

# Seyhan Karakulak, PhD

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## EDUCATION

**University of California, San Diego**, San Diego, California USA 2004 - 2010

Ph.D. Electrical Engineering, 2010

- ◇ Dissertation Title: “From Channel Modeling to Signal Processing for Bit Patterned Media Recording ”

M.S. Electrical Engineering, 2007

**Istanbul Technical University**, Istanbul, TURKEY 1999 - 2004

B.S. in Mathematics, and Electronics and Communications Engineering (Double Major)

## PROFESSIONAL EXPERIENCE

15 years of cumulative industry and research experience in the areas of system architecture for solid-state storage devices, information theory, communication theory, error correction coding, signal processing, machine learning, and statistical learning for magnetic recording and solid-state storage systems. Have been involved with several projects as a system architect that resulted in successful ASIC implementations.

**SK Hynix America Inc**, San Jose, California USA, *Principal Algorithm Research Engineer*  
06/2020 - current

Advanced Algorithm Team

- ◇ Designing algorithms for AI-assisted data storage that incorporates deep learning frameworks.

**Insight Data Science**, New York City, New York USA, *Fellow* 01/2020 - 06/2020

Data Science Fellowship Program

- ◇ Consulted for Lolli, a shopping rewards application company and helped them develop models to detect fraudulent behavior.
- ◇ Built supervised learning methods using logistic regression and neural networks to form a user reputation score based on the imbalanced data set with few instances of labeled fraud data. Distinguished legitimate and fraudulent instances based on this user reputation score.

**Western Digital**, San Diego, California USA, *Technologist* 06/2016 - 12/2018

Research and Development Engineering Department

- ◇ Designed soft decoding spec for LDPC codes that resulted in successful ASIC implementations.
- ◇ Provided leadership in performance and reliability spec qualification algorithms for next generation flash technologies. The algorithms included information theoretical and machine learning approaches such as supervised classification, density evolution, and optimization of symmetric information rates.

**HGST Incorporated, a WD brand**, San Diego, California USA, *Principal Engineer* 09/2013 - 06/2016

Research and Development Engineering Department

- ◇ Designed signal processing algorithms to enhance the decoding performance of flash devices using LDPC codes.
- ◇ Characterized several generations of flash channels and implemented novel detection, coding and decoding algorithms.

**STEC Incorporated** (acquired by HGST Incorporated on 09/2013), San Diego, California USA,  
*Systems Architect* 04/2010 - 09/2013

Research and Development Engineering Department

- ◇ Designed qualification methods for decoding algorithms in flash and inter-cell interference algorithms for soft decoding of LDPC codes.
- ◇ Developed inter-cell interference (ICI) detectors to mitigate the effect of ICI for several generations of flash-based SSDs. The detectors included SOVA and BCJR type algorithms.

**Qualcomm Incorporated**, San Diego, California USA, *Intern* 06/2007 - 09/2007

Corporate Research and Development

- ◇ Implemented and analyzed link and system simulations for Ultra Mobile Broadband project.

**University of California, San Diego**, 2005 - 2010

*Research Assistant* at Center for Magnetic Recording Research

- ◇ Dissertation research involved channel modeling, detection, equalization, and information theoretic limits for bit-patterned media recording channels.

SELECTED  
PUBLICATIONS AND  
PATENTS

**S. Karakulak**, A. Weathers, and R. Barndt, "Read level grouping algorithms for increased flash performance," US9905302, Feb. 2018.

**S. Karakulak**, A. Weathers, and R. Barndt, "Calibrating optimal read levels," US9576671, Feb. 2017.

**S. Karakulak**, A. Weathers, and R. Barndt, "Read level profiling algorithms for NAND based SSD flash," *IEEE Global Communications Conference (GLOBECOM)*, Dec. 2016.

**S. Karakulak**, A. Weathers, and R. Barndt, "Word-line inter-cell interference detector in flash system," US9343170, June 2014.

**S. Karakulak**, M. Nemati, A. Weathers, and R. Barndt, "Inter-cell interference algorithms for soft decoding of LDPC codes," US9117529, USA, Dec. 2011.

**S. Karakulak**, P. H. Siegel, J. K. Wolf, and H. N. Bertram, "Joint-track equalization and detection for patterned media recording," *IEEE Transactions on Magnetics*, vol. 46, pp. 3639-3647, Sep. 2010.

**S. Karakulak**, P. H. Siegel, and J. K. Wolf, "A parametric study of inter-track interference in bit patterned media recording," *IEEE Transactions on Magnetics*, vol. 46, pp. 819-824, Mar. 2010.

**S. Karakulak**, P. H. Siegel, J. K. Wolf, and H. N. Bertram, "A new read channel model for patterned media storage," *IEEE Transactions on Magnetics*, vol. 44, no. 1, pp. 193-197, Jan. 2008.

AWARDS AND  
HONORS

- ◇ IEEE Senior Member 2017
- ◇ The Schultz Prize for excellence in graduate student research, University of California, San Diego 2010
- ◇ Fellowship from the department of Electrical and Computer Engineering, University of California, San Diego 2004
- ◇ 2nd highest GPA among the entire graduating class of Istanbul Technical University 2003
- ◇ Werner von Siemens Excellence Award for excellence in undergraduate studies 2003

**References available upon request**