

# Dr. Thejasvi Beleyur

POSTDOCTORAL RESEARCHER

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## Work Experience

### DFG Postdoctoral grant holder

DFG WALTER BENJAMIN AWARDEE

*Chair of Biodiversity & Collective Behaviour, Uni Konstanz, Germany*

*Aug 1 2022-current*

### Postdoctoral researcher

EXTENSION CONTRACT FOR CASCB WORK

*Centre for the Advanced Study of Collective Behaviour (CASCB), Konstanz, Germany*

*April 1 2022-June 30 2022*

### Postdoctoral researcher

DEVELOPING ANALYSIS WORKFLOWS TO ANALYSE THE USHICHKA DATASET

*CASCB, Uni Konstanz*

*March 15 2021-March 14 2022*

### Doctoral work on IMPRS contract

MODELLING AND MULTI-SENSOR TRACKING OF FREE-FLYING BAT GROUPS

*Max-Planck Institute for Ornithology, Seewiesen, Germany*

*June 1 2020- Nov 31 2020*

### Doctoral work on DAAD scholarship

MODELLING AND MULTI-SENSOR TRACKING OF FREE-FLYING BAT GROUPS

*Max-Planck Institute for Ornithology, Seewiesen, Germany*

*Sep 1 2015- Feb 28 2020*

### Research assistant and lab manager

SOCIAL SPIDER WEB CONSTRUCTION AND SETTING UP UNDERGRADUATE LABORATORY FACILITIES

*Azim Premji University, Bengaluru, India*

*Aug 1 2014 - July 31 2015*

## Education

### PhD

PHD THESIS: THEORETICAL AND EMPIRICAL INVESTIGATIONS OF ECHOLOCATION IN BAT GROUPS

*University of Konstanz, Germany*

*2015-2021 (Defence: 10th June 2021)*

### BS-MS dual degree in Biological Sciences

MASTERS THESIS: TASK DIFFERENTIATION DURING PREY CAPTURE AND RETREAT-MATE RECOGNITION IN THE INDIAN SOCIAL SPIDER, STEGODYPHUS SARASINORUM (ERESIDAE)

*IISER-Thiruvananthapuram, India*

*2008-2013*

## Awards and grants

### Best Early Career Researcher talk

IBAC 2023

*International Bioacoustics Society conference, Japan, 2023*

*2023*

### Walter Benjamin Position

DFG POSTDOCTORAL GRANT

*Chair of Biodiversity and Collective Behaviour, Uni. Konstanz*

*2022.*

### Young Scholar Fund Award

BRIDGE FELLOWSHIP

*CASCB, Uni. Konstanz*

*2022*

### CASCB Medium Grant

POST DOC GRANT

*CASCB, Uni Konstanz*

*2021-2022*

### IMPRS Bridge Award

AWARD TO WRAP UP PHD

*IMPRS for Organismal Biology*

*June 2020- Nov 2020*

### DAAD-GSSP scholarship

SCHOLARSHIP AWARDED TO PURSUE DOCTORAL STUDIES

*German Academic Exchange Service (DAAD)*

*2015-2020*

## IMPRS best paper award

ANNUAL AWARD GIVEN TO BEST PAPERS SUBMITTED IN THE GRADUATE SCHOOL.

IMPRS for Organismal Biology

2020

## Google Cloud Platform Research Credits

A 1000\$ GRANT THAT PROVIDES ACCESS TO CLOUD COMPUTING RESOURCES TO EXECUTE SIMULATIONS FOR BELEYUR & GOERLITZ 2019

Google Cloud

2019

## IMPRS travel grant

TRAVEL GRANT AWARDED TO ATTEND THE SNAK 2018 ACOUSTICS COURSE IN ODENSE, DENMARK

IMPRS for Organismal Biology

2017

## Publications

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1. Framond, L. de, Beleyur, T., Lewanzik, D., & Goerlitz, H. R. (2023). Calibrated microphone array recordings reveal that a gleaning bat emits low-intensity echolocation calls even in open-space habitat. *Journal of Experimental Biology*. <https://doi.org/10.1242/jeb.245801>
2. Beleyur, T. (2022). beamshapes: A Python package to generate directivity patterns for various sound source models. *Journal of Open Source Software*, 7(69), 3740. <https://doi.org/10.21105/joss.03740>
3. Beleyur, T., Murthy, T. G., Singh, S., Somanathan, H., & Uma, D. (2021). Web architecture, dynamics and silk investment in the social spider *Stegodyphus sarasinorum*. *Animal Behaviour*, 179, 139–146.
4. Beleyur, T., & Goerlitz, H. R. (2019). Modeling active sensing reveals echo detection even in large groups of bats. *Proceedings of the National Academy of Sciences*, 116(52), 26662–26668.
5. Batstone, K., Flood, G., Beleyur, T., Larsson, V., Goerlitz, H. R., Oskarsson, M., & Astroem, K. (2019). Robust self-calibration of constant offset time-difference-of-arrival. *ICASSP 2019-2019 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 4410–4414.
6. Beleyur, T., Bellur, D. U., & Somanathan, H. (2015). Long-term behavioural consistency in prey capture but not in web maintenance in a social spider. *Behavioral Ecology and Sociobiology*, 69(6), 1019–1028.
7. Beleyur, T., Abdul Kareem, V. K., Shaji, A., & Prasad, K. (2013). A mathematical basis for plant patterning derived from physico-chemical phenomena. *Bioessays*, 35(4), 366–376.

