



UNIVERSITY OF CENTRAL FLORIDA
CENTER FOR RESEARCH IN COMPUTER VISION

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“General Geometric Models of Image Formation”
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ABSTRACT

I will present in this talk some recent work aimed at understanding the geometry of very general imaging systems that may include refractive and reflective interfaces. A key observation is that, irrespective of the optics, any image is formed by intersecting some sensor array with a 2D family of straight lines (the impinging light rays) forming a so-called line congruence. Line geometry is thus the key to a unified theoretical framework for 3D computer vision. Concretely, I will revisit multi-view geometry using the concurrent lines variety formed by n -tuples of lines that meet at a point, leading to new characterizations of geometric consistency for point correspondences. I will also use geometric and analytical models of line congruences to extend this approach to completely general camera models, including pinhole, two-slit, and catadioptric cameras in a unified way. In particular, I will present novel structure-from-motion and self-calibration algorithms for two-slit cameras, and discuss completely new camera designs based on the proposed framework.

BIOGRAPHY

Jean Ponce is a Professor at Ecole Normale Supérieure in Paris, France, where he heads the Department of Computer Science. Dr. Ponce is an IEEE Fellow and a Sr. Member of the Institut Universitaire de France. He is the recipient of two US patents and an Advanced ERC grant, and was awarded the CVPR Longuet-Higgins prize in 2016. He has served on the editorial boards of several international journals in Computer Vision and Robotics, and was the Editor-in-Chief of the International Journal of Computer Vision from 2003 to 2008. He also served as Program Chair of the 1997 IEEE Conference on Computer Vision and Pattern Recognition, General Chair of the 2000 edition of that conference, and General Chair of the 2008 European Conference on Computer Vision. Dr. Ponce is the co-author of "Computer Vision: A Modern Approach", a textbook that has been translated in Chinese, Japanese, and Russian, and is working on a new book, "Geometric Foundations of Computer Vision".