

Dr. Chih-Li Sung

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Experience	Assistant Professor	2018 - Present
	Department of Statistics and Probability, Michigan State University, U.S.A.	
	Visiting Assistant Professor	May - July, 2022
	Department of Statistics, National Cheng Kung University, Taiwan	
	Graduate Research Assistant	2014 - 2018
	Georgia Institute of Technology, U.S.A.	
	Research Assistant	2013 - 2014
	Academia Sinica, Taiwan	
	Statistical Engineer	2010 - 2013
	Walsin Lihwa Corp., Taiwan	
Education	Ph.D. in Industrial Engineering	2014 - 2018
	Major in Statistics, Minor in Computer Science Georgia Institute of Technology, U.S.A. Thesis title: <i>Contributions to binary-output computer experiments and large-scale computer experiments</i> Advisors: Profs. C. F. Jeff Wu and Benjamin Haaland	
	M.S. in Statistics	2008 - 2010
	National Tsing Hua University, Taiwan	
	B.S. in Applied Mathematics	2004 - 2008
	National Tsing Hua University, Taiwan	
Research Interests	Computer Experiments, Experimental Designs, Uncertainty Quantification, Machine Learning, Big Data, and Applications of Statistics in Engineering	
Grants	<ul style="list-style-type: none">• NSF DMS 2338018 (PI, 06/01/2024 - 05/31/2029, \$423,591), <i>CAREER: Single-Fidelity vs. Multi-Fidelity Computer Experiments: Unveiling the Effectiveness of Multi-Fidelity Emulation.</i>• NSF DMS 2113407 (PI, 07/01/2021 - 06/30/2024, \$142,009), <i>Collaborative Research: Efficient Bayesian Global Optimization with Applications to Deep Learning and Computer Experiments.</i> This project is in collaboration with Dr. Ying Hung at Rutgers University.	
Editorial Services	• Associate Editor	
	- Technometrics	2022 - present
	- Computational Statistics & Data Analysis	2021 - present

Publications

[†] Supervised student

19. Heo, J.[†], **Sung, C.-L.** (2024+). Active learning for a recursive non-additive emulator for multi-fidelity computer experiments.
Technometrics, accepted.
 (Winner of INFORMS 2023 QSR Best Student Paper)
 (Winner of 2024 ASA SPES + Q&P Best Student Paper)
18. Lin, W.-A.[†], **Sung, C.-L.**, and Chen, R.-B. (2024+). Category tree Gaussian process for computer experiments with many-category qualitative factors and application to cooling system design.
Journal of Quality Technology, accepted.
 (C. Z. Wei Memorial Award from CIPS in 2022)
17. **Sung, C.-L.**, Wang, W., Cakoni, F., Harris, I., and Hung, Y. (2024). Functional-input Gaussian processes with applications to inverse scattering problems.
Statistica Sinica, 34(4), 1883-1902.
16. **Sung, C.-L.**, Wang, W., Ding, L., and Wang, X. (2024). Mesh-clustered Gaussian process emulator for partial differential equation boundary value problems.
Technometrics, 66(3), 406-421.
15. **Sung, C.-L.**, Ji, Y., Mak, S., Wang, W., and Tang, T. (2024). Stacking designs: designing multifidelity computer experiments with target predictive accuracy.
SIAM/ASA Journal on Uncertainty Quantification, 12(1), 157-181.
14. **Sung, C.-L.** and Tuo, R. (2024). A review on computer model calibration.
WIREs Computational Statistics, 16(1), e1645.
13. **Sung, C.-L.** and Hung, Y. (2024). Efficient calibration for imperfect epidemic models with applications to the analysis of COVID-19.
Journal of the Royal Statistical Society: Series C, 73(1), 47-64.
12. Zhou, M., Ni, C., **Sung, C.-L.**, Ding, S., and Wang, X. (2024). Modeling of thermo-physical properties and vapor-liquid equilibrium using Gaussian process regression.
International Journal of Heat and Mass Transfer, 219, 124888.
11. Zhou, M., Chen, W., Su, X., **Sung, C.-L.**, Wang, X., and Ren, Z. (2023). Data-driven modeling of general fluid density under subcritical and supercritical conditions.
AIAA Journal, 61(4), 1519-1531.
10. **Sung, C.-L.**, Haaland, B., Hwang, Y., and Lu, S. (2023). A clustered Gaussian process model for computer experiments.
Statistica Sinica, 33(2), 893-918.
9. **Sung, C.-L.**, Barber, B. D., and Walker, B. J. (2022). Calibration of inexact computer models with heteroscedastic errors,
SIAM/ASA Journal on Uncertainty Quantification, 10(4), 1733-1752.
8. **Sung, C.-L.** (2022). Estimating functional parameters for understanding the impact of weather and government interventions on COVID-19 outbreak.
Annals of Applied Statistics, 16(4), 2505-2522.
7. **Sung, C.-L.**, Hung, Y., Rittase, W., Zhu, C., and Wu, C. F. J. (2020). Calibration for computer experiments with binary responses and application to cell adhesion study.
Journal of the American Statistical Association, 115(532), 1664-1674.
6. **Sung, C.-L.**, Hung, Y., Rittase, W., Zhu, C., and Wu, C. F. J. (2020). A generalized Gaussian process model for computer experiments with binary time series.
Journal of the American Statistical Association, 115(530), 945-956.
5. **Sung, C.-L.**, Wang, W., Plumlee, M., and Haaland, B. (2020). Multi-resolution functional ANOVA for large-scale, many-input computer experiments.

