Brain, Computation, and Data Science

ACTIVITIES - 2017

AN INITIATIVE OF INDIAN INSTITUTE OF SCIENCE AND PRATIKSHA TRUST

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INDIAN INSTITUTE OF SCIENCE
भारतीय विज्ञान संस्थान

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Overview

The Brain, Computation, and Data Science initiative is the brainchild of Mr. Kris Gopalakrishnan and Mrs. Sudha Gopalakrishnan, founders of the Pratiksha Trust, Bangalore. In June 2015, the Pratiksha Trust set up three Distinguished Chair Professorships at the Indian Institute of Science, Bangalore. The purpose of these Chair Professorships is to bring frontline researchers in the areas of neuromorphic computing, computational neuroscience, machine learning, and data science to the IISc campus to help strengthen research, and international collaboration in these important emerging areas. The mission of this initiative is to foster intense research collaboration leading to capacity building, ecosystem creation, and high impact research outcomes in brain, computation, and data science in IISc and India.

The participating departments and centres of IISc include:
Computer Science and Automation, Centre for Neuroscience, Electrical Communication Engineering, Electrical Engineering, Electronic Systems Engineering, Mathematics, Molecular Biophysics, and Computational and Data Science.

A parallel, complementary initiative has also been set up at the Indian Institute of Technology - Madras, Chennai, where also 3 chair professorships have been set up in this area.

This booklet provides a bird's eye view of the activities undertaken as a part of this wonderful initiative in IISc during 2017.

Research Areas

Computational Neuroscience

Neuromorphic Computing and Engineering

Data Science

Machine Learning

Brain Inspired Algorithms

Signal Processing

Image Analysis

From Director, IISc

"We are immensely grateful to Shri. Kris Gopalakrishnan and Smt. Sudha Gopalakrishnan for choosing the Indian Institute of Science for these generously endowed chair professorships. These chairs intend to invigorate and accelerate extremely important emerging interdisciplinary research areas. I am sure the chair professors will add a new dimension to research collaboration between IISc researchers and star contributors to these areas anywhere in the world."

Anurag Kumar
Director, Indian Institute of Science, Bangalore

From Pratiksha Trust Founders

Kris Gopalakrishnan

Sudha Gopalakrishnan

"We hope the launching of these distinguished chair positions will help push the frontiers in brain inspired research. It would be excellent if the collaborations lead to highly creative new computing architectures and algorithms inspired by the functioning of the brain."

Kris Gopalakrishnan and Sudha Gopalakrishnan
Founders, Pratiksha Trust, Bangalore

The IISc Team

Admin Committee

K.V.S. Hari, ECE
Jayant Haritsa, CSA
E. Jemmis, IPC
Y. Narahari, CSA (convener)
G. Rangarajan, MATH
Vijayalakshmi Ravindranath, CNS
P.S. Sastry, EE

Scientific Advisory Committee

S. Bhatnagar, CSA
K.V.S. Hari, ECE
Aditya Murthy, CNS
M.N. Murty, CSA
Rishikesh Narayanan, MBU
P.S. Sastry, EE (Convener)
Rajesh Sundaresan, ECE

Faculty Team (Brain, Computation, and Data Science Group)

D. Ambedkar, CSA
Bharadwaj Amrutur, ECE
S.P. Arun, CNS
R. Venkatesh Babu, CDS
Shalabh Bhatnagar, CSA
Arnab Bhattacharyya, CSA
Chiranjib Bhattacharyya, CSA
Sridharan Devarajan, CNS
Sriram Ganapathy, EE
Santanu Mahapatra, ESE
Prasanta Kumar Ghosh, EE
K.V.S. Hari, ECE
Aditya Murthy, CNS
Chandra Murthy, ECE
Rishikesh Narayanan, MBU
Hardik Pandya, ESE
T.V. Prabhakar, ESE
A.G. Ramakrishnan, EE
Supratim Ray, CNS
P.S. Sastry, EE
Chandra Sekhar Seelamantula, EE
S.K. Sikdar, MBU
Yogesh Simmhan, CDS
T.V. Sreenivas, ECE
Shayan G. Srinivasa, ESE
Mayank Srivastava, ESE
Rajesh Sundaresan, ECE
Partha Talukdar, CDS
Chetan Singh Thakur, ESE
Phaneendra Yalavarthy, CDS
and
all other interested
faculty members

