

# CURRICULUM VITAE – KARIMIREDDY

## Personal information

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**Email:** [karimire@usc.edu](mailto:karimire@usc.edu)    **Google Scholar:** [profile](#)  
**Research Interests:** Private Machine Learning (Federated/Collaborative Learning),  
Data Valuation and Economy, ML for Health, Optimization, Uncertainty Quantification.

## Education

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**EPFL, Lausanne** 09.2016–09.2021  
PhD in Computer Science advised by Prof. [Martin Jaggi](#).  
Thesis title: *Optimization Algorithms for Collaborative Machine Learning*.

**Indian Institute of Technology, New Delhi** 07.2011–06.2016  
Bachelor and Master of Technology in Computer Science.

## Appointments & Work Experience

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**University of Southern California** 08.2024–present  
Assistant Professor in [Computer Science](#).

**UC Berkeley** 01.2022–07.2024  
Postdoc in societal aspects of collaborative learning, data sharing, and privacy advised  
by [Michael I. Jordan](#).

**Centre for Tropical Medicine and Global Health** 07.2020–12.2021  
Advisory member working with the [IDDO](#) on private sharing of epidemic data.

**Google Research, Remote** 06.2020–08.2020  
Developed new scalable algorithms and software for federated learning.

**Google Research, New York** 07.2019–11.2019  
Developed new optimization methods for NLP and for federated learning.

**The Broadline, New Delhi** (now rebranded as [Loki.ai](#)) 05.2016–08.2016  
Developed core recommendation engine and tools to assist journalists using NLP.

## Selected Awards

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**Best paper award** in FL-NeurIPS workshop 2022. 2022

**Patrick Denantes Memorial Prize** awarded by EPFL to  
the *best thesis in computer science*. 2022

**EPFL Thesis Distinction** awarded to the top 8% of all theses. 2022

**Chorafas Foundation Prize** awarded for “*exceptional work  
in the domains of applied research*”. 2021

**SNSF Mobility PostDoc Fellowship**. 2021–2023

**Best paper award** in FL-ICML workshop 2021. 2021

**Top Reviewer (thrice)** awarded at ICML and NeurIPS 2019, 2019, 2020

**Outstanding performance (thrice)** awarded by EPFL. 2018, 2019, 2020

**EDIC Fellowship** for selected incoming PhD students by EPFL. 2016–2017

## Knowledge Transfer

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1. AI lead, working with **MSF** (doctors without borders) on incorporating federated learning and continual learning into **Antibiogo**: a mobile app to detect and quantify antimicrobial resistance in low resource countries. It is a **CE-marked clinical app soon to undergo clinical trials**.
2. Working with International Committee of the **Red Cross (ICRC)** to privately train a chatbot on internal documents, and develop a decentralized machine learning platform to train models privately.
3. Advisory member at the Infectious Diseases Data Observatory (**IDDO**), Oxford. Developing a collaborative data-sharing platform for health crises. 06.2020–12.2021
4. Helped **Facebook** implement our algorithm PowerSGD, resulting in  $2\times$  reduction in training time for models powering most text understanding services (**news**).
5. Helped **Owkin** and **Google** implement our federated learning algorithm SCAF-FOLD. These are currently being tested for production, and even run on **real hospitals** for **federated breast-cancer detection**.

## Academic Service

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**Co-Lead** of the **Data Quality and Federated Learning Working Group** at **MONAI** to push the boundaries of federated learning for healthcare.

**Co-organizer** of the **Federated Learning in the Age of Foundation Models** workshop at NeurIPS'24, on the challenges and opportunities foundational models pose to FL.

**Lead organizer** of the **MBZUAI 2023 Collaborative Learning Workshop: Empowering Sustainable Futures** as part of the **COP28**. The workshop brought together experts from a broad background to foster interactions that may otherwise not occur, and in the process set a research agenda for leveraging collaborative learning for sustainable development.

