

# Manasi Malik

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## EDUCATION

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<b>Johns Hopkins University (JHU)</b> Ph.D. in Cognitive Science COMPUTATIONAL COGNITIVE SCIENCE TRACK <i>PI: Dr. Leyla Isik</i>	JAN'21 – PRESENT
<b>Brains, Minds, &amp; Machines Summer School (BMM)</b> Organized by MIT and Harvard, at Marine Biological Laboratory in Woods Hole, MA	AUG'23 – SEPT'23
<b>Indraprastha Institute of Information Technology, Delhi (IIIT Delhi)</b> Bachelor of Technology (Honors) Major: ELECTRONICS & COMMUNICATION ENGINEERING Minor: COMPUTATIONAL BIOLOGY	JUL'15 – MAY'19

## INDUSTRY EXPERIENCE

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<b>Researcher at TCS Research and Innovation</b> I developed deep-learning methods to improve effectiveness of advertising using user behaviour data.	AUG'19 – DEC'20
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## PUBLICATIONS & SELECTED PRESENTATIONS

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- Publications* **Malik, M., Isik, L.** [Relational visual representations underlie human social interaction recognition](#). Nature Communications 14, 7317 (2023).
- M. Malik, G. Gupta, L. Vig, and G. Shroff,** [BCQ4DCA: Budget Constrained Deep Q-Network for Dynamic Campaign Allocation in Computational Advertising](#), IEEE International Joint Conference on Neural Networks, 2021 (IJCNN '21).
- Yashaswi Rauthan, Vatsala Singh, Rishabh Agrawal, Satej Kadlay, Niranjana Pedanekar, Shirish Karande, **Manasi Malik**, and Iaphi Tariang, [Avoid Crowding in the Battlefield: Semantic Placement of Social Messages in Entertainment Programs](#), International Workshop on AI for Smart TV Content Production, Access and Delivery (AI4TV '20)
- Manasi Malik, Ganesh Bagler, and Arpan Banerjee.** [Network analysis of neuro-cognitive processes: studying mcgurk effect using EEG data](#), IIITD, 2019.
- Talks* **Manasi Malik, Leyla Isik** [Social Inference from Relational Visual Information](#), Vision Sciences Society (VSS '22), Florida, USA
- Manasi Malik, Leyla Isik,** Social Inference from Relational Visual Information, MIT Computational Cognitive Science group (virtual, 2022)
- Manasi Malik, Leyla Isik,** Social Inference from Relational Visual Information, JHU Social & Cognitive Origins Group (2023)
- Manasi Malik, Leyla Isik,** Social Inference from Relational Visual Information, Brown Bag Talk, JHU Cognitive Science (2022)
- Posters* **Manasi Malik, Leyla Isik,** [Human Social Interaction Judgements are Uniquely Explained by both Bottom-up Graph Neural Networks and Generative Inverse Planning Models](#), Conference on Cognitive Computational Neuroscience (CCN'23), Oxford, UK
- Manasi Malik, Leyla Isik,** Human Social Interaction Judgements are Uniquely Explained by both Bottom-up Graph Neural Networks and Generative Inverse Planning Models, [Johns Hopkins AI-X Foundry Fall 2023 Symposium](#), Baltimore, USA

**Manasi Malik**, Leyla Isik [Both Purely Visual and Simulation-based Models Uniquely Explain Human Social Interaction Judgements](#), Journal of Vision 2023;23(9):5111.

**Manasi Malik**, Leyla Isik, [Social Inference from Relational Visual Information: An Investigation with Graph Neural Network Models](#), Conference on Cognitive Computational Neuroscience (CCN'22), San Francisco, USA ([poster](#))

*Patents* [Pending] Gupta, G., Vig, L., Shroff, G., & **Malik, M.** (2023). Budget constrained deep q-network for dynamic campaign allocation in computational advertising. US Patent Application No. 17/812,396.

## SELECTED PROJECTS

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### COMPLEX NETWORKS ANALYSIS AND COMPUTATIONAL MODELING

<b>Social Inference from Relational Visual Information</b> <i>Advisor: <a href="#">Dr. Leyla Isik</a></i> I am working on modeling how humans make social interaction judgments from visual stimuli in third-person scenarios. We develop a graph-neural-network based model to show that relational representations of visual stimuli lead to more human-like social judgements. Our graph-neural-network model is also useful for AI systems to make human-like social inferences at a fraction of the computational cost of typical Bayesian inference models. We're now collecting fMRI data to look at the relationship between computational models and brain representations of social interactions.	JAN'21 – PRESENT
<b>Network Analysis of Neuro-Cognitive Processes: Studying McGurk Effect using EEG Data</b> <i>Advisors: <a href="#">Dr. Arpan Banerjee</a>, <a href="#">Dr. Ganesh Bagler</a>, <a href="#">Dr. Dipanjan Roy</a></i> We investigated the underlying mechanism of multi-sensory perception, using an audio-visual illusion called the McGurk Effect. Using EEG and behaviour data from multiple subjects, we applied graph theory concepts to understand differences in brain network organizations during different percepts. <a href="#">[LINK]</a>	MAY'18 – MAY'19
<b>Network Analysis of Food-Disease Associations</b> <i>Advisor: <a href="#">Dr. Ganesh Bagler</a></i> The focus of this research was to use clustering analysis to infer how different food and disease categories relate to each other. We created signed bipartite graphs using mined food-disease associations data and found clusters using Bi-Louvain algorithm. <a href="#">[LINK]</a>	JAN'18 – NOV'18
<b>Controllability Analysis in Brain Networks</b> <i>Advisor: <a href="#">Dr. Ganesh Bagler</a></i> We studied the controllability of a Mouse Brain network, and find different driver regions when controlled, can affect the behavior of the animal.	AUG'17 – NOV'17

