

Kohitij Kar

CONTACT INFORMATION	77 Massachusetts Ave Cambridge, MA 02139, USA	kohitij@mit.edu
RESEARCH INTERESTS	My primary aim is to develop an advanced understanding of primate visual cognition. This will be achieved by performing large-scale macaque electrophysiology, high throughput primate behavioral testing, development of causal (chemogenetic, pharmacological etc.) perturbation strategies and using the results to guide the next generation of brain models.	
CURRENT POSITION	Postdoctoral Associate Institution: Massachusetts Institute of Technology Department: McGovern Institute for Brain Research Mentor: James J DiCarlo	Nov 2015–present
EDUCATION	Rutgers University, The State University of New Jersey , Newark, NJ Ph.D., Neuroscience, January 2015 Thesis Topic: <i>Neural mechanisms of actions of transcranial electrical stimulation</i> Advisor: Bart Krekelberg, Ph.D Chair: Denis Pare, Ph.D New Jersey Institute of Technology , Newark, NJ M.S., Biomedical Engineering, January 2010 Thesis Topic: <i>Investigating the machine learning and neurophysiological relevance of a cortico-hippocampal connectionist model</i> Advisors: Mark Gluck, Ph.D and Mesut Sahin, Ph.D Heritage Institute of Technology , Kolkata, West Bengal, INDIA B.Tech.(equivalent to B.S.), Electronic and Instrumentation Engineering , May 2008	
RESEARCH EXPERIENCE	Postdoctoral Associate McGovern Institute for Brain Research, Massachusetts Institute of Technology (MIT) Supervisor: James J. DiCarlo, Ph.D Postdoctoral Associate Center for Molecular and Behavioral Neuroscience, Rutgers University Newark Supervisor: Bart Krekelberg, Ph.D Graduate Research Assistant Behavioral and Neural Sciences Graduate Program, Rutgers University Newark Supervisor: Bart Krekelberg, Ph.D Master Thesis Researcher New Jersey Institute of Technology , Supervisors: Mark Gluck, Ph.D and Mesut Sahin, Ph.D	Nov 2015–present Jan 2015–Nov 2015 Jan 2010–Jan 2015 Jan 2009–Jan 2010

PROFESSIONAL SERVICE	<p>Editorial Board Member Frontiers in Systems Neuroscience</p> <p>Invited Peer Reviewer Nature Communications, PNAS, Current Biology, PLOS Comp. Bio, Scientific Reports, Journal of Neurophysiology, Journal of Physiology, NeuroImage, Human Brain Mapping, Brain Stimulation, Frontiers in Systems Neuroscience, Experimental Brain Research, Transactions in Biomedical Engineering and Journal of Neural Engineering.</p>	2015 – Present 2013 – Present
AWARDS AND FELLOWSHIPS	<p>Funding</p> <ul style="list-style-type: none"> • John W. Jarve (1978) Seed Fund for Science Innovation — co-award with James DiCarlo and Pouya Bashivan <p>Awards at Conferences</p> <ul style="list-style-type: none"> • Elsevier/Vision Research Travel Award (VSS) 2021 • Trainee Professional Development Award (SFN) 2019 • Best Paper Award at Conference on Cognitive Computational Neuroscience 2018 • Accepted Cosyne Workshops 2019,2020 • Selected as a speaker for the NYU SPiNES Seminar series 2019 <p>Summer School Fellowships</p> <ul style="list-style-type: none"> • Computational Neuroscience Vision Summer School at Cold Spring Harbor 2014 • Functional MRI Visiting Fellowship at MGH, Cambridge, MA 2010 <p>Student Awards</p> <ul style="list-style-type: none"> • Provost Scholarship by New Jersey Institute of Technology 2008-2009 • Gold Medal for 1st Rank from West Bengal University of Technology 2008 <p>Honors</p> <ul style="list-style-type: none"> • NIH, Stadtman Investigator Search Semi-Finalist 2021 • Member of Tau Beta Pi, Engineering Honor Society, NJ Chapter 2010 • ISA Certified Automation Engineer 2008 	2019-2020
STUDENTS MENTORING AND OUTREACH	<ul style="list-style-type: none"> • Jocasta Manasseh Lewis, Female member of underrepresented minority Undergraduate Research Opportunities Program (MIT) Project: Representation of visual motion in IT neurons • Raina D'Aleo, Marcelo Armendariz, Lynn Sorensen, Jiaqi Shang Graduate Trainees at Brain Minds and Machine (BMM) summer school (Woodshole, MA) • Sophia Chirayil and Melanie Arrogave, Liberty Science Center, Partners in Science Program (Rutgers) Project: Concurrent tACS and fMRI • Michael Frederikse, Undergraduate Research Intern (Rutgers) Project: Development of microsaccade detection toolbox 	2018-2019 2018, 2019 2014 2012
TEACHING EXPERIENCE	<p>Visiting Lecturer</p> <p>Visual object recognition: computational and biological mechanisms Topic: First steps into inferior temporal cortex Harvard University, Cambridge, MA</p>	Fall 2019