Pratiksha Trust Distinguished Chairs at IISc

Shri K. Vaidyanathan Distinguished Chair

Professor Shihab Shamma

Professor, Institute of Systems Research
University of Maryland

Education

BS – Imperial College - 1976
MS – Stanford University - 1977
Ph.D. – Stanford University - 1980

Expertise

Speech models of brain
Neural signal processing
Computational neuroscience
Robust control systems
Neuromorphic engineering

Awards and Distinctions

Fellow, IEEE
Fellow, Acoustical Society of USA
ISR Outstanding Faculty Award
NIH Advisory Board
Blaise Pascal Intl. Research Chair

Prof Shihab Shamma's Impressions

The goal of Mr. Kris Gopalakrishnan's initiative is to build up the research and educational activities in the broad area of Neuromorphic Systems and Data Analyses. In an initial visit in 2016, I met and held many discussions with faculty members at IISc, especially in the areas of Neural Systems, Computational Neuroscience, and Microelectronics Engineering. We decided together then that the best way forward initially is to expose the IISc community to stateof-the-art neuromorphic research by holding periodic general and more focused workshops. The hope was also to engage the invited speakers with various members of the IISc community so as to initiate joint and independent projects and exchanges.

Towards these initial goals, I helped IISc colleagues organize two fairly large workshops, one in January 2017, and the other in January 2018. These one-week workshops engage a range of scholars from the USA, Europe, and India, with backgrounds in Signal Processing, Computer Science, Neuroscience, Engineering, Mathematics, and many other specialties. The 2017 workshop was extremely well-attended and instigated many lively debates and discussions on the sidelines. Among the most important debates concerned the limits and potential capabilities of neuromorphic approaches in current and future artificial intelligence applications, and perhaps more importantly, how these neuromorphic innovations relate to the more established classical approaches within the fields in which the attending scientists were experts, and what light can they shed on how these newly developed systems actually accomplish the amazing feats they do.

In addition to these annual workshops, IISc faculty and myself organized a few smaller more focused visits, e.g., by experts in Microelectronics (van Schaik and Ettienne-Cummings, 2017) and Computational Neuroscience (Kanold and Sahani, 2016). We hoped that these smaller meetings foster longer deeper discussions that lead to more tangible projects or actions to build up the Neuromorphic activities at IISc. For example, one recent exciting development is the hiring of two young and highly promising faculty (Chetan Thakur and Sriram Ganapathy) whose research focuses on Neuromorphic Microelectronics and Speech Processing, respectively. Another is the potential establishment of formal links and exchanges targeted to these research areas between IISc, on the one hand, and UCL and UMD (UK and USA) on the other hand. Finally, perhaps the most satisfying aspect of the many visits that I have already made to IISc and other IIT's in India has been the exceptionally bright and enthusiastic students that I met everywhere I went. In many ways, through discussions and lectures, I have both learned and enjoyed teaching them about my research and colleagues' discoveries. Subsequently, I have had the pleasure of advising them or sponsoring them on how to continue their education and academic careers through Post-Doctoral research. I am certain that some of these relationships will long outlast my tenure as a Visiting Professor, and as such I am grateful for the opportunity this experience has given me.

Smt. Sudha Murty Distinguished Chair

Professor Vasant Honavar

Professor, Pennsylvania State University
Director: Center for Big Data Analytics
Director: Artificial Intelligence Research Laboratory

Education

BE – BMS College, Bangalore, 1982
MS – Drexel, 1984
MS, PhD – Wisconsin, Madison, 1990

Expertise

Artificial Intelligence
Machine Learning
Knowledge Representation
Bioinformatics
Data Science
Health Informatics Neurocomputing

Awards and Distinctions

National Science Foundation Director's Award for Superior Accomplishment
Edward Frymoyer Endowed Professorship
CRA Computing Community Consortium Council Member
Iowa State Univ. Regents Award For Faculty Excellence
Univ. Wisconsin ECE 125 People of Impact

Prof Vasant Honavar's Impressions

I have visited IISc three times (Winter of 2016-2017, Summer of 2017, and Winter of 2017-18) since being named Sudha Murty distinguished visiting chair of Neurocomputing and Data Science. During these visits, I have participated in the Brain and Computation Workshop at IISc, and interacted with IISc faculty and graduate students. I have established collaborations with the faculty of the Center for Brain Research (CBR) on machine learning and analyses and predictive modeling of longitudinal health data.

