2014 World Economic Forum Young Scientists

Each year the World Economic Forum recognizes outstanding researchers under the age of 40 who are pioneering new fields and leading in the pursuit of answers for global impact and the common good.

Computational biology and neuroscience of learning and memory

Panayiota Poirazi is Research Director at the Institute of Molecular Biology and Biotechnology, FORTH, Greece. Her lab develops computational methods and tools for analysing large-scale gene expression data related to human cancer in search of gene markers and disease sub-categories; identifying regulatory elements such as miRNA precursors and their targets in whole genomes of plants and mammals; building theoretical models of gene regulatory networks; and modelling healthy and degenerated brain cells and neural networks to relate learning and memory capacity with biophysical and/or morphological properties. She holds a Bachelor degree in Mathematics from the University of Cyprus, and Master and PhD in Computational Neuroscience from the University of Southern California.

Human-computer interaction

Chris Harrison is Assistant Professor at the Human-Computer Interaction Institute at Carnegie Mellon University, where he investigates novel sensing technologies and interaction techniques, especially those that empower people to interact with small devices in big ways. Prior, he was CTO at Qeexo, a touchscreen technology start-up. Harrison was recently named as one of the top 30 scientists under 30 by Forbes, a top 35 innovator under 35 by the MIT Technology Review, and one of six innovators to watch by Smithsonian magazine. He is also the recipient of fellowships from Google, Microsoft Research and Qualcomm.

Optical sensors

Andrea Armani is the Fluor Early Career Chair in Engineering and Associate Professor of Chemical Engineering and Materials Science at the University of Southern California. Armani is the recipient of several awards, including the Office of Naval Research Young Investigator Award, the Presidential Early Career Award for Scientists and Engineers, and NIH Director's New Innovator Award. She has a Bachelor in Physics from the University of Chicago and a PhD in Applied Physics from the California Institute of Technology.

Drug discovery and science diplomacy

Mande Holford is an Assistant Professor of Chemical Biology at Hunter College in New York. Her research combines chemistry and biology to discover, characterize and deliver novel neuropeptides from venomous marine snails as tools for manipulating cell signalling in the nervous system. She is actively involved in science education, advancing the public understanding of science and science policy. She has a scientific appointment at the American Museum of Natural History. Holford is a Member of the American Association for the Advancement of Science (AAAS), American Chemical Society, American Peptide Society and New York Academy of Sciences. She earned her PhD at Rockefeller University.

Adapting sustainable energy systems

Inês Azevedo is Associate Professor in the Department of Engineering and Public Policy at Carnegie Mellon University, and Co-Director of the Climate and Energy Decision Making Center. Her research interests lie at the intersection of environmental, technical and economic issues, such as how to address the challenge of climate change and move towards a more sustainable energy system. Azevedo is author of numerous peer-reviewed journal publications and co-author of two reports from the National Research Council. She received the Early Career Award from the Dean of the Carnegie Institute of Technology. Azevedo has a BSc in Environmental Engineering, a MSc in Engineering Policy and Management of Technology from the Technical University of Lisbon, and a PhD in Engineering and Public Policy from Carnegie Mellon University.

Modelling of material and biological mechanics

Antoine Jérusalem is an Associate Professor in the Department of Engineering Science Education at the University of Oxford, with research interests in computational mechanics of materials, large-scale parallel simulations and multi-scale cell mechanics. He is also the Founder of the International Brain Mechanics and Trauma Lab. Prior, Jérusalem was Head of the Computational Mechanics of Materials Group, a Visiting Researcher at the IMDEA Materials Institute in Spain, and Research Assistant at MIT. Jérusalem received a Diplôme d'Ingénieur from Ecole Nationale de l'Aéronautique et de l'Espace in France, and an MSc in Aeronautics and Astronautics and a PhD in Computational Mechanics of Materials from the Massachusetts Institute of Technology (MIT).

Machine vision

Michael Bronstein is an Assistant Professor at the Institute of Computational Science in the Faculty of Informatics at the University of Lugano in Switzerland. He also serves as a research scientist at Intel. Bronstein's research interests include geometric methods in computer vision, pattern recognition and computer graphics. He has worked on 3D data acquisition and processing, which was the technological core of the Israeli start-up Invision to develop a low-cost 3D sensor. Bronstein has authored over 70 publications in leading journals and conferences, over a dozen of patents and the book "Numerical geometry of non-rigid shapes". His research was recognized by numerous awards and was featured in CNN, SIAM News and Wired. Bronstein received his PhD from the Technion.

