–215

(7) Cheney, N., Bongard, J., Sunspiral, V., & Lipson, H. (2016). On the difficulty of co-optimizing morphology and control in evolved virtual creatures. *Artificial Life Conference Proceedings*, 226–233

(6) Corucci, F., Cheney, N., Lipson, H., Laschi, C., & Bongard, J. (2016). Material properties affect evolutions ability to exploit morphological computation in growing soft-bodied creatures. *ALIFE 2016, the Fifteenth International Conference on the Synthesis and Simulation of Living Systems*, 234–241

(5) Corucci, F., Cheney, N., Lipson, H., & Laschi, C. (2016). Evolving swimming soft-bodied creatures. *ALIFE XV, The Fifteenth International Conference on the Synthesis and Simulation of Living Systems, Late Breaking Proceedings*, *6*

(4) Cheney, N., Bongard, J., & Lipson, H. (2015). Evolving soft robots in tight spaces. *Proceedings of the 2015 annual conference on Genetic and Evolutionary Computation*, 935–942

(3) Cheney, N., Ritz, E., & Lipson, H. (2014). Automated vibrational design and natural frequency tuning of multi-material structures. *Proceedings of the 2014 Annual Conference on Genetic and Evolutionary Computation*, 1079–1086

(2) Cheney, N., Clune, J., & Lipson, H. (2014). Evolved electrophysiological soft robots. *Artificial life conference proceedings*, 222–229

(1) Cheney, N., MacCurdy, R., Clune, J., & Lipson, H. (2013). Unshackling evolution: Evolving soft robots with multiple materials and a powerful generative encoding. *Proceedings of the 15th annual conference on Genetic and evolutionary computation*, 167–174

Preprints and Non-Peer-Reviewed Publications

(8) Minot, J. R., Maier, M., Demarest, B., Cheney, N., Danforth, C. M., Dodds, P. S., & Frank, M. R. (2023). The resume paradox: Greater language differences, smaller pay gaps. *arXiv preprint arXiv:2307.08580*

(7) Langle-Chimal, O. D., Merril, S. C., Clark, E. M., Bucini, G., Liu, T.-L., Shrum, T. R., Koliba, C., Zia, A., Smith, J. M., & Cheney, N. (2023). Behavioral patterns in a disease spreading simulation. *arXiv preprint arXiv:2305.16600*

(6) Beaulieu, S. L., Clune, J., & Cheney, N. (2021). Continual learning under domain transfer with sparse synaptic bursting. *arXiv preprint arXiv:2108.12056*

(5) Clark, E. M., Merrill, S. C., Trinity, L., Bucini, G., Cheney, N., Langle-Chimal, O., Shrum, T., Koliba, C., Zia, A., & Smith, J. M. (2019). Using digital field experiments to elicit risk mitigation behavioral strategies for disease management across agricultural production systems. *arXiv preprint arXiv:1909.12905*

(4) Cheney, N., Schrimpf, M., & Kreiman, G. (2017). On the robustness of convolutional neural networks to internal architecture and weight perturbations. *arXiv preprint arXiv:1703.08245*

(3) Cheney, N. (2017). *Automated design of embodied machines: Optimization algorithms for soft robot morphologies and behaviors* (Doctoral dissertation). Cornell University

(2) Cheney, N., Clune, J., Yosinski, J., & Lipson, H. (2013). Hands-free evolution of 3d-printable objects via eye tracking. *arXiv preprint arXiv:1304.4889*

(1) Celis, S., Cheney, N., Eppstein, M., Benson, B., & Spector, P. (2012). Ablation of multi-wavelet reentry: Agreement between an evolutionary computational and a conceptually guided strategy

Contributed Abstracts and Talks

(21) Donath, E., Hébert-Dufresne, L., & Cheney, N. (2023). A NLP pipeline to automatically predict human behavioral responses to viral epidemics like Ebola. Machine Learning for Healthcare.

(20) Masquelin, A., Cheney, N., Bates, J. & Kinsey, C.M. (2023). Image Reconstruction of Pulmonary Nodules to Interrogate Deep Neural Networks Using Masked Autoencoders. American Thoracic Society International Conference.

(19) Zia, A., Clark, E., Bucini, G., Baye, R., Merrill. S., Turnbull, S., Koliba, C., Cheney, N., Hebert-Dufresne, L., & Smith, J. (2023). Discovering Leverage Points for Enhancing Biosecurity in Swine Production Networks Using Agent Based Models. Conference on Research Workers in Animal Disease.