Journal of the American Statistical Association, 115(530) 908-919.

4. Chang, Y.-H., Zhang, L., Wang, X., Yeh, S.-T., Mak, S., **Sung, C.-L.**, Wu, C. F. J., and Yang, V. (2019). Kernel-smoothed proper orthogonal decomposition-based emulation for spatiotemporally evolving flow dynamics prediction. *AIAA Journal*, 57(12), 5269-5280.
3. Mak, S., **Sung, C.-L.**, Yeh, S.-T., Wang, X., Chang, Y.-C., Joseph, V. R., Yang, V., and Wu, C. F. J. (2018). An efficient surrogate model for emulation and physics extraction of large eddy simulations. *Journal of the American Statistical Association*, 113(524):1443-1456. (SPES Award from ASA in 2019)
2. Yeh, S.-T., Wang, X., **Sung, C.-L.**, Mak, S., Chang, Y.-H., Wu, C. F. J., and Yang, V. (2018). Data-driven analysis and mean flow prediction using a physics-based surrogate model for design exploration. *AIAA Journal*, 56(6):2429-2442.
1. **Sung, C.-L.**, Gramacy, R. B., and Haaland, B. (2018). Potentially predictive variance reducing subsample locations in local Gaussian process regression. *Statistica Sinica*, 28(2):577-600.

Submitted Papers

[†] Supervised student

2. Steensma, A. K., Kaste, J. A., Heo, J.[†], Orr, D., **Sung, C.-L.**, Shachar-Hill, Y., and Walker, B. J. (2024). Modeling with uncertainty quantification identifies essential features of a non-canonical algal carbon-concentrating mechanism.

1. **Sung, C.-L.**, Song, Y., and Hung, Y. (2023). Advancing inverse scattering with surrogate modeling and Bayesian inference for functional inputs.

Conference Proceedings

3. Li, Y., Wang, X., Mak, S., **Sung, C.-L.**, Wu, C. F. J., and Yang, Y. (2018). Novel perspectives of spatial flame transfer function identification and thermo-acoustic instability analysis. In *Proceedings of the 2018 AIAA Propulsion and Energy Forum*.
2. Li, Y., Wang, X., Mak, S., **Sung, C.-L.**, Wu, C. F. J., and Yang, Y. (2018). Uncertainty quantification of flame transfer function under a Bayesian framework. In *Proceedings of the 2018 AIAA Aerospace Sciences Meeting*.
1. Chang, Y.-H., Zhang, L., Wang, X., Yeh, S.-T., Mak, S., **Sung, C.-L.**, Wu, C. F. J., and Yang, Y. (2017). Spatial-temporal flow dynamics prediction with large design space via data-driven analysis and LES-based surrogate model. In *ILASS-Americas 29th Annual Conference on Liquid Atomization and Spray Systems*.