Nanotechnology and medical diagnostic devices

Wendy Dittmer is Principal Scientist of Philips Research at Royal Philips where she leads teams developing innovative new healthcare solutions helping to shape the strategic portfolio for corporate research. Her research interests include diagnostic and interventional devices, cardiology and miniaturized sensing and imaging technologies. Dittmer has a PhD in Chemistry, with a specialization in nanocrystal devices, from the University of California, Berkeley. She is a Member of the European Society of Cardiology.

Bioremediation and waste water management

Noble Banadda is Professor and Chair of the Department of Agricultural and Bio Systems Engineering at Makerere University in Uganda. He has field experience in design and operation of wastewater-activated sludge systems, anaerobic digestion of wastewaters and sludges, and bioremediation processes of soils, as well as experience in various aspects of mathematical modelling of bioprocesses, food processing engineering and biosystems. Banadda received a BSc in Food Science and Technology from the Sokoine University of Agriculture in Tanzania, an MSc in Processing Engineering and PhD in Chemical Engineering. He was also a Cochran Fellow at the Massachusetts Institute of Technology.

Stem cells, tissue engineering and 3D bioprinting

Ivana Gadjanski is an Assistant Professor at Belgrade Metropolitan University, with research interests in the field of stem cells and tissue engineering. She is the Founder of Pubsonic, a biomedical search engine start-up, and the Fab initiative, a non-profit that supports entrepreneurship in the STEAM field in Serbia and the Western Balkans. She also established Serbia's first Fab Lab, a workshop for rapid prototyping and a 3D bioprinting facility at the R&D Center for Bioengineering. Gadjanski has been a Fulbright and TED Fellow and a Member of the Global Young Academy. She earned a PhD in Neuroscience in Germany.

Cognitive neuroscience and the study of consciousness

Morten Overgaard is Professor in Cognitive Neuroscience at the Institute of Clinical Medicine, University of Aarhus, Denmark. A leader of many large-scale European research projects, he studies the relationship between conscious experience and brain processes from a combined experimental, philosophical and neurorehabilitation perspective. Overgaard is a pioneer in translational neuroscience, investigating how subjective consciousness relates to behavioural measures and brain processes. His research is guided by the integration between humanities/philosophy of mind and neuroscience; and between clinical work (neurorehabilitation and psychiatry) and basic research. He works on theories of the brain that include subjective experience. Overgaard holds an MA in Psychology from the University of Copenhagen and a PhD from Aarhus University.

Neurological origins of the embodied self

Aikaterini Fotopoulou is Senior Lecturer, Psychoanalysis Unit at the University College London (UCL). Fotopoulou heads a research lab that focuses on the relationship between brain, body and mind. She is also Director of the London Neuropsychoanalysis Fund, a registered charity. Fotopoulou is a recipient of the Elizabeth Warrington Early Career Prize from the British Neuropsychological Society. She studied neuropsychology and psychoanalysis, and holds a PhD in Cognitive Neuroscience from the University of Durham.

CRISPR tool for editing DNA

Feng Zhang is a Core Member of the Broad Institute of MIT and Harvard, where he is revolutionizing the fields of genomics and neuroscience. Zhang has developed a technique for editing DNA called CRISPR. This tool allows researchers to identify a corrupted segment in a sequence of DNA that leads to disease so that it may be deleted or replaced by other genetic material. Although his main focus is the molecular machinery of brain cells, the potential applications of this technology extend well beyond neuroscience. With these tools, researchers can deepen their understanding of how the genome works, examining the failures that lead to disease. He is recipient of the Perl/UNC Prize in Neuroscience, the NIH Director's Pioneer award and the National Science Foundation's Alan T. Waterman award. He has also received technology innovation awards from the McKnight and Damon Runyon foundations, and the International Society for Transgenic Technologies.

Soft and flexible interfaces and electronic skins

Stéphanie P. Lacour is an Assistant Professor at the School of Engineering at the Ecole Polytechnique Fédérale de Lausanne, in Switzerland. She pioneered the development of stretchable electronics, demonstrating elastic metallization and the first stretchable electronic circuit. Lacour was named one of the "Top 35 Innovators under the age of 35" by the MIT Technology Review in 2006. She was also awarded a University Research Fellowship from the Royal Society in 2007 and the Zonta Award in 2011 for her research achievement as a young female academic. Lacour is the recipient of an ERC starting grant entitled Electronic Skins, aiming at defining the foundations of a prosthetic skin that restores natural touch sensations for patients wearing an artificial hand. She is also a 2012 Volume Organizer for the MRS Bulletin and organizes, since 2006, a symposium on soft electronics and neural interfaces at international MRS meetings. Lacour received her PhD in Electrical Engineering from INSA de Lyon in France, and completed postdoctoral research at Princeton University and the University of Cambridge.

