Tarun Sharma

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About

I am a PhD student in the lab of Professor Michael Dickinson at Caltech. I am currently working on the flight and gaze stabilization systems of the fruit fly. My research interests involve neuroethology, machine learning and computer vision for ecological purposes. I am currently also working on monitoring ants in the field and bioacoustics analysis of bumblebee buzzes.

Education

Caltech, Pasadena — Sept 2018 – Present
PhD in Computation and Neural Systems
Advisor: Michael Dickinson
GPA: 4.2/4.0

PESIT, Bangalore — Aug 2013 – May 2017
B.E in Computer Science and Engineering
GPA: 9.4/10.0

Work Experience

Research Assistant, Brown University — Aug 2017 – June 2018
Worked on the behavioral analysis of animals along with other computer vision research projects.

Intern, SAP Labs, Bangalore — Jan 2017 – June 2017
Worked on the thematic segmentation of text data using recurrent neural networks.

Research Intern, Brown University — May 2016 – Aug 2016
Worked on learning 3D shape information using rendered data and deep neural networks.

Intern, MadStreetDen, Chennai — May 2015 – Aug 2015
Worked on using machine vision to make a navigational assistive system for the visually impaired.

Publications

Corfas, R.A, **Sharma, T.**, Dickinson, M.H, (2019) Diverse Food-Sensing Neurons Trigger Idiothetic Local Search in Drosophila. *Current Biology*, doi:10.1016/j.cub.2019.03.004

Kotri, J., **Sharma, T.**, Kejriwal, S., Dasari, Y., Abinaya, S., (2019) Thematic Segmentation of Long Content using Deep Learning and Contextual Cues. *US Patent*. Patent number: US 10,339,922 B2

Govindarajan, L., **Sharma, T.**, Colwill, R., Serre, T., (2018) Neural Computing on a Raspberry Pi: Applications to Zebrafish Behavior Monitoring. *Proceedings of VAIB 2018,* Corpus ID: 52950335

Linsley, D., Linsley, J.W, **Sharma, T.**, Meyers, N., Serre, T., (2018) Learning to predict action potentials end-to-end from calcium imaging data. *IEEE Xplore,* doi:10.1109/CISS.2018.8362319

Linsley, D., Eberhardt, S., **Sharma, T.**, Gupta, P., Serre, T., (2017) What Are the Visual Features Underlying Human Versus Machine Vision? *Proceedings of ICCV Workshops 2017,* pp. 2706-2714

Suresh, S., **Sharma, T.**, Prashanth, T.K, Subramaniam, V., Sitaram, D., Nirupama, M., (2016) Towards quantifying the amount of uncollected garbage through image analysis. *Proceedings of ICVGIP 2016,* doi:10.1145/3009977.3010061

Sharma, T., Apoorva, J.H.M, Lakshmanan, R., Gogia, P., Kondapaka, M., (2016) NAVI: Navigation aid for the visually impaired. *IEEE Xplore,* doi:10.1109/CCAA.2016.7813856

Amso, D., Govindrajan, L., Gupta, P., Placido, D., Baumgartner H., Lynn, A., Gunther, K., **Sharma, T.**, Veerabadran, V., Thakkar, K., Kim, S.C, Serre, T., (2021) Using Computational Analysis of Behavior to Discover Developmental Change in Memory-Guided Attention Mechanisms in Childhood. *Preprint PsyArXiv,* doi:10.31234/osf.io/gq4rt

Awards

Chen Graduate Innovator Grant (2019), *Chen Institute - Caltech*
Awarded this grant to work on a side project on the behavioral analysis of the praying mantis. Worked on using key point tracking and unsupervised behavior discovery by spectral analysis on adult and juvenile praying mantids.

Runner up at "What the Hack 2.0" (2014), *SAP Labs India*
Awarded this prize for idea and execution of "Voice prompted Contextual Advertisements". The system would extract the transcript from a YouTube video, identify concepts and brand names using Alchemy API, and subsequently show the user ads that are semantically related to the content of the video.

Best Out of the Box Idea (2015), *SimpliLearn Solutions India*
Awarded this prize at a hackathon called "SimpliHack" for the idea and implementation of a 'smart education' system consisting of real time in video doubt tagging, a ranking system and geolocation to find people to study with.

Certificate of Recognition (2014), *Microsoft Corporation India*
Awarded this certificate for successfully building and publishing a Windows Store app, 'Hands Free Cake Book', that uses machine vision to allow the user to scroll by detecting the movement of their hand via the camera. The app currently has 30,000 plus downloads.

Certificate of Appreciation (2015), *MIT Media Labs and L.V Prasad Eye Institute*
Was part of a small group of students selected to participate in a seven day workshop on technological innovation and advancements in healthcare for the human eye. Worked on using the Oculus Rift to test and compare different modalities of feedback given to a person using visual assistive technology.

Certificate of Participation (2015), *MIT Media Labs Design Innovation Workshop*
Was part of a small group selected to participate in the civic innovation track at this workshop. Worked on a project called 'SenseMakers', which provided location based local comparisons to global social issues in order to spread awareness in an effective manner.

Teaching

Computer Vision for Ecology Summer School (2022), *Caltech*
Teaching assistant at CV4E 2022 (https://cv4ecology.caltech.edu/), an intensive three-week program aimed at teaching applied computer vision methods to senior ecology graduate students and postdocs. Students developed hands-on computer vision systems to help answer their own ecological research questions, using their own data. As part of the core instructor team, I worked closely with multiple students providing daily mentorship and hands-on assistance on their projects. I also gave lectures on data annotations tools and unsupervised and self-supervised learning.

BE/Bi 106: Comparative Biomechanics (2021), *Caltech*
Teaching assistant for the nine-unit course on Comparative Biomechanics at Caltech. This course focused on how engineering principles of solid and fluid mechanics can be applied to the study of biological systems. The course drew on a wide array of biological phenomena from plants and animals. The course was taught by Michael Dickinson.

Presentations

Machine Learning for Conservation (2022), *Georgia Tech*
Invited talk to students of HumaniTech class at Georgia Tech on the applications, benefits and challenges in using machine learning tools to tackle environmental challenges.

Monitoring Social Insect Activity with Minimal Human Supervision (2022), *CompSust*
Oral presentation at Doctoral Consortium on Computational Sustainability (CompSust) 2022, with Julian Wagner on our research on monitoring ants in the wild using computer vision.

Naturalistic behavior repertoires of the praying mantis (2021), *Caltech*
Oral presentation at Chen Graduate Innovator Symposium, with Annie Erickson on our work of unsupervised detection of behavior in praying mantids.

Towards Quantifying the Amount of Uncollected Garbage through Image Analysis, *ICVGIP*
Poster presentation at the Tenth Indian Conference on Computer Vision, Graphics and Image Processing in 2016.