

TIANXING CHU

Curriculum Vitae

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EDUCATION

Peking University

Ph.D. in Photogrammetry and Remote Sensing, Jun. 2012

Emphasis: Global Navigation Satellite System (GNSS) and Integrated Navigation

Wuhan University

B.E. in Geomatics Engineering, Jun. 2007

RESEARCH INTERESTS

- Emergent remote sensing and geomatics techniques (e.g. UAS photogrammetry and LiDAR)
- Ubiquitous navigation and positioning (e.g. Signal of Opportunity and MEMS sensors)
- Indoor simultaneous localization and mapping
- Machine learning applied to geospatial applications
 - Precision agriculture
 - Coastal dynamics modeling and environmental analytics
 - Seamless navigation and contextual awareness

ACADEMIC APPOINTMENTS

- **Assistant Professor** August 2018 – Present
School of Engineering and Computing Sciences, Conrad Blucher Institute of Surveying and Science (CBI), Texas A&M University-Corpus Christi (TAMU-CC)
- **Assistant Research Scientist** January 2018 – August 2018
CBI, TAMU-CC
Directed by Dr. Michael J. Starek, Director of Measurement Analytics Lab (MANTIS)
- **Post-doctoral Research Associate** January 2014 – December 2017
CBI, TAMU-CC
Directed by Dr. Michael J. Starek, Director of MANTIS, and Dr. Ruizhi Chen, former CBI Endowed Chair and Professor
- **Research Associate** July 2012 – December 2013
Development Research Center, National Administration of Surveying, Mapping and Geoinformation of China

- **Visiting Scholar** November 2009 – November 2011
Colorado Center for Astrodynamics Research (CCAR)
Department of Aerospace Engineering Sciences, University of Colorado-Boulder
Advisor: Dr. Dennis Akos, Institute of Navigation Thurlow Award Winner

- **Graduate Research Assistant** September 2008 – October 2009
Institute of Remote Sensing and GIS
School of Earth and Space Sciences, Peking University

HONORS AND AWARDS

- Winner of Performance Evaluation of Smartphone Indoor Localization Application (PerfLoc) Challenge, Public Safety Communications Research Division (PSCR), National Institute of Standards and Technology (2018)
- Recipient of Best Paper Award at the *SPIE Defense + Commercial Sensing Conference of Autonomous Air and Ground Sensing Systems for Agricultural Optimization and Phenotyping II* sponsored by Monsanto (2017)

PROFESSIONAL ACTIVITIES

Academic Membership

- Member of the Editorial Board, *GPS Solutions*, 2014 – Present
- Administrative Editor, *Journal of Global Positioning Systems*, 2016 – 2018

Scientific Conference Service

2014 IEEE International Conference on *Ubiquitous Positioning Indoor Navigation and Location Based Service (UPINLBS)*, Session Chair (GNSS II)

Reviewer Service

- GPS Solutions
- IEEE Transactions on Aerospace & Electronic Systems
- IEEE Transactions on Vehicular Technology
- IEEE Transactions on Instrumentation & Measurement
- IEEE Signal Processing Letters
- Remote Sensing of Environment
- ISPRS Journal of Photogrammetry and Remote Sensing
- Aerospace Science & Technology
- Survey Review
- Journal of Aerospace Engineering
- Journal of Global Positioning Systems
- Journal of Navigation
- Journal of Applied Remote Sensing

- Sensors
- Remote Sensing
- Computers and Electronics in Agriculture

Media Report

June 28, 2017 - [UAS Researchers Take First Place at International SPIE Conference](#) featured on TAMU-CC news

May 16, 2018 - [Winners of the PerfLoc Prize Competition](#) featured on NIST news

June 25, 2018 - [A&M-Corpus Christi Researcher helps Tackle Indoor GPS Limitations and Wins \\$20,000](#) featured on TAMU-CC news