**Co-organizer** of the **Federated Learning in the Age of Foundation Models** workshop at NeurIPS'23, on the challenges and opportunities foundational models pose to FL.

**Panelist** on the **Federated Learning NeurIPS 2022**, where we discussed the interdisciplinary nature of FL, and how to benchmark on sensitive private datasets.

**Lead organizer** of the **MBZUAI 2022 Collaborative Learning: Theory to Practice** workshop. The workshop brought together theoreticians and practitioners to set a research agenda pushing beyond the current barriers facing collaborative learning. We particularly focused on understanding bottlenecks in healthcare.

**Co-organized** the **AutoTrain** challenge at **AMLD 2020**. We aimed to benchmark and test developments in optimization algorithms for machine learning.

### Reviewing service:

- Area chair at ICLR 2025.
- ICML 2018, 2019, 2020, 2022. Expert reviewer in 2021. Top reviewer 2019, 2020.
- NeurIPS 2018, 2019, 2020, 2022. Awarded top reviewer 2019.
- AISTATS 2018, 2019, 2020.
- Expert external reviewer for ALT 2020, CDC 2021, and PODC 2021.
- Journal of Machine Learning (JMLR)
- IEEE/ACM Transactions on Networking (ToN)
- European Journal of Operational Research (EJOR)
- Optimization Methods and Software

## Students supervised

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### Semester projects and internships (Master/undergrad students):

1. Anastasia Koloskova, *Efficient greedy methods for optimization.* 06.2017–09.2017
2. Quentin Rebjock, *Error feedback for gradient compression.* 09.2018–01.2019
3. Fedor Moiseev, *Bias correction for non-iid federated learning.* 09.2019–01.2020
4. Felix Grimberg, *Personalized federated learning.* 02.2020–05.2020
5. Ilyas Fatkhullin, *Accelerated inexact gradient descent.* 06.2020–10.2020
6. Mahmoud Hegazy, *Transfer learning via parameter sharing.* 06.2020–10.2020
7. Andrei Afonin, *Bias correction for semi-supervised learning.* 09.2020–01.2021
8. Usman A. Khan, *Federated image segmentation for science.* 02.2021–05.2021
9. Andrei Afonin, *Model agnostic communication protocols.* 02.2021–01.2022
10. Nina Mainusch, *Federated drug identification for Antibio.* 02.2021–02.2022

### Master Theses:

1. Eloise Berthier, *Differential privacy of cyclic non-convex SGD.* 04.2019–07.2019
2. Ignacio Aleman, *Scalable causal inference from noise residuals.* 03.2020–08.2020
3. Felix Grimberg, *Optimal model averaging for collaborative learning.* 09.2020–01.2021
4. William Cappelletti, *Byzantine robust decentralized optimization.* 09.2020–01.2021

### PhD students:

1. Thijs Vogels, *Low rank methods for practical gradient compression.* 09.2018–10.2020
2. Lie He, *Scalable private and secure federated learning.* 03.2020–08.2022
3. Matteo Pagliardini, *Learning transferable diverse ensembles.* 02.2021–08.2022
4. El-Mahdi Chyati, *Personalized federated learning.* 09.2021–12.2021
5. Mariel Werner, *Robust and Personalized federated learning.* 03.2022–06.2024
6. Tiffany Ding, *Continual learning under distribution shifts.* 06.2022–01.2023
7. Baihe Huang, *Incentivizing data sharing.* 09.2022–12.2023
8. Charles Lu, *Federated uncertainty quantification.* 09.2022–present
9. Tianyu Guo, *Collaborative Causal Inference.* 02.2023–present

## Teaching

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1. Privacy-Preserving Machine Learning ([CSCI-699](#)) Fall 2024

## Open Source Software

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Software I have contributed to which are actively maintained and ready to use:

1. Real world federated medical datasets ([FLAMBY](#))
2. DIStributed COLlaborative machine learning platform for humanitarian aid: ([DISCO](#))
3. Running fast and flexible federated learning simulations: ([FedJAX](#))
4. Efficient compressed communication for deep learning: ([PowerSGD](#))
5. Compressed communication for decentralized deep learning: ([PowerGossip](#))

# Publications List

Note: \* indicates that the authors with equal contributions or alphabetical ordering.