Awards

- **NSF CAREER Award** 2024-2029
National Science Foundation
- **SPES + Q&P Best Student Paper Winner** August 2024
(Student: Junoh Heo) ASA
- **QSR Best Student Paper Winner** October 2023
(Student: Junoh Heo) INFORMS
- **IMS New Researchers Travel Award** April 2023
Institute of Mathematical Statistics
- **Full Membership in Sigma Xi** October 2021
The Scientific Research Honor Society
- **Statistics in Physical Engineering Sciences (SPES) Award** August 2019
American Statistical Association

- **Alice and John Jarvis, Ph.D. Student Research Award** April 2018
(Honorable Mention) Stewart School of ISyE, Georgia Tech
- **Best Student Poster Winner** October 2017
(1st Prize) Georgia Statistics Day, Emory University
- **Best Student Poster Winner** June 2017
ISBIS Meeting, the IBM Watson Research Center
- **Spring Research Conference Travel Award** May 2016
SRC, Illinois Institute of Technology
- **Hacklytics: Go Back Home Safe** April 2016
(3rd Place) Data Science at Georgia Tech
- **Government Scholarship to Study Abroad** August 2015
Ministry of Education, Taiwan
- **Dr. Chen Wen-Chen Statistics Science Thesis Award** June 2010
Dr. Chen Wen-Chen Memorial Foundation

Teaching

- **Instructor**, Michigan State University
 - **STT481: Capstone in Statistics** 2018, 2019, 2020, 2021, 2022, 2023
Student evaluation (average of SIRS form; 1 is the best and 5 is the worst):

2018 Fall	2019 Spring	2019 Fall	2020 Spring	2020 Fall
1.638	1.537	1.680	1.665	1.612
2021 Spring	2021 Fall	2022 Spring	2022 Fall	2023 Spring
1.598	1.713	1.392	1.919	1.560

- **STT801: Design of Experiments** 2021, 2022, 2023
Student evaluation (average of SIRS form; *1 is the best* and 5 is the worst):

2021 Spring	2022 Spring	2023 Spring
1.340	1.498	1.205

- **STT997: Advanced Topics in Statistics** 2024 Spring
Student evaluation (average of SPLS form; *5 is the best*): 4.5
- **Graduate Teaching Assistant**, Georgia Institute of Technology
 - ISYE6413: Design and Analysis of Experiments January 2017
 - ISYE3770: Statistics and Applications August 2015

Mentorship

STT: Department of
Statistics and
Probability at MSU

- **Ph.D. Students**
 - Andrews Boahen (*STT*) 2024-present
 - Romain Boutelet (*STT*, co-supervised with Prof. Andrew O. Finley) 2023-present
 - Chun-Yi Chang (*STT*) 2022-present
 - Junoh Heo (*STT*) 2021-present
 - Wei-Ann Lin (*NCKU*, primary advisor: Prof. Ray-Bing Chen) 2019-present
- **Masters-level Students**
 - Haojun Yang (*STT*) 2021-2022

	<ul style="list-style-type: none"> - Chun-Yi Chang (<i>STT</i>, Current position: Ph.D. student at MSU) 2021-2022 - Kun Xia (<i>STT</i>) 2021-2022 - Wei Chen (<i>Florida Tech</i>, Primary advisor: Prof. Xingjian Wang) 2020-2021 - Ashton Pallottini (<i>STT</i>, Current position: Ph.D. student at U. of Chicago) 2019-2020 - Jinwon Park (<i>STT</i>) 2019-2019
	<ul style="list-style-type: none"> • Undergraduate-level Students <ul style="list-style-type: none"> - Chungmin Lee (<i>Yonsei University</i>) 2024-present - Aditya Pendyala (<i>STT</i>) 2024-present - Noah Jankowski (<i>STT</i>) 2021-2022 • MSU IMPACTS Trainees <ul style="list-style-type: none"> - Duncan Boren (<i>BMB</i>, primary advisor: Prof. Josh Vermaas) 2022-present - Joshua Kaste (<i>Plant Biology</i>, primary advisor: Prof. Yair Shachar-Hill) 2020-2021
Panel Review	<ul style="list-style-type: none"> • National Science Foundation (2022, 2024)
Conference/ Workshop Activities	<ul style="list-style-type: none"> • Organizing the workshop: “UQ and Trustworthy AI Algorithms for Complex Systems and Social Good” March 2025 • Organizing the session at JSM: “Recent Advances in Active Learning and Bayesian Optimization” August 2024
Educational Outreach	<ul style="list-style-type: none"> • 12th Annual MSU Science Festival April 2024 Our lab hosted an engaging event: “Rolling the Dice: Unveiling Normal Distributions” as part of the MSU Science Festival. Our booth provided a fun and hands-on learning experience, helping learners of all ages understand the concept of normal distribution through fun and interactive games. • REU exchange program 2024 Spring I had the honor of mentoring an exchange student from Xian University, alongside three talented MSU undergraduate students. As part of this program, I had the privilege of supervising an undergraduate research project titled “March Machine Learning Mania 2024,” fostering innovation and exploration in the realm of machine learning. • Gifted Education Symposium November 2023 I shared my career journey and applications of statistics and AI, as well as future opportunities in these areas, with junior high school students in Penghu, Taiwan.
Software	<ol style="list-style-type: none"> 7. Heo, J. and Sung, C.-L. (2024). RNAmf: Recursive Non-Additive Emulator for Multi-Fidelity Data. R package version 1.0.0. 6. Sung, C.-L. (2023). MRFA: Fitting and Predicting Large-Scale Nonlinear Regression Problems using Multi-Resolution Functional ANOVA (MRFA) Approach. R package version 0.6. 5. Sung, C.-L. (2023). mcGP: Mesh-clustered Gaussian process. R package version 0.1. 4. Sung, C.-L. (2022). HetCalibrate: Calibration of Inexact Computer Models with Heteroscedastic Errors. R package version 0.2. 3. Sung, C.-L. (2022). GPcluster: Clustered Gaussian Process. R package version 0.1. 2. Sung, C.-L. (2018). calibrateBinary: Calibration for Computer Experiments with Binary Responses. R package version 0.1. 1. Sung, C.-L. (2017). binaryGP: Fitting and Predicting a Gaussian Process Model with (Time-Series) Binary Response. R package version 0.2.