I hosted Professor Vijayalakshmi Ravindranath of IISc and Professor Ganesh Chauhan of CBR at Pennsylvania State University (PSU) during November 2017. During the visit, they met with a number of PSU faculty as well as some key members of the PSU administration (e.g., Provost Nicholas Jones). The discussions during the visit helped identify areas of mutual interest that draw on CBR's current focus and the complementary strengths of IISc and PSU in Cognitive and Brain Sciences, Artificial Intelligence, Neurocomputing and Data Sciences, Population Health Research, and Genomics, Bioinformatics and Health Informatics.

Prof. Ravindranath and I are planning to organize a joint workshop to be held at IISc during the spring or summer of 2018, to develop specific collaborative research projects that could benefit from exchange of faculty, postdoctoral scholars, and graduate students between the two institutions. These projects can also form the kernel of an inter-institutional partnership between IISc and PSU, perhaps leading to one or more collaborative research networks that involve additional partners. Some of these projects can leverage PSU's recent investment in a Digital Collaboratory for Precision Health Research (one of 8 recently funded projects aligned with PSU's 2016-2020 strategic plan), focused on a secure, data access and use policy compliant infrastructure for predictive and causal modeling of health risks and intervention outcomes through integrative analysis of heterogeneous, fine-grained, richly structured, longitudinal patient data), and a number NSF and NIH funded projects on related topics.
I am also collaborating with Computer Science and Automation faculty on topics in Causal Inference and Machine Learning. Additional opportunities for collaboration are being explored with the Molecular Biophysics unit. A number of research articles that acknowledge support provided by Sudha Murty Chair are currently in press.

Pratiksha Trust Distinguished Chair Professor

Professor Christos Papadimitriou

Donovan Family Professor of Computer Science
Columbia University, New York, USA

Education

B.S Athens Polytechnic, 1972
MS Princeton University, 1974
Ph.D., Princeton University, 1976

Expertise

Theory of algorithms and complexity, and its applications to optimization, databases, control, AI, robotics, economics and game theory, the Internet, evolution, and the brain

Awards and Distinctions

Member of National Academy of Sciences, USA
Member of National Academy of Engineering, USA
Member, American Academy of Arts and Sciences
Knuth Prize, Gödel Prize
von Neumann Medal
Kalai prize for CS in Game Theory
EATCS Award (European Association for Theoretical Computer Science)
Author of Novels: "Turing", " Logicomix" and "Independence"
Honorary Doctorates from Nine Universities

Pratiksha Trust Distinguished Chairs at IIT-Madras

Prof. H.N. Mahabala Chair

Prof. Partha Mitra
Cold Spring Harbor Lab

Dr. N.R.Narayana Murthy Chair

Prof. Mriganka Sur
Massachusetts Institute of Technology

Prof. Muthukrishnan Chair

Prof. Anand Raghunathan
Purdue University

Workshops Organized

First Workshop on Brain, Computation, and Learning

January 9-13, 2017

Organizing Committee:

S.P. Arun, Arnab Bhattacharyya, Rishikesh Narayanan, P.S. Sastry, Chandra Sekhar Seelamantula, Shihab Shamma, Partha Talukdar

