

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 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.
Publications	14. 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, <i>International Journal of Heat and Mass Transfer</i> , 219, 124888.
[†] Joint first authors	13. Sung, C.-L. and Hung, Y. (2023+). Efficient calibration for imperfect epidemic models with applications to the analysis of COVID-19, <i>Journal of the Royal Statistical Society: Series C</i> , accepted.
	12. Sung, C.-L. [†] , Wang, W. [†] , Cakoni, F., Harris, I., and Hung, Y. (2024). Functional-input Gaussian processes with applications to inverse scattering problems. <i>Statistica Sinica</i> , 34(4), to appear.

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.
6. **Sung, C.-L.** and Tuo, R. (2023). A review on computer model calibration, submitted.
5. 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)
4. **Sung, C.-L.**, Song, Y., and Hung, Y. (2023). Advancing inverse scattering with surrogate modeling and Bayesian inference for functional inputs, submitted.
3. **Sung, C.-L.**, Wang, W., Ding, L., and Wang, X. (2023). Mesh-clustered Gaussian process emulator for partial differential equation systems, submitted.

Submitted Papers

[†] Supervised student

2. **Sung, C.-L.**, Ji, Y., Mak, S., Wang, W., and Tang, T. (2022). Stacking designs: designing multi-fidelity computer experiments with target predictive accuracy, 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*.

Editorial Services

• Associate Editor

- Technometrics 2022 - present
- Computational Statistics & Data Analysis 2021 - present

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

- 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)

Awards	<ul style="list-style-type: none"> • QSR Best Student Paper Winner (Student: Junoh Heo) INFORMS 	October 2023
	<ul style="list-style-type: none"> • IMS New Researchers Travel Award Institute of Mathematical Statistics 	April 2023
	<ul style="list-style-type: none"> • Full Membership in Sigma Xi The Scientific Research Honor Society 	October 2021
	<ul style="list-style-type: none"> • Statistics in Physical Engineering Sciences (SPES) Award American Statistical Association 	August 2019
	<ul style="list-style-type: none"> • Alice and John Jarvis, Ph.D. Student Research Award (Honorable Mention) Stewart School of ISyE, Georgia Tech 	April 2018
	<ul style="list-style-type: none"> • Best Student Poster Winner (1st Prize) Georgia Statistics Day, Emory University 	October 2017
	<ul style="list-style-type: none"> • Best Student Poster Winner ISBIS Meeting, the IBM Watson Research Center 	June 2017
	<ul style="list-style-type: none"> • Spring Research Conference Travel Award SRC, Illinois Institute of Technology 	May 2016
	<ul style="list-style-type: none"> • Hacklytics: Go Back Home Safe (3rd Place) Data Science at Georgia Tech 	April 2016
	<ul style="list-style-type: none"> • Government Scholarship to Study Abroad Ministry of Education, Taiwan 	August 2015
	<ul style="list-style-type: none"> • Dr. Chen Wen-Chen Statistics Science Thesis Award Dr. Chen Wen-Chen Memorial Foundation 	June 2010

Software	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	<ul style="list-style-type: none"> • 2023 	
	<ol style="list-style-type: none"> 1. Seminar, Institute of Statistical Science, Academia Sinica (October). <i>Active learning for a recursive non-additive emulator for multi-fidelity computer experiments.</i> 2. Seminar, Department of Statistics, National Chengchi University (October). <i>Stacking designs: designing multi-fidelity computer experiments with target predictive accuracy.</i> 3. Seminar, TAMIDS, Texas A&M University (August). <i>Stacking designs: designing multi-fidelity computer experiments with target predictive accuracy.</i> 4. Industry 4.0 Technology Implementation workshop (August). <i>Statistical emulation, calibration, and optimization for digital twin.</i> 5. EcoSta 2023, Tokyo, Japan (August). <i>Functional-input Gaussian processes with applications to inverse scattering problems.</i> 	

Invited talks are
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6. **ISI World Statistics Congress 2023** (July). *mcGP: mesh-clustered Gaussian process emulator for partial differential equation systems.*
 7. **ICSA Applied Statistics Symposium 2023** (June). *Stacking designs: designing experiments for multi-fidelity modeling with confidence.*
 8. **Spring Research Conference 2023** (May). *Stacking designs: designing experiments for multi-fidelity modeling with confidence.*
 9. **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.*