**Dissertation
Committee
Service**

STT: Department of
Statistics and
Probability at MSU

- Meiqi Liu (*STT*, in progress)
- Tathagata Dutta (*STT*, in progress)
- Duncan Boren (*BMB*, in progress)
- Xuran Wang (*CEPSE*, 2024)
- Haoxiang Feng (*STT*, 2024)
- Joshua Kaste (*Plant Biology*, 2024)
- Zi Li (*ECE*, 2023)
- Yao Song (*Statistics, Rutgers University*, 2023)
- Anirban Samaddar (*STT*, 2023)
- Mookyoung Son (*STT*, 2023)
- Abhijnan Chattopadhyay (*STT*, 2022)
- Runze Su (*STT*, 2022)
- Ibrahim Kekec (*Economics*, 2021)
- Juna Goo (*STT*, 2020)
- Wei Chen (*Florida Tech*, master thesis, 2020)

Talks

Invited talks are
boldfaced

• **2024**

1. **JSM 2023 Conference, Portland** (August). *Functional-input Gaussian processes with applications to inverse scattering problems.*
2. **2024 International Conference for Statistics and Data Science** (July). *Stacking designs: designing multifidelity computer experiments with target predictive accuracy.*
3. **The 28th South Taiwan Statistics Conference** (June). *Active learning for a recursive non-additive emulator for multi-fidelity computer experiments.*
4. **Seminar, Department of Mathematics and Statistics, University of Massachusetts Amherst** (April). *Stacking designs: designing multifidelity computer experiments with target predictive accuracy.*

• **2023**

1. **Annual Meeting and Conference of Chinese Statistical Association** (December). *Stacking designs: designing multi-fidelity computer experiments with target predictive accuracy.*
2. **Seminar, Institute of Statistical Science, Academia Sinica** (October). *Active learning for a recursive non-additive emulator for multi-fidelity computer experiments.*
3. **Seminar, Department of Statistics, National Chengchi University** (October). *Stacking designs: designing multi-fidelity computer experiments with target predictive accuracy.*
4. **Seminar, TAMIDS, Texas A&M University** (August). *Stacking designs: designing multi-fidelity computer experiments with target predictive accuracy.*
5. **Industry 4.0 Technology Implementation workshop** (August). *Statistical emulation, calibration, and optimization for digital twin.*
6. **EcoSta 2023, Tokyo, Japan** (August). *Functional-input Gaussian processes with applications to inverse scattering problems.*
7. **ISI World Statistics Congress 2023** (July). *mcGP: mesh-clustered Gaussian process emulator for partial differential equation systems.*