Number of partcipants: 250

Invited speakers

Upinder Bhalla
NCBS

Hynek Hermanski
Johns Hopkins

Vasant Honavar
PennState

Stephane Mallat
Ecole Polytechnic

C.P. Jawahar
IIIT, Hyderabad

Patrick Kanold
Univ. of Maryland

Nima Mesgarani
Columbia University

Amith Mutha
IIT, Gandhinagar

Balaraman Ravindran
IIT-Madras

Maneesh Sahani
Univ. College London

Christoph Schreiner
UCSF Medical Center

Shihab Shamma
University of Maryland

S.P. Arun
IISc, Bangalore

Venkatesh Babu
IISc, Bangalore

Arnab Bhattacharyya
IISc, Bangalore

Sridharan Devarajan
IISc, Bangalore

A. Dukkipati
IISc, Bangalore

Rishikesh Narayanan
IISc, Bangalore

Chandra Sekhar Seelamantula
IISc, Bangalore

Sujit Sikdar
IISc, Bangalore

Partha Pratim Talukdar
IISc, Bangalore

Summary of the Workshop

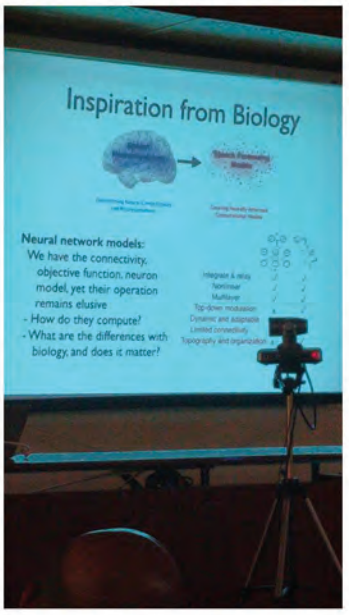
Computational approaches to understanding brain function constitute an important and growing area of interdisciplinary research. These approaches and associated techniques have acted as a melting pot for researchers from disparate disciplines to come together and address one of the grandest challenges of the 21st century, namely, understanding brain function. The grandness of the challenge and the requirement on diverse forms of expertise has deemed that such endeavors require synergistic interactions among neurobiologists and computer scientists. Over the past decade or two, neurobiologists have made significant conceptual advances in our understanding of the brain through technical breakthroughs that have yielded unprecedented opportunities to gather large-scale structural and functional data. On the other hand, over the same period, computer scientists have developed exceptional tools to address questions in machine learning and data analytics, tools that are not only helpful in emulating brain function, but also are radically transforming many applications in information and communication technologies.

To benefit from such synergistic interactions among neurobiologists and computer scientists, an international workshop on Brain, Computation and Learning was held during 9-13 January 2017 at IISc.

This workshop was aimed at creating a useful dialogue between neurobiologists and computer scientists and educating research students of each area with relevant topics and concepts of the other. The workshop had talks and tutorials from prominent researchers from all over the world.

The speakers at the workshop include: Upinder Bhalla, NCBS, Bangalore; Christoph Schreiner, University of California, San Fransisco; Vasant Hannovar, The Pennysylvania State University; Hynek hermanski, Johns Hopkins Univeristy; Stephane Mallat, École Polytechnique, Palaiseau; Maneesh Sahani, University College, London; Shihab Shamma, The University of Maryland; Pratik Mutha, IIT, Gandhinagar; B. Ravindran, IIT, Madras; C.V. Jawahar, IIIT, Hyderabad; Patrick Kanold, University of Maryland; Srdjan Ostojic, École Normale Supérieure, Paris; Yves Boubenec, École Normale Supérieure, Paris; Nima Mesgarani, Columbia Univerity; Mrigankar Sur, MIT; and Arnab Bhattacharya, Sridharan Devarajan, Partha Talukdar, Rishikesh narayan, S.P.Arun, Venkatesh Babu, Sujit Sarkar, Chandra Sekhar S., and Ambedkar Dukkipati, all from IISc.

About two hundred students (selected from over 400 applicants) from all over India attended the workshop. In addition, about twenty faculty members from different institutions in India also participated in the workshop. Due to the generous funding from Pratiksha trust, all the participants were provided with free accommodation and some



minimal support towards travel. The workshop provided an oppurtunity for young researchers to understand the diverse themes of brain research and to appreciate the close relationships that are developing between neuroscience and computer science. From the feedback received from the participants, most of them felt that they benefitted a lot from the workshop. Many participants requested IISc to conduct these workshops every year.

Symposium on Neuromorphic Cognitive Computing

October 4, 2017

Number of participants: 202

Speakers

Prof. Shihab Shamma
(University of Maryland)
"Neural networks and the representation of categories in the brain"

