Biographical Sketch for Shashi Shekhar

Short Bio: Shashi Shekhar, a McKnight Distinguished University Professor at the University of Minnesota and an U.C. Berkeley alumnus, is a leading scholar of spatial computing and Geographic Information Systems (GIS). He is serving on the Computing Research Association (CRA) board, and as a co-Editor-in-Chief of Geo-Informatica journal (Springer). Earlier, he served as the President of the University Consortium for GIS (UCGIS), and on many National Academies' committees. Recognitions include IEEE-CS Technical Achievement Award, UCGIS Education Award, IEEE Fellow and AAAS Fellow. Contributions include algorithms for evacuation route planning and spatial pattern (e.g., colocation, linear hotspots) mining, an Encyclopedia of GIS and a Spatial Databases textbook. He has a long and successful history of collaborating with the Department of Defense (e.g., multiple grants from the National Geospatial Intelligence Agency and Army Geospatial Center).

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Professional Preparation

IIT, Kanpur, India,	Computer Science	B. Tech.,	1985
University of California, Berkeley	Computer Science	M.S.	1987
University of California, Berkeley	Business Administration	M.S.	1989
University of California, Berkeley	Computer Science	Ph.D.	1989

Appointments

2015 -	Distinguished University Teaching Professor	U of Minnesota
2005 -	McKnight Distinguished University Professor,	U of Minnesota
2001 -	Professor,	U of Minnesota
1995-2000	Associate Professor,	U of Minnesota
1989-1995	Assistant Professor,	U of Minnesota

Five Closely Related Products

1. *Intelligent systems for geosciences: an essential research agenda.* Communications of the ACM, 62(1): 76-84, 2018. (w/ Y. Gil et al.)

2. *A TIMBER Framework for Mining Urban Tree Inventories Using Remote Sensing Datasets.* IEEE Intl. Conference on Data Mining, 1344-1349, 2018. (w/ Y. Xie et al.)

3. *Theory-Guided Data Science: A New Paradigm for Scientific Discovery from Data*, IEEE Transactions on Knowledge and Data Engineering, 29(10): 2318-2331, June 2017. (w/ A. Karpatne et al.)

4. *Spatial ensemble learning for heterogeneous geographic data with class ambiguity: A summary of results.* In Proceedings of the 25th ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems, 2017. (w/ Z. Jiang et al.)

5. *Focal-test-based spatial decision tree learning.* IEEE Transactions on Knowledge and Data Engineering, 27(6): 1547-1559, 2014. (w/ Z. Jiang et al.)

Five Other Significant Products

1. *Transdisciplinary Foundations of Geospatial Data Science,* ISPRS Intl. Jr. of Geo-Informatics, 6(12), 2017. doi:10.3390/ijgi6120395. (with Y. Xie et al.)

2. *Encyclopedia of GIS* (2nd Ed.), Springer, 2017, isbn 978-3-319-17884-4. (Co-Ed. w/ H.

Xiong, and X. Zhou). (1st Edition in 2008, isbn 978-0-387-30858-6)

3. *Spatial Computing*, Communications of the ACM, 59(1): 72-81, 2016 (cover article). (w/ S. K. Feiner, and W. G. Aref)

4. *Spatiotemporal Data Mining: A Computational Perspective*, ISPRS Intl. Jr. of Geo-Information, 4(4), 2306-2338, 2015. (w/ Z. Jiang et al.)

5. *A Tour of Spatial Databases*, Prentice Hall, 2003, isbn 013-017480-7. (w/ S. Chawla)

Synergistic Activities

- Technical contributions in computational methodologies: Received the IEEE-CS Technical Achievement Award (2006) and was elected an IEEE fellow (2003) as well as an AAAS Fellow (2008) for contributions to spatial database storage methods, data mining, and geographic information systems (GIS). Technical contributions include scalable algorithms for evacuation route planning, connectivity clustered access methods for storage of roadmaps, colocation patterns for spatial data, etc.

- Innovations at teaching and training: Led a NSF IGERT on interdisciplinary graduate education (2007-2012); Developed and taught a massively open online course titled "From GPS and Google Maps to Spatial Computing" in 2014 with over 21,000 students across 182 countries. Developed one of the first courses on Spatial Databases; Co-authored a popular textbook on Spatial Databases (Prentice Hall, 2003); co-edited an Encyclopedia of GIS (Springer, 2nd edition 2017, 1st edition 2008), which was recommended highly by a review in ACM Computing Reviews (Nov. 2008); Presented tutorials on spatial data mining in conferences; Chaired curriculum committee of Computer Science & Eng. department at the University of Minnesota (1998-2000); Served as a Computer Science representative on UCGIS curriculum committee (1998-99); Served on IEEE-Computer Society Computer Sc. and Eng. Practices Publication Board (1995-97). Received the University Consortium on GIS Education Award (2015), the University of Minnesota Graduate Education Award (2015), and the UCGIS Education Award (2016).

- Broadening participation of underrepresented groups in STEM: Supervised Ph.D. thesis of over half a dozen members from underrepresented groups. Supervised over two dozen undergraduate (UG) students from historically black colleges in Expedition (2009-2014) and Army High Performance Computing Research Center annual summer workshops (1997-2006,), NSF Research Experience for UGs, and UG Research Opportunity Program. Mentored four high school students.

- Research Team Management and community building: Directed the Army High Performance Computing Research Center (2005-2007) with about 50 faculty members across 6 universities with an annual budget of $5M/year. Recently directed an NSF IGERT (2006-2012) project with two dozen faculty members across half a dozen departments. Currently leading a large NSF Smart and Connected Communities (2017-2020) project with about ten faculty members across 4 universities and 6 disciplines.