## Peer-reviewed conference and journal publications

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1. DAVED: Data Acquisition via Experimental Design for Decentralized Data Markets.  
*NeurIPS 2024*.  
Charles Lu, Baihe Huang, **Sai Praneeth Karimireddy**, Praneeth Vepakomma, Michael Jordan, Ramesh Raskar.
2. My-This-Your-That - Interpretable Identification of Systematic Bias in Federated Learning for Biomedical Images.  
*NPJ Digital Medicine 2024*.  
Klavdiia Naumova, Arnout Devos, **Sai Praneeth Karimireddy**, Martin Jaggi, Mary-Anne Hartley.
3. Collaborative Heterogeneous Causal Inference Beyond Meta-analysis.  
*ICML 2024*.  
El Mahdi Chayti, **Sai Praneeth Karimireddy**.
4. Privacy Can Arise Endogenously in an Economic System with Learning Agents.  
*FORC 2024*.  
Nivasini Ananthakrishnan\*, Tiffany Ding\*, Mariel Werner\*, **Sai Praneeth Karimireddy**, Michael I. Jordan.
5. Optimization with Access to Auxiliary Information.  
*TMLR 2024*.  
El Mahdi Chayti, **Sai Praneeth Karimireddy**.
6. Provably Personalized and Robust Federated Learning.  
*TMLR 2023*.  
Mariel Werner, Lie He, **Sai Praneeth Karimireddy**, Mike I Jordan, Martin Jaggi.
7. Federated Learning Showdown: The Comparative Analysis of Federated Learning Frameworks.  
*Federated Learning Technologies and Applications (FLTA 2023)*.  
**Sai Praneeth Karimireddy**, Narasimha Raghavan Veeraragavan, Severin Elvatun, Jan Franz Nygård
8. Federated Conformal Predictors for Distributed Uncertainty Quantification.  
*ICML 2023*.  
Charles Lu, Yaodong Yu, **Sai Praneeth Karimireddy**, Michael I. Jordan, Ramesh Raskar.
9. Agree to Disagree: Diversity through Disagreement for Better Transferability.  
*ICLR 2023*.  
Matteo Pagliardini, Martin Jaggi, François Fleuret, **Sai Praneeth Karimireddy**.
10. TCT: Convexifying Federated Learning using Bootstrapped Neural Tangent Kernels.  
*NeurIPS 2022*.  
Yaodong Yu, Alexander Wei, **Sai Praneeth Karimireddy**, Yi Ma, Michael I. Jordan.

