

KONSTANTINOS KONSTANTINIDIS

Ph.D. Student
Department of Electrical and Computer Engineering
Iowa State University
Ames, IA 50011

PERSONAL INFORMATION

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GOOGLE SCHOLAR: https://scholar.google.com/citations?user=pLi_5zwAAAAJ&hl=en

EDUCATION

JANUARY 2017 **Ph.D. in Electrical and Computer Engineering**
- DECEMBER 2022 Department of Electrical and Computer Engineering,
(expected) Iowa State University, Ames, IA.
Advisor: Professor Aditya Ramamoorthy.
Current GPA: 3.94/4.0.

SEPTEMBER 2011 **Diploma in Electrical and Computer Engineering (5-year program)**
- DECEMBER 2016 School of Electrical and Computer Engineering,
Technical University of Crete, Chania, Greece.
Thesis: “*Fast Synchronization of OQPSK Signals.*”
Advisor: Professor George N. Karystinos.
GPA: 3.4/4.0.

RESEARCH INTERESTS

- Distributed Computing.
- Machine Learning.
- Network Coding.

ACADEMIC EXPERIENCE

- JANUARY 2017 - PRESENT **Graduate Research Assistant**
Application of Coding Theoretic Techniques to Robust Machine Learning and Distributed Computing.
Iowa State University.
- FALL 2020 **Graduate Teaching Assistant**
EE 571: Convex Optimization
Enrollment: 20+ students
Iowa State University.
- SPRING 2019 **Graduate Teaching Assistant**
EE 322: Probabilistic Methods for Electrical Engineers
Enrollment: 70+ students
Iowa State University.
- FALL 2018 **Graduate Teaching Assistant**
EE 322: Probabilistic Methods for Electrical Engineers
Enrollment: 50+ students
Iowa State University.

GRADUATE RESEARCH EXPERIENCE

- JANUARY 2020 - PRESENT Department of Electrical and Computer Engineering,
Iowa State University.
Project: Robust Machine Learning
Description: Developed a novel defense for distributed deep learning scenarios in which computing devices may return erroneous or malicious gradients in an effort to fool the training. The method is robust to the most sophisticated attacks and achieves on average a 20% increase in top-1 accuracy on CIFAR-10 dataset over defenses suggested by prior work. It maintains training convergence even when 30% of the devices behave adversarially and enjoys a 36% reduction on the fraction of corrupted gradients.
Supervisor: Prof. Aditya Ramamoorthy.
- MAY 2017 - APRIL 2020 Department of Electrical and Computer Engineering,
Iowa State University.
Project: Communication-Efficient Distributed Computing
Description: Developed an algorithm to reduce MapReduce communication time across the servers on AWS EC2 platform. Tweaked the baseline TeraSort algorithm, popular for sorting large datasets (generated and fetched within the HDFS system) and adapted it to our scheme. The method uses MPI to facilitate communication among the servers and achieves significant speedups of up to 4.7 \times . Extended this work to the case when the desired functions can be aggregated (amenable to deep learning applications). Its speedup is 4.3 \times over the baseline approach.
Supervisor: Prof. Aditya Ramamoorthy.

INDUSTRY EXPERIENCE

- JUNE 2021 **Software Engineering Intern at C3.ai**
- AUGUST 2021 Implemented an end-to-end framework for cluster failure prediction; the framework has two components. The first one is the data pipeline which loads cluster health metrics, handles missing data and creates a training data set. The second component is the ML pipeline which trains a model and makes predictions regarding the cluster's state as soon as new test data becomes available. Followed the process of continuous integration / continuous deployment (CI/CD).

