Thejasvi **Beleyur**

Postdoctoral researcher

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About Me

I'm a sensory biologist who tackles questions related to animal behaviour using a mix of experiments, computation and field observations.

Education

PhD — *University of Konstanz, Germany* — *2015-2021*

PhD thesis: Theoretical and empirical investigations of echolocation in bat groups

BS-MS dual degree in Biological Sciences — *IISER-Thiruvananthapuram, India* — *2008-2013*

Masters thesis: Task differentiation during prey capture and retreat-mate recognition in the Indian social spider, Stegodyphus sarasinorum (Eresidae)

Work Experience

Postdoctoral researcher — *Centre for the Advanced Study of Collective Behaviour, Konstanz, Germany* — *2021-current*

Developing analysis workflows to analyse the Ushichka dataset

Doctoral work — *Max-Planck Institute for Ornithology, Seewiesen, Germany* — *2015-2021*

Modelling and multi-sensor tracking of free-flying bat groups

Research assistant and lab manager — *Azim Premji University, Bengaluru, India* — *2014-2015*

Social spider web construction and setting up undergraduate laboratory facilities

Junior research fellow — *IISER-Thiruvananthapuram, India* — *2013-2014*

Analysis of task differentiation during prey capture and web construction

Awards and grants

CASCB Medium Grant — *Centre for the Advanced Study of Collective Behaviour, Uni. Konstanz* — *2021-2022*

Post doc grant

DAAD-GSSP scholarship — *German Academic Exchange Service (DAAD)* — *2015-2020*

Scholarship awarded to pursue doctoral studies

IMPRS best paper award — *IMPRS for Organismal Biology* — *2020*

Annual award given to best papers submitted in the graduate school.

Google Cloud Platfrom Research Credits — *Google Cloud* — *2019*

A 1000$ grant that provides access to cloud computing resources to execute simulations for Beleyur & Goerlitz 2019

IMPRS travel grant — *IMPRS for Organismal Biology* — *2017*

Travel grant awarded to attend the SNAK 2018 acoustics course in Odense, Denmark

Scientific software packages

I strive to make the code I write for various projects as modular and re-usable as possible while adopting software development best practices. Below are a few of the packages that I've published online.

- `beamshapes`: computational implementations of various sound-radiation models. The models can be used to perform predictions for planned experiments, or parameter inference on already collected data (under review at Journal of Open Source Software). *Paper hyperlink*. *Online docs hyperlink*
- `itsfm`: allows segmentation of sounds based on frequency modulation into frequency modulated (FM) and constant frequency (CF) regions. Various inbuilt and custom measurements can also be performed on the segmented audio. *Preprint hyperlink*. *Online docs hyperlink*
- `tacost`: generates simulated multi-channel 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

- 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 maintains 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 divisons 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

- *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

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 Stadtteilfest: I was in charge of explaining various exhibits highlighting animal and plant forms as part of a one-day even 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 inaugration 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.

Publications

1. 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
2. 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.
3. 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.
4. 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.
5. 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.
6. 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.