Quantifying water use

Maite Martínez Aldaya is a Research Associate with the Botin Foundation and Water Footprint Network's Water Observatory in Spain. She has worked on water management, consumption, production and trade issues at the European Commission, United Nations, University of Twente, Public University of Navarra, Complutense University and Technical University of Madrid. She has also worked as a consultant to the United Nations Environment Programme (UNEP). Martínez Aldaya is a Member of the Young Global Academy. She received an MSc in Environmental Policy and a PhD in Ecology from the London School of Economics.

New material science

Michelle Moram is a materials physicist working on new technologies for water treatment and sustainable energy generation in the developing world. She is currently a Lecturer in Energy Materials in the Faculty of Engineering, Department of Materials, at Imperial College London. Prior to joining Imperial, she spent five years developing III-nitride semiconductors as an independent Oppenheimer Research Fellow and Jesus College Research Fellow at the Departments of Materials Science and Physics at the University of Cambridge. Moram is a Royal Society University Research Fellow at Imperial College London and a recipient of numerous honours, including the Leverhulme Research Leadership award, the IOM3 Silver Medal and the BACG Young Scientist of the Year award. She received her PhD from the University of Cambridge.

Science policy and cellular biology

Vanny Narita is a government-led Innovation Program Specialist at the National Innovation Committee of the Republic of Indonesia. She is also a Researcher at the Agency of the Advancement and Application of Technology. Her research focuses on valuable recombinant protein expression, working closely with industries within Indonesia's Vaccine and Medicine Consortium. Narita is the National Contact Point for Health for Horizon 2020-EU. She is a Member of the Global Young Academy.

Drug discovery and regulatory policy

Vidushi Neergheen-Bhujun is a Senior Lecturer at the University of Mauritius, specializing in applied biochemistry and pharmacognosy. This includes basic research and clinical trials to determine health-promoting and disease management potential of traditional herbal, endemic medicinal and food plants against several non-communicable diseases. She is also interested in assisting the development of national policies and programmes for the regulation of herbal medicine and functional food in Mauritius. Neergheen-Bhujun is a Member of the Global Young Academy, with executive positions in 2012 and 2013. She also leads the secretariat of the Society for Free Radical Research Africa. Neergheen-Bhujun has a PhD in Biosciences from the University of Mauritius.

Mathematical statistics applied to the natural sciences

Victor M. Panaretos is Associate Professor of Mathematical Statistics at Ecole Polytechnique Fédérale de Lausanne (EPFL) in Switzerland, where he leads a group of eight researchers developing mathematical statistics for complex data structures. At the age of 24, he became the youngest faculty member ever to hold a chaired professorship at EPFL and then one of the youngest ever ERC Starting Grant Awardees. Panaretos is the recipient of the Erich Lehmann Award for an Outstanding Doctoral Thesis in Theoretical Statistics. He has a PhD from the University of California, Berkeley.

Applied mathematics and biostatistics for public health

Roger Peng is Associate Professor of Biostatistics at the Johns Hopkins Bloomberg School of Public Health in the US. His main research interest focuses on developing and applying novel statistical methods to assessing the health impacts of environmental pollutants. Peng is Co-Founder of the Johns Hopkins Data Science Specialization offered through Coursera. He has a BSc in Applied Mathematics from Yale University and a PhD in Statistics from UCLA.

New materials science and energy storage systems

Jennifer Rupp is Head of the Department of Materials at ETH Zurich in Switzerland. Her main research interests are on materials development and structure-transport relations for information memory storage, microsystems and energy conversion and storage systems. This includes new device design concepts and performance testing. Rupp is an elected member of the European Academy of Science for Chemistry and on the editorial board of the Journal of Electroceramics. She is the winner of the Spark Award 2014 by ETH Zurich for the most innovative and economically important invention of the year for a new memristor information storage concept. Rupp studied mineralogy and crystallography at the University of Vienna in Austria and received her PhD in Material Science from ETH Zurich.

Radio astronomy and cosmic magnetic fields

Anna Scaife is a Reader at the School of Physics and Astronomy at the University of Southampton in the United Kingdom. Her research includes pioneering work in the study of galaxy stability and evolution through radio astronomy which allows for the observation of cosmic-ray electrons and magnetic fields invisible to optical telescopes. Her research is laying the ground work for understanding how cosmic magnetic fields are generated and for experiments planned for the Square Kilometre Array.

Superconductors

Suchitra Sebastian is an Associate Professor in the Department of Physics at the University of Cambridge. Her research interests are in the area of correlated electron systems, particularly in novel materials. Sebastian is the recipient of numerous awards, including the: Junior Research Fellowship, Trinity College, Cambridge University (2006); Lee Osheroff Richardson North American Science prize (2007); Young Scientist Medal in Magnetism, International Union of Pure and Applied Physics (2012); Moseley Medal, Institute of Physics (2012); Women in Science Fellowship to develop the next generation of superconductors, L'Oreal-UNESCO (2013); and a five-year European Research Council starting grant (2014). Sebastian earned an MSc and PhD in Applied Physics from Stanford University in the US, and an MBA from the Indian Institute of Management in India.

