

Curriculum Vitae of Pranav C. Khandelwal

Presidential Postdoctoral Fellow, Virginia Tech, USA
Guest Scientist, Institute of Flight Mechanics and Controls, University of Stuttgart, Germany

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Academic positions

2024-now **Presidential Postdoctoral Fellow**
Department of Mechanical Engineering, Virginia Tech, USA
Advisor(s): Dr. Jake Socha, [Organismal biomechanics & bio-inspired engineering](#)
Dr. Shane Ross, [Dynamics Lab](#)

Guest Scientist
Institute of Flight Mechanics and Controls, University of Stuttgart, Germany
Advisor: Dr. Aamir Ahmad, [Flight Robotics and Perception Group](#)

2023-2024 **Postdoctoral Researcher**
Institute of Flight Mechanics and Controls, University of Stuttgart, Germany
Advisor: Dr. Aamir Ahmad, [Flight Robotics and Perception Group](#)

Guest Scientist
Max Planck Institute for Intelligent Systems, Tübingen, Germany
[Perceiving Systems Department](#)

2021-2023 **Postdoctoral Researcher**
Max Planck Institute for Intelligent Systems, Stuttgart, Germany
Advisor: Dr. Ardian Jusufi, [Locomotion in Biorobotic and Somatic Systems](#)

2021-now **Research Collaborator**
University of North Carolina at Chapel Hill, USA

2021 **PhD in Biology**
Biology Department, University of North Carolina at Chapel Hill, USA
Dissertation: How do animals glide in their natural habitat? A holistic approach using the flying lizard *Draco dussumieri*
Advisor: Dr. Tyson L. Hedrick, [Comparative Biomechanics Lab](#)

2013-14 **Junior Research Fellow**
Mechanical Engineering, Indian Institute of Science, India
Advisor: Dr. Namrata Gundiah, [Biomechanics Lab](#)

2013 **Masters in Physics with a minor in Biology**
Indian Institute of Science Education and Research, Trivandrum, India (IISER)
Thesis: A characterizational study of doped PEDOT:PSS as viable tissue engineered and optoelectronic constructs
Advisor(s): Dr. Manoj A. G. Namboothiry, [MOBEL](#), School of Physics, IISER
Dr. Namrata Gundiah, [Biomechanics Lab](#), Indian Institute of Science

Awards & Fellowships

2024 [Biomimicry Launchpad Program](#) participant, (Biomimicry Institute, USA)

2024 £3,996 – [Institute of Advanced Studies Visiting Fellowship](#) (University of Surrey, UK)

2023 \$160,000 – [Presidential Postdoctoral Fellowship](#) (Virginia Tech, USA)

- 2020 \$5,000 - Gordan W. and Janice L. Plumbee Summer Research Fellowship (UNC Chapel Hill, USA)
- 2019 \$2,500 - Kenan Trust Graduate Student Research Award (UNC Chapel Hill, USA)
- 2016 \$3,737 – 2nd place in [crowdfunding](#) grant challenge
- 2008-13 [INSPIRE fellowship](#), awarded by the Government of India (IISER, India)

Invited Talks

- 2024 Title: Understanding animal movement in the wild: from flying lizards to zebras
Department of Biological Sciences, Virginia Tech, USA
- 2023 Title: How do organisms move in the wild?
Institute of Flight Mechanics and Controls, University of Stuttgart, Germany
- 2021 Title: How do animals glide in their natural habitat?
Centre for the Advanced Study of Collective Behavior, Konstanz, Germany
- 2020 Title: Markerless tracking of animal movement using deep learning
Undergraduate course on deep learning in Biology, UNC Chapel Hill, USA
- 2016 Title: Gliding locomotion in animals
Morehead planetarium family science day event on flight, Chapel Hill, USA

Publications

*indicates corresponding author; †indicates co-first author

Socha, J. J.* & **Khandelwal, P. C.** (2024). Animal locomotion: Wing-like femoral lobes help orchid mantid nymphs glide. [Current Biology, 34, R94–R98](#).

Ross, S. D., Zakaria, M., Socha, J. J., Hedrick, T. L., **Khandelwal, P. C.** (2024). Tail-assisted pitch control in flying lizards. AIAA 2024-2689. [AIAA SCITECH 2024 Forum](#).