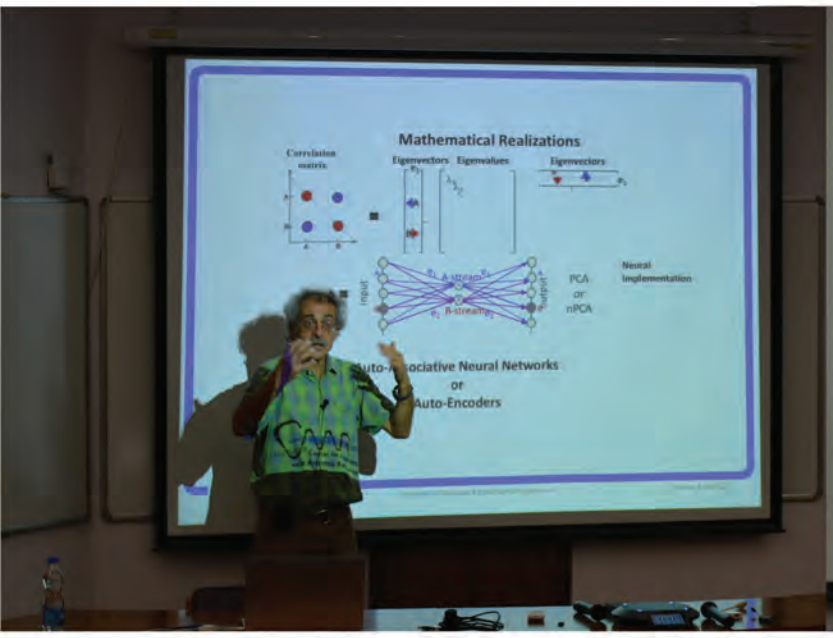
Dr. Raghavendra Singh
(IBM India)
"Cognition and computation"

Prof. André van Schaik
(The MARCS Research Institute, Western Sydney University)
"Neuromorphic event-based image processing"

Prof. Sridharan Devarajan
(Indian Institute of Science, Bangalore)
"Neuromorphic models of brain oscillations"

Prof. Ralph Etienne-Cummings
(The Johns Hopkins University)
"I, Robot: Blurring the lines between mind, body and robotics"

Prof. S P Arun
(Indian Institute of Science, Bangalore)
"Cracking the code for visual objects"



Summary of the Symposium

The Pratiksha Trust hosted a one-day "Neuromorphic Cognitive Computing Symposium" at IISc Bangalore. The purpose of this symposium was to promote an interactive discussion and knowledge of the latest research in the field of neuromorphic computing. Neuromorphic computing is an interdisciplinary research domain that draws inspiration from multiple disciplines such as biology, engineering, and mathematics. The objective of the workshop was to bring people from such multiple disciplines on a single platform and discuss potential research and collaborations in this exciting area. Participation in the workshop was overwhelming; 202 people from various research backgrounds, including participants from industry, attended the workshop. The symposium provided an opportunity to discuss key initiatives taken by The Pratiksha Trust to support research in IISc to promote neuromorphic engineering in India. The demo session at the symposium was enormously successful, as participants directly interacted with several neuromorphic systems and were amazed to see how these systems outperform the conventional technology. Neuromorphic camera and real-time cochlea model are some examples of the neuromorphic systems that were demonstrated.

The symposium featured several interesting talks by world leaders in neuromorphic engineering (Prof. Shihab Shamma, Prof. Andre van Schaik, and Prof. Ralph Etienne-Cummings) and one by a speaker from the industry. These talks covered the breadth of research ranging from neuroscience to engineering. Below is a brief summary of each of the talks:

1. "Neural networks and the representation of categories in the brain": Prof. Shihab Shamma from the University of Maryland discussed the principle of temporal coherence, which postulates that a signal is perceived as emitted from a single source only when all of its features are temporally modulated coherently, causing them to bind perceptually.

2. “Neuromorphic event-based image processing”: Prof. Andre van Schaik from The MARCS Research Institute, Western Sydney University discussed the event-based neuromorphic camera and its applications to 'micro' air vehicles (MAVs). His research provided convincing proof that the asynchronous nature of the neuromorphic camera removes the need for any global timing system, such as the global shutter used in conventional cameras. As a result, these cameras do not suffer from the motion blur and the saturation effects suffered by conventional cameras.

3. “I, Robot: Blurring the lines between mind, body and robotics”: Prof. Ralph Etienne-Cumming from The Johns Hopkins University presented an overview of the field of neuromorphic engineering and discussed specific applications. His work showed that future brain-machine interfaces (BMI) will not only be used to infer the host’s intentions from brain activities or to provide the host with extrinsic information (e.g., sensory feedback), but may provide enhancements and/or replacement of parts of the brain itself. He assert that such BMI devices will not be truly realized until the electronics “speak the same language” as the biological brain. Hence, the complete system must be neuromorphic, implying that it must replicate the form and function of the brain.4. “Cognition and computation”: This talk, presented by Dr. Raghavendra Singh from IBM Inc. India, focused on building computational models to enable cognition in machines. He discussed the biological plausibility of current deep learning models, implementation of such models on low power neuromorphic chips, and their application to the enticing world of fashion.

