The Sharing Economy for the Smart Grid

The sharing economy. It is all the rage. Going on vacation? Rent out your home for extra income! Have space in your car? Pick up passengers for extra income! Companies such as AirBnB, VRBO, Lyft, and Uber have disrupted housing and transportation sectors. Their innovative business models are based on resource sharing that leverage underutilized infrastructure. They are enabled by peer-to-peer platforms that match eager sellers with willing buyers. Are there compelling sharing economy opportunities in the electricity sector? What products can be shared in tomorrow’s Smart Grid?

In this talk, we begin by exploring sharing economy opportunities in the electricity sector. We discuss regulatory and technical challenges to these opportunities. We then study the specific problem of a collection of firms sharing their electricity storage. We show that the investment decisions of the firms form a Nash equilibrium which supports the social welfare. We offer explicit expression for optimal storage investments and equilibrium prices for shared storage in a spot market. We discuss control technology platforms necessary for the physical exchange of power, and market platforms necessary to trade electricity storage.

We then explore the promise of trading excess PV generation in a sharing economy. We argue that this approach encourages investment in renewables, without imposing unsustainable tariff structures such as net-metering. We suggest that a location-based solar subsidy policy can maximize the social welfare of PV producers.

Kameshwar Poolla
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Thursday, September 28
4:00 – 5:00 PM
Electrical Engineering Building 045

Reception will take place at 3:30 PM in the lobby.

Diversity in Clean Energy (DiCE) coffee at 10:30 AM in MolES 315

About the Speaker
Kameshwar Poolla received his B.Tech. degree from the Indian Institute of Technology, Bombay in 1980; and his Ph.D. from the Center for Mathematical System Theory, University of Florida, Gainesville in 1984, both in Electrical Engineering. He served on the faculty of the Department of Electrical and Computer Engineering at the University of Illinois, Urbana from 1984 through 1991. Since 1991, he has been at the University of California, Berkeley, where he is now Professor in the Departments of Mechanical Engineering and Electrical Engineering and Computer Sciences. He has also held visiting appointments at Honeywell, McGill University, and MIT and has worked as a Field Engineer with Schlumberger AFR, Paris. He was co-founder of OnWafer Technologies, a start-up that offered yield enhancement and metrology solutions for the semiconductor industry. OnWafer was acquired by KLA-Tencor in 2007.

Dr. Poolla was awarded the 1984 Outstanding Dissertation Award by the University of Florida; the 1988 NSF Presidential Young Investigator Award; the 1993 Hugo Schuck Best Paper Prize; the 1994 Donald P. Eckman Award; a 1997 JSPS Fellowship; the 1997 Distinguished Teaching Award from the University of California, Berkeley; and the 2004 and 2007 IEEE Transactions on Semiconductor Manufacturing Best Paper Prizes. He is the Cadence Design Systems Distinguished Professor of Mechanical Engineering. Dr. Poolla has been awarded 5 patents.