Price E.†, **Khandelwal, P. C.**†, Rubenstein D. I., Ahmad, Aamir*. (2024). Accelerated video annotation driven by deep detector and tracker. Robotics and Autonomous Systems (In review). [Biorxiv preprint](#).

Khandelwal, P. C.*, Zakaria, M., Socha, J. J. (2023). A year at the forefront of gliding locomotion. [Biol Open 15 August 2023; 12 \(8\): bio059973](#).

Chellapurath, M.*, **Khandelwal, P. C.**, Schulz, A. K. (2023). Bioinspired robots can foster nature conservation. [Frontiers in Robotics and AI, 10, 1145798](#).

Khandelwal, P. C., Ross, S. D., Dong, H., Socha, J. J.* (2023). Convergence in Gliding Animals: Morphology, Behavior, and Mechanics. [Chapter](#) in Convergent Evolution – Animal Form and Function. Eds V. Bels and A. P. Russel. Springer Link

Khandelwal, P. C.*, & Hedrick, T. L. (2022). Combined effects of body posture and three-dimensional wing shape enable efficient gliding in flying lizards. [Sci Rep 12, 1793 \(2022\)](#).

Chellapurath, M., **Khandelwal, P. C.**, Rottier, T., Schwab, F., & Jusufi, A.* (2022). Morphologically adaptive crash landing on a wall: soft-bodied models of gliding geckos with varying material stiffnesses. [Advanced Intelligent Systems, 2200120](#).

Khandelwal, P. C., & Hedrick, T. L.* (2020). How biomechanics, path planning and sensing enable gliding flight in a natural environment. [Proceedings of the Royal Society B, 287\(1921\), 20192888](#).

Khandelwal, P. C., Agrawal, S. S., Namboothiry, M. A., & Gundiah, N.* (2014). Fabrication of a novel biomaterial with enhanced mechanical and conducting properties. [Journal of Materials Chemistry B, 2\(42\), 7327-7333.](#)

Manuscripts in Preparation

Khandelwal, P. C.[†], Schulz, A.[†], Chellapurath, M.[†], Merker S., Jusufi, A. (2024). Scaly-Tail Organ Enhances Static Stability During the Perching of Pel's Scaly-tailed Flying Squirrel. (target journal: Journal of the Royal Society Interface, submission in September 2024)

Khandelwal, P. C.[†], Zakaria, M.[†], Hedrick, T. L., Socha, J. J., Ross, S. D. (2024). The role of tail during pitch control in the flying lizard *Draco dussumieri*. (target journal: Journal of the Royal Society Interface, submission in November 2024)

Khandelwal, P. C., Siddal, R. (2024). The role of hindlimbs to initiate roll in flying lizards. (target journal: Communications Biology, submission in November 2024)

Khandelwal, P. C., Byrnes, G., Jusufi, A. (2025). Effect of takeoff perturbation during gap crossing in squirrels. (target journal: Journal of Experimental Biology, submission in January 2025)

Published conference abstracts

*indicates undergraduate student mentee; ** indicates presenter

Khandelwal, P. C.**, Price, E., Rubenstein D. I., Ahmad, Aamir. (2024). A framework for fast, large-scale, semi-automatic inference of animal behavior from monocular videos. *Society for Integrative and Comparative Biology Annual Meeting*, Jan 2-6, Seattle, WA, USA.

Khandelwal, P. C.**, Price, E., Rubenstein D. I., Ahmad, Aamir. (2023). Towards large-scale spatio-temporal tracking of animal behavior in the wild. [Spatio-temporal Data Analysis for Wildlife Conservation](#). *ACM SIGSPATIAL International Workshop*, Nov 13, Hamburg, Germany.

Khandelwal, P. C.**, Socha J J., Hedrick, T L., Jusufi, A (2022). The role of tail during reorientation in flying lizards. *Society for Integrative and Comparative Biology Annual Meeting*, Jan 3-7, Phoenix, AZ, USA.

Khandelwal, P. C.**, Hedrick T L (2020). Gliding through clutter – obstacle avoidance and path planning in the flying lizard *Draco dussumieri*. *Society for Integrative and Comparative Biology Annual Meeting*, Jan 3-7, Austin, TX, USA.