(18) Masquelin, A., Cheney, N., Bates, J. & Kinsey, C.M. (2022). Looking at the Negative-Using False Positives to Learn How Deep Neural Nets Classify Lung Cancer in CT Images. American Thoracic Society International Conference.

(17) Merrill, S. C., Clark, E., Bucini, G., Koliba, C., Trinity, L., Cheney, N., Langle-Chimal, O. D., Sellnow, T., Sellnow, D., Zia, A., Shrum, T., & Smith J. M. (2021). Why we need to account for human behavior and decision-making to effectively model the non-linear dynamics of livestock disease. International Crisis and Risk Communication conference.

(16) Masquelin, A., Cheney, N., Bates, J. & Kinsey, C.M. (2021). Learning the Surrounding-Parenchymal Features Improve Lung Cancer Classification. American Thoracic Society International Conference.

(15) Clark, E., Zia, A., Cheney, N., Shrum, T., Trinity, L., Koliba, C., Langle-Chimal, O., Merrill. S., Bucini, G., & Smith, J. (2021). Linking experimental games with agent based models to quantify agricultural outbreak dynamics. Conference on Research Workers in Animal Disease.

(14) Zia, A., Trinity, L., Shrum, T., Sellnow, T., Sellnow, D., Langle-Chimal, O., Koliba, C., Clark, E., Cheney, N., Bucini, G., Merrill. S., & Smith, J. (2021). Linking experimental games with agent based models to quantify agricultural outbreak dynamics. Conference on Research Workers in Animal Disease.

(13) Koretsky, M. J., Brovman, E. Y., Urman, R. D., Tsai, M. H., & Cheney, N. (2021). A machine learning approach to predicting early and late postoperative reintubation. American Association of Clinical Directors Perioperative Leadership Summit.

(12) Merrill, S. C., Clark, E., Bucini, G., Koliba, C., Trinity, L., Cheney, N., Langle-Chimal, O. D., Sellnow, T., Sellnow, D., Zia, A., Shrum, T., Beattie, R., Urbani, J., Wiltshire, S., & Smith J. M. (2020). Systems Approach to Understanding Biosecurity Decision-Making. American Society of Animal Science.

(11) Meyer, B., Tulipani, L., Gurchiek, R. D., Allen, D., Larie, D., Solomon, A., Cheney, N. & McGinnis, R.S. (2020). Deep Learning to Classify Fall Risk from Wearable Accelerometer Data During Standing in Persons with Multiple Sclerosis. The American Society of Biomechanics Annual Meeting.

(10) Smith, J., Bass, T., Bucini, G., Cheney, N., Clark, E., Cummings, J., Getchell, M., Greene, E., Hiney, K., Iverson, J., Kerr, S., Koliba, C., Littlefield, R., Martin, J., McDonald, J., Merill, S., Parker, J., Rankin, J., Schulz, L., Sellnow, D., Sellnow, T., Sero, R., Shrum, T., Tonsor, G., & Zia, A. (2020). Interactions and innovations generate insights for influencing biosecurity adoption in agricultural animal systems. Conference on Research Workers in Animal Disease.

(9) Cheney, N., Mtuke, F., Dominick, T. S., Benoit, M. Y., & Tsai, M. H. (2020). Operating room tardiness following staffing changes at an ambulatory surgical center. American Association of Clinical Directors Perioperative Leadership Summit.

(8) Skrip, L. A., Bedson J., Abramowitz, S., Jalloh, M. B., Bah, S., Jalloh, M. F., Langle, O., Cheney, N., Hébert-Dufresne, L. & Althouse, B. M. (2019). Unmet needs and behavior during the Ebola response in Sierra Leone: a retrospective, mixed-methods analysis of community feedback from the Social Mobilization Action Consortium. The American Society of Tropical Medicine and Hygiene.

(7) Smith, J., Bass, T., Bucini, G., Cheney, N., . . . , Zia, A. (2019). Taking a transdisciplinary approach reveals new insights for protecting food animal health. Conference on Research Workers in Animal Disease.

(6) Langle, O., Cheney, N. (2019). Gamification for Decision Making Analysis. The Latin American Conference on Complex Networks.

(5) Langle, O., Dodds, P., Cheney, N. (2019). Mexico's Resilience in an Earthquake Event. The Latin American Conference on Complex Networks.

