Statement on Research and teaching

My doctoral work was in the area of Robust Control. Initially I was looking at Neural Networks and Fuzzy Logic and some simulation studies. However, I preferred to switch over to a more rigorous approach of applying differential game theoretic techniques for the H_∞ control of Nonlinear Systems. I have attempted to integrate the measures of robustness and intelligence in the game theoretic framework.

Dynamic Programming was an integral part of my thesis and working extensively on this goaded me to look at the "computational" issues. Consequently, I started looking at the Linear Control Synthesis problems from a computational complexity point of view and discovered certain interesting issues; for instance, the pole placement problem with constraints is computationally hard, and the complexity of simple output feedback control problem is unknown. This problem is still in the list of open problems in Systems & Control. Complexity theory provides a rigorous mathematical framework to study such problems and prompts us to invent computationally tractable algorithms. This line of research is very pragmatic since computation is now regarded as an equal and indispensable partner along with theory and experiment in engineering practice. In the year 2001 I was invited to visit the Institute of Mathematical Sciences (www.imsc.res.in) Chennai, as an associate professor. This institute has provided facilities for my carrying out this research for three years. Towards late 2002, the Department of Science & Technology (DST) of the Government of India has approved my proposal for further research in this direction on a larger scale and funded me under its Young Scientists scheme. I am currently looking into Robust Control Synthesis using Statistical Learning Theory (SLT), Randomized Algorithms, and Real Computation.

In May 1996 I joined the National Institute of Technology Tiruchirappalli as a lecturer in the fledgling department of Instrumentation and Control Engineering. Owing to the wider spectrum of courses offered here, I devised the "Control Stream" with core courses Mathematics, Network Theory, Signals and Systems, Microelectronics, Operational Amplifiers, Control Systems – I & II, Modern Control Theory (in that order), and related electives like Robotics, Automotive Control Systems, and Intelligent Control. Most of these are regularly offered by me. Over the past seven years this stream has evolved quiet well with a rich blend of mathematical rigor and physical intuition. I have also developed a Control Systems Laboratory where low cost electrical network elements and hands-on experimentation are preferred to expensive demonstration modules.