

Training Experiences – Shashi Shekhar

Prof. Shekhar served as the P.I. (9/2008 – 7/2010) of an IGERT training grant, titled “IGERT: Non-equilibrium Dynamics Across Space and Time: A Common Approach for Engineers, Earth Scientists and Ecologists” (NSF DGE-0504195, \$2,819,194 (approx.), Aug. 2005 - July 2011). It brought together scholars of computer science, electrical engineering, ecology, civil & environmental engineering, and the earth sciences to study the interplay between landscape changes and ecosystem processes across a wide range of spatial and temporal scales and across interfaces, with an emphasis on non-equilibrium dynamics. This training grant led to a new interdisciplinary curriculum to help engineers consider environmental constraints in addition to economic constraints, and helped ecologists to understand effects of physical processes and materials transport on ecosystem dynamics. Over a dozen Ph.D. theses have resulted across multiple disciplines. He also served on the advisory board of two NSF IGERT programs at Buffalo and Maine. He has served on the advisory committee of GIS research and education programs in Brazil, Canada, India, Ireland, Saudi Arabia, has hosted Ph.D. students (e.g., Fullbright scholars) from many countries including Brazil, and India.

During his academic career, Shekhar has supervisor over 100 students including 26 Ph.D. students. Shashi has also mentored undergraduate students under the Undergraduate Research Opportunity Program, the National Science Foundation’s Research Experience for Undergraduates, and summer programs for underrepresented groups. His doctoral advisees are serving major research universities (e.g., U of Iowa, Virginia-Tech., Rutgers, North Carolina State Univ., Univ. of Texas at Dallas, etc.), premier federal laboratories (e.g., Oakridge National Laboratory (ORNL), National Geospatial-Intelligence Agency (NGA)), and industry (e.g., Uber, IBM-TJWatson, Microsoft, ESRI, Oracle Spatial, SAS). Many have risen to leadership roles. For example, Dr. Siva Ravada leads the Oracle Spatial group as a Senior Director. Dr. Ranga Raju Vatsavai served as the first Lead Data Scientist at USDOE ORNL and now serves as the Associate Director of the Center for Geospatial Analytics at the North Carolina State University. Dr. Jim Kang is a scientist at the NGA and has received prestigious awards from Director of National Intelligence. Shashi’s students also play prominent roles in professional societies (e.g., Lu, Vice-Chair, and Huang, Treasurer, at ACM SIG-Spatial) and conferences (e.g., Ravada, Lu, Zhang, and Huang, have served as conference chairs).

In mid-1990s, Shashi helped put together a curriculum and a proposal for a professional degree, the Masters in Geographic Information Science (MGIS) at the University of Minnesota. Since approval of the MGIS proposal, Shashi has created the first GIScience program within a Computer Science department by designing courses on spatial databases and spatial computing. At the time, there were few pedagogical materials available. To address the needs, Shashi co-published multiple survey papers a textbook and an encyclopedia. Shashi’s textbook on spatial databases (Prentice Hall, 2003) is highly regarded (850 citations) and used to teach spatial database topics around the world. It has international editions (e.g., India), and has been translated in to foreign languages (e.g., Chinese, Russian). Recently, Shashi led efforts to help professional education in GIS by co-editing an Encyclopedia of GIS (Springer, 2009). His Encyclopedia of GIS has over 200 articles, which have been downloaded over 130,000 times via Springer’s website. In addition, it is also available on Google Books. In addition, he has co-authored survey papers on spatial databases as well as spatial data mining. These survey papers are used in courses around the world.

To address the multi-disciplinary audience, Shashi’s courses discuss core ideas at three levels, namely, curiosity (20%), conceptual (30%) and technology (50%). Shashi’s excellent ratings in student evaluations show that this 3-tier format has made his courses effective on our campus and around the world. His recent (Fall 2014) massively open online course (MOOC), titled “From GPS and Google Maps to Spatial Computing” on Coursera attracted over 21,800 students from 182 countries and received frequent compliments such as “inspiring”, “well-structured”, “comprehensive”, and “engaging”. Many

remarked that the separation of concepts and the technology track was a brilliant masterstroke and allowed a diverse group to engage in the MOOC. Video-lectures from this course are available on youtube.com for public use.

Shashi served on the National Academies' committee on "Future U.S. Workforce for Geospatial Intelligence" (2012-2013) to assess current education and training programs, identify gaps, and suggest ways to build necessary knowledge and skills to ensure U.S. supply of geospatial professions for the next 20 years. The committee authored an influential report, which is shaping GIS graduate programs around the country. Earlier, he served two-terms (2003-2009) on the National Academies' Mapping Sciences Committee that provides independent advice to society and to government at all levels on geospatial science, technology, and policy including the issue of "human resources and education in support of the advancement of mapping science". At the University of Minnesota, he also served as a co-P.I. on a 5-year grant titled "U-Spatial: Support for Spatial Research", to create a campus resource to technical training and assistance to score of graduate students and researchers to support spatial sciences and creative activities. Due to the tremendous success of the U-Spatial project, it has become a part of research computing infrastructure at the University.