Graphene quantum electromechanical systems

Christoph Stampfer is a Professor in the Department of Physics and Head of the Second Institute of Physics A at RWTH Aachen University in Germany. His research interests include the fields of microelectronics and nanotechnology, with a particular focus on carbon based microelectronics. Stampfer has authored and co-authored more than 100 papers for Nature Physics, Nano Letters, Physical Review Letters and Applied Physics Letters, among others. He is the recipient of an ERC Starting Grant to work on graphene quantum electromechanical systems. Stampfer earned a BSc in Applied Physics from the University of Edinburgh and a PhD from the ETH Zürich in Switzerland.

Human-computer interaction

Sriram Subramanian is a Professor of Human-Computer Interaction in the Computer Science Department at the University of Bristol in the United Kingdom. His research focuses on expanding the possibilities of user experiences when interacting with computer-mediated environments through the use of haptics, visual and smell modalities. Subramanian is also Co-Founder of Ultrahaptics, which brings back the sense of (tactile) touch to touchless interfaces, creating the experience of feeling without touching. Prior, he was a Senior Scientist at Philips Research Eindhoven in the Netherlands. Subramanian has an undergraduate degree in physics, an MA in Electrical Communication Engineering and a PhD in Industrial Design.

Medical nanotechnology

Peter Tessier is an Associate Professor of Chemical & Biological Engineering at Rensselaer Polytechnic Institute (RPI) in the US. His research interests focus on designing and optimizing a class of large therapeutic proteins (antibodies) that hold great potential for treating human disorders ranging from cancer to Alzheimer's disease. Tessier is the recipient of a number of research awards, including a Humboldt Fellowship for Experienced Researchers, the Pew Scholar Award in Biomedical Sciences and the National Science Foundation CAREER Award.

Self-assembly of DNA

Yin Peng is an Assistant Professor in Systems Biology at Harvard Medical School and a Faculty Member of the Wyss Institute for Biologically Inspired Engineering at Harvard University. His research interests lie at the interface of information science, molecular engineering and biology. His current focus is to engineer information directed self-assembly of nucleic acid (DNA/RNA) structures and devices, and to exploit such systems to do useful molecular work. Yin is the recipient of several awards, including: NIH Director's New Innovator Award (2010); NSF CAREER Award (2011); DARPA Young Faculty Award (2011); ONR Young Investigator Program Award (2011); NIH Director's Transformative Research Award (2013); NSF Expedition in Computing Award (2013); and ACS Synthetic Biology Young Scientist Award (2014).

Applied mathematics

Erez Aiden is an Assistant Professor in the Department of Genetics at the Baylor College of Medicine, where he directs the Center for Genome Architecture, and in the Department of Computer Science and Computational and Applied Mathematics at Rice University. His research has made fundamental contributions to a large variety of disciplines, including molecular biology, polymer physics, historical linguistics, wearable computing, and mathematics. These include: development of a three-dimensional genome sequencing method; discovery of dynamic reorganization of the genomic architecture to facilitate gene expression or silencing; the characterization of the genome as a "fractal globule;" quantitative analysis of the evolutionary dynamics of language which led to the discovery that the rate of verb regularization depends on the inverse-square of its usage frequency. He has over 20 patents in various stages of filing. Co-inventors include Bob Langer, Nathan Myhrvold and Bill Gates.

Pollinator health and pollination services

Nigel Raine is Researcher in Ecology, Evolution and Behavior, School of Biological Sciences, Royal Holloway, University of London. Understanding and ameliorating the causes of global bee declines has important consequences for the pollination of food crops and wild flowers. Our reliance on agricultural chemicals (e.g. pesticides) to boost crop quality and yield is one environmental stressor that could have a significant detrimental impact on both wild and managed bees. Pesticides act on insects by disrupting the normal flow of information through the nervous system, so even when applied at levels that are not fatal it is likely that they could affect behaviour. His research aims to answer how field relevant exposure to multiple pesticides affects the behaviour of individual bees and consequently colony function in social species.

Game design for social progress

Jessica Hammer is Assistant Professor at Carnegie Mellon University, jointly appointed between the Human-Computer Interaction Institute and the Entertainment Technology Center. She studies how games can change the way people think, feel and behave. Other research interests include creativity, gender, mobile technologies and community design. She earned a PhD in Cognitive Studies in Education at Columbia University.