11. FLamby: Datasets and Benchmarks for Cross-Silo Federated Learning in Realistic Healthcare Settings.  
*NeurIPS 2022*.  
Jean du Terrail et al. (multi-institutional collaborative effort).
12. Towards Model-Agnostic Federated Learning using Knowledge Distillation.  
*ICLR 2022*.  
Andrei Afonin, **Sai Praneeth Karimireddy**\*
13. Byzantine-Robust Learning on Heterogeneous Datasets via Bucketing.  
*ICLR 2022 Spotlight*.  
**Sai Praneeth Karimireddy**\*, Lie He\*, Martin Jaggi.
14. Mime: Mimicking Centralized Stochastic Algorithms in Federated Learning.  
*NeurIPS 2021*.  
**Sai Praneeth Karimireddy**, Martin Jaggi, Satyen Kale, Mehryar Mohri, Sashank Reddi, Sebastian Stich, Ananda Theertha Suresh
15. RelaySum for Decentralized Deep Learning on Heterogeneous Data.  
*NeurIPS 2021*.  
Thijs Vogels\*, Lie He\*, Anastasia Koloskova, **Sai Praneeth Karimireddy**, Sebastian Stich, Martin Jaggi.
16. Learning from History for Byzantine Robust Optimization.  
*ICML 2021*.  
**Sai Praneeth Karimireddy**, Lie He, Martin Jaggi.
17. Quasi-global Momentum: Decentralized Deep Learning on Heterogeneous Data.  
*ICML 2021*.  
Tao Lin, **Sai Praneeth Karimireddy**, Sebastian Stich, Martin Jaggi.
18. Practical Communication Compression in Decentralized Deep Learning.  
*NeurIPS 2020*.  
Thijs Vogels, **Sai Praneeth Karimireddy**, Martin Jaggi.
19. Why are Adaptive Methods Good for Attention Models?  
*NeurIPS 2020*.  
Jingzhao Zhang, **Sai Praneeth Karimireddy**, Andreas Veit, Seungyeon Kim, Sashank Reddi, Sanjiv Kumar
20. Weight Erosion: An Update Aggregation Scheme for Personalized Collaborative Machine Learning.  
*DART 2020*.  
Felix Grimberg, Mary-Anne Hartley, Martin Jaggi, **Sai Praneeth Karimireddy**.
21. Accelerated Gradient Boosted Machines.  
*AISTATS 2020*.  
Haihao Lu\*, **Sai Praneeth Karimireddy**\*, Natalia Ponomareva, Vahab Mirrokni.
22. SCAFFOLD: Stochastic Controlled Averaging for Federated Learning.  
*ICML 2020*.  
**Sai Praneeth Karimireddy**, Satyen Kale, Mehryar Mohri, Sashank Reddi, Sebastian Stich, Ananda Theertha Suresh.

23. The Error-Feedback Framework: Better Rates for SGD with Delayed Gradients and Compressed Communication.  
*JMLR 2020.*  
Sebastian Stich, **Sai Praneeth Karimireddy**.
24. PowerSGD: Practical Low-rank Gradient Compression for Distributed Opt.  
*NeurIPS 2019.*  
Thijs Vogels, **Sai Praneeth Karimireddy**, Martin Jaggi.
25. Error Feedback fixes SignSGD and other Gradient Compression Schemes.  
*ICML 2019 Long talk.*  
**Sai Praneeth Karimireddy**, Quentin Rebjock, Sebastian Stich, Martin Jaggi.
26. Efficient greedy coordinate descent for composite problems.  
*AISTATS 2019.*  
**Sai Praneeth Karimireddy**<sup>\*</sup>, Anastasia Koloskova<sup>\*</sup>, S Stich, Martin Jaggi.
27. On Matching Pursuit and Coordinate Descent.  
*ICML 2018.*  
Francesco Locatello<sup>\*</sup>, Anant Raj<sup>\*</sup>, **Sai Praneeth Karimireddy**, Sebastian Stich, Martin Jaggi.
28. Adaptive Balancing of Gradient and Update Computation Times using Approximate Subproblem Solvers.  
*AISTATS 2018 Oral.*  
**Sai Praneeth Karimireddy**, Sebastian Stich, Martin Jaggi.
29. Some results on a class of mixed van der Waerden numbers.  
*Rocky Mountain Journal of Mathematics Vol.48 2018.*  
Kaushik Maran<sup>\*</sup>, **Sai Praneeth Reddy**<sup>\*</sup>, Dravyansh Sharma<sup>\*</sup>, Amitabha Tripathi<sup>\*</sup>.
30. Assignment Techniques for Crowdsourcing Sensitive Tasks.  
*CSCW 2016.*  
Elisa Celis<sup>\*</sup>, **Sai Praneeth Reddy**<sup>\*</sup>, Ishaan Singh<sup>\*</sup>, Shailesh Vaya<sup>\*</sup>.
31. Brief Announcement: Multi-Broadcasting under the SINR Model.  
*PODC 2016.*  
**Sai Praneeth Reddy**, Shailesh Vaya.