RESEARCH ACTIVITIES

Sponsored Projects

- (Co-PI since October 2018) *Regional Geospatial Modeling for Gulf of Mexico* (\$7.1M)
NOAA/NGS (multi-university consortium, 2016-present)
- (Co-PI) *Aqua Smart* (\$2.5K)
Texas A&M Engineering Experiment Station (multi-A&M campus consortium, 2018-2019)
- (Co-Investigator) *Development and Validation of a UAS-based Sensing Platform for Monitoring the Growth and Health of Cotton* (\$30K)
Texas State Support Committee (TAMU-CC, 2015-2016)
- (Co-Investigator) *Development of a UAS-based Sensing Platform for Precision Agriculture* (\$30K)
Texas Research Development Fund (TAMU-CC, 2015-2016)
- *GNSS Receiver Testing and Performance Evaluation*
SiRF Technology, Inc. (Univ. of Colorado-Boulder, 2010-2011)
- *Public Security and Emergency Response Management System Development*
Ministry of Science and Technology of China (Peking Univ., 2008-2009)

Pending Proposals

- (co-PI) *Equipment to Develop a Shallow Water Autonomous Tactical-mapping Surface Vessel (SWAT- SV) for Advancing Maritime ISR Research* (\$582K)
DOD-ONR (TAMUCC, 2019-2020)
- (PI) *Mobile Geospatial Sensing for 3D Campus Survey and Indoor Localization* (\$20K)
Texas Comprehensive Research Fund (TAMUCC, 2019-2020)

Collaborators

Michael Brewer (Texas A&M AgriLife Research), Liang Chen (Wuhan University, China), Ruizhi Chen (Wuhan University, China), Xiuwan Chen (Peking University, China), Yuwei Chen (Finnish Geospatial Research Institute, Finland), Juha Hyypä (Finnish Geospatial Research Institute, Finland), Juan Landivar (Texas A&M AgriLife Research), Xinlian Liang (Finnish Geospatial Research Institute, Finland), Jingbin Liu (Wuhan University, China), Murilo Maeda (Texas A&M AgriLife Research), Seth Murray (Texas A&M University), Chenghai Yang (USDA-ARS)

TEACHING ACTIVITIES

- GSEN-5998: *Graduate Thesis*, TAMU-CC, Spring 2019
- GISC-2301: *Geospatial Systems II*, TAMU-CC, Spring 2019
- GSEN-6386: *Problems in Remote Sensing of the Environment*, TAMU-CC, Fall 2018
- GSEN-5396: *Directed Independent Study*, TAMU-CC, Fall 2018
- GISC-3325: *Geodetic Science* (co-lecturer), TAMU-CC, Spring 2014
- GISC-4315: *Satellite Positioning* (co-lecturer), TAMU-CC, Fall 2014

POSTGRADUATE THESIS ADVISOR

Bryan Gillis (M.S., thesis committee chair, anticipated graduation in summer 2019)

Edison Veloz (M.S., thesis committee member, anticipated graduation in summer 2019)

Michael Walpert (M.S., thesis committee member, anticipated graduation in summer 2019)

Kevin Wilson (M.S., thesis committee member, anticipated graduation in summer 2019)

TECHNICAL SKILLS

- **Programming:** Matlab, C/C++, JAVA, Python, Fortran
- **GIS and Remote Sensing:** QT Modeler, ArcGIS, ERDAS Imagine, Pix4D, Photoscan
- **GNSS Processing:** NovAtel Inertial Explorer, NovAtel Connect, Avera RF Signal Record & Playback
- **LiDAR:** LASTools, Terrasolid, LiDARUSA ScanLook
- **Machine Learning:** Weka
- **Certificate and Training**
 - Small Unmanned Aircraft Systems Remote Pilot Certificate granted by FAA for flying under the small UAS rule *14 CFR part 107* (Nov. 2017)
 - Pulse Aerospace Vapor 55 UAS Operator Training Certificate (May, 2017); Extensive UAV, LiDAR, GNSS surveying and application experience

PUBLICATIONS

Book Chapters

1. **Chu, T.** Current progress and developing trends of GNSS (in Chinese), in *Report on Status of Innovation of Surveying, Mapping and Geoinformation in China*. Social Sciences Academic Press, Beijing, pp. 89-95, 2012.

Patents

1. Chen, R., **Chu, T.** High-accuracy visual positioning system and method in urban and indoor environments. Chinese Patent CN106447585A, issued February 22, 2017.