4. “Cognition and computation”: This talk, presented by Dr. Raghavendra Singh from IBM Inc. India, focused on building computational models to enable cognition in machines. He discussed the biological plausibility of current deep learning models, implementation of such models on low power neuromorphic chips, and their application to the enticing world of fashion.

5. “Robust working memory through gamma oscillations”: Dr. Sridharan Devarajan from the Indian Institute of Science, Bangalore, described an in-silico model network of excitatory and inhibitory neurons that seeks to emulate robust maintenance of information in working memory. Due to the wide heterogeneity in the firing properties of in-silico neurons, persistent activity

within this network does not remain stable but rather drifts to the local neighbourhood of the most excitable neurons. He demonstrated how inducing synchronous gamma-band oscillations within this network transiently homogenizes the firing properties of neurons, thereby enabling the robust and stable maintenance of persistent activity within this network.

6. "Cracking the code for visual objects": Dr. S P Arun from the Indian Institute of Science, Bangalore, presented recent findings from his lab elucidating the code for visual objects using both behavioural experiments in humans and single neuron recordings from monkeys. This code operates according to systematic rules, incorporates knowledge about the world, enables simple decoding of relevant information and is systematically different from most computer vision algorithms.

7. Demo and posters: This session was the most successful part of the event. Various labs from IISc presented demos and posters covering the broad range of topics from neuroscience to electronics engineering.

Compact Course on MRI Physics

December 2017

Prof. Krishna Nayak
University of Southern California, USA

Krishna Nayak is a Professor of Electrical Engineering in the University of Southern California, USA, with joint appointments in Radiology and Biomedical Engineering. Prof. Nayak received a PhD in Electrical Engineering from Stanford University in 2001. His research expertise and interests are in Magnetic Resonance Imaging; MRI pulse sequence design; MRI reconstruction; MRI artifact correction; Real-time imaging; Application of MRI to the assessment of cardiovascular disease and obesity; Signal and image processing. He directs the Magnetic Resonance Engineering Laboratory whose research mission is to develop and clinically translate novel magnetic resonance imaging (MRI) technology.

Prof. Krishna Nayak visited IISc from Nov 21 - Dec 25, 2017. He delivered 5 research seminars on Real-Time MRI and related topics at IISc and to Bangalore-area professional interest groups. He also taught a weeklong short-course on MRI Physics that was attended by about 45 faculty and students. He had interactions with Prof. Phaneendra Yalavarty (CDS) and his group, and also met with several other faculty including Prof. Prasanta Ghosh (EE), Partha Talukdar (CDS), PS Sastry (EE), Anil Kumar (NMR Center), and Sridharan Devarajan (CNS).

Summary of the Course on MRI Physics

The course covered the basics of MR physics and MR image reconstruction with a hands-on homework session following each module. The homework sessions utilised MATLAB and each participant carried a laptop to complete the hand-on part. The course was designed for early researchers (graduate students, post-docs, and faculty members) to comprehensively

understand the MR imaging from a signal/image processing perspective. It was open (free of cost) to the academic community. Specific topics included: Physics, signal equation, 2D/3D imaging; Sampling considerations, contrast, noise, etc.; Discrete object approximation, parallel imaging; Model-based reconstruction, physics-based constraints.

The course attended by over 45 participants from IISc (CDS, CNS, EE, ECE, and NMR), NIMHANS, IIIT, Bangalore, and IIT-Tirupati. The course was well received by all participants and added much needed signal processing prospective to Magnetic Resonance Image formation. More details about the course and related course material can be found here: https://sites.google.com/view/mrimaging

Pratiksha Trust Young Investigators

IISc has recently introduced Young Investigator awards to recognize and reward the accomplishments of young faculty members or prospective faculty members. The Pratiksha endowment now supports the award of several Young Investigator awards.

