Citation

For pioneering contributions for computer vision and for computational neuroscience

Dr. Olivier Faugeras

Position and Organization :
Director, NeuroMathComp Laboratory
Inria Sophia Antipolis Méditerranée (France)

Doctorate : Ph.D. in Computer Science (Univ. of Utah, USA, 1976)
Sc.D. in Mathematics (Univ. of Paris VI, France, 1981)

Date of Birth : December 22, 1949

Brief Biography :
1968　B.S. in Mathematics and Physics, Lycée Louis le Grand (Paris, France)
1971　M.S. in Mathematics and Physics, Ecole Polytechnique (Paris, France)
1973　M.S. in Electrical Engineering, Ecole Nationale
　　　　Supérieure des Télécommunications (Paris, France)
1976　Ph.D. in Computer Science, Univ. of Utah (Salt-Lake-City, USA)
1976-79　Junior Scientist, Inria Rocquencourt (France)
1979-80　Assistant Prof., Univ. of Southern California,
　　　　(Los Angeles, USA)
1980-81　Associate Prof., Univ. of Paris XI, Orsay
1981　Sc.D. in Mathematics, Univ. of Paris VI
1981-89　Senior Scientist, Inria Rocquencourt
　　　　Director, Image Processing Lab.
　　　　Director, Robotics and Vision Lab.
1984-96　Associate Prof., Applied Mathematics and Computer
　　　　Science, Ecole Polytechnique (Palaiseau, France)
1989-2001　Senior Scientist, Inria Sophia Antipolis Méditerranée (France)
1996-2001　Adjunct Prof., EECS, member of the AI Lab., MIT
2002-08　Director, Odyssée Lab., Inria Sophia Antipolis
　　　　Méditerranée, Ecole Normale Supérieure,
　　　　and Ecole Nationale des Ponts et Chaussées
2008-　Director, NeuroMathComp Lab., Inria Sophia Antipolis
　　　　Méditerranée and Univ. of Nice Sophia Antipolis

Main Awards and Honors :
1989　Fiat Institut de France Foundation Prize
1998　France Telecom Prize awarded by the French Académie
　　　　des Sciences
2007　Doctor Honoris Causa, Univ. of Karlsruhe (Germany)
2008　Koenderink Prize for the Most Influential Papers
　　　　Published in ECCV from 1990 to 1998
　　　　(together with Quang-Tuan Luong and Steve Maybank)
2009　Winner of the IDEAS call of the European Research
　　　　Council (ERC)

French Académie des Sciences, member
National Academy of Technologies of France, member
World Technology Network, member

Main Achievements :

Dr. Faugeras was born on December 22, 1949 in Neuilly-sur-Seine, France. He earned his Bachelors degree in Mathematics and Physics from the Lycée Louis-le-Grand, Paris (1968), a Masters in Mathematics and Physics from the Ecole Polytechnique, Paris (1971), and a doctor of Philosophy (Ph.D.) degree in Computer Science from the University of Utah, Salt Lake City (1976). After spending a year as an Assistant Professor at the University of Southern California, Los Angeles (USC) he joined the University of Paris XI, Orsay, France, in 1980, as an Associate Professor. He earned a doctor of Science (Sc.D.) in Mathematics from the University of Paris VI (1981). The same year he started the Robotics and Vision laboratory at INRIA Rocquencourt of which he was the Director until 1989 when he moved the laboratory to Inria Sophia Antipolis in the South of France. He continued teaching, as an Associate Professor at the Ecole Polytechnique from 1984 to 1996, and as an Adjunct Professor at MIT, from 1996 to 2001. In 2002 he started the Brain Images Analysis Laboratory (Odyssée) at Inria Sophia Antipolis which he directed until 2008 when he started the Mathematical and Computational Neuroscience Laboratory (NeuroMathComp) which he has been leading since then. He co-founded two companies in France.

One of his important contributions to image analysis and computer vision is to the generic problem of matching. For the localization and recognition of two- and three-dimensional objects in grayscale images and range data he developed very efficient tree search techniques based on the representation of the rigid and affine transformations between models of the objects and segmented image data. Expanding on these ideas and in view of using them for robot navigation applications he developed a method to seamlessly integrate 3D noisy data obtained by a mobile robot equipped with binocular and trinocular stereo. Some of the resulting algorithms were implemented on specific hardware with industrial partners in the framework of large projects funded by the European community.
In 1993 he published "Three-Dimensional Computer Vision: a Geometric Viewpoint" at MIT Press.

One subproblem in 3D reconstruction turned out to be critical. This is the so-called camera calibration problem. This apparently very technical question turned out to be deeply connected to very interesting mathematics such as group theory and algebraic geometry. This observation allowed him to revolutionize the field of camera calibration by allowing to calibrate from the environment without the use of beacons and, perhaps more importantly, to describe completely what kinds of 3D reconstructions could be obtained from various levels of calibration through the use of projective, affine and Euclidean invariants. The theory that he developed turned out to be the source of many applications in the advertising and media industries. In 2001 he published "The Geometry of Multiple Images: the laws that govern the formation of multiple images of a scene and some of their applications" at MIT Press.

Starting in 2002 he became interested in the processing and analysis of brain images, including several modalities of Magnetic Resonance imagery (MRI) as well as magneto- and electro-encephalography (MEEG). He developed new methods for fusing fMRI and MEEG data. He also worked on the direct and inverse problems in MEEG to efficiently solve the Maxwell equations in a very complicated geometry, that of the human brain. For this he developed new techniques based on the theory of harmonic functions.

He then turned his attention to the problem of discovering and studying good models of the brain electrical activity. He addressed two related key issues. One is the question of the spatiotemporal scales at which to focus the models, and how to bridge these scales. Another one is the question of deterministic versus stochastic modeling.

Using bifurcation theory he proposed a mathematical framework encompassing a large variety of equations at several spatial scales. He has used these theoretical developments to model large cortical areas and such neuronal diseases as epilepsy. Using probability theory, he has developed ways of relating two different spatial scales such as the scale of the individual neurons and that of a cortical area. Starting from a detailed description at the level of individual neurons he developed new sparse and accurate representations at the mesoscopic scale: these can be used to predict emerging phenomena which play a prominent role in shaping our cognitive abilities.
Among his institutional contributions is the co-creation in 2011 of the Journal of Mathematical Neuroscience, published by Springer.

In honor of these achievements, Dr. Faugeras was one of the youngest scientists elected at the French Académie des Sciences and at the National Academy of Technologies of France. He was the recipient of the World Technology Award in 2001. He was also made Doctor Honoris Causa from the University of Karlsruhe in 2007.

For pioneering contributions for computer vision and for computational neuroscience, Dr. Olivier Faugeras is hereby awarded the Okawa Prize.