Khandelwal, P. C.**, Hedrick T L (2018). Take-off biomechanics in gliding lizards. *Society for Integrative and Comparative Biology Annual Meeting*, Jan 3-7, San Francisco, CA, USA.

Khandelwal, P. C.**, Hedrick, T L (2017). The short and long of gliding. *Society for Integrative and Comparative Biology Annual Meeting*, Jan 4-8, New Orleans, LA, USA.

*Yu, S.**, Khandelwal, P. C., *Gardner, H., Hedrick, T. L. (2017). Continuous aerodynamic pitch perturbation of hawkmoths. *Society for Integrative and Comparative Biology Annual Meeting*, Jan 4-8, New Orleans, LA, USA.

Khandelwal, P. C.**, Evangelista, D., Hedrick, T. L. (2016). The glide of the dragon – glide characterization and performance in *Draco dussumieri*. *Society for Integrative and Comparative Biology Annual Meeting*, Jan 3-7, Portland, OR, USA.

Evangelista, D.**, Khandelwal, P. C., Rader, J., Hedrick, T. L. (2015). Free flight kinematics of massed Chimney Swifts entering a chimney roost at dusk. *Society for Integrative and Comparative Biology Annual Meeting*, Jan 3-7, West Palm Beach, FL, USA.

Journals/Conferences served as manuscript reviewer

Proceedings of the Royal Society B Journal of Experimental Biology PNAS Nexus

Journal of the Royal Society Interface IROS 2024

Open access data

Khandelwal P. C. & Hedrick T. L., (2022). Free-flight kinematics and aerodynamics data on flying lizards. <https://doi.org/10.6084/m9.figshare.16602368>

Khandelwal P. C. & Hedrick T. L., (2020). Kinematic data on freely behaving flying lizards. <https://doi.org/10.5061/dryad.70rxwdbt6>

Contributed grant writing

- 2024 Horizon Europe Framework Program (Biodiversity and ecosystem services), "AlofNature – Intelligent Robotic Systems and Sensor Networks for Large-Scale Biodiversity Monitoring", € 669,9960 (not funded, lead-PI – Dr. Aamir Ahmad)
- 2022 Swiss National Science Foundation, "Soft Paleo-robotics: Recreating Ancient Marine Reptiles' Agile Swimming with Soft Robo-physical Modelling", \$1,000,000 (not funded, co-PI - Dr. Ardian Jusufi)
- 2022 Swiss National Science Foundation, "Versa-Tail: Soft biomimetic Limbs enable agile Locomotion Transitions", \$1,500,000 (not funded, PI - Dr. Ardian Jusufi)
- 2021 European Research Council Starting Grant, "Deciphering how animals achieve robust locomotion using soft robotics.", \$1,500,000 (not funded, PI – Dr. Ardian Jusufi)

Teaching and mentoring experience

- 2024-now **PhD mentor**
Mentoring 1 graduate student with PhD titled 'Biomechanics of foraging behavior in arboreal colubrids'
- 2024 **Undergraduate mentor**
Mentoring 2 students' part of the Research Experience for Undergraduates program at Virginia Tech - Solving problems with Data Science
- 2015-20 **Teaching Instructor** for Introductory lab BIOL 101
Independently conducted the course including lecturing, test making, grading, and experiments. The course consisted of over 60 students each semester
- 2020 **Undergraduate tutor**
Tutored UNC athletes in 100 level Math, Physics, Biology, Computer Science
- 2015-20 **Undergraduate mentor**
Mentored 4 students as part of their Undergraduate research project. The projects were presented at regional and national conferences.