PUBLICATIONS

- K. Konstantinidis and A. Ramamoorthy, "Aspis: A Robust Detection System for Distributed Learning," (preprint), August 2021.
Available online: <https://arxiv.org/abs/2108.02416>
- K. Konstantinidis and A. Ramamoorthy, "ByzShield: An Efficient and Robust System for Distributed Training," *Machine Learning and Systems (MLSys)*, April 2021.
Available online: <https://proceedings.mlsys.org/paper/2021/file/d9d4f495e875a2e075a1a4a6e1b9770f-Paper.pdf>
- K. Konstantinidis and A. Ramamoorthy, "Resolvable Designs for Speeding up Distributed Computing," *IEEE Transactions on Networking (ToN)*, May 2020.
Available online: <https://ieeexplore.ieee.org/document/9103948>
- K. Konstantinidis and A. Ramamoorthy, "CAMR: Coded Aggregated MapReduce," *IEEE International Symposium on Information Theory (ISIT)*, July 2019.
Available online: <https://ieeexplore.ieee.org/document/8849227>
- K. Konstantinidis and A. Ramamoorthy, "Leveraging Coding Techniques for Speeding up Distributed Computing," *IEEE Global Communications Conference (GLOBECOM)*, December 2018.
Available online: <https://ieeexplore.ieee.org/document/8647133>
- L. Tang, K. Konstantinidis and A. Ramamoorthy, "Erasure Coding for Distributed Matrix Multiplication for Matrices With Bounded Entries," *IEEE Communications Letters*, January 2019.
Available online: <https://ieeexplore.ieee.org/document/8528366>

AWARDS

- JUNE 2019 **Best Student Poster Award**
Midwest Machine Learning Symposium (MMLS), Madison, WI.
APRIL 2019 **Teaching Excellence Award**
Iowa State University, Ames, IA.
JUNE 2018 **Academic Excellence Award**
Gerondelis Foundation, Lynn, MA.
MARCH 2018 **John Hatsios and Andromache Tsandes Award**
Iowa State University, Ames, IA.

PAPER REVIEW DUTIES

- *IEEE* Transactions on Communications (TCOM).
- *IEEE* International Symposium on Information Theory (ISIT).

UNDERGRADUATE INTERNSHIP AND PROJECT EXPERIENCE

- AUGUST 2016 School of Mineral Resources Engineering,
Technical University of Crete.
Interned in Geodesy & Geomatics Lab.
Project: Development of an Android app that stores geodesy measurements on server.
Supervisor: Grad. student Dimitrios Galanakis.
- JULY 2016 School of Mineral Resources Engineering,
Technical University of Crete.
Interned in SenseLab Laboratory.
Project: Representation of a cylindrical geological core in horizontal plane.
Supervisor: Assist. Prof. Panayotis Partsinevelos.
- JANUARY 2015 School of Electrical and Computer Engineering,
Technical University of Crete.
Carried out research in probabilistic graphical models.
Project: Implementation of forward/backward inference (Viterbi) as well as learning
(Baum Welch) algorithms on the Dishonest Casino problem.
Supervisor: Assoc. Prof. Aggelos Bletsas.

SELECTED GRADUATE COURSEWORK

- **Machine Learning**
Grade: A.
- **Data Analytics in Electrical and Computer Engineering**
Grade: A.
- **Random Processes for Communications and Signal Processing**
Grade: A.
- **Deep Learning**
Grade: A-.
- **Numerical Analysis of High Performance Computing**
Grade: A.

SELECTED UNDERGRADUATE COURSEWORK

- **Information Theory and Coding**
Grade: 10/10.
- **Statistical Signal Processing for Telecommunications**
Grade: 10/10.
- **Probabilistic Graphical Models (graduate course)**
Grade: 8/10.
- **Convex Optimization**
Grade: 8.5/10.
- **Modeling and Performance Evaluation of Communication Networks**
Grade: 10/10.

SKILLS

Programming Languages

Proficient: Python, SQL, Matlab, **Good:** C++, Java, Bash.

Interfaces/Frameworks

Proficient: AWS, PyTorch, NumPy, MPI, MapReduce **Good:** scikit-learn, Hadoop, HDFS, Git, Jenkins, Splunk.

Networking

FTP, SSH, DDNS, VPN, WOL.

Miscellaneous

Windows, Linux, Excel, L^AT_EX.