

Morgan Leigh Turner, PhD

Postdoctoral Associate & CRA/CCC/NSF Computing Innovation Fellow
Department of Computer Science and Engineering | University of Minnesota
turnerm@umn.edu | morganlturner.com

EDUCATION

- 2020 Ph.D. Ecology & Evolutionary Biology, Brown University
"Internal and external foot kinematics at the animal-substrate interface"
- 2018 Sc.M. Ecology & Evolutionary Biology, Brown University
- 2013 B.A. Biological Anthropology, Paleobiology minor, University of Washington, Seattle

PROFESSIONAL APPOINTMENTS

- 2021 - 2023 Postdoctoral Associate & CRA/CCC/NSF Computing Innovation Fellow, Dept. Computer Science & Engineering, University of Minnesota

HONORS and AWARDS

- 2021 Leadership Development Grant, Office of Postdoctoral Initiatives, University of Minnesota \$500
- 2020 Society of Integrative and Comparative Biology Grant in Aid for Research: "The impact of interdigital substrate flow on theropod dinosaur footprint diversity" \$706
- 2019 Brown EEB Doctoral Dissertation Enhancement Grant: "Postural Grades and Foot Function Gradients in Archosaurs" \$12,343
- 2018 IEEE VIS (Visual analytics science and technology, Information visualization, Scientific visualization) Best Poster Award: "Developing Virtual Reality Visualizations of Dinosaur Track Creation with Scientific Sketching"
- 2016 NSF Graduate Research Fellowship Program Honorable Mention

PEER-REVIEWED PUBLICATIONS

Published

- Cieri RL, **Turner ML**, Novotny J, Tveite J, Gatesy SM, Falkingham PL, Laidlaw DH, Kirk AM, Kaplan H, Carney RM, Jensen B, Moorman AFM, Wang T, Schultz JT, Howell M, Cruz C, Smith A, Gerichs W, Lian Y, Engel B, Farmer C. (Accepted) Virtual and Augmented Reality: new tools for visualizing, analyzing, and communicating complex morphology. *Journal of Morphology*.
- Turner ML** and Gatesy SM. (2021). Alligators employ intermetatarsal reconfiguration to modulate plantigrade ground contact. *The Journal of Experimental Biology*. 224, jeb242240.
<https://doi.org/10.1242/jeb.242240>
- Falkingham PL, **Turner ML**, Gatesy SM. (2020). Constructing and testing hypotheses of dinosaur foot motions from fossil tracks using digitization and simulation. *Palaeontology*. <https://doi.org/10.1111/pala.12502>
- Turner ML**, Falkingham PL, Gatesy SM. (2020). It's in the loop: shared subsurface foot kinematics in birds and other dinosaurs shed light on a new dimension of fossil track diversity. *Biology Letters*. 16: 20200309. <http://dx.doi.org/10.1098/rsbl.2020.0309>
- Tsai HP, **Turner ML**, Manafzadeh AR, Gatesy SM. (2020). Contrast-enhanced XROMM reveals in vivo soft tissue interactions in the hip of *Alligator mississippiensis*. *Journal of Anatomy*. 236(2), 288-304.
<https://doi.org/10.1111/joa.13101>
- Novotny J, Tveite J, **Turner ML**, Gatesy SM, Drury F, Falkingham P, Laidlaw DH. (2019). Developing Virtual Reality Visualizations for Unsteady Flow Analysis of Dinosaur Track Formation using Scientific Sketching. *IEEE Transactions on Visualization and Computer Graphics*. 25(5): 2145-2154.
<https://doi.org/10.1109/TVCG.2019.2898796>

- Farlow JO, Robinson NJ, **Turner ML**, Black J, Gatesy SM. (2018). Footfall Pattern of a Bottom-Walking Crocodile (*Crocodylus acutus*). *Palaios* 33(9):406-413. <https://doi.org/10.2110/palo.2018.037>
- Turner ML** and Sidor CA. (2017). Pathology in a Permian Parareptile: Congenital Malformation of Sacral Vertebrae. *Journal of Zoology*. <https://doi.org/10.1111/jzo.12519>
- Turner ML**, Tsuji LA, Ide O, Sidor CA. (2015). The vertebrate fauna of the Upper Permian of Niger—IX. The appendicular skeleton of *Bunostegos akokanensis* (Parareptilia: Pareiasauria). *Journal of Vertebrate Paleontology* 35, e994746. <https://doi.org/10.1080/02724634.2014.994746>

