

# CYNDI V. CASTRO, P.E.

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## EDUCATION

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### University of Houston

Ph.D. in Civil Engineering

Exp. 12/21

### University of Texas at Austin

M.S. in Civil Engineering (Geographical Information Systems)

2016

### Texas A&M University at College Station

B.S. in Civil Engineering (Water Resources Track)

2011

## PROFESSIONAL APPOINTMENTS

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- 2022\* *Postdoctoral Fellow* (\*Awarded, Upcoming January 2022)  
**University of Illinois at Urbana-Champaign**  
Department of Civil & Environmental Engineering | NSF EAR-PF Fellow
- 2019-2020 *Flood Resilience Fellow*  
**City of Houston Mayoral Office**  
Department of Sustainability, Recovery and Resilience | NSF INTERN Fellow
- 2018-2021 *Graduate Research Scientist*  
**University of Houston**  
Department of Environmental Engineering
- 2015-2019 *Civil Engineer* (P.E. Licensure No. 123286, State of Texas, 2016)  
**Jones|Carter Engineering Firm**  
Department of Hydrological & Hydraulic Sciences
- 2014-2016 *Graduate Research Scientist*  
**University of Texas at Austin**  
Department of Civil and Environmental Engineering | NSF GRFP Fellow
- 2014 *Stormwater Manager*  
**City of Houston Public Works**  
AECOM Consultant, Department of Stormwater Engineering
- 2013-2014 *Construction Manager*  
**Ghana National Gas Company**  
AECOM Takoradi, Ghana
- 2011-2014 *Civil Engineer-in-training*  
**AECOM Technical Services**  
Department of Community Infrastructure & Public Works
- 2010-2011 *Undergraduate Research Assistant*  
**Texas A&M University at College Station**  
Department of Ocean Engineering | NSF CAREER Project

## RESEARCH GRANTS & FELLOWSHIPS

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2021-2022	<b><u>NSF EAR-PF Postdoctoral Fellowship</u></b> EAR-PF: Earth Sciences Postdoctoral Fellowship (NSF 18-565) PI. Award No. 2052598. “Green infrastructure scaling from local observations to regional applications as a coupled human-water system.”	\$174,000
2019-2020	<b><u>NSF INTERN Fellowship</u></b> Supplemental funding for NSF GRFP Fellowship (NSF 18-102) Intern. Award No. 1934192. Awarded to PI: Hanadi S. Rifai.	\$55,000
2014-2019	<b><u>NSF GRFP Fellowship</u></b> GRFP: Graduate Research Fellowship Program (NSF 13-085) Fellow. Award No. 2013162199. “Flood and landslide risk analysis using LiDAR.”	\$142,000
2021	<b><u>NSF HEGS Program Grant*</u></b> HEGS: Human-Environment and Geographic Sciences Program (NSF 20-547) Lead author. PI: Hanadi S. Rifai. “Assessing the multifunctionalities of nature-based solutions for addressing societal and environmental stressors.”	

\* Submitted January 2021, pending final decision.

## PUBLICATIONS

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### Journal Articles:

**Castro, C. V.** and Maidment, D. R. (2020). HMS-PrePro: A GIS preprocessing tool for rapid initialization of HEC-HMS basin models. *Environmental Modelling & Software*, 104732. <https://doi.org/10.1016/j.envsoft.2020.104732>

### Book Chapters:

**Castro, C.V.** and Rifai, H.S. (2021). Gulf Coast Rivers of the Southwestern United States: Trinity River, San Jacinto River, Neches River. Chapter 5 in: Delong, M.D., Jardine, T.D., Benke, A.C., Cushing, C.E. (Eds.) *RIVERS OF NORTH AMERICA (2<sup>ND</sup> EDITION)*. Academic Press. ISBN: 9780128188484.

### In-Submission/Progress:

**Castro, C. V.** and Rifai, H. S. (2021). Integrating social, economic, and environmental risk into flood management of aging dam infrastructure by combining cost-benefit and multi-criteria decision analyses. *Natural Hazards and Earth System Sciences*. (In Review, Preprint Available: <https://doi.org/10.5194/nhess-2021-144>).