Peer-Reviewed Journal Papers

1. Yang, T., Wan, W., Chen, X., **Chu, T.**, Qiao, Z., Liang, H., Wei, J., Wang, G., Hong, Y. Land surface characterization using BeiDou signal-to-noise ratio observations. *GPS Solutions*. **2019**, 23(32), 1-12.
2. Wang, Y., Wang, J., Chen, X., **Chu, T.**, Liu, M., Li, Y. Feature surface extraction and reconstruction from industrial components using multistep segmentation and optimization. *Remote Sensing*. **2018**, 10(7), 1073.
3. **Chu, T.**, Starek, M.J., Brewer, M.J., Murray, S.C., Pruter, L.S. Characterizing canopy height with UAS structure-from-motion photogrammetry—results analysis of a maize field trial with respect to multiple factors. *Remote Sensing Letters*. **2018**, 9(8), 753-762.
4. Pugh, N., Horne, D., Murray, S., Carvalho, G., Malambo, L., Jung, J., Chang, A., Maeda, M., Popescu, S., **Chu, T.**, Starek, M., Brewer, M., Richardson, G., Rooney, W. Temporal estimates of crop growth in sorghum and maize breeding enabled by unmanned aerial systems, *The Plant Phenome Journal*. **2018**, 1(1), doi:10./tppji2017.08.0006.
5. Chen, R., **Chu, T.**, Landivar, J.A., Yang, C., Maeda, M.M. Monitoring cotton (*Gossypium hirsutum* L.) germination using ultrahigh-resolution UAS images. *Precision Agriculture*. **2018**, 19(1), 161-177.
6. **Chu, T.**, Starek, M.J., Brewer, M.J., Murray, S.C., Pruter, L.S. Assessing lodging severity over an experimental maize (*Zea mays* L.) field using UAS images. *Remote Sensing*. **2017**, 9(9), 923.
7. Stanton, C., Starek, M.J., Elliott, N., Brewer, M., Maeda, M., **Chu, T.** Unmanned aircraft system-derived crop height and NDVI metrics for sorghum yield and aphid stress assessment, *Journal of Applied Remote Sensing*. **2017**, 11(2), 026035.
8. Yang, T., Wan, W., Chen, X., **Chu, T.**, Hong, Y. Using BDS SNR observations to measure near-surface soil moisture fluctuations: results from low vegetated surface. *IEEE Geoscience and Remote Sensing Letters*. **2017**, 14(8), 1308-1312.
9. Liu, K., Wang, Y., Chen, R., **Chu, T.** Research on human activity recognition with multiple contexts by using random forest (in Chinese). *Bulletin of Surveying and Mapping*. **2017**, 7, 29-33, 44.
10. Liu, K., **Chu, T.**, Bi, J., Wang, Y., Chen, R. An indoor positioning system accuracy evaluation approach considering static and dynamic context (in Chinese). *Bulletin of Surveying and Mapping*. **2017**, 5, 17-20, 66.
11. **Chu, T.**, Chen, R., Landivar, J.A., Maeda, M.M., Starek, M.J. Cotton growth modeling and assessment using unmanned aircraft system visual-band imagery. *Journal of Applied Remote Sensing*. **2016**, 10(3), 036018.
12. Liu, K., Wang, Y., Chen, R., **Chu, T.**, Bi, J. A survey of human activity recognition using smartphones. *Journal of Residuals Science & Technology*. **2016**, 13(8), 385.
13. Liu, K., Chen, R., **Chu, T.**, Wang, Y., Liu, J., Chen, Y., Pei, L. Recognizing human activities in smartphones: a comprehensive algorithm assessment of a multiple context approach. *Journal of Residuals Science & Technology*. **2016**, 13(6), 98.
14. Chen, R., **Chu, T.**, Liu, K., Liu, J., Chen, Y. Inferring human activity in mobile devices by computing multiple contexts. *Sensors*. **2015**, 15, 21219-21238.
15. Liu, J., Zhu, L., Wang, Y., Liang, X., Hyppä, J., **Chu, T.**, Chen, R. Reciprocal estimation of pedestrian location and motion state toward a smartphone geo-context computing solution. *Micromachines*. **2015**, 6, 699-717.