PRESENTATIONS

Invited Seminars

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| 2021, June | Bell Museum of Natural History Endotherm Researchers Meeting |
| 2020, Dec | DinoFest Jurassic Roadshow |
| 2020, July | Beneski Museum of Natural History and Culture |
| 2019, Nov | Burke Museum of Natural History and Culture |
| 2019, Oct | CCV-Con, Center for Computation and Visualization, Brown University |
| 2019, Feb | Ecology and Evolutionary Ecology Brown Bag Seminar, Brown University |
| 2018, Sept | Ecology and Evolutionary Ecology Brown Bag Seminar, Brown University |
| 2018, Jan | Initiative to Maximize Student Development, Brown University |
| 2017, April | Scientific Visualization Group, Department of Computer Science, Brown University |
| 2016, Feb | Ecology and Evolutionary Ecology Brown Bag Seminar, Brown University |

Panels

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| 2021, Nov | Panel Organizer, Navigating Interdisciplinary Careers in Visualization, IEEE VIS |
| 2021, June | Panelist, Careers in Biomechanics, International Women in Biomechanics |
| 2017, April | Panelist, Wheaton College Summit for Women in STEM |

Workshops

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| 2021, Aug | Animation Guest Instructor, Unity for the Interactive Visualization Lab Workshop series |
| 2019, July | Virtual Morphology (VirtMorph) symposium, International Congress of Vertebrate Morphology conference, Prague, Czechia |

Invited and Contributed Conference Presentations

*invited symposium presentation †undergraduate mentee

- †Deibert C, **Turner ML**, and Keefe DF (2021). An exploratory visualization tool for linking 2D and 3D biomechanical motion data. *REU Virtual Poster Symposium*.
- Turner ML** and Gatesy SM (2021). Intermetatarsal mobility in the American alligator. *Society of Integrative and Comparative Biology Annual Meeting [virtual]*.
- Capano JG, Kaczmarek EB, Lomax JJ, **Turner ML**, Brainerd EL, and Ryerson WG. Reticulated pythons roll their hemimandibles and splay their quadrates to engulf enormous prey. *Society of Integrative and Comparative Biology Annual Meeting [virtual]*.
- Turner ML** and Gatesy SM (2020). Intermetatarsal mobility and grades of foot contact in the American alligator: building a new perspective on archosaurian foot evolution. *Society of Vertebrate Paleontology Annual Meeting [virtual]*.
- Gatesy SM and **Turner ML** (2020). Dinosaurs in disguise: substrate flow accounts for unusual Early Jurassic tracks. *Society of Vertebrate Paleontology Annual Meeting [virtual]*.
- Turner ML** and Gatesy SM. (2020). Looking inside the sole: intermetatarsal mobility in the American alligator. *Society of Integrative and Comparative Biology Annual Meeting*.