**Castro, C. V.**, Schaefer, K. L., Gonzalez, A., Haces-Garcia, F., Rifai, H. S. Capturing benefits for the air-energy nexus by adopting high-efficiency supercritical CO<sub>2</sub>-based power production. (Draft Complete, Final Internal Peer-Review. To Submit to: *Nature Energy*, Aug. 2021).

**Castro, C. V.** and Rifai, H. S. (2021). NBS-Geo: A web-based mapping app for nature-based solutions by integrating seamless, cloud-based datasets across social, hydrological, environmental, and ecological domains. (Draft Complete, Final Internal Peer-Review. To Submit to: *Sustainability*, Aug. 2021).

**Castro, C.V.**, Penny, G., Gunda T., Montanari, A., Polo, M.J. (Lead Authors). Limaye, S., Cavus, Y., Aksoy, H., Khatami, S., Kalantari, Z., Oel, P., Odongo, V., Casterllarin, A., Persiano, S., Papacharalampous, G., Tyralis, H., Llasat, M., Kohnova, S., Szolgay, J., Strasser, U., Shanono, N., Pistocchi, A., Ganora, D., Conrad, L., Pande, S., Teweldebrihan, M., Sanderson, M., Kington, J., Finger, D., Hendricks, D., Li, B., Evers, M., Losada, M., Dong, X., Civantos, J., Sivapalan, M., Medeiros, P., Mazvimavi, D., Allasia, D., Arumi, J., Rivera, D., Pouladi, P. *Panta Rhei Case Studies*. Chapter 11 in: Tian, F., Wei., J., Sivapalan, M., Blöschl, G. (Eds.) *COEVOLUTION AND PREDICTION OF COUPLED HUMAN-WATER SYSTEMS: A SYNTHESIS OF CHANGE IN HYDROLOGY AND SOCIETY*. (In-press, Publication: March 2023).

Viglione, A., Mukherjee, J., Archfield, S., **Castro, C.V.**, Hirabayashi, Y., Lafaye de Micheaux, F., Leong, C., Mazzoleni, M., Merz, B., Nakamura, S., Nardi, F., Rusca, M., Szolgay, J., Yan, H. Human-Flood Systems. Chapter 6 in: Tian, F., Wei., J., Sivapalan, M., Blöschl, G. (Eds.) *COEVOLUTION AND PREDICTION OF COUPLED HUMAN-WATER SYSTEMS: A SYNTHESIS OF CHANGE IN HYDROLOGY AND SOCIETY*. (in-progress)

**Castro, C. V.** Rifai, H. S. Integrating resilience and sustainability for a novel planning framework for green systems in light of future climate and societal stressors. (Final Draft Complete, in Co-author Review).

Kiaghadi, A., Loveland, M., **Castro, C. V.**, Hunter, T., Dawson, C., Rifai, H. S. Modeling estuarian salinity recovery in compound flood events: A case study of Galveston Bay response for Hurricanes Ike and Harvey. (Final Draft Complete, in Co-author Review).

**Castro, C. V.**, Lemke, M., Rifai, H. S. Nature-based solutions at the intersection of society and earth-system processes: A causal reflection of a complex urban system. (Results Complete, Manuscript Draft In-progress).

**Castro, C. V.**, Penny, G., Gunda, T. Socio-hydrology: A decadal reflection and vision for the future. (Draft In-progress).

## **TEACHING EXPERIENCE**

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2021	<b>Center for Integration of Research, Teaching, and Learning (CIRTL) Training</b> Associate-level certificate for evidence-based STEM instruction.
2018-2019	<b>Future Faculty Fellowship (F<sup>3</sup>) Program Training</b> Nominated by University of Houston Graduate School Professional development training for student engagement, instruction, & assessment.
2015	<b>Guest Lecturer: CE 397, Flood Forecasting   University of Texas at Austin</b> Prepared Select Exercises for Instructor of Record: Dr. David R. Maidment National Flood Interoperability Experiment Geodatabase Development

- 2015           **Guest Lecturer: CE 394K.3, GIS in Water Resources – University of Texas at Austin**  
Prepared & Taught Select Exercises for Instructor of Record: Dr. David R. Maidment  
HEC-HMS Modeling using data from GIS Data Services
- 2009-2011   **Texas A&M Center for Student-Athlete Services**  
Tutor for student-athletes in 6 math and engineering courses.

