

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	<ul style="list-style-type: none">• Associate Editor<ul style="list-style-type: none">- Technometrics 2022 - present- Computational Statistics & Data Analysis 2021 - present

Publications

17. **Sung, C.-L.**, Wang, W., Ding, L., and Wang, X. (2024+). Mesh-clustered Gaussian process emulator for partial differential equation boundary value problems. *Technometrics*, accepted.
16. **Sung, C.-L.**, Ji, Y., Mak, S., Wang, W., and Tang, T. (2024+). Stacking designs: designing multi-fidelity computer experiments with target predictive accuracy. *SIAM/ASA Journal on Uncertainty Quantification*, accepted.
15. **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), in press.
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

3. Heo, J.†, **Sung, C.-L.** (2023). Active learning for a recursive non-additive emulator for multi-fidelity computer experiments, submitted. (Winner of INFORMS 2023 QSR Best Student Paper)
2. **Sung, C.-L.**, Song, Y., and Hung, Y. (2023). Advancing inverse scattering with surrogate modeling and Bayesian inference for functional inputs, submitted.
1. Lin, W.-A.†, **Sung, C.-L.**, and Chen, R.-B. (2022). Category tree Gaussian process for computer experiments with many-category qualitative factors and application to cooling system design, submitted. (C. Z. Wei Memorial Award from CIPS in 2022)

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
- **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

- **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**
 - 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
 - Chun-Yi Chang (*STT*, Current position: Ph.D. student at MSU) 2021-2022
 - Kun Xia (*STT*) 2021-2022
 - Wei Chen (*Florida Tech*, Primary advisor: Prof. Xingjian Wang) 2020-2021
 - Ashton Pallottini (*STT*, Current position: Ph.D. student at U. of Chicago) 2019-2020
 - Jinwon Park (*STT*) 2019-2019
- **Undergraduate-level Students**
 - Noah Jankowski (*STT*) 2021-2022
- **MSU IMPACTS Trainees**
 - Duncan Boren (*BMB*, primary advisor: Prof. Josh Vermaas) 2022-present
 - Joshua Kaste (*Plant Biology*, primary advisor: Prof. Yair Shachar-Hill) 2020-2021

**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)
- Joshua Kaste (*Plant Biology*, in progress)
- Zi Li (*ECE*, in progress)
- Xuran Wang (*CEPSE*, in progress)
- Haoxiang Feng (*STT*, in progress)
- Yao Song (*Statistics, Rutgers University*, in 2023)
- Anirban Samaddar (*STT*, in 2023)
- Mookyong 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)

Software

7. Heo, J. and **Sung, C.-L.** (2023). **RNAmf**: Recursive Non-Additive Emulator for Multi-Fidelity Data. R package version 0.1.0.
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.

Talks

Invited talks are
boldfaced

- **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.*