Memorial

Guanrong Chen

Dear Rui, all of a sudden you departed from this world, leaving me with mixed feelings of disbelief: unexpected, unwanted and unprepared, along with a great deal of sadness and sorrow. You had been persistently fighting with many troubles and difficulties through your lifetime, mostly won victories and celebrations, but finally failed in a valiant battle with Parkinson's disease and thereby left us on July 22, 2013, in College Station, Texas.

Rui, you might remember College Station is the very place where I got your first phone call in the spring of 1987, which completely changed my life and career. "Hello, Ron Chen? Howdy!" To me, it was a surprising call in a sweet voice from a stranger mimicking an Aggie. "I read your two recent papers and found that they matched quite well with my current research projects. Would you like to come to Rice University to work with me as a post-doctoral fellow?" Well, you got your expected answer: *Yes*!

I remember my first question for you was something like, you are Indian but how come you have a Portuguese name? You smiled, and then explained. You were born in Panjim, Goa, India in 1929, which was a small Portuguese overseas territory beginning in the early 16th century for about 450 years until it was annexed by India in 1961.

With your support to the start of my academic career, I was appointed Visiting Assistant Professor in Electrical and Computer Engineering after one year of my arrival to Rice. Through my three years of association with you at Rice, I gradually learned more about you and your past, which garnered me a lot of respect to you—both as an established academic as well as an amazing human being. I learned that even in earlier ages, you had already demonstrated your high talents, not only musically—opting to turn down the admission to piano studies at Trinity College of Music in London, but also academically—choosing instead to attend MIT in Boston for your undergraduate and later graduate studies in electrical engineering. That fairy tale went back to year 1947.

Afterwards, Rui, I learned that during your graduate studies at MIT, you took time off to visit your family in

Rui de Figueiredo and Ron Chen at IEEE ISCAS'08, Seattle.

Lisbon, Portugal, where you started research with the Portuguese Atomic Energy Commission using the experimental nuclear reactor located in Sacavem. A few years later you returned to Boston and completed your Ph.D. degree in Applied Mathematics from Harvard University in 1959. You then returned to Portugal again, where you served as the head of the Applied Mathematics and Physics Division of the Portuguese Atomic Energy Commission, representing Portugal as a diplomat and technical expert to deal with scientific and business duties in national as well as international affairs.

Rui, your wife Isabel told me that you two got married in 1961 and then moved back to the USA together, where you accepted a tenured position as an Associate Professor in the School of Electrical Engineering at Purdue University. In 1965, you and your family moved to Houston, Texas, where you became a jointly appointed Full Professor of Electrical Engineering and of Mathematical Sciences at Rice University for the following 25 years.

Rui, indeed there are many things I remember from my three years of association with you at Rice, and from the many years to follow.

I remember cheering you on in a small elegant chamber room at Rice to celebrate your receipt of the NCR Faculty Excellence Award in 1988.

Personalized Health Monitoring

The Department of Electrical and Computer Engineering at the University of Massachusetts Amherst (UMass Amherst) invites applications for one or more tenure-track positions in the field of Personalized Health Monitoring at the Assistant, Associate and Full Professor levels starting September 2014. We seek candidates who apply a solid background in computer systems engineering or electrical engineering to the challenges of personalized health monitoring.

With the founding of the $45 Million Center for Personalized Health Monitoring, UMass Amherst is catalyzing research to digitize biology. Research aimed at measuring activity, anatomy, physiology, environmental exposure, blood chemistry, and pathogen detection are all of interest. Potential technologies of interest include, but are not limited to, embedded system and software design, body area networks, wearable electronics, hi-frequency spectroscopy/imaging and electrochemical sensing.

The Center for Personalized Health Monitoring is part of University and Commonwealth of Massachusetts initiatives in the Life Sciences which have provided modern laboratory facilities and opportunities for interdisciplinary collaboration with researchers from the University of Massachusetts Medical School, Baystate Medical Center and several Research Institutes and Centers on campus. These positions are part of a recent call for four Faculty Positions in Biomedical Engineering at the University of Massachusetts Amherst.

Candidates must have an earned doctorate in ECE or related field at the time of appointment. Successful candidates will be expected to develop a strong externally funded research program; and must be committed to teaching undergraduate and graduate courses in computer systems engineering or electrical engineering. Interest in contributing to the development of a multidisciplinary biomedical education program is desirable. Rank and salary will be commensurate with qualifications and experience.

The search committee will begin reviewing applications on December 2, 2013. The search will continue until the position is filled (contingent on approval and funding). We strongly prefer candidates to submit their applications online at http://umass.interviewexchange.com/jobofferdetails.jsp?JOBID=42655 or http://umass.interviewexchange.com If necessary, applications can be mailed to PHM Search, ECE Department, UMass, Marcus Hall, 100 Natural Resources Road, Amherst, MA 01003.

The University of Massachusetts Amherst is an Equal Opportunity/Affirmative Action Employer, promotes diversity, and encourages applications from women and members of minority groups. The University seeks to increase the diversity of its professoriate, workforce and undergraduate and graduate student populations because broad diversity is critical to achieving the University's mission of excellence in education, research, educational access and service in an increasingly diverse globalized society. Therefore, in holistically assessing many qualifications of each applicant of any race or gender we would factor favorably an individual's record of conduct that includes students and colleagues with broadly diverse perspectives, experiences and backgrounds in educational, research or other work activities. Among other qualifications, we would also factor favorably experience overcoming or helping others overcome barriers to an academic career or degree.

I remember you brought me to NASA—Johnson Space Center, where we worked together for the Space Station Freedom project, involving such as robotics vision and control, which enabled me to establish industrial connections and to develop hand-on skills much beyond my major mathematics.