8. **ICSA Applied Statistics Symposium 2023** (June). *Stacking designs: designing experiments for multi-fidelity modeling with confidence.*
 9. **Spring Research Conference 2023** (May). *Stacking designs: designing experiments for multi-fidelity modeling with confidence.*
 10. **Seminar, University of St Andrews, Scotland** (January). *When epidemic models meet statistics: understanding COVID-19 outbreak.*
- **2022**
 1. **AISC 2022, UNC Greensboro** (October). *Functional-input Gaussian processes with applications to inverse scattering problems.*
 2. **Seminar, Virginia Tech** (September). *Stacking designs: designing multi-fidelity computer experiments with confidence.*
 3. **JSM 2022 Conference, Washington DC** (August). *When epidemic models meet statistics: understanding the impact of weather and government interventions on COVID-19 outbreak.*
 4. **Seminar, Academia Sinica, Taiwan** (July). *Stacking designs: designing experiments for multi-fidelity modeling with confidence.*
 5. **EcoSta 2022, Kyoto, Japan** (June). *Stacking designs: designing experiments for multi-fidelity modeling with confidence.*
 6. **Seminar, National Tsing Hua University, Taiwan** (May). *When epidemic models meet statistics: understanding COVID-19 outbreak.*
 - **2021**
 1. **INFORMS 2021 Conference** (October). *Estimating functional parameters for understanding the impact of weather and government interventions on COVID-19 outbreak.*
 2. **JSM 2021 Conference** (August). *Estimating functional parameters for understanding the impact of weather and government interventions on COVID-19 outbreak.*
 3. **JSM 2021 Conference** (August). *Multi-level emulator for multi-fidelity simulations.*
 4. **UQ Seminar, Academy of Mathematics and Systems Science, Chinese Academy of Sciences** (January). *Computer experiments with binary time series and applications to cell biology: modeling, emulation and calibration.*
 - **2020**
 1. **JSM 2020 Conference** (August). *Calibration of inexact computer models with heteroscedastic errors.*
 2. **Seminar, University of California, Los Angeles** (February). *Multi-resolution functional ANOVA for large-scale, many-input computer experiments.*
 3. **Colloquium, Michigan State University** (January). *Applications of computer experiments: emulation and calibration.*
 - **2019**
 1. **INFORMS 2019 Conference** (October). *A clustered Gaussian process model with an application to solar irradiance emulation.*
 2. **INFORMS 2019 Conference** (October). *Multi-resolution functional ANOVA for large-scale, many-input computer experiments.*
 3. **ICOSDA 2019** (October). *Exploiting variance reduction potential in local Gaussian process search.*
 4. **ICISE 2019** (June). *Multi-resolution functional ANOVA for large-scale, many-input computer experiments.*

5. **EcoSta 2019** (June). *Exploiting variance reduction potential in local Gaussian process search.*
 6. **The 28th South Taiwan Statistics Conference** (June). *Exploiting variance reduction potential in local Gaussian process search.*
 7. **Seminar, Academia Sinica, Taiwan** (June). *Multi-resolution functional ANOVA for large-scale, many-input computer experiments.*
 8. **Seminar, National Tsing Hua University, Taiwan** (May). *Computer Experiments with Binary Time Series and Applications to Cell Biology: modeling, estimation and calibration.*
 9. **Research Colloquium, Purdue University** (February). *Applications of computer experiments: emulation and calibration.*
- **2018**
 1. **INFORMS 2018 Conference** (October). *An efficient surrogate model for emulation and physics extraction of large eddy simulations.*
 2. **Workshop on Computer Experiments, Academia Sinica, Taiwan** (July). *Calibration for computer experiments with binary responses.*
 3. **SIAM UQ** (April). *Calibration for computer experiments with binary responses.*
 - **2017**
 1. **INFORMS 2017 Conference** (October). *A generalized Gaussian process model for computer experiments with binary time series.*
 2. **Georgia Statistics Day, Emory University** (October). *A generalized Gaussian process model for computer experiments with binary time series* (poster presentation).
 3. **JSM 2017 Conference** (July). *Multi-resolution functional ANOVA for large-scale, many-input computer experiments.*
 4. **ISBIS Meeting** (June). *Multi-resolution functional ANOVA for large-scale, many-input computer experiments* (poster presentation).
 5. **SPUQ Workshop** (May). *A generalized Gaussian process model for computer experiments with binary time series* (poster presentation).
 6. **NAE Regional Meeting** (April). *Surrogate modeling and data-driven physics extraction of large-eddy simulations* (poster presentation).
 - **2016:**
 1. **ICSA Symposium** (June). *Potentially predictive variance reducing subsample locations in local Gaussian process regression.*
 2. **SRC Conference** (May). *Potentially predictive variance reducing subsample locations in local Gaussian process regression.*