16. Guo, N., Zhao, Y., **Chu, T.** Galileo E5 signal acquisition and tracking based on a wide-band customized universal peripheral N210 platform. *Advanced Materials Research*. **2013**, 765-767, 2686-2690.
17. **Chu, T.**, Guo, N., Backén, S., Akos, D. Monocular camera/IMU/GNSS integration for ground vehicle navigation in challenging GNSS environments. *Sensors*. **2012**, 12, 3162-3185.
18. Wu, C., Su, H., **Chu, T.**, Cai Y. Beidou based mobile emergency monitoring and commanding technology (in Chinese). *Digital Communication World*. **2011**, 6(12), 60-63.
19. Wu, C., Su, H., Cai, Y., **Chu, T.**, Tang, A. Mutual visualization technology for mobile emergency management (in Chinese). *Journal of Safety Science and Technology*. **2011**, 7(5), 37-41.
20. Vinande, E., Weinstein, B., **Chu, T.**, Akos, D. GNSS receiver evaluation: record-and-playback test methods. *GPS World*. **2010**, 21(1), 28-34. *This article was selected as the **Feature Paper** by the journal*
21. Yu, Q., Wu, Y., Chen, X., **Chu, T.** Simulation analysis of GNSS geometric performance. *Computer Simulation*. **2010**, 27(6), 87-92.

Conference Papers and Oral Presentations

1. Starek, M.J., **Chu, T.** Evaluation of UAS-lidar versus UAS-sfm: a case study. Presented at *ASPRS 2019 Annual Conference*, Denver, CO, USA, January 28–30, 2019.
2. Starek, M.J., **Chu, T.**, Bridges, D. Evaluation of a survey-grade, long-range UAS lidar system: a case study in South Texas. In *Proceedings of 2018 IEEE International Geoscience and Remote Sensing Symposium (IGARSS)*, Valencia, Spain, July 22–27, 2018, pp. 8765-8768.
3. Starek, M., **Chu, T.**, Brewer, M., Murray, S. UAS surveying of crop development over an experimental maize field, Presented at *2018 ASCE UESI Surveying & Geomatics Conference*, Pomona, CA, USA, April 22–24, 2018.
4. **Chu, T.**, Starek, M.J., Brewer, M.J., Murray, S.C. UAS automated lodging detection and multiple factor assessment of SfM crop height. Presented at *2017 TAMU System Internal UAS Post Season Meeting*, College Station, TX, USA, January 9, 2018.
5. **Chu, T.**, Starek, M.J., Brewer, M.J., Murray, S.C. Multi-platform UAS imaging for crop height estimation: performance analysis over an experimental corn field. In *Proceedings of 2017 IEEE International Geoscience and Remote Sensing Symposium (IGARSS)*, Fort Worth, TX, USA, July 23–28, 2017, pp. 4338-4341.
6. Xu, W., Liu, Y., Yang, Y., Liu, X., Hu, B., **Chu, T.**, Song, H. An optimized fusion method for double-wearable-wireless-band platform on remote controller. In *Proceedings of 2017 IEEE International Conference on Agents (ICA)*, Beijing, China, July 6–9, 2017, pp. 90-94.
7. **Chu, T.**, Starek, M.J., Brewer, M.J., Murray, S.C. Assessing crop lodging over an experimental maize field using UAS images. Presented at *USDA-HSI Field Day on UAS in Precision Farming*, Corpus Christi, TX, USA, June 13, 2017.
8. **Chu, T.**, Starek, M.J., Brewer, M.J., Murray, S.C., Masiane, T. UAS imaging for automated crop lodging detection: a case study over an experimental corn field. In *Proceedings of SPIE Defense + Commercial Sensing Conference of Autonomous Air and Ground Sensing Systems for Agricultural Optimization and Phenotyping II*, Anaheim, CA, USA, April 10–11, 2017, doi: 10.1117/12.2262812. *This paper won **Best Paper Award** at the conference sponsored by Monsanto.*

