

Efficient Search for the Optimal Control of Biological Control Systems

Chih-Ming Ho

Center for Cell Control and Institute for Cell Mimetic Space Exploration

Henry Samueli School of Engineering and Applied Science

University of California, Los Angeles

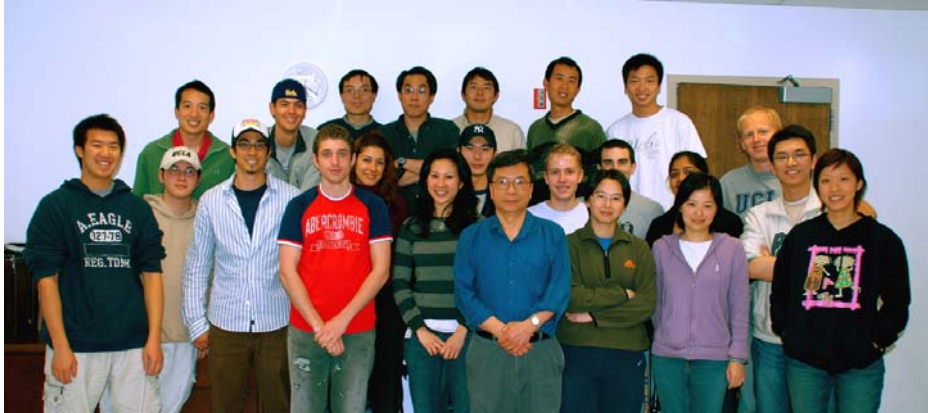
Los Angeles, California 90095

A universal goal of technological development, including nanotechnology, is the enrichment of human life. A disparity of nine orders of magnitude separate the length scales of a human (a meter) and the nanometer, presenting significant technical challenges. This goal will ultimately be achieved through the development of a definitive pathway that uses existing and future technology to paint the new roadmap from the nanoscale to enrich human life.

As the length scale increases, the molecular properties may not preserve and new properties will emerge. The challenges in exploring the governing mechanisms across a wide span of length scales is best stated by P. W. Anderson in his paper published in *Science* (1972) as “at each level of complexity entirely new properties appear, and the understanding of the new behaviors requires research which I think is as fundamental in its nature as any other.” In addition, the information contents will increase as the system length scale grows.

Millions of molecules form a biological cell and self organize into coherent cellular functions. These molecules are regulated by information rich network of pathways which are still far from complete comprehension. Cell is truly an efficient and autonomous micron-scale “factory”. Sometimes, malfunctions, caused by disease, may happen to the “factory”. In this presentation, we will illustrate schemes for efficiently searching of the most potent drug cocktail from a large number of possible drug combinations for therapeutic intent.

Dr. Chih-Ming Ho



Dr. Chih-Ming Ho received his Ph.D. from The Johns Hopkins University and holds the Ben Rich-Lockheed Martin Chair Professor in the UCLA School of Engineering. He is the Director of the Institute for Cell Mimetic Space Exploration (<http://www.cmise.org>) and the Director of Center for Cell Control (<http://CenterForCellControl.org>). He served as UCLA Associate Vice Chancellor for Research from 2001 to 2005.

Dr. Ho is known for his work in micro/nano fluidics, bio-nano technologies and turbulence. He was ranked by ISI as one of the top 250 most cited researchers worldwide in the entire engineering category. In 1997, Dr. Ho was inducted as a member of the National Academy of Engineering. In the next year, he was elected as an Academician of Academia Sinica. Dr. Ho holds five honorary professorships. He has published 260 papers and presented over 130 keynote talks in international conferences and 15 named distinguished talks. Dr. Ho was elected Fellow of the American Physical Society as well as American Institute of Aeronautics and Astronautics for his contributions in a wide spectrum of technical areas.