### **ADDITIONAL FELLOWSHIPS, HONORS, & AWARDS**

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2021	Cullen Graduate Student Success Fellowship	\$500
2019-2022	Crawford and Hattie Jackson Foundation Fellowship (x3)	\$15,000
2019-2021	Texas Section American Water Works Association (AWWA) (x2)	\$4,000
2019-2020	Union Plus Firefighter Scholarship	\$1,000
2019-2020	University of Houston Future Faculty Fellowship	\$3,000
2019-2020	CHI University Award for 2D PC-SWMM Hydraulic Model	\$2,000
2018-2019	Southeast Texas Chapter AWWA Award	\$1,750
2018-2019	University of Houston President's Endowed Scholarship	\$4,000
2018-2021	University of Houston Graduate Tuition Fellowship	\$42,000
2014-2016	University of Texas Thrust Endowed Fellowship	\$18,000
2009-2010	Study Abroad Scholarship Katholieke Universiteit, Leuven, Belgium	\$6,000
2009-2010	Judy K. and Donald Ray '68 Scholarship	\$1,000
2009-2010	British Petroleum American Scholarship	\$1,000
2007-2011	Texas A&M University President's Endowed Scholarship	\$12,000
2007-2011	Texas A&M Academic Achievement Award	\$10,000
2007-2008	Industrial Engineering Endowed Scholarship	\$1,000
2008-2009	Barnes & Noble Merit Award	\$1,000
2008	Dean McCorkle Endowed Scholarship	\$1,000

### **PRESENTATIONS**

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#### Conference Oral Presentations:

- Castro, C.V.** (2021). Institutional and societal feedbacks and influences regarding nature-based solution implementation. *Delft Conference on Sociohydrology*. Delft University of Technology, Netherlands.
- Castro, C.V.** (2020). The levee effect and socio-hydrological adaptation. *Women in STEM Symposium*. University of Chicago, Chicago, Illinois.
- Castro, C. V.** (2017). Public geospatial data sourcing and processing for watershed analyses. *Texas Floodplain Management Administration Conference*, Austin, Texas.
- Castro, C. V.** (2016). A GIS framework for gathering data and preparing HEC-HMS basins. *Texas Natural Resources Information Systems GeoRodeo*, Austin, Texas.
- Castro, C. V.** (2016). Living Atlas of the World provides data services for hydrologic modeling. *Esri ArcGIS Water Conference*, Austin, Texas.
- Castro, C. V.** (2015). Performance assessment of WFDEI satellite data for estimating global rainfall intensity. *Global Flood Partnership Annual Conference*, National Center for Atmospheric Research (NCAR), Boulder, Colorado.

### Conference Poster Presentations:

- Castro, C. V.** (2019). GH13C: Hydrological, societal, and environmental impacts of flood control reservoir releases on downstream communities using remote sensing and modeling during Hurricane Harvey. *American Geophysical Union Fall Conference*, San Francisco, California.
- Castro, C. V.** (2015). Performance Assessment of WFDEI Satellite Data for Estimating Global Rainfall Intensity. Global Flood Partnership Annual Conference, National Center for Atmospheric Research (NCAR), Boulder, Colorado.

### Additional Conference Sessions (Prepared as Team, Presented by Co-author):

- Penny, G., **Castro, C.V.**, Gunda, T., Montanari, A., Polo Gómez, M.J. (2021). Panta Rhei: A decadal review of cause-effect pathways from global case studies. *Delft Conference on Sociohydrology*. Delft University of Technology, Netherlands.
- Viglione, A., Mukherjee, J., Annis, A., Archfield, S., **Castro, C.V.**, Hirabayashi, Y., Hollermann, B., de Micheaux, F.L., Carmen Llasat, M., Mazzoleni, M., Merz, B., Nakamura, S., Nardi, F., Rusca, M., Yan, H. (2021). Panta Rhei Chapter 6: Human-Flood Systems. *Delft Conference on Sociohydrology*. Delft University of Technology, Netherlands.
- Rifai, H.S. and **Castro, C.V.** (2020). At the intersect of engineered systems for flood mitigation, society, and resiliency: the Harvey posed challenge in greater Houston. *HurriCon Conference: Science at the intersection of hurricanes and the populated coast*. East Carolina University, North Carolina. (Co-authored; Presented by Rifai, H.S.)