(4) Langle, O., Frati, L., Cheney N., Dodds, P. (2019). Computational Mass Migration: Big Data to Understand Mobility. The Latin American Conference on Complex Networks.

(3) Langle, O., Cheney, N. (2019). Mexico's Resilience in an Earthquake Event. NetSci 2019 Satellite: Network Science for Social Good.

(2) Cheney, N. (2015). Automated Creativity: Designing Robots Through Artificial Evolution. TEDx Cornell, Ithaca, NY. **(4% acceptance rate)**

(1) Cheney, N. (2015). Computational Creativity: Harnessing Evolution to Automate Design. Three Minute Thesi Competition, Ithaca, NY (10% acceptance rate)

Invited Talks

2023 Cross Labs Workshop on Creative Embodiment and the Creative Brilliance of Nature (Tokyo, Japan; virtual)

2023 Vermont Biomedical Research Network (Burlington, VT)

2023 University of Maine (Orno, ME; virtual)

2022 Santa Fe Institute Workshop on Embodied, Situated, and Grounded Intelligence (Santa Fe, NM; virtual)

2022 Vanderbilt Machine Learning Seminar Series (Nashville, TN; virtual)

2021 Allen Institute for Artificial Intelligence (Seattle, WA; virtual)

2021 University of California Irvine Cognitive Sciences Colloquium Series (Irvine, CA; virtual)

2021 Synaptic Supercollider (Burlington, VT)

2020 Artificial Life Conference First Proteus Workshop (keynote; Montreal, Canada; virtual)

2020 Army Science Planning and Strategy Meeting, Army Research Laboratory (Los Angeles, CA)

2020 London Machine Learning Meetup (London, England; virtual)

2018 International Conference of Intelligent Robots and Systems (IROS) workshop on Soft Robotic Modeling and Control (Madrid, Spain)

2018 Wyoming Energy Summit (Laramie, WY)
2018 Computer Science Dept, University of Delaware (Newark, DE)
2017 Sentient Technologies (San Francisco, CA)
2016 Tufts University (Medford, MA)
2015 University of New Mexico (Albuquerque, NM)
2015 Santa Fe Institute (Santa Fe, NM)
2014 WorldWide Storefront: Circus for Construction (Ithaca, NY)
2014 Cornell Architecture, Art, and Planning (Ithaca, NY)
2013 Inside Cornell Seminar Series (New York City, NY)

Teaching

University of Vermont (UVM), Univeristy of Wyoming (UW), Cornell Univeristy (CU)

2021– CS/CSYS 352: Evolutionary Computation (UVM)
(teaching eval avg. learning outcome: 4.8/5, instructor effectiveness: 4.9/5)
2020– CS/STAT/CSYS 287: Data Science I (UVM)
(teaching eval avg. learning outcome: 4.2/5, instructor effectiveness: 4.3/5)
2018 Guest Lecturer, CS 228: Human Computer Interactions (UVM)
2017–2018 ECTL Certification in Teaching and Learning, Ellbogen Center for Teaching and Learning (UW)
2018 COCS 4010 – Special Topics in Compute Science: Genetic Algorithms (UW)
2018 COCS 5010 – Graduate Topics in Computer Science: Deep Reinforcement Learning (UW)
2018 COCS 5000 – Seminar in Computer Science (UW)
2018 COSC 4560/5560 – Modern Robotics (UW)
2017 COSC 4550/5550 – Intro to Artificial Intelligence (UW)
2016-2017 Guest Lecturer, CS206: Evolutionary Robotics (UVM)
2014 Co-Lecturer (w/ Hod Lipson), CS5723: Evolutionary Computation (CU)
2013 Guest Lecturer, CS5723: Evolutionary Computation (CU)
2009-2012 Subject Area Tutor, University of Vermont Tutoring Center (UVM)

Entrepreneurship, Licensing, and Commercialization

2023– Spark-VT Award for discovery-to-commercialization, UVM Innovations ($45,000)
2022– Licensed 11 algorithms for remotely monitoring muscle and joint function to Medidata Solutions
2023 Inventor Hall of Fame Award, University of Vermont Invention2Venture
2023 Entrepreneurial Team Collaborator, NSF I-Corps National Program ($50,000 award)
2023 Co-founder, BioBee (research startup on behavioral digital biomarkers for mental health assessment)
2022 Entrepreneurial Team Collaborator, Gotham Innovation Gambit, NSF New York Regional I-Corps Hub ($4,000 award)
2019 Speaker, UVM Center for Biomedical Innovation Project Development Workshop on Rural Delivery of High Quality Health and Wellness
2013 Clune, J., Lipson, H., Yosinski, J., Cheney, N. (2013). U.S. Provisional Patent Application No. 61/892,945. "System and Methods for Eye Tracking in Interactive Evolution of Content"