### IMAGE AND SIGNAL PROCESSING

<b>Emotion Detection through EEG signals</b> <i>Advisor: <a href="#">Dr. Anubha Gupta</a></i> We used electroencephalogram (EEG) data for emotion recognition in human beings. We trained a Support Vector Machine (SVM) classifier where features were frequency data from Fourier Transform and Wavelet Transform of the signals	AUG'16 – NOV'16
<b>Face and Kinship Verification in the Wild</b> <i>Advisor: <a href="#">Dr. A V Subramanyam</a></i> The goal of the project was to use Large-margin multi-metric learning (LM3L) method to decide whether there is a kinship relation between two individuals via their face images.	JAN'19 – APR'19
<b>PhotoFix : Fixing Photos Using Semantically Similar Images</b> <i>Advisor: <a href="#">Dr. A V Subramanyam</a></i> The goal of this project was to fix patches and holes in pictures - or imperfectly taken photos - by replacing these with information from other semantically similar pictures.	AUG'17 – NOV'17

## MACHINE LEARNING

### RL for Grocery Shopping Solutions

JAN'18 – APR'18

Advisor: [Dr. Sanjit Kaul](#)

We used reinforcement learning techniques to make grocery shopping easier. Modeled variables like price, availability, travelling cost for multiple shops.

### RLdrive: Reinforcement Learning for Better Driving Decisions

AUG'17 – NOV'17

Advisor: [Dr. Saket Anand](#)

Used RL techniques to make agent reach from start to goal position while minimizing costs. The environment created had randomly placed obstacles. We aimed to explore if spatial and temporal information from different vehicles can help make better decisions.

## TEACHING

Teaching Assistant, Introduction to Computational Cognitive Science (JHU)	Spring 2023
Teaching Assistant, Introduction to Cognitive Neuropsychology (JHU)	Fall 2022
Teaching Assistant, Visual Cognition (JHU)	Spring 2022
Teaching Assistant, Computational Social Cognition (JHU)	Fall 2021
Teaching Assistant, Indian Poetry Through The Ages (IIITD)	Winter 2019
Teaching Assistant, Introduction to Poetry (IIITD)	Monsoon 2016

## SERVICE

- Active member of the [Diversity and Representation Committee](#), Dept. of Cognitive Science, JHU
- Curator for [TEDxIIITD '18](#)
- **Student Council** Representative for ECE batch in 2017-18
- **Co-ordinator**, Bio-Bytes (Computational Biology Club) (Jan'17 - May'17)

## AWARDS AND ACHIEVEMENTS

- **All Rounder Award, ECE department** 2019 graduating batch
- **Qualified for DST INSPIRE Scholarship** - 2015 (Through Admission to Indian Institute of Science Education and Research Mohali)

## SKILLS

PROGRAMMING SKILLS	<ul style="list-style-type: none"><li>- Proficiency in MATLAB, Python</li><li>- Exposure to R, C/C++, SQL, HTML</li><li>- Competitive programming course (CodeChef challenges, Summer 2016)</li></ul>
DEEP LEARNING & AI SKILLS	<ul style="list-style-type: none"><li>- Neural Network architectures: GNN, CNN, RNN</li><li>- Deep Reinforcement Learning</li><li>- Training and optimization techniques: gradient descent, regularization, etc.</li><li>- Frameworks: Tensorflow, PyTorch</li></ul>
RESEARCH & DATA ANALYSIS SKILLS	<ul style="list-style-type: none"><li>- Collecting and Analyzing Behavioral Data</li><li>- Statistical analysis (ANOVA, Regression, Hypothesis Testing)</li><li>- Mathematical modeling, Linear Algebra, Graph Theory</li><li>- Experimental Design</li></ul>
TOOLS AND TECHNOLOGIES	<ul style="list-style-type: none"><li>- NetworkX, Scikit-learn, Pajek, OpenCV</li><li>- fMRIPrep, Brain Connectivity Toolbox</li><li>- NENGO, Linux, Git, Docker</li></ul>
WORKSHOPS	<ul style="list-style-type: none"><li>- Summer School on Statistical and Machine Learning Approaches in Neuroimaging and Cognitive Neuroscience, IIIT Hyderabad (<a href="#">SSNI2017</a>)</li></ul>