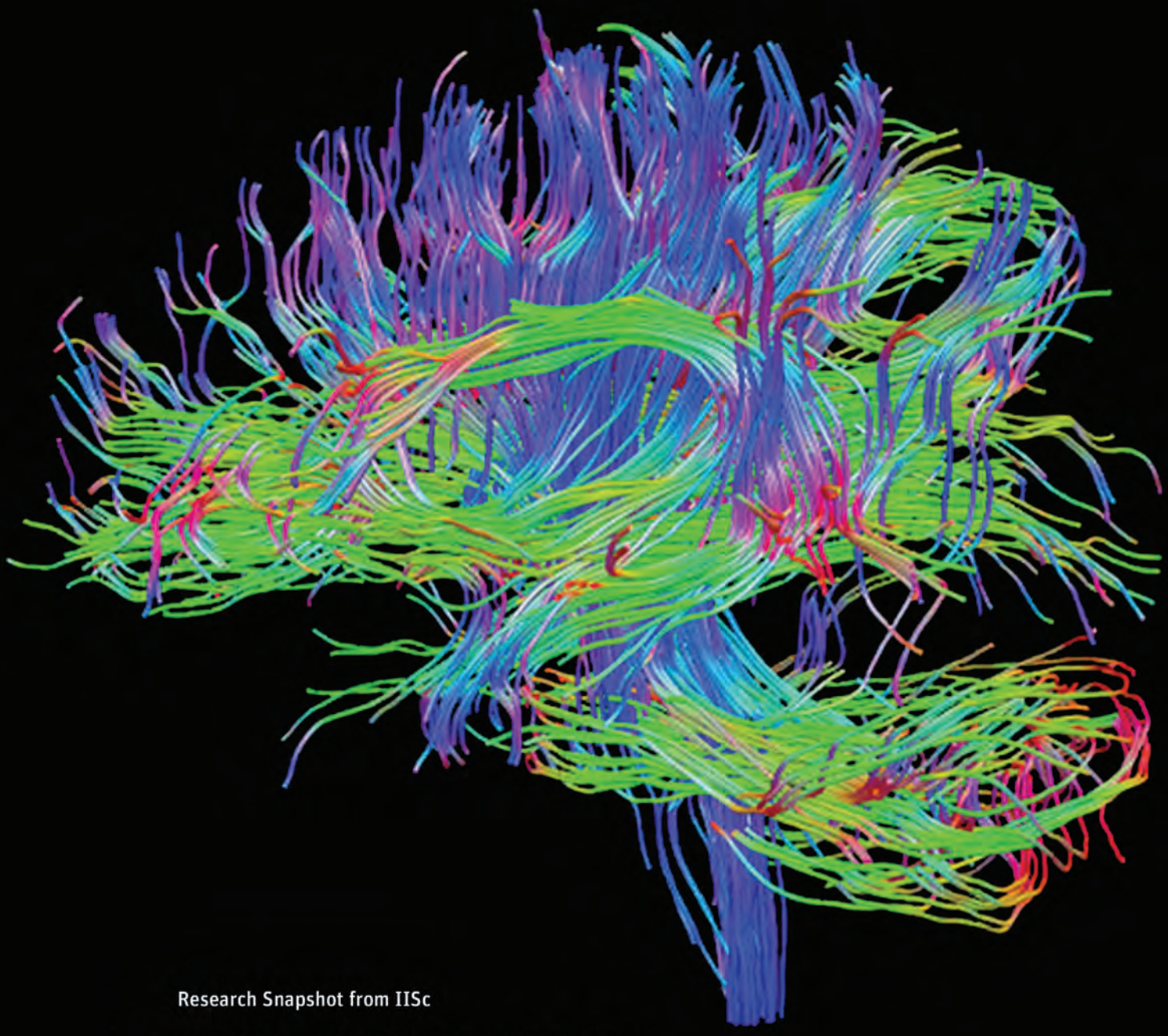
The awardees receive, for two years, a top-up salary of Rs 25,000 per month and a research grant of Rs 3 lakhs per year. The following faculty members were selected for the award with effect from August 2017.