### Seminar Presentations:

- 2020            Urbanization Challenges & Solutions in Public Policy, Engineering, and Academic Research. Houston Early Research Experience, *University of Houston*, Houston, TX.
- 2019            Hurricane Harvey: Lessons Learned about Stormwater & Environmental Engineering. Houston Scholars Program, *University of Houston*, Houston, TX.
- 2018            Natural Disaster Response and Preparation using Social-media and Citizen Science. *Taste of Science* Community Event, Houston, TX.
- 2018            Insights into Stormwater and Drainage Impacts after Simultaneous 500-Year Events. *Harris County Flood Control District*, Houston, TX.
- 2017            The Future of Flooding. **TEDx** Sugar Land, TX.
- 2017            Girls in STEM: A Day in the Life. *Girls in STEM Education Conference*, Klein, TX.
- 2017            Regional Stormwater Detention and Environmental Mitigation for Native Vegetative Species and Natural Habitats. *City of Houston Public Works Department*, TX.
- 2017            Feasibility analysis of dental college rehabilitation in Ludhiana, India. *Jones/Carter Engineering Firm*, Houston, TX.
- 2016            ArcGIS Preprocessing for Extracting Geospatial Data from Cloud-based Repositories. *Lower Colorado River Authority*, Austin, TX.
- 2016            FEMA Floodplain Mapping: Trending toward Data as a Service. *City of Austin Public Works Department*, Austin, TX.

- 2015 National Flood Interoperability Experiment (NFIE) Geospatial Framework, Precursor to NOAA National Water Model. *University of Texas*, Civil Engineering Departmental Seminar, Austin, TX.
- 2015 Hydraulic Modeling Overview and Case Study of Onion Creek Floodplain. David Maidment CE 365K Hydraulic Engineering Class. *University of Texas*, Austin, TX.
- 2014 Unified Methods for GIS-based Hydrological Modeling. *University of Texas*, Civil Engineering Departmental Seminar, Austin, TX.
- 2014 Hydraulics and Hydrologic Largescale Modeling for City of Jeddah, Saudi Arabia. American Society of Civil Engineering, *Texas A&M University*, College Station.
- 2013 Urban Design, Land Development, Comprehensive Stormwater Drainage. American Society of Civil Engineering, *Texas A&M University*, College Station, TX.

Workshops:

- 2016 Hydraulic and Hydrologic Engineering and Modeling Frameworks and Best Practices. Sole instructor. Jones|Carter University Program, Houston, TX.
- 2016 AutoCAD Civil 3D Site Grading and Detention Ponds. Sole instructor. Jones|Carter University Program, Houston, TX.

**SERVICE ACTIVITIES**

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Academic Service:

- 2021 **Journal Reviewer:** Journal of Hydrology
- 2021 **Conference Session: Co-Convener & Chair:** AGU Fall 2021 Conference, Session “Socio-hydrology: Advancing the Science of Water and People.”
- 2021 **NSF Workshop Convener:** NSF GRFP Workshop Facilitation for Society for Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS)
- 2020-2021 **Diversity and Inclusion Committee Member:** Texas American Water Works Association (TAWWA) Southeast Texas Chapter
- 2020 **Conference Reviewer:** AGU Fall 2020 Outstanding Student Presentation Awards
- 2020 **Grant Reviewer:** Sigma Xi Grants-in-Aid of Research, Research Honor Society

Community Mentoring:

- 2021-2022 TAWWA Professional Mentoring Program
- 2020-2021 Galveston Ball High School Life Skills Educational Outreach
- 2017-2018 MathCounts, Texas Society of Professional Engineers
- 2012-2014 Rice University Engineers Without Borders, Student Chapter Professional Mentor
- 2011-2014 Architecture, Construction, Engineering (ACE) Mentor Program of America
- 2010-2011 Save Our Streets Youth Community Mentor
- 2009-2011 Society of Women Engineers Elementary Reading & Writing Lab Volunteer