## Peer-reviewed workshop papers

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1. Evaluating and Incentivizing Diverse Data Contributions in Collaborative Learning.  
*FL ICML workshop 2023.*  
Baihe Huang, **Sai Praneeth Karimireddy**, Michael I. Jordan.
2. Scaff-PD: Communication Efficient Fair and Robust Federated Learning.  
*FL ICML workshop 2023.*  
Yaodong Yu, **Sai Praneeth Karimireddy**, Yi Ma, Michael I. Jordan.
3. Federated Conformal Predictors for Distributed Uncertainty Quantification.  
*FL ICML workshop 2023.*  
Charles Lu, Yaodong Yu, **Sai Praneeth Karimireddy**, Michael I. Jordan, Ramesh Raskar.

4. Mechanisms that Incentivize Data Sharing in Federated Learning.  
*FL-NeurIPS 2022 Best paper.*  
Sai Praneeth Karimireddy\*, Wenshuo Guo\*, Michael I. Jordan.
5. Towards Provably Personalized Federated Learning via Threshold-Clustering of Similar Clients.  
*FL-NeurIPS 2022.*  
Mariel Werner, Lie He, Sai Praneeth Karimireddy, Mike I Jordan, Martin Jaggi.
6. Optimal Model Averaging: Towards Personalized Collaborative Learning.  
*FL ICML workshop 2021 Best paper.*  
Felix Grimberg, Mary-Anne Hartley, Sai Praneeth Karimireddy, Martin Jaggi.
7. Byzantine-Robust Learning on Heterogeneous Datasets via Resampling.  
*NeurIPS workshop 2020 (SPICY FL).*  
Lie He\*, Sai Praneeth Karimireddy\*, Martin Jaggi.
8. Secure Byzantine Machine Learning.  
*NeurIPS workshop 2020 (SPICY FL).*  
Lie He, Sai Praneeth Karimireddy, Martin Jaggi.
9. Global Convergence of Newton-type Methods without Strong-Convexity or Lipschitz Gradients.  
*NeurIPS workshop 2019 (OptML).*  
Sai Praneeth Karimireddy, Sebastian Stich, Martin Jaggi.

## Preprints

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1. Evaluating and Incentivizing Diverse Data Contributions in Collaborative Learning.  
*Arxiv 2023.*  
Baihe Huang, Sai Praneeth Karimireddy, Michael I. Jordan.
2. Scaff-PD: Communication Efficient Fair and Robust Federated Learning.  
*Arxiv 2023.*  
Yaodong Yu, Sai Praneeth Karimireddy, Yi Ma, Michael I. Jordan.
3. Online Learning in a Creator Economy.  
*Arxiv 2023.*  
Banghua Zhu, Sai Praneeth Karimireddy, Jiantao Jiao, Michael I Jordan.
4. Mechanisms that Incentivize Data Sharing in Federated Learning.  
*Arxiv 2022.*  
Sai Praneeth Karimireddy\*, Wenshuo Guo\*, Michael I. Jordan.
5. Secure Byzantine-Robust Machine Learning.  
*Arxiv 2020.*  
Lie He, Sai Praneeth Karimireddy, Martin Jaggi.

## Patents

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1. Methods and systems for creating tasks.  
Applied in US 2013, Granted in US 2017 ([url](#)).  
Shailesh Vaya\*, Akshayaram Srinivasan\*, Sai Praneeth Reddy K\*.

2. Methods and systems for recognizing handwriting in handwritten documents.  
Applied in US 2013, Granted in US 2015 ([url](#)).  
Shailesh Vaya\*, Akshayaram Srinivasan\*, **Sai Praneeth Reddy K\***.
3. Apparatus and method for secure digital coupon verification.  
Applied in US 2015, Pending ([url](#)).  
**Sai Praneeth Reddy K\***, Ishaan Preet Singh\*, Shailesh Vaya\*