Scientific Course Consultant

Brain, Minds and Machine Summer Course Summer 2018, 2019
Directors: Gabriel Kreiman, and Tomaso Poggio
Marine Biological Laboratory, in Woods Hole, MA

Instructor

Computer Simulations in NEURON 2014, 2015
Behavioral and Neural Sciences Graduate Program
Rutgers Newark

Laboratory in Mammalian Physiology 2011
Department of Biological Sciences
NJIT and Rutgers Newark

Teaching Assistant

Analytical and Computational Neuroscience Fall 2012
Instructor: Horacio G. Rotstein
Department of Mathematical Sciences, NJIT

Scientific Computing in MATLAB Springs 2011
Instructor: Bart Krekelberg
Behavioral and Neural Sciences, Rutgers Newark

Foundations in Neuroscience Springs 2010
Instructor: Ian Creese
Behavioral and Neural Sciences, Rutgers Newark

PUBLICATIONS

1. **Kar, K.**, DiCarlo, J. J. (2020). Fast recurrent processing via ventral prefrontal cortex is needed by the primate ventral stream for robust core visual object recognition. **Neuron**
2. Rajalingham, R., **Kar, K.**, Sanghavi, S., Dehaene, S., DiCarlo, J. J. (2020). A potential cortical precursor of orthographic processing in untrained monkeys **Nature Communications**
3. Tremblay, S., ..., **Kar, K.**, ..., DiCarlo, J., Platt, M. (2020) "An Open Resource for Non-Human Primate Optogenetics". **Neuron**
4. **Kar, K.**, Issa, E., Schmidt, K., Kubilius J. and DiCarlo, J. (2019) "Evidence that recurrent circuits are critical to the ventral stream's execution of core object recognition behavior." **Nature Neuroscience**.
5. Bashivan P.*, **Kar, K.***, and DiCarlo, J. (2019) "Neural Population Control via Deep Image Synthesis." **Science**, [* denotes equal contribution].
6. Rajalingham, R.*, Issa, E. B.*, Bashivan, P., **Kar, K.**, Schmidt, K., and DiCarlo, J. J. (2018) "Large-scale, high-resolution comparison of the core visual object recognition behavior of humans, monkeys, and state-of-the-art deep artificial neural networks." **Journal of Neuroscience**, 0388-18.
7. **Kar, K.**, Ito, T., Cole, M. W., Krekelberg, B. (2020). Transcranial alternating current stimulation attenuates BOLD adaptation and increases functional connectivity. **Journal of Neurophysiology**, 123(1), 428-438.
8. **Kar, K.** Duijnhouwer, J., and Krekelberg, B. (2017) "Transcranial alternating current stimulation attenuates neuronal adaptation." **Journal of Neuroscience**, 37(9), 2325-2335.

9. **Kar, K.**, and Krekelberg B. (2016) “Testing the assumptions underlying fMRI adaptation using intracortical recordings in area MT.” **Cortex**, 80, 21-34.
10. **Kar, K.** (2015) “Commentary: On the possible role of stimulation duration for after-effects of transcranial alternating current stimulation.” **Frontiers in systems neuroscience**, 9, 148.
11. **Kar, K.**, and Krekelberg, B. (2014) “Transcranial alternating current stimulation attenuates visual motion adaptation.” **Journal of Neuroscience**, 34(21), 7334-7340.
12. Sip, K. E., Smith, D. V., Porcelli, A. J., **Kar, K.**, and Delgado, M. R. (2014) “Social closeness and feedback modulate susceptibility to the framing effect.” **Social Neuroscience**, 10(1), 35-45.
13. **Kar, K.**, and Wright, J. (2013) “Probing the mechanisms underlying the mitigation of cognitive aging with anodal transcranial direct current stimulation.” **Journal of Neurophysiology**, 111(7), 1397-1399.
14. **Kar, K.**, and Krekelberg, B. (2012) “Transcranial electrical stimulation over visual cortex evokes phosphenes with a retinal origin.” **Journal of Neurophysiology**, 108(8), 2173-2178.