Service

Discipline:

2015– Reviewer: Nature Machine Intelligence, Trends in Cognitive Sciences, Trends in Neuroscience, Soft Robotics, IEEE Transactions on Evolutionary Computation, IEEE Transactions on Cognitive and Developmental Systems, IEEE Transactions on Cybernetics, International Journal of Robotics Research, Evolutionary Computation, Evolutionary Intelligence, Artificial Life, Theoretical Computer Science, Fluctuation and Noise Letters, Nature Communications, PLOS ONE, IEEE International Conference on Robotics and Automation (ICRA), IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), IEEE RAS International Conference on Soft Robotics (RoboSoft), ACM Special Interest Group on Graphics and Interactive Techniques (SIGGRAPH), IEEE Congress on Evolutionary Computation (CEC), Genetic and Evolutionary Computation Conference (GECCO), Artificial Life Conference (ALife), International Symposium on Robotics Research (ISRR), Living Machines Conference

2019– Panelist: NSF Division of Information and Intelligent Systems (IIS); NSF Division of Electrical, Communications, and Cyber Systems (ECCS); NSF EPSCoR

2020– Program Committee, ALife Conference

2019– Program Committee, GECCO

2022–2023 Associate Editor, Soft Robotics

2020–2021 Special Edition Editor, Frontiers in Robotics

2016–2021 Co-Organizer, GECCO Virtual Creatures Competition

2020 Workshop Co-Organizer, The First Proteus Workshop, Artificial Life Conference

2019 Session Chair, Structure: Machine Learning, NetSci Conference

Outreach:

2021– Faculty Mentor, Essex High School STEM Academy

2019 Invited Speaker, Wake Robin Life Plan Community, Shelburne, VT

2018 Invited Speaker, Mount Mansfield Union High School & Good Shepherd Lutheran Church, Jericho, VT

2017 Invited Speaker, University of Wyoming Lab School

2017 Faculty Mentor and Workshop Instructor, Wyoming Latina Youth Conference, Laramie, WY

2017 Faculty Mentor and Workshop Instructor, American Society of Civil Engineers and Boy Scouts of America, Laramie, WY

2017–2018 Faculty Mentor, Laramie Robotics Club, Laramie, WY

2017 Invited Domain Expert, "The AI Disruption of Work – Educational Responses," Jackson, WY

2017 Invited Domain Expert, "Wyoming Global Technology Summit," Jackson Hole Technology Partnership & Wyoming Governor Matt Mead, Jackson, WY

2017 Invited Domain Expert, "Navigating Economic and Social Change Caused by Disruptive Technologies," Vermont Agency of Commerce and Community Development

2017 Hour of Code Week Volunteer and Speaker, St. Albans City School, St. Albans, VT

2015 Alumni Advisor, ALANA (African, Latino, Asian, Native American) Multicultural Networking Reception, University of Vermont

2014 Hour of Code Week Volunteer and Speaker, Browns River Middle School, Jericho, VT

2014 Cornell SiGMA (Sibley Graduates in Mechanical & Aerospace) Outreach Committee, Cornell University

2014 Speaker, Cornell Women in Engineering Weekend, Ithaca, NY

2013 Instructor, Graduate Women in Science Kid's Science Day, Ithaca, NY

Institutional:

2022– Founding Director, UVM Data Collider

2021– Advisory Board, Vermont Advanced Computing Core

2021– Broadening Participation in Computing Committee

2020– Computer Science Department Graduate Committee
2020– Speaker, Seminar for New Computer Science Majors
2018– Judge, Computer Science Fair
2021–2022 Faculty Search Committee, Department of Nutrition and Food Sciences

Advising and Mentoring

Postdoc Advisor:

2021– Brad Demarest, Postdoc, Computer Science

PhD Advisor:

