
**UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD**

In Re: U.S. Patent 7,116,710 : Attorney Docket No. 082944.0102

Inventor: Jin, Hui, *et al* :

Filed: May 18, 2001 :

Issued: October 3, 2006 : IPR No. Unassigned

Assignee: California Institute of Technology

Title: Serial Concatenation of Interleaved Convolutional Codes Forming
Turbo-Like Codes

Mail Stop PATENT BOARD
Patent Trial and Appeal Board
U.S. Patent and Trademark Office
P.O. Box 1450
Alexandria, Virginia 22313-1450

Submitted Electronically via the Patent Review Processing System

DECLARATION OF HENRY D. PFISTER

Active 17009673.6

TABLE OF CONTENTS

	<u>Page</u>
I. Background and Qualifications.....	1
II. Legal Understanding	3
A. Anticipation	3
B. Obviousness.....	4
III. Background on the Relevant Technology.....	7
A. Review of Linear Error-Correcting Codes.....	7
B. