Amrita School of Biotechnology’s Bioinspired robotics study titled “Using Cerebellar Architecture to Control Low-Cost Robotic Arms” was presented as an invited talk by Prof. Shyam Diwakar at the International Symposium on the Neuromechanics of Human Movement, October 4-6, 2016 organized by University of Heidelberg, Germany.

The symposium was organized by Dr. Manish Sreenivasa of IWH and included other speakers including Francisco Valero-Cuevas – U. Southern California, USA, Andrea d’Avella - U. Messina, Italy, Massimo Sartori - U. Göttingen, Germany, Marjolein van der Krogt - VU U. Medical Center, Netherlands, Roger Enoka - U. Colorado Boulder, USA, Hartmut Geyer - Carnegie Mellon U., USA, Auke Ijspeert - EPFL, Switzerland among others.

Computational neuroscience is the mathematical modeling study of brain cells and circuits. Amrita University’s Computational neuroscience research on neural network driven robots is being extended to use cerebellar architectures to control low-cost robotic articulators or arms. This is a work also done by Asha Vijayan, Chaitanya Kumar Nutakki, PhD students and Dhanush Kumar, Research Associate under the guidance of Prof. Shyam Diwakar at the Amrita School of Biotechnology.
Dr. Sujay Chattopadhyay, Assistant Professor, Department of Microbiology, University of Washington, Seattle, USA, with established expertise in Computational Genomics, visited the Amrita School of Biotechnology on December 14th, 2016. He gave a very insightful talk on “Adaptive Evolution in Microbial Genomes”, as a part of the invited lecture series.

Dr. Sujay discussed the challenges faced in the area of microbial genomics in detecting patho-adaptive evolutionary changes, especially those that are overlooked by conventional micro-evolutionary tools. Comparative genome-wide analysis of pathogens like Escherichia coli and Salmonella illustrate a significant overlap in the functional trajectories of adaptive mutations, representing strong evidence of the link between adaptive evolution and virulence. Dr. Sujay pointed out how changes in the habitat of the pathogen, e.g., from gut to the urinary tract, resulted in gene acquisition, mutation or loss, as a means of evolution of virulence.

Dr. Sujay also discussed synonymous vs non-synonymous mutations and the importance of detecting adaptive convergent evolution of the fimH gene that occurs due to accumulation of Hotspot mutations. He explained their detection thereof, using software tools like TimeZone and PanCoreGen developed by his team. Additionally, he spoke about ongoing work on the microbial variome database. In summary, Dr. Sujay’s seminar illustrated how a perfect blend of Microbiology and Comparative Genomics can help dissect the complexities of adaptive evolution.
Prof. Shyam Diwakar gave an expert talk titled “Computational Neuroscience of Circuit Function and Dysfunction: a Cerebellum Perspective” at the XXX-IV Annual Meeting of Indian Academy of Neurosciences (IAN) held at National Brain Research Center, Manesar, India from October 19-21, 2016.

Amrita PhD students Arathi Nair, Hemalatha Sasidharakurup, Sandeep Bodda, Nutakki Chaitanya Kumar and Mithun Haridas presented their studies at the meeting. While Arathi presented her study on parallel computing of mathematical models of brain circuits, Sandeep presented on local field potential reconstructions using neural mass models. Chaitanya Nutakki presented a poster on mathematical modeling of fMRI signals from circuit models and Hemalatha presented on biochemical systems theory of Parkinson’s disease. Mithun Haridas of Amrita CREATE presented on an app for dyslexia. Arathi, Sandeep, Hemalatha and Chaitanya are PhD students at Amrita School of Biotechnology’s Computational Neuroscience and Neurophysiology Laboratory.

Since its inception in 1982, Indian Academy of Neuroscience has been holding meetings regularly at different centres involved in neuroscience research in the country. Prof. Shyam Diwakar was elected as an executive committee member of the Indian Academy of Neuroscience in October 2014 and has been a life member since 2004.
Dr. Sankarprasad Bhuniya currently serves as a research professor at Amrita Center for Industrial Research & Innovation and Amrita Center for Excellence in Advanced Materials and Green Technologies. He is also a professor in the department of Chemical Engineering, Amrita School of Engineering, Coimbatore. During his visit to Amrita School of Biotechnology on December 9, 2016, he delivered an excellent, informative talk on Chemoselective Fluorescent Probe for Tracking of Small Molecule and Chemotherapeutic in Living Cells. He explained how small molecular reactive fluorogenic probes can be smartly utilized to interrogate short-lived reactive species in the cellular microenvironment in a pathogenic or non-pathogenic state. By exploiting the differences in molecular reactivity, these emerging strategies for fluorescence-based bio-imaging can sort and identify the species of interest within this complex microenvironment.

Recently, a chemoselective probe for potassium cyanide (KCN), nitroxyl (HNO), tumor hypoxia imaging has been developed. A Nitroxyl(HNO) probe for tracking HNO in systems, such as resistance to superoxide infraction in mammalian vascular systems. Dr. Buniya also has expertise in theranostics. Theranostics, combining therapy and diagnosis, is an appealing approach for chemotherapy in medicine and exhibits improved biodistribution, selective cancer targeting ability, reduced toxicity, masked drug efficacy, and minimum side effects. The role of diagnostic tools in theranostics is to collect information about the diseased state before and after specific treatment.
In order to create awareness of the importance of mushrooms, the students of S3 B.Sc. Microbiology hosted a program named “Mycoscope” November 10th-11th, 2016. The Mycoscope 2016 programme presented an expo on the properties and uses of fungi, as well as recent discoveries about the fungi kingdom.

At “Mycoscope” the students learned that a number of fungi, in particular the yeasts, are important “model organisms” for studying problems in genetics and molecular biology. Fungi include some of the most important organisms, both in terms of their ecological and economic roles. By breaking down dead organic material, they continue the cycle of nutrients through ecosystems. In addition, most vascular plants could not grow without the symbiotic fungi, or mycorrhizae, that inhabit their roots and supply essential nutrients.

Other fungi provide numerous drugs (such as penicillin and other antibiotics), foods like mushrooms, truffles and morels, and the bubbles in bread, champagne, and beer. Fungi also cause a number of plant and animal diseases: in humans, ringworm, athlete’s foot, and several more serious diseases are caused by fungi. Fungi are more chemically and genetically similar to animals than other organisms, which makes fungal diseases very difficult to treat. Plant diseases caused by fungi include rusts, smuts, and leaf, root, and stem rots, and may cause severe damage to crops.

Fungi are an ideal source of food as they contain high levels of fiber, which plays an important role in weight management by functioning as a “bulking agent” in the digestive system. They are good source of protein, vitamins (source of Vitamin D), folic acid and containing all the essential amino acids and have virtually sodium free and no cholesterol. They possess, antiviral, antibacterial, anticancer and antidiabetic properties, boost the immune system and contribute to cardiovascular health.

Mushrooms can be grown on composted straw and animal manure indoors where the temperature, humidity and carbon dioxide levels are tightly controlled. There has been a big increase in the interest in more ‘exotic’ mushroom rooms in the last twenty-five years, and now species such as Lentinula and Pleurotus can be found along side Agaricus, the most extensively cultivated mushroom, in most supermarkets.

The event included a workshop on mushroom cultivation and a cooking competition was conducted with the faculty members making dishes with mushrooms. Faculty members Ajith Madhavan and Chinchu Bose bagged the first prize in the cooking competition. The cultivated mushrooms by the students were exhibited in the event which included Pleurotus and Milky mushrooms. The Amrita School of Biotechnology thanked Prof. Bipin Nair and also other faculty members for their valuable support. “Mycoscope” was a grand success and brought the students and staff together in an event that combined scientific analysis, practical application and the joy of cooking.
Amrita University faculty Prof. Shyam Diwakar was an invited speaker at the School of Brain Cells & Circuits “Camillo Golgi” course titled “The cerebellum inside-out: cells, circuits and functions” held from December 1-5, 2016 at Erice, Italy. He gave a talk titled “Computational Neurosciences of Cerebellar Circuit Disorders” during the round table session.

The course was organized by Prof. Egidio D’Angelo of University of Pavia, Italy Prof. Claudia Wheeler-Kingshott of UCL, London, UK and Prof. Chris De Zeeuw of Erasmus University, Rotterdam, The Netherlands. The course was funded by European Union’s Human Brain Project, Centro Fermi, Ettore Majorana Foundation, University College London (UK); Erasmus University, (The Netherlands) and University of Pavia, Italy.

Speakers at the course included the following professors: Angus Silver, Claudia Wheeler-Kingshott, Paola Giunti, Raj Kapoor from UCL, UK; Egidio D’Angelo and Tomaso Vecchi from Pavia; Boris Barbour (ENS, France); Stephane Dieudonne, École des Neurosciences, Paris; Narender Ramnani from Royal Holloway (UK); Christian Hansel from Chicago, Laurens Witter from Harvard Medical School and VU; Arseny Sokolov from EPFL (Switzerland); Aleksandra Badura from Netherlands Institute for Neuroscience; Freek Hoebeek from Rotterdam, (Netherlands); Peter Strick from Pittsburg (USA); Diego Sepulveda-Falla (Hamburg, Germany); Prof. Shyam Diwakar (India).

Amrita School of Biotechnology’s Computational Neuroscience lab has been working in collaboration with University of Milan and University of Pavia, Italy since 2009 and also via Indo-Italy Program of Cooperation 2012-14. The course was organized at the Ettore Majorana Foundation and Centre for Scientific Culture and the International School of Brain Cells and Circuits was dedicated to the Italian Nobel Laureate, Camillo Golgi.