2023– Nate Gaylinn, PhD, Computer Science (co-advised w/ Josh Bongard)
2022– Jackson Dean, PhD, Complex Systems and Data Science
2022– Neil Traft, PhD, Complex Systems and Data Science
2021– Bryn Loftness, PhD, Complex Systems and Data Science (co-advised w/ Ryan McGinnis)
2021– Jordan Donovan, PhD, Complex Systems and Data Science
2021– Alican Mertan, PhD, Computer Science
2019– Gabriel Meyer-Lee, PhD, Computer Science
2019– Lapo Frati, PhD, Complex Systems and Data Science
2020–2023 Brett Meyer, PhD, Complex Systems and Data Science (co-advised w/ Ryan McGinniss) (next: Senior Data Scientist at Medidata)
2018–2023 Ollin Langle-Chimal, PhD, Complex Systems and Data Science (next: Senior Data Scientist at ThinkMD)
2018–2023 Shawn Beaulieu, PhD, Complex Systems and Data Science (next: Postdoc at Harvard/Tufts/UVM)

MS Advisor:

2021–2023 Denis Hudon, MS, Complex Systems and Data Science

Undergraduate Research Advisor:

2023– Livi Poon, Undergraduate Research, B.A., Computer Science and Neuroscience
2023– Gian Cercena, Honors Thesis, B.S., Data Science (co-advised w/ Scott Merrill)
2022–2023 Ashley Heath, Honors Thesis, B.S., Data Science (next: Intern at Diameter Health)
2019–2020 Jack Felag, Honors Thesis, B.S., Computer Science (co-advised w/ Josh Bongard) (next: PhD student at Binghamton University)
2019–2020 Mathew Koretsky, Honors Thesis, B.S., Data Science (next: Postbac IRTA Researcher at NIH)
2019–2020 Brett Meyer, Honors Thesis, B.S., Biomedical Engineering (co-advised w/ Ryan McGinnis) (next: PhD student at UVM)

PhD Thesis Committee Member/Chair:

2023– Haorui Sun, PhD, Biomedical Engineering
2023– Uyoyo Adeyemo, PhD, Natural Resources
2023– Caitlin Grasso, PhD, Computer Science
2019– Rosaura Chapina, PhD, Environmental Science
2018– Kevin Andrew, PhD, Computer Science
2018–2023 Axel Masquelin, PhD, Biomedical Engineering (core lab member and research mentor on NIH F31/F99/K00 fellowships; next: Postdoc at Brigham and Women's Hospital, Harvard Medical School)
2020-2021 Ali Javed, PhD, Computer Science
2018–2021 Colin Van Oort, PhD, Complex Systems and Data Science

2018-2020 Sam Kriegman, PhD, Computer Science

MS Thesis Committee Member/Chair:

2022–2023 Zack Goldstein, MS, Food Systems
2022–2023 Nicole Donahue, MS, Electrical and Biomedical Engineering
2020–2021 Ryan Grindle, MS, Computer Science
2020–2021 Sarah Pell, MS, Computer Science
2020–2021 Connor Klopfer, MS, Complex Systems and Data Science
2019–2020 Blake Hewgill, MS, Electrical and Biomedical Engineering

Undergraduate Thesis Committee Member/Chair:

2022-2023 Noah Beckage, B.S., Biological Sciences
2020–2021 Aislinn O'Keefe, B.S., Animal Science
2020–2021 Sidhanth Kafley, B.S., Computer Science
2020–2021 Joeseph Wills, B.S., Computer Science
2018–2020 Nathan Tolley, B.S., Computer Science

PhD Studies Committee Member:

2022–2023 Jonathan St-Onge, PhD, Complex Systems and Data Science
2022–2023 Sam Rosenblat, PhD, Complex Systems and Data Science
2021–2022 Juniper Lovato, PhD, Complex Systems and Data Science
2021–2022 Atoosa Parsa, PhD, Computer Science
2021–2022 Ijaz Ul Haq, PhD, Computer Science
2021–2022 Amanda Bertschinger, PhD, Computer Science
2020–2021 Maike Holthuijzen, PhD, Complex Systems and Data Science
2020–2021 Fayha Almutairy, PhD, Computer Science

Media Coverage

2013– The New Yorker, Wired, TED, New Scientist, Popular Science, Discover Magazine, NBC News, Discovery Channel News, Foreign Affairs, The Next Web, Live Science, Yahoo News, IEEE Spectrum, Buzzfeed, DVICE, Digg, Tech News Daily, Science Daily, International Business Times, Communications of the ACM, National Science, Foundation, Red Orbit, PhysOrg, io9, Biotechnologia.pl, Cornell Chronicle, Cornell Daily Sun

Social Media (front page articles): HackerNews, Slashdot, Reddit

Scientific Communication Visualizations: YouTube/Twitter (over 1,000,000 views)

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