9. Brewer, M.J., Starek, M.J., **Chu, T.** UAS-derived NDVI and crop height metrics: assessment of sorghum and corn health affected by insects and plant characteristics. Presented at *2016 TAMU System Internal UAS Post Season Meeting*, College Station, TX, USA, January 12, 2017.
10. Yang, C., Landivar, J., Maeda, M., Jung, J., Starek, M.J., **Chu, T.**, Chang, A. Comparison of aerial imagery from manned and unmanned aircraft platforms for monitoring cotton growth. In *Proceedings of 2017 Beltwide Cotton Conferences*, Dallas, TX, USA, January 4–6, 2017.
11. Xu, W., Liu, Y., Yang, Y., Ning, X., **Chu, T.**, Song, H. An optimized fusion method for double-wearable-wireless-band platform on cloud-health application. In *Proceedings of 8th International Symposium on Parallel Architecture, Algorithm and Programming*, Haikou, China, June 17–18, 2017, pp. 224-236.
12. Odvody, G.N., Murray, S.C., Jung, J., Maeda, M.M., **Chu, T.**, Starek, M.J. UAV imaging of corn hybrid response to southern rust and progression to charcoal stalk rot. Presented at *28th annual Texas Plant Protection Conference*, Bryan, TX, USA, December 7, 2016.
13. Murray, S.C., Richardson, G., Malambo, L., Shi, Y., Hartley, B., Demieville, J., Pekar, J., Thomasson, J.A., Popescu, S., Cope, D., Olsenholler, J., Bishop, M.P., Valasek, J., Dong, X., Rooney, W.L., Oliver, G., Ratcliff, C., Baltensperger, D.D., Maeda, M., Maeda, A., Chang, A., **Chu, T.**, Jung, J., Starek, M., Brewer, M.J., Landivar, J. Temporal estimates of maize plant growth in a breeding program using ground based and unmanned aerial vehicle systems. Presented at *2016 Meeting of American Society of Agronomy, Crop Science Society of America, and Soil Science Society of America*, Phoenix, AZ, USA, November 6–9, 2016.
14. Jia, M., Yang, Y., Kuang, L., Xu, W., **Chu, T.**, Song, H. An indoor and outdoor seamless positioning system based on Android platform. In *Proceedings of 2016 IEEE Trustcom/BigDataSE/ISPA*, Tianjin, China, August 23–26, 2016, pp. 1114-1120.
15. Chen, R., **Chu, T.**, Landivar, J., Jung, J., Yang, C., Chang, A., Enciso, J., Maeda, M. Unmanned aerial system (UAS) for precision agriculture: first results from a growing cycle of cotton. In *Proceedings of 2016 Beltwide Cotton Conferences*, New Orleans, LA, USA, January 5–7, 2016.
16. Landivar, J., Maeda, M., McGinty, J., Jung, J., Chen, R., Chang, A., **Chu, T.**, Enciso, J., Yang, C. Integration of ground- and UAS-platforms for the evaluation of cultivar performance (phenotyping) and experimental treatments. In *Proceedings of 2016 Beltwide Cotton Conferences*, New Orleans, LA, USA, January 5–7, 2016.
17. Maeda, M., Landivar, J., McGinty, J., Jung, J., Chen, R., Chang, A., Enciso, J., **Chu, T.** Development of a ground-based platform for plant phenotyping and crop management decisions. In *Proceedings of 2016 Beltwide Cotton Conferences*, New Orleans, LA, USA, January 5–7, 2016.
18. Jung, J., Chang, A., Landivar, J., Maeda, M., Chen, R., **Chu, T.**, Enciso, J., Yang, C. Unmanned aerial system (UAS) assisted framework for the selection of high yielding cultivars. In *Proceedings of 2016 Beltwide Cotton Conferences*, New Orleans, LA, USA, January 5–7, 2016.
19. Chang, A., Jung, J., Landivar, J., Maeda, M., Chen, R., Enciso, J., **Chu, T.**, Yang, C. Unmanned aerial system (UAS) based cotton growth monitoring system. In *Proceedings of 2016 Beltwide Cotton Conferences*, New Orleans, LA, USA, January 5–7, 2016.
20. Liu, K., Chen, R., **Chu, T.**, Wang, Y. Enhancing the probability models for inference of significant activities using a real-time learning machine in smartphone. In *Proceedings of the 28th International Technical Meeting of The Satellite Division of the Institute of Navigation (ION GNSS+ 2015)*, Tampa, FL, USA, September 14–18, 2015, pp. 2055-2059.