### International Initiatives:

- 2021 **South African National Biodiversity Institute, Kirstenbosch Research Centre**  
Watershed modeling support for ecosystem adaptation to climate change.
- 2018 **Respire Haiti, Haiti**  
Team leader to support community education and medical care.
- 2017-2018 **Intra-American Development Bank, Haiti**  
Drainage modeling for culvert design in flood-prone region.
- 2017 **Engineering Ministries International, India**  
Civil engineering for rehabilitation of medical college & hospital in Ludhiana, India.
- 2014-2015 **Road to Mafrq, Inc., Jordan**  
Board member for 501c organization to expand educational opportunities.
- 2013-2014 **United Nations High Commissioner for Refugees (UNHCR), Ghana**  
Engineering assistance to UNHCR refugee camp leaders.
- 2013 **Living Water International (LWI), Nicaragua**  
Installed water wells in Leon, Nicaragua.
- 2011-2013 **Engineers Without Borders, Houston Professional Chapter, El Salvador**  
Team leader for potable water system design and installation.
- 2012 **Children's Educational Center, Haiti**  
Funded and coordinated installation of two water wells for children's center.
- 2011 **Disaster Assistance Response Team (DART), Haiti**  
Disaster response services and drainage remediation following earthquake.
- 2010 **Water Purification, Zambia**  
Worked with local engineers to employ low-cost water treatment devices.

### Media Articles:

- Castro, C. V.** (2021). HMS-PrePro: An automated GIS toolbox for extracting cloud-based data, delineating watersheds, and calculating hydrological parameters. *Esri ArcGIS Water Blog*. <https://tinyurl.com/HMSPreProEsri>
- Castro, C.V.** (2016). The Living Atlas can provide better access to data for hydrologic modeling. *Esri ArcUser Article*, Volume Spring 2016, pp 32-35. <https://tinyurl.com/LivingAtlasEsri>

### Open-source Products:

- Castro, C. V.** (2021). GeoNBS: Web-mapping application to explore and download seamless, authoritative, inter-disciplinary social, environmental, and hydrological datasets regarding nature-based solution planning. <https://tinyurl.com/nbsgeo>
- Castro, C. V.** (2019). HMS-PrePro 10.7.1: Global GIS processing tool for HEC-HMS hydrological basin models using cloud-based data and automated spatial analysis. Github Repository. <https://doi.org/10.5281/zenodo.3662765>

## INDUSTRY CONTRIBUTIONS

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Copyright to primary engineer-of-record (EOR). Products available at: [cvcastro.com/background/](http://cvcastro.com/background/).

### Jones|Carter:

- [14] **Castro, C.V.** (2018). Cypress Creek 2017 disaster recovery channel ID No's K133-00-00-X025, K133-04-00-X026, K133-00-00-X003, K137-00-00-X012, & K149-00-00-X003. Primary EOR. *Harris County Flood Control District*. Project ID Z100-00-00-X274.
- [13] Landry, K., and **Castro, C.V.** (2018). Houston Avenue and White Oak Drive intersection improvements. Primary EOR for drainage analysis. *Memorial Heights Redevelopment Authority/TIRS No. 5*. WBS No. N-T05000.
- [12] **Castro, C.V.** (2017). Post Hurricane Harvey stormwater and drainage impact analysis of earthen channels and reservoirs for Energy Corridor District, Houston, Texas. Primary EOR. *Houston Energy Corridor District*.
- [11] **Castro, C.V.** (2017). Slope stabilization and bench restoration at Buffalo Bayou park Shepherd Drive to 1200 feet West of Sabine Street. Primary EOR. *Harris County Flood Control District (HCFCD)*. Project ID W100-00-00-X036.
- [10] **Castro, C.V.** (2017). Legends ranch central detention basin weir repair. FEMA Hazard Mitigation Grant Program. Primary EOR. *Spring Creek Utility District*. City of Houston ILMS No. 17005056. Log No. 17-0088.
- [9] **Castro, C.V.** (2017). Eureka, Parksedge, Rodeo Ditch, & Sharpstown detention basins. Primary EOR. *City of Houston Department of Public Works and Engineering Capital Projects*. WBS No. M-430296.
- [8] **Castro, C.V.** (2017). Floodplain letters of map revisions (LOMRs) for Trails of Katy Sections 1 and 3. *Federal Emergency Management Association National Flood Insurance Program (FEMA)*.
- [7] **Castro, C.V.** (2016). IH-635 Grapevine Creek Bridge hydrologic and hydraulic report. Lead engineer. *Texas Department of Transportation (TxDOT)*. CSJ No. 2374-07-063.