- Capano JG, Brainerd EL, **Turner ML**, Ryerson WG. (2019). Cranial Kinesis During Prey Ingestion in the Reticulated Python. *Northeastern Regional Meeting of the Society of Integrative and Comparative Biology Division of Vertebrate Morphology and Comparative Biomechanics*.
- ***Turner ML**, Novotny J, Falkingham PL, Laidlaw DH, Gatesy SM. (2019). Where does footprint morphology come from? Developing virtual reality visualizations for exploring dinosaur track formation. *International Congress of Vertebrate Morphology*. (Invited symposium talk).
- Falkingham PL, **Turner ML**, Gatesy SM. (2019). Generating and Testing Hypotheses of Dinosaur Foot Motions Using 3D-Digitized Tracks and Large-Scale Granular Simulations. *International Congress of Vertebrate Morphology*.
- Novotny J, Tveite JJ, **Turner ML**, Gatesy SM, Falkingham PL, Laidlaw, DH. (2018). Developing a Virtual Reality Application for Unsteady Flow Analysis in Dinosaur Track Creation. IEEE VIS (Visual analytics science and technology, Information visualization, Scientific visualization). (Best Poster Award)
- ***Turner ML**, Falkingham PL, Gatesy SM. (2018). Where does footprint morphology come from? Integrating 3D methods for exploring dinosaur track formation. *Society of Vertebrate Paleontology Annual Meeting*. (Invited symposium talk).
- Tsai HP, **Turner ML**, Manafzadeh AR, Gatesy SM. (2018). Contrast-enhanced XROMM reveals in vivo soft tissue interaction in the hip of Alligator mississippiensis: implications for pseudosuchia. *Society of Vertebrate Paleontology Annual Meeting*.
- Farlow JO, Robinson NJ, **Turner ML**, Black J, Gatesy SM. (2018). Footfall Pattern of a Bottom-Walking Crocodile (*Crocodylus acutus*). *Society of Vertebrate Paleontology Annual Meeting*.
- Turner ML**, Gatesy SM. (2018). Intra-foot kinematics of the American alligator. *Northeastern Regional Meeting of the Society of Integrative and Comparative Biology Division of Vertebrate Morphology and Comparative Biomechanics*.
- Turner ML**, Falkingham PL, Gatesy SM. (2018). Avian subsurface foot kinematics on deformable substrates. *Society for Integrative and Comparative Biology Annual Meeting*.
- Gatesy SM, **Turner ML**, Falkingham, PL. (2018). CT Imaging of Dinosaur Footprints: Hidden Topography and the Origin of Track Diversity. *Society for Integrative and Comparative Biology Annual Meeting*.
- Napoli JG, Tsai HP, **Turner ML**, Manafzadeh AR, Gatesy SM. (2018). In- and Ex-Vivo Analysis of the Kinematics and Function of the Tendon of Sutton in Alligator mississippiensis. *Society for Integrative and Comparative Biology Annual Meeting*.
- Tsai HP, **Turner ML**, Manafzadeh AR, Gatesy SM. (2018). Significance of hip kinematics for interpreting articular soft tissue function in Alligator mississippiensis. *Society for Integrative and Comparative Biology Annual Meeting*.
- Turner ML**, Falkingham PL, Gatesy SM. (2017). Sub-Surface Foot-Trajectories and Fossil Dinosaur Tracks. *Last Days of Pangea Triassic-Jurassic Research Symposium*.
- Tsai HP, **Turner ML**, Manafzadeh AR, Gatesy SM. (2017). Significance of hip kinematics for interpreting articular soft tissue function in Alligator mississippiensis: evolutionary and biomechanical implications for Saurischia. *Last Days of Pangea Triassic-Jurassic Research Symposium*.
- Turner ML**, Falkingham PL, Gatesy SM. (2016). The morphology of motion in sub-surface foot trajectories and fossil dinosaur tracks. *Northeastern Regional Meeting of the Society of Integrative and Comparative Biology Division of Vertebrate Morphology and Comparative Biomechanics*.
- Tsai HP, **Turner ML**, Manafzadeh AR, Gatesy SM. (2016). Hip joint kinematics of Alligator mississippiensis: Significance of articular soft tissues for interpreting hind limb function. *Northeastern Regional Meeting of the Society of Integrative and Comparative Biology Division of Vertebrate Morphology and Comparative Biomechanics*.
- Turner ML**, Falkingham PL, Gatesy SM. (2016). The morphology of motion in sub-surface foot trajectories and fossil dinosaur tracks. *Society of Vertebrate Paleontology Annual Meeting*.

- Turner ML, Falkingham PL, Gatesy SM. (2016). The morphology of motion: sub-surface foot trajectories and fossil tracks. *International Congress of Vertebrate Morphology*.
- Turner ML, Sidor CA, Tsuji LA. (2015). Removing assumptions of anatomical orientation from cladistic characters: an example from pareiasaurs. *Society of Vertebrate Paleontology Annual Meeting*.
- Turner ML, Tsuji LA, Sidor CA. (2014). Evidence for the earliest evolution of a fully parasagittal quadruped. *Society of Vertebrate Paleontology Annual Meeting*.
- Turner ML, Tsuji LA, Sidor CA. (2013). The Ontogeny of the Scapulocoracoid of the Pareiasaur *Bunostegos akokanensis* (Amniota: Parareptilia) from the Permian of Niger. *Undergraduate Research Symposium, University of Washington*.

TEACHING and MENTORSHIP

Teaching

- F18 / S19 Special Projects TA: BIOL3644/3655: Human Anatomy I/II, Warren Alpert Medical School
- F17 / S18 TA: BIOL3644/3655: Human Anatomy I/II, Warren Alpert Medical School
- F16 / S17 TA: BIOL3644/3655: Human Anatomy I/II, Warren Alpert Medical School
- F15 / F17 Guest Lecturer and Science Contributor: CSC11370/ ILLUS3340: Virtual Reality Design for Science, Brown University + Rhode Island School of Design
- S 14 Peer TA: BIOL 443: Evolution of Mammals and their Ancestors, University of Washington
- F 13 Peer TA: BIOL 453: Comparative Anatomy of Vertebrates, University of Washington

Undergraduate Student Mentorship

- 2021 - present Kevin Bradt. University of Minnesota. Project: linked 2D-3D biomechanics visualizations
- 2021 - 2021 Cheyenne Deibert. Vanderbilt University. Project: linked 2D-3D biomechanics visualizations
- 2018 - 2019 Eli Mitnik, Brown University. Project: track indenter experiments and analysis in R