21. **Chu, T.**, Chen, R., Liu, K., Liu, J., Chen, Y. Contextual thinking for inference and prediction of daily activities by mining smartphone data. In *Proceedings of the 28th International Technical Meeting of The Satellite Division of the Institute of Navigation (ION GNSS+ 2015)*, Tampa, FL, USA, September 14–18, 2015, pp. 2511-2517.
22. **Chu, T.**, Chen, R. Integrating multiple floor plans to a global map for indoor navigation. Presented at *ESRI DevSummit 2015 User Presentations*, Palm Springs, CA, USA, March 10–13, 2015.
23. Chen, R., **Chu, T.** ActThinker: A framework for Significant Activity Inference Based on Mobile Geospatial Computing. Presented at *ESRI DevSummit 2015 User Presentations*, Palm Springs, CA, USA, March 10–13, 2015.
24. Xu, W., Chen, R., **Chu, T.**, Kuang, L., Yang, Y., Li, X., Chen, Y. A context detection approach using GPS module and emerging sensors in smartphone platform. In *Proceedings of 2014 IEEE International Conference on Ubiquitous Positioning Indoor Navigation and Location Based Service (UPINLBS 2014)*, Corpus Christi, TX, USA, November 20–21, 2014, pp. 156-163.
25. Chen, R., **Chu, T.**, Liu, J., Chen, Y., Chen, L., Xu, W., Tang, J. Development of a contextual thinking engine in mobile devices. In *Proceedings of 2014 IEEE International Conference on Ubiquitous Positioning Indoor Navigation and Location Based Service (UPINLBS 2014)*, Corpus Christi, TX, USA, November 20–21, 2014, pp. 90-96.
26. Chen, R., **Chu, T.**, Liu, J., Li, X., Chen, Y., Chen, Y., Chen, L. DGNSS-C: a differential solution for enhancing smartphone GNSS performance. In *Proceedings of the 27th International Technical Meeting of the Satellite Division of the Institute of Navigation (ION GNSS+ 2014)*, Tampa, FL, USA, September 8–12, 2014, pp. 490-497.
27. Li, X., Chen, R., **Chu, T.** A crowdsourcing solution for road surface roughness detection using smartphones. In *Proceedings of the 27th International Technical Meeting of the Satellite Division of the Institute of Navigation (ION GNSS+ 2014)*, Tampa, FL, USA, September 8–12, 2014, pp. 498-502.
28. **Chu, T.**, Akos, D. Assisted GNSS—performance results of multiplexed measurements, limited bandwidth, and a vectorized implementation. In *Proceedings of the 2011 International Technical Meeting of the Institute of Navigation*, San Diego, CA, USA, January 24–26, 2011, pp. 1007-1018.
29. **Chu, T.**, Akos, D. Assisted GNSS—traditional and vectorized: implementation and performance results. In *Proceedings of the 23rd International Technical Meeting of the Satellite Division of the Institute of Navigation (ION GNSS 2010)*, Portland, OR, USA, September 21–24, 2010, pp. 1605-1614.
30. **Chu, T.**, Chen, X., Wu, C., Tang, A., Su, H. Cooperative location technology based on mobile emergency terminals (in Chinese). In *Proceedings of the 2009 International Technical Meeting on GNSS*, Beijing, China, August 8–9, 2009, pp. 385-389.
31. Wu, C., **Chu, T.**, Tang, A., Su, H. GNSS based network positioning technology for cooperative emergency management. In *Proceedings of SPIE 7471, Second International Conference on Earth Observation for Global Changes*, Chengdu, China, May 25–29, 2009, 74711Q.

Journal and Conference Articles in Preparation

1. Starek, M.J., **Chu, T.**, Mitsova, H., Harmon, R.S. Optimization of terrestrial laser scanning survey design for dynamic terrain monitoring. In preparation to submit to *International Journal of Remote Sensing*.

2. Li, X., Goldberg, D., **Chu, T.**, Ma, A. Discovering individualized hazardous driving scenes using GIS and mobile sensing. Under minor revision at *Transactions in GIS*.