Software for teaching and research

- 2020 **Virtual teaching lab for Biology 101**
Developed [5 interactive apps](#) simulating lab experiments used by ~500 undergraduate students
The apps have allowed instructors to successfully conduct remote labs and students to actively engage and learn experimental design, conduct experiments, and collect data for analysis
- 2020 **Handling images for a Deep Learning toolbox**
An app to quickly transition back and forth between pre-existing annotating video package [DLTdv](#) and deep learning toolbox [DeepLabCut](#). The app functionality can

read video, extract annotated frames, and create datasets for neural network training and refinement

- 2018 **Saving bats! Processing 3D trajectories and kinematics**
A user-friendly app to visualize field recordings of bat flight in the presence of wind turbines. App processes 3D position data and generates kinematic metrics like velocity, acceleration, and track curvature to inform decisions for wind energy facilities to minimize the detrimental effect of wind turbine on bats
- 2017 **Let's measure! Extracting morphometric measurements**
A graphical interface to read images, calibrate them and measure user-defined features
Stores a detailed log of time, pixel location, version, and measurements of user, allowing to check and average out measurement errors across multiple users for the same feature measurement
- 2016 **Assessing student academic performance**
Automated student performance monitoring for a class of ~400 students for the Introductory Biology 101 course
The program routinely gathered assignment/test scores from database and performed analysis to list students with potential grade concerns

Workshops attended

- 2023 [Spatio-temporal Data Analysis for Wildlife Conservation](#)
ACM SIGSPATIAL International Workshop, Hamburg, Germany
- 2022 [Movement academy](#), Technische Universität Darmstadt, Germany
Movement control in humans and animals bringing together researchers from academia, industry, and medical practitioners
- 2020 DeepLabCut workshop, Rowland Institute, Cambridge, USA
Deep learning for markerless tracking of animal pose

Science outreach and community service

- 2022 Guest Scientist for discussion on gliding biomechanics of flying lizards
Undergraduate course on animal biomechanics
Saint Mary's College, Notre Dame, Indiana, USA
- 2021 How Did Animals Inspire Human Flight? - [STEM in 30: Season 8, Episode 4](#)
Smithsonian National Air and Space museum, USA
Contributed field season footage of the lizard *Draco dussumieiri* to showcase gliding flight in flying lizards
- 2020 Science feature for Indian news outlet NDTV Gadgets
Authored an article that candidly talks about the use and challenges of technology for field data collection. The article can be found [here](#)
- 2019 Wild Karnataka [documentary](#), State of Karnataka, India
Part of the research team and supported video recording of flying lizards in the jungle
- 2015-19 Science Expo, UNC Chapel Hill
Discussing insect flight with hawkmoth flight demonstrations for the public
- 2018 Meet a scientist, Science Expo, UNC Chapel Hill
One-on-one interactions with all age groups answering questions on animal locomotion
- 2017 Public outreach through regular updates during 2017 field season
All updates can be accessed [here](#)

- 2016 Darwin Day, North Carolina Museum of Natural Sciences, NC, USA
Discussing insect flight with hawkmoth flight demonstrations for the public
- 2014-20 SEWA International (Non-profit organization), RTP Chapter, USA
In charge of organizing monthly community service activities

Press & Media

- 2024 [YouTube](#) - Animal Behavior Inference from Drone Videos
- 2022 [BNR Dutch news radio interview](#) on flying lizard aerodynamics
- 2020 [Outside JEB](#) – featured article covering flying lizards research work
- 2020 [Endeavors](#) – featured article in the UNC research magazine on flying lizard field work
- 2020 [Crowdfunding campaign](#) - How the dragon glides: the biomechanics of a flying lizard
- 2016 [YouTube](#) – How *Draco* glide in a cluttered environment

Professional affiliations

- 2015-21 Society for Integrative and Comparative Biology ([SICB](#))

Professional service

- 2021-23 PostdocNet election committee member at MPI-IS
- 2022 Division of Animal Behavior poster judge at the SICB national meeting
- 2021 Grassroots grant reviewer. Internal grants at MPI-IS
- 2021 IMPRS PhD program application evaluator for MPI-IS
- 2018 Session co-chair, Flight: Birds, Bats and Gliders, [SICB national meeting](#)
- 2018 Graduate student ambassador, Biology Department, UNC Chapel Hill
- 2017-19 Treasurer and Event Organizer, Badminton Club, UNC Chapel Hill
- 2016-17 Officer and Webmaster, Biology Graduate Student Association, UNC Chapel Hill

Research profiles

- Google Scholar <https://scholar.google.com/citations?user=vFFYrvsAAAAJ&hl=en>
- ORCID <https://orcid.org/0000-0002-0589-4467>
- ResearchGate <https://www.researchgate.net/profile/Pranav-Khandelwal>