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: *Contributions to binary-output computer experiments and large-scale computer experiments*
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

- NSF DMS 2113407 (**PI**, 07/01/2021 - 06/30/2024, $142,009), *Collaborative Research: Efficient Bayesian Global Optimization with Applications to Deep Learning and Computer Experiments*. This project is in collaboration with Dr. Ying Hung at Rutgers University.

Publications

† Joint first authors

11. **Sung, C.-L.**, Barber, B. D., and Walker, B. J. (2023). Calibration of inexact computer models with heteroscedastic errors, *SIAM/ASA Journal on Uncertainty Quantification*, in press.
10. **Sung, C.-L.**, Haaland, B., Hwang, Y., and Lu, S. (2023). A clustered Gaussian process model for computer experiments. *Statistica Sinica*, in press.
9. 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*, accepted.

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

† Joint first authors

4. **Sung, C.-L.**, Ji, Y., Tang, T., and Mak, S. (2022). Stacking designs: designing multi-fidelity computer experiments with confidence, submitted.

3. **Sung, C.-L.** and Hung, Y. (2022). Efficient calibration for imperfect epidemic models with applications to the analysis of COVID-19, major revision submitted.

2. **Sung, C.-L.**†, Wang, W.†, Cakoni, F., Harris, I., and Hung, Y. (2022). Functional-input Gaussian processes with applications to inverse scattering problems, major revision 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, under revision. **(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

    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
1.598	1.713	1.392	1.919

  - **STT801: Design of Experiments** 2021, 2022

    Student evaluation (average of SIRS form; 1 is the best and 5 is the worst):

2021 Spring	2022 Spring
1.340	1.498

- **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**
  - Chun-Yi Chang (*STT*) 2022-present
  - Junoh Heo (*STT*) 2021-present
  - Wei-Ann Lin (*NCKU*, primary advisor: Prof. Ray-Bing Chen) 2019-present
  - Duncan Boren (*BMB*, primary advisor: Prof. Josh Vermaas) 2022-present
  - Joshua Kaste (*Plant Biology*, primary advisor: Prof. Yair Shachar-Hill) 2020-2021
- **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

Dissertation Committee Service

STT: Department of Statistics and Probability at MSU

- Anirban Samaddar (*STT*, in progress)
- Mookyong Son (*STT*, in progress)
- Zi Li (*ECE*, in progress)
- Xuran Wang (*CEPSE*, in progress)
- Haoxiang Feng (*STT*, in progress)
- Abhijnan Chattopadhyay (*STT*, 2022). Decode phenome-genome interactions: a data science approach.
- Runze Su (*STT*, 2022). Machine learning towards data with complex structures.
- Ibrahim Kekec (*Economics*, 2021). Essays on discrete multivalued treatments with endogeneity and heterogeneous counterfactual errors.
- Juna Goo (*STT*, 2020). A spatio-temporal model for white matter tractography in diffusion tensor imaging.
- Wei Chen (*Florida Tech*, master thesis, 2020). A modified peng-robinson cubic equation of state based on Bayesian framework.

Awards

- **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

Software

5. **Sung, C.-L.** (2020). `HetCalibrate`: Calibration of Inexact Computer Models with Heteroscedastic Errors. `R` package version 0.1.
4. **Sung, C.-L.** (2020). `GPcluster`: Clustered Gaussian Process. `R` package version 0.1.
3. **Sung, C.-L.** (2019). `MRFA`: Fitting and Predicting Large-Scale Nonlinear Regression Problems using Multi-Resolution Functional ANOVA (MRFA) Approach. `R` package version 0.4.
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. **Seminar, University of St Andrews, Scotland** (January). *When epidemic models meet statistics: understanding the impact of weather and government interventions on 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.*