RESEARCH EXPERIENCE (selected)

- 2015 - 2021 Custom interface and visualization development for skeletal animation data
- 2015 - 2021 Computed Tomography (CT) bone model making, animation, anatomical coordinate systems
- 2015 - 2020 Live animal handling, training, surgery (alligator, boa constrictor, human, tegu, python)
- 2015 - 2020 Operator of Keck X-ray Reconstruction of Moving Morphology (XROMM)
- 2015 - 2019 Virtual Reality application and interface development with scientific visualization collaborators
- 2012 - 2015 Fossil specimen description, systematics, pathology

SERVICE

Institutional

- 2021 - present Inclusiveness, Diversity, Equity, and Advocacy Committee, Dept. of Computer Science & Engineering, Univ. of Minn.
- 2021 - present Diversity Equity and Inclusion Alliance, College of Science and Engineering, Univ. of Minn.
- 2018 - 2020 Vice President, Ecology and Evolutionary Biology Grad Student Association, Brown Univ.
- 2017 Graduate Student Council Representative, Brown University

Community Outreach

Museums + General Public

- 2019-2020 Custom museum exhibit and website on fossil dinosaur track formation created for permanent display at the Beneski Museum of Natural History at Amherst College, MA
- 2014 "Dinosaurs and Cavemen" Dept. of Pathology and Anatomical Sciences, Univ. of Missouri
- 2014 "Behind the Scenes Night" Burke Museum of Natural History and Culture

2012 - 2015 "Dino Day" Burke Museum of Natural History and Culture

Elementary School

2019 - 2020 "Brown Junior Researcher Program" Francis J Varieur Elementary, Pawtucket, RI
2017 - 2018 "Brown Junior Researcher Program" Boys and Girls Club, East Providence, RI

High School

2019 Judge, Rhode Island Science and Engineering Fair, Warwick, RI
2018 Scientist Guest, Wild Ones, Providence, RI
2018 Virtual Reality demonstrations, Brown University, RI

Manuscript Review

Anatomical Record, Frontiers in Zoology, IEEE VIS, Integrative and Organismal Biology, Zoological Journal of the Linnean Society

ADDITIONAL EDUCATION

Certificates

2020 Course Design, Sheridan Center for Teaching and Learning, Brown University
2017 Reflective Teaching, Sheridan Center for Teaching and Learning, Brown University
2013 Natural Science Illustration, School Prof. and Cont. Education, University of Washington

Non-degree-bearing tertiary education

2021 Columbia University: Python Data Wrangling Boot Camp
2009, 2012 Gage Academy of Art: Forensic Art for Fine Artists; Drawing from Observation
2009 – 2010 Bellevue College: High School Running Start Program, 3.90 GPA, Dean's List

MUSEUM and ILLUSTRATION POSITIONS

2014 - 2016 Cartographer, African Safari Company
2014 - 2015 Casting and Molding Technician, Burke Museum of Natural History and Culture
2014 Artist in Residence, John Day Fossil Beds National Monument, Oregon
2013 - 2016 Scientific Illustrator, Biology Department and Burke Museum of Natural History and Culture
2012 - 2015 Research Assistant (Dr. Christian Sidor, Dr. Linda Tsuji), University of Washington
2009 - 2012 Volunteer Fossil Preparator, Burke Museum of Natural History and Culture

SCIENCE x ART shows

2017, May "Discover: A Conversation Between Art and Science," Rhode Island School of Design and Brown Collaboration Show
2016, Nov "Art of Science" Exhibition, Brown University
2013, May Natural Science Illustration Portfolio Show, Burke Museum of Natural History and Culture

SKILLS

Imaging Techniques X-ray operator for XROMM and CT; high-speed videography
Software Adobe Photoshop, Adobe Illustrator, Amira, Arduino IDE, Autodesk Maya, Findex CT software, GeoMagic, Git, MakerWare by MakerBot, MatchMover, Paraview, Phantom Camera Control, Adobe Premiere Pro, Tinkercad, Unity, XMA Lab
Computer Languages Proficient: Maya Embedded Language (MEL), R
Familiar: C++, Processing, Python

Practical

3D printing, animal husbandry and handling, casting and molding, dissection, experimental design, fossil preparation, IACUC protocols, instrumentation, interaction design, survival animal surgery

AFFILIATIONS

International Women in Biomechanics (2020-present)

International Society of Vertebrate Morphology (2016-present)

Society for Integrative and Comparative Biology (2015-present)

Society of Vertebrate Paleontology (2014-present)