I remember many of your scientific contributions, of course. These contributions include the invention of generalized spline filters and, in particular, the Butterworth and Chebyshev generalized spline filters, useful for dynamical-source-model-based recovery of analog signals from linear observations. You had successfully applied your techniques to many projects in telecommunications, biomedical engineering and machine intelligence alike. For example, with some collaborators together you developed a neural-network-based algorithm for early detection of normal, dementia and Alzheimer's disease from brain image data, which was shown to outperform the clinical diagnostician to some extent. In addition, you had developed a generalized-moments-invariant/attributed-graph approach for 3D robotic vision, a new theory of photometric stereo for Lambertian surfaces, and some computer-oriented pattern recognition techniques for combined seismic-and-well-log-data-based analysis with application to petroleum exploration. Generations today don't realize that you and our peers are the modern day Edisons and Franklins.

In particular, I remember we worked together on one of your most favorite research topics, to which you made major contributions, about the generalized Fock space, denoted *F*. I always joked with you that this *F* stands also for Figueiredo, which is a reproducing kernel Hilbert space of nonlinear input-output maps of generic nonlinear dynamical systems. It was your suggestion to use a "linear" orthogonal projection in *F* for optimal recovery of underlying "nonlinear" maps from the system input-output data, producing an elegant theory in mathematics with some successful practice in data-information processing. When we started to prepare a technical book, which summarized this generalized Fock space theory and techniques, entitled *Nonlinear Feedback Control Systems: An Operator Theory Approach* (Academic Press, 1993), you showed me your very first book *Contributions to the Theory of Certain Non-linear Differential Equations* (Lisboa, 1960), a small-sized but very valuable treatise that not many friends knew about, which impressed me very much, thus motivated me to finish and publish our coauthored book soon after I left Rice.

I left Rice in 1990, when you accepted a joint position as a Full Professor of Electrical and Computer Engineering and of Mathematics at the University of California at Irvine, where you worked also as the Director of the Laboratory for Machine Intelligence and Soft Computing

of the California Institute for Telecommunications and Information Technology (Calit2), until you retired from there in 2007. You were so dedicated, enthusiastic and also energetic that, even in retirement with a new distinguished title as Above-Scale Research Professor, you continued your research activities as usual till the very last minute of your lifetime.

Rui, having said so much above, I have to confess that there are many good things about you and your past that I do not remember in detail. I do not remember exactly how many honors and awards you had received throughout your career, which were simply countless. Nevertheless, I do remember some of your notable awards, which include the IEEE Circuits and Systems (CAS) Society Technical Achievement Award (1994), IEEE CAS Society Golden Jubilee Medal (1999), IEEE Third Millennium Medal (2000), IEEE CAS Society Mac Van Valkenburg Award (2002), and Kapitsa Medal (2009). In addition, you were elected Foreign Member of the Russian Academy of Natural Sciences (RANS) in 2007. You were awarded, again by the RANS, the 2010 Golomb-Chilingar Medal of Honor for "Giants of Science and Engineering", in acclaim of your sustained life-long fundamental contributions to sciences and engineering and extraordinary international leadership in your profession. Last but not
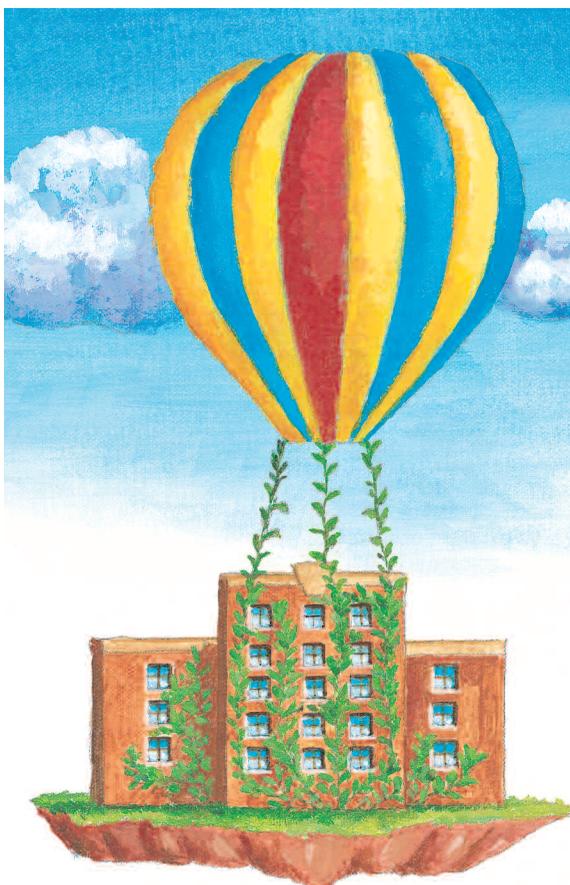
least, I would like to mention that you were elected IEEE Fellow in 1976 and served as the 1998 President of the IEEE CAS Society.

Rui, I also have to confess that we (a few colleagues together with nominator Prof Robert W. Newcomb from the University of Maryland) failed to name you for the forthcoming IEEE Gustav Robert Kirchhoff Award, to honor your "sustained pioneering contributions to mathematical foundations of signal and image processing and nonlinear networks; and turning them into technologies, with major impact on wide-ranging IT applications." For one reason, we were told that traditionally it recognizes awardees who are still alive today. In our hearts, however, your legacy will live on with or without anymore official recognitions.

Dear Rui, you treated everyone with kindness, trust and respect. My clear memories about you and your glorious past will refuse to fade away. As a tiny instance I remember you were the only one that I knew who used to say "so long" when hanging up the phone. Here let me say the same to you:

"So long, Rui. May God bless you forever!"

G Ron Chen
City University of Hong Kong