- Service to community: Serving as a member of the *Computing Research Association Board* (2016-19), co-Editor-in-Chief of Springer *Geo-Informatica: An Intl. Journal on Advances in Computer Sc. for GIS*. Served as the president of the *University Consortium on GIS* (2016-17). Served as a member of the *Computing Community Consortium Council* (2012-2015), multiple National Academies committees (e.g., *From Maps to Models: Augmenting the Nation's Geospatial Intelligence Capabilities* (2015-16), *Geo-targeted Alerts & Warnings* (2012), *GEOINT Workforce* (2011), *Mapping Science Committee* (2003-9), *Priorities for GEOINT Research* (2006), etc. Invited plenary speaker on spatial big data, spatial computing and spatial data mining at many forums.

Current and Pending Support
(See GPG Section II.D.8 for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.	
Investigator: *Shashi Shekhar*	Other agencies (including NSF) to which this proposal has been/will be submitted. NONE

Support: ☐ Current ☒ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title: MURESA: Multiscale Uncertainty Reasoning for Environmental Situational Awareness **(This proposal)**
Source of Support: USDOD MURI (Prime: Syracuse University)
Total Award Amount: $1M   Total Award Period Covered: 05/01/20 – 04/30/25
Location of Project: *University of Minnesota*
Person-Months Per Year Committed to the Project.   Cal: 1.5   Acad: Sumr:

Support: ☐ Current ☒ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title: Identifying Aberration Patterns in Multi-attribute Trajectory Data with Gaps
Source of Support: USDOD National Geospatial-Intelligence Agency (NGA)
Total Award Amount: $1M   Total Award Period Covered: 9/1/2020 – 8/31/2025
Location of Project: *University of Minnesota*
Person-Months Per Year Committed to the Project.   Cal: 1   Acad: Sumr:

Support: ☒ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title: Planning Grant: Engineering Research Center for Intelligent Infrastructure for Safe, Efficient and Resilient Mobility (ERC-I2SERM)
Source of Support: NSF (PI: A. Misra, University of Kansas)
Total Award Amount: $100K   Total Award Period Covered: 8/31/2018 - 7/31/2020
Location of Project: *University of Minnesota*
Person-Months Per Year Committed to the Project.   Cal: 0.12   Acad: Sumr:

Support: ☒ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title: III: Medium: Investigating Spatio-Temporal Informatics to Advance Transportation Science
Source of Support: NSF
Total Award Amount: $1,2M   Total Award Period Covered: 08/01/19 – 07/31/23
Location of Project: *University of Minnesota*
Person-Months Per Year Committed to the Project.   Cal: 1   Acad: Sumr:

Support: ☒ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title: Cloud Connected Delivery Vehicle: Boosting Fuel Economy Using Physics-aware Spatiotemporal Data Analytics and Real-time Powertrain Control
Source of Support: USDOE: ARPA-E NextCar (P.I.: W. Northrop)
Total Award Amount: $1.7M   Total Award Period Covered: 02/17/17 – 02/16/20
Location of Project: *University of Minnesota*
Person-Months Per Year Committed to the Project.   Cal: 0.8   Acad: Sumr:

Support: ☒ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title*:* S&CC-IRG Track 1: Connecting the Smart-City Paradigm with a Sustainable Urban Infrastructure Systems Framework to Advance Equity in Communities
Source of Support: NSF
Total Award Amount: $2.5M   Total Award Period Covered: 09/01/17 – 08/31/20
Location of Project: *University of Minnesota*
Person-Months Per Year Committed to the Project.   Cal: 1   Acad: Sumr:

Support: ☒ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title*:* Specialty Crops Research Initiative: Increasing low-input turf-grass adoption through breeding, innovation, and public education
Source of Support: USDA: NIFA: Specialty Crops Research Program (P.I.: Eric Watkins)
Total Award Amount: $5,485,450   Total Award Period Covered: 09/01/17 – 08/31/21
Location of Project: *University of Minnesota*
Person-Months Per Year Committed to the Project.   Cal: 1   Acad: Sumr:

Support: ☒ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title: II-NEW: Research Infrastructure for Big Spatial and Temporal Data
Source of Support: NSF (P.I.: M. Mokbel)
Total Award Amount: $391,512   Total Award Period Covered: 07/01/15 – 06/30/20
Location of Project: *University of Minnesota*
Person-Months Per Year Committed to the Project.   Cal: 0.12   Acad: Sumr:

| Support: | ☒ Current | ☐ Pending | ☐ Submission Planned in Near Future | ☐ *Transfer of Support |

Project/Proposal Title: Clinical and Translational Science Award (CTSA)
Source of Support: NIH: National Center for Advancing Translational Sciences (P.I.: B. Blazar)
Total Award Amount: $42.6 M   Total Award Period Covered: 3/30/2018 - 2/28/2023
Location of Project: *University of Minnesota*
Person-Months Per Year Committed to the Project.   Cal: 0.6   Acad: Sumr:

| Support: | ☒ Current | ☐ Pending | ☐ Submission Planned in Near Future | ☐ *Transfer of Support |

Project/Proposal Title: Collaborative Proposal Midwest Big Data Hub: Building Communities to Harness the Data Revolution
Source of Support: NSF (P.I.: J. Peterson)
Total Award Amount: $340K   Total Award Period Covered: 06/01/2019 - 05/31/2023
Location of Project: *University of Minnesota*
Person-Months Per Year Committed to the Project.   Cal: 0.12   Acad: Sumr:

*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.

NSF Form 1239 (10/99)   USE ADDITIONAL SHEETS AS
                                                                              NECESSARY

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