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Faculty Search Committee  
Department of Neuroscience  
Brown University

Dear Search Committee Members:

I am very pleased to write this letter of recommendation for Dr. Sachin Talathi who has applied for a faculty position in computational neuroscience in your department. I have known Dr. Talathi in two different roles: as Dean of the College of Engineering and also as a scientific collaborator. During the last three years, I have worked with him and several students on an interdisciplinary project at the intersection of epilepsy, computational neuroscience and control systems & machine learning. As a result, I have come to know him well.

Dr. Talathi is an extremely talented young researcher with tremendous promise for a long-term productive academic research career. He earned his Ph.D. from UCSD working under the guidance of Prof. Henry Abarbanel who is a renowned nonlinear dynamical systems theorist. While I am not an expert in computational neuroscience, I believe his doctoral research was of outstanding quality and was published in leading journals in physics and neuroscience. More importantly, his doctoral research has given him very strong foundations to work on a wide range of problems in neuroscience and neuro-engineering.

Dr. Talathi joined the University of Florida as a post-doctoral researcher under mentorship of Dr. William Ditto and Dr. Paul Carney. In 2009, he was promoted to the rank of Assistant Research Scientist in recognition of his excellent performance. In 2010 he accepted tenure track faculty position within the College of Medicine, Department of Pediatric Neurology. In his work at the University of Florida, he has developed a sound understanding of epilepsy and experimental animal models for temporal lobe epilepsy. Indeed, he has become quite adept and comfortable with experimental work and has continued his work at the intersection of computational neuroscience and experimental neurophysiology in his lab at the UF College of Medicine. The combination of very strong foundations in computational neuroscience and experimental aspects of clinically significant neuro-engineering research have now put him in a position to have a very successful research career in interdisciplinary neuroscience research. Moreover, he is truly an academic at heart and is very keenly interested in connecting research with educational efforts. Thus, a tenure-track position in a more traditional basic science department will be a much better venue for him to develop his academic career.

Dr. Talathi's postdoctoral work in circadian control epileptogenesis is very exciting. It has already earned the interest and respect of a commercial organization. I believe the academic

community will grow to understand the importance of this recent work and it will have great impact in the coming years. He proposes a circadian control hypothesis as a putative mechanism for circadian-phase-induced-imbalance in the observed firing rate of the two classes of population spikes. He has compelling in vivo results supporting this hypothesis. He has continued this research in his lab at UF. His group in collaboration with the lab of Paul Carney has recently identified cellular mechanisms underlying the observed phase shift in the circadian rhythm of hippocampal neural activity and a manuscript reporting these findings is currently under review at Nature Neuroscience.

Dr. Talathi's theoretical neuroscience work in last few years has focused on the study of inhibitory neural synchrony in hippocampal networks. I have collaborated with him on two specific projects as related to his research interests in neural synchrony: (a) Control of neural synchrony, specifically application of optical stimulation techniques to design and test model based control algorithms to suppress interictal spikes in an epileptic brain and (b) Methods and techniques for multivariate analysis of cross frequency coupling in EEG signals. He has recently proposed a new theoretical framework to study synchrony in networks of pulse coupled oscillators. This novel methodology has great implication for our understanding of the origin of brain rhythms in particular the gamma rhythms in the brain. Equally importantly, these models can be used for developing closed loop control strategies, which have the potential of ameliorating epileptic seizures. Taken together, these results will allow us to make major advances on new treatments of epilepsy and other major neurological disorders. A group of five faculty members including Dr. Talathi and myself were recently awarded an internal grant to pursue initial work on control of epileptic seizures. He played a critically important role in this effort.

We have also collaborated on a number of projects involving the application of advanced machine learning (and signal processing) techniques to neuroscience problems: Specifically, the development of fast support vector machine algorithms with applications in screening and detection of epileptic seizures and signal processing algorithms for estimating directional interactions in neuronal networks. These works have resulted in several publications.

I am generally aware of Dr. Talathi's current work on the problem related to cognitive decline resulting from acute brain injury and its influence on the transition of the brain to epilepsy. This promises to turn into a very exciting line of research.

Dr. Talathi has an excellent record of high quality publications during the last five years. He has also received several awards in recognition of his excellent research. He has also participated in writing of several research proposals including a role as PI on an NSF CRCNS proposal, an NIH R01 and R21 proposals, which are currently pending review. Earlier in his career, he was awarded a highly competitive postdoctoral fellowship from the Epilepsy Foundation of America. He was a co-investigator on an NIH R01 entitled "Evolution into Epilepsy". He has a very creative mind and a very strong work ethic. These characteristics, together with his excellent background in neuroscience and neuro-engineering, have put him in a very strong position to take major new steps in his independent academic research career.

Even though he was not required to teach, Dr. Talathi volunteered to design and teach a graduate course in neural dynamics and modeling, as he realized the BME dept did not have any formal course in this area. He has continually received excellent teaching evaluations in this course. In fact, I sat on his course in 2011 and have watched his teaching first hand. He is very devoted to student learning and makes a tremendous effort to help students understand rather difficult and challenging material. I believe he will be an excellent teacher.

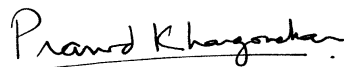
Dr. Talathi has worked with me on mentoring two doctoral students: Dr. Erin Boykin (electrical and computer engineering) who worked on causality direction analysis in neuronal networks and Mr. Manu Nandan (computer information science and engineering) who will complete his Ph.D. on machine learning applications to epilepsy. He has also helped mentor several other graduate and undergraduate students on joint work with me. These experiences along with successful mentoring of his own doctoral students have demonstrated a very strong capability of mentoring and advising graduate and undergraduate students.

Dr. Talathi has recently received an early career award from the Mathematical Biology Institute at Ohio State University. He has also been recently invited to present his work at the Workshop on neural modeling and applications to brain disease in Toronto.

Dr. Talathi has excellent communication skills. I have seen him make many oral presentations and they are always very effective and clear. He matches his presentations to his audience very well. He also writes very well.

In summary, Dr. Talathi is a superbly talented young researcher. He has prepared himself very well for a long-term academic research and scholarly career. I believe he has tremendous potential for high achievement. I most enthusiastically recommend him for a faculty position in your department.

Sincerely,

A handwritten signature in black ink, reading "Pramod P. Khargonekar". The signature is fluid and cursive, with a horizontal line drawn underneath the name.

Pramod P. Khargonekar  
Eckis Professor of Electrical and Computer Engineering  
Dean Emeritus, College of Engineering