Sridharan Devarajan
Centre for Neuroscience

Sriram Ganapathy
Electrical Engineering

Prasanta Kumar Ghosh
Electrical Engineering

Chetan Singh Thakur
Electronic Systems Engineering



Research Snapshot from IISc

The image shows a whole brain connectome obtained with diffusion MRI and tractography. The connectome comprises white matter fibers (structural connections) between major cortical and sub-cortical brain regions. Colors indicate the dominant direction of fiber propagation (blue: up and down; green: front and back; red: left and right)

Pratiksha Trust Travel Fellowships

One of the initiatives that is being supported from the Pratiksha Trust endowment is the Pratiksha Travel Fellowship scheme. Under this reserach students, postdoctoral fellows and young faculty members at IISc are being supported to attend reputed international conferences to present their reserach work. Support is also provided to research students to attend prestegious international workshops or summer schools where there is a highly competitive selection process. To qualify for support the conference/paper should have relevance to the theme of Brain Science, Computer Science and Machine learning. The decisions on awarding these fellowships are taken by the Scientific advisory Committee. In 2017, the following persons are awarded these fellowships.

1. Mr. R.T. Promod, ECE (Student of Prof. S.P.Arun)

Attended the Summer School on 'Brains, Minds and Machines' at the Marine Biological Laboratory, Massachusetts, USA. (Selection for the summer school is highly competitive)

2. Mr. Deepak B.S., CDS (Student of Prof. Venkatesh Babu)

Attended IEEE conference on Computer Vision and Pattern Recognition (CVPR), 2017, Hawaii, USA, to present the paper:

Deepak Babu Sam, Shiv Surya, R. Venkatesh Babu, "Switching Convolutional Neural Network for Crowd Counting"

3. Mr. Devraj Mandal, EE (Student of Dr. Soma Biswas)

Attended IEEE conference on Computer Vision and Pattern Recognition (CVPR), 2017, Hawaii, USA, to present the paper:

Devraj Mandal, Soma Biswas, "Generalized Semantic Preserving Hashing for n-Label Cross-Modal Retrieval"

4. Ms. Debaleena Basu, CNS (Student of Prof. Aditya Murty)

Attended Gordon Research Conference (GRC) on Eye Movements, Bates College, Lewiston, ME, USA, 9th-14th July, 2017 to present a paper

Debaleena Basu and Aditya Murty, "Neural correlates of processing bottlenecks during sequential saccades"

5. Mr. Konda Reddy Mopuri, CDS (Student of Prof. Venkatesh Babu)
Attended British Machine Vision Conference (BMVC), 4-7 September, 2017, to present a paper:

Konda Reddy Mopuri and R. Venkatesh Babu, "Fast Feature Fool: A data independent approach to Universal Adversarial Perturbations"

6. Ms. Manisha Sinha, MBU (Student of Prof. Rishikesh Narayanan)
Attended Society for Neuroscience Annual Meeting, November 11–15, 2017, Washington, D.C., USA to present

Manisha Sinha and Rishikesh Narayanan, "An emergent model of hippocampal sharp wave ripple complexes reveals sublayer-specific stratified disparitites"

7. Ms. Shilpa Chaturvedi, CDS (Student of Prof. Yogesh Simhan)

Attended IEEE eScience conference 2017, Auckland, New Zealand, 24–27 October to present

Shilpa Chaturvedi, Sahil Tyagi, Yogesh Simmhan, "Collaborative Reuse of Streaming Dataflows in IoT Applications"

8. Dr. Prasanta Kumar Ghosh, Assistant Professor, EE, attended INTERSPEECH 2017 at Stockholm, Sweden to present four papers

9. Dr. Sriram Ganapathy, Assistant Professor, EE, attended INTERSPEECH 2017 at Stockholm, Sweden to present two papers

Activities Planned for 2018

Second Workshop on Brain, Computation, and Learning, IISc, Bangalore (January 8-12, 2018)

IISc-University College of London (UCL) Joint Workshop on Brain, Computation, and Data Science in UCL, London (May 2018) (supported by UCL)
This is initiated by Prof. Maneesh Sahani from UCL, London

Broadcom Workshop on Brain Inspired/Neuromorphic Computing (May 2018)
This event will be funded by Broadcom as a part of their CSR initiative

Organization of Compact Courses

Summer School for Graduate Students

Organization of Brainstorming Workshops

Recruitment of Post-Doctoral Fellows

Exchange of graduate student visitors between IISc and other universities

The objective of all of the above activities will be to evolve and launch ambitious collaborative projects in frontier topics in brain, computation, and data science.

For more information:
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