### AECOM:

- [6] Williford, E. and **Castro, C.V.** (2013). Rice University George R. Brown tennis courts, green infrastructure, and LEED certified stormwater construction plans. Lead graduate engineer. *City of Houston Department of Public Works*.
- [5] **Castro, C.V.** (2013). Western corridor gas infrastructure development project. Primary author. *Ghana National Gas Limited Company*.
- [4] Williford, E. and **Castro, C.V.** (2012). Channel conveyance restoration at Buffalo Bayou Park, Shepherd Drive to 1200 feet West of Sabine Street. Lead graduate engineer. *Harris County Flood Control District*. Project ID W100-00-00-X036.
- [3] Williford, E. and **Castro, C.V.** (2012). Holcombe drainage and paving improvements. Graduate engineer. *City of Houston Department of Public Works*. WBS No. M-420126-0076-4.
- [2] Holder, A., Zeve, M. and **Castro, C.V.** (2013). US-59, Rosenberg TX, highway expansion and drainage analysis from Spur 10 to SH99. *Texas Department of Transportation*.
- [1] **Castro C.V.** (2012). Large-scale 2D SWMM hydrologic and hydraulic modeling. Graduate engineer. *Kingdom of Jeddah, Saudi Arabia*. WER06-REP-0040-C.



## PROFESSIONAL AFFILIATIONS & CREDENTIALS

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American Geophysical Union (AGU)	Member
American Society of Civil Engineers (ASCE)	Former Member
American Water Works Association (AWWA)	Diversity & Inclusion Committee Member
Chi Epsilon National Honor Society	Texas A&M Chapter, President
Engineers Without Borders (EWB)	Houston Professional Chapter, Officer
Texas Floodplain Mgmt. Association (TFMA)	<b>Floodplain Manager License No. 2977-16N</b>
Texas Board of Professional Engineers (TBPE)	<b>Professional Engineering License No. 123286</b>
Society of Women Engineers (SWE)	Former Member
United States Green Building Council (USGBC)	<b>LEED Green Associate Certification</b>
Urban Land Institute (ULI)	Hines Urban Land Use Competition Participant

## TECHNICAL PROGRAMS

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Air Quality Modeling:	EPA COBRA Program
Computer Coding:	Java, Python, Matlab, R, VBA
Energy Modeling:	EPA AVERT Program
Engineering Design:	AutoCAD, AutoCAD Civil 3D, Microstation
Geographic Systems:	Esri ArcGIS, ArcPy Coding, ArcHydro
Natural Hazards:	FEMA Hazus Program
Remote Sensing:	ENVI Geospatial
Water Distribution:	Bentley OpenFlows WaterGEMS
Watershed Modeling:	HEC-HMS, HEC-GeoHMS, HEC-RAS 1D/2D, HEC-GeoRAS, HY-8 Hydraulics, FlowMaster, Winstorm, SWAT, SWMM 2D

## REFERENCES

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### **Murugesu Sivapalan**

Chester and Helen Siess Endowed Professor  
University of Illinois at Urbana-Champaign  
Grainger College of Engineering  
Department of Geography  
Department of Civil Engineering  
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### **David R. Maidment**

Hussein M. Alharthy Centennial Chair  
Civil Engineering Emeritus  
University of Texas at Austin  
Cockrell School of Engineering  
Department of Civil Engineering  
[maidment@utexas.edu](mailto:maidment@utexas.edu) 512.471.0065

### **Gopal Penny**

Upcoming Assistant Professor  
University of Singapore  
Current Postdoctoral Researcher  
University of Michigan  
Ann Arbor, Michigan  
[gopalpenny@gmail.com](mailto:gopalpenny@gmail.com)

### **Keh-Han Wang**

Professor  
Director, Graduate Program  
University of Houston  
Cullen College of Engineering  
Department of Civil & Environmental Engineering  
[KHWang@uh.edu](mailto:KHWang@uh.edu) 713.743.4277