PEER REVIEWED
CONFERENCE
PUBLICATIONS

1. Kubilius, J.*, Schrimpf, M.*, **Kar, K.**,... & DiCarlo, J. (2019). Brain-Like Object Recognition with High-Performing Shallow Recurrent ANNs. **Advances in Neural Information Processing Systems**, 2019 [oral presentation]
2. Nayebi, A.*, Bear, D.*, Kubilius, J.*, **Kar, K.**, Ganguli, S., Sussillo, D., and DiCarlo, J. J., and Yamins, D. (2018) “Task-Driven Convolutional Recurrent Models of the Visual System.” **Advances in Neural Information Processing Systems**, 5291-5302, 2018

PREPRINTS

1. Schrimpf, M.*, Kubilius, J.*, Hong, H., Majaj, N. J., Rajalingham, R., Issa, E. B., **Kar, K.** ... and DiCarlo, J. J. (2018) “Brain-Score: Which Artificial Neural Network for Object Recognition is most Brain-Like?.” *bioRxiv*.
2. Arend, L., Han, Y., Schrimpf, M., Bashivan, P., **Kar, K.**, Poggio, T., DiCarlo, J.J. and Boix, X. (2018). Single units in a deep neural network functionally correspond with neurons in the brain: preliminary results. Center for Brains, Minds and Machines (CBMM).

MANUSCRIPT IN
PREP

1. **Kar, K.**, and DiCarlo, J. J. “Chemogenetic inactivation of macaque V4 produces reversible deficits in core object recognition”. (in prep)

PATENT

1. Enhancement of Sensory Sensitivity by Transcranial Alternating Current Stimulation
Inventors: Bart Krekelberg and **Kohitj Kar**
US Patent 20,150,328,447.
2. Software and Methods for Controlling Neural Responses in Deep Brain Regions
Inventors: Pouya Bashivan, James J. DiCarlo and **Kohitj Kar**
US Patent application no. PCT/US2020/030804

CONTRIBUTED
BOOK CHAPTER

1. *Chapter (not yet published):* Visual neuroscience in the age of big data and artificial intelligence
Book: Big Data in Psychiatry, Neurology, and Personalized Healthcare
Author: **Kohitij Kar**
Publisher: Elsevier

SELECTED
CONFERENCE
PUBLICATIONS

1. **Kar, K.**, and DiCarlo, J. Evidence that recurrent pathways between the prefrontal and inferior temporal cortex are critical during core object recognition. *Cosyne 2020*, Denver, Colorado, USA
2. **Kar, K.**, and DiCarlo, J. "Evidence that recurrent pathways between the prefrontal and inferior temporal cortex is critical during core object recognition." *Neuroscience Abstract*, Chicago, Society for Neuroscience, 2019.
3. **Kar, K.**, and DiCarlo, J. "Chemogenetic down-regulation of macaque V4 responses produce reversible deficits in core object recognition behavior." *Neuroscience Abstract*, San Diego, Society for Neuroscience, 2018.
4. **Kar, K.**, Schmidt, K., DiCarlo J. "Linking image-by-image population dynamics in the macaque inferior temporal cortex to core object recognition behavior." *Cognitive Computational Neuroscience*, 2018.
5. Bashivan, P.*, **Kar, K.***, DiCarlo J. "Neural Population Control via Deep ANN Image Synthesis." *Cognitive Computational Neuroscience*, 2018.
6. Kubilius, J.*, **Kar, K.***, Schmidt, K., DiCarlo J. "Can Deep Neural Networks Rival Human Ability to Generalize in Core Object Recognition?" *Cognitive Computational Neuroscience*, 2018.
7. **Kar, K.**, Kubilius, J., Issa, E., Schmidt, K., and DiCarlo, J. "Does the primate ventral stream need cortical feedback to compute rapid online image-by-image object identity?" *Neuroscience Abstract (Nanosymposium)*, Washington DC, Society for Neuroscience, 2017.
8. **Kar, K.**, Kubilius, J., Issa, E., Schmidt, K., and DiCarlo, J. "Evidence that feedback is required for object identity inferences computed by the ventral stream." *COSYNE* Salt Lake City, Utah, 2017.
9. **Kar, K.**, Wright, J., and Krekelberg, B. "Effects of transcranial alternating current stimulation on human BOLD responses during visual motion adaptation." *OHBM 2015 Annual Meeting*
10. **Kar, K.**, Duijnhouwer, J, and Krekelberg, B. "tACS-What goes on inside? The neural consequences of transcranial alternating current stimulation." *Brain Stimulation*, 7.2, 2014: e12.
11. **Kar, K.**, Duijnhouwer, J, Krekelberg, B. "Transcranial electrical stimulation mitigates motion adaptation in V1, MT, and MST neurons of awake, behaving macaques." *Neuroscience Abstracts*, San Diego, CA, Society for Neuroscience, 2013.
12. **Kar, K.**, and Krekelberg, B. "Effects of transcranial electrical stimulation on human motion detection." *Journal of Vision, VSS Abstracts*, 2012.
13. **Kar, K.**, Krekelberg B. "Retinal and cortical effects of transcranial electric stimulation" *Journal of Vision, VSS Abstracts*, 2011.
14. **Kar, K.**, Moustafa, A., Myers, C., Gluck, M. "Using an animal learning model of the hippocampus to simulate human fMRI data." *Bioengineering Conference, Proceedings of the 2010 IEEE 36th Annual Northeast* , vol., no., pp.1-2, 26-28, March 2010.