## Mentoring

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During the one year I've been at the University of Konstanz, I have co-supervised two student (one Bachelors and one Masters student) in collaboration with Professors Sebastian Goldluecke and Oliver Deussen at the Department of Computer and Information Science:

- *3D Trajectory Reconstruction for Animal Data* by Giray Tandogan. This Masters thesis investigated methods to match 2D tracks from two cameras of animals flying in the field into their corresponding 3D trajectories. Additionally supervised by Hemal Naik.
- *Pose Estimation of Thermal Cameras and Lidar Scan in a Cave Environment* by Julian Jandeleit. This Bachelors project (and now thesis) investigated methods to estimate the location of cameras in a LiDAR scan of a cave. The cameras also recorded portions of the cave surface, though their positions in the cave were unknown.

## Scientific software packages

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I strive to make the code I write for various projects as modular and re-usable as possible while adopting software development best practices. A selection of packages that I've written, along with a short description.

- `beamshapes`: computational implementations of various sound-radiation models. The models can be used to perform predictions for planned experiments, or parameter inference. *Paper hyperlink*. *Online docs hyperlink*
- `itsfm`: segments sounds based on frequency modulation. Various inbuilt and custom measurements can also be performed on the segmented audio. *Preprint hyperlink*. *Online docs hyperlink*
- `tacost`: generates simulated multichannel audio data when given array geometry, sound emission positions and emitted signal. *Preprint hyperlink*. *Online docs hyperlink*
- `batracker` (*under development*): a bat-centric acoustic tracking package developed to handle simple (single-few bats, clean recordings) to complex (multiple bats, overlapping calls, reverberance) datasets using the

latest in signal analysis and tracking algorithms. To my knowledge, this is the first bat-centric open-source package in development. *Online docs hyperlink*

## Technical skills

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- Acoustic and video tracking of animals
- Design, execution and analysis of bioacoustics and animal behaviour experiments
- Experience handling animals (ants, spiders, bats) and managing field work
- Signal and image analysis, digital data acquisition methods
- Writing readable and reproducible scientific code
- Coding in order of language proficiency: Python, R, MATLAB
- Writing and maintaining scientific software packages

### OTHER COMPETENCIES

- Scientific manuscript and grant writing
- Track record of working in interdisciplinary environments

### LANGUAGES SPOKEN (SELF-ASSESSED CEFR LEVELS)

The CEFR (link) has three divisions (A: basic user, B: independent user, C: proficient user). Each division has two levels (1,2).

- English: C2 (proficiency)
- German: B1 (upper intermediate)
- Kannada: B1
- Hindi: B1
- Bahasa Indonesia: A2 (elementary)

## In-house talks and workshops on software and coding practices

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- *Version Control for Organismal Biologists*: introductory workshop on why one should use version control and how to do it with Git (3 workshops so far)
- *Python for Organismal Biologists*: introductory workshop on using Python for scientific computing with example code and Jupyter notebooks that participants run during the workshop (2 workshops so far)

## Public outreach

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My German is good enough to allow semi-technical conversations that convey my enthusiasm for bats, echolocation and the techniques we use to study them. I use the various opportunities to interact with the public:

- September 2018, 'Fledermausführung': I co-led a 'bat walk' session for a group of school children while talking about the biology, behaviour and techniques related to bats.
- July 2017, BIOTOPIA Stadtteilstadt: I was in charge of explaining various exhibits highlighting animal and plant forms as part of a one-day event to increase public awareness of the then newly opened BIOTOPIA museum.
- June 2017, Tag der Oeffenen Tür: Open day at the Max-Planck Institute for Ornithology, Seewiesen. I was part of an exhibit showcasing various aspects of bat biology and echolocation research done in my former lab.
- January 2017, BIOTOPIA inauguration event: I had an exhibit showing a live feed of a single thermal camera as people walked by, explaining how it works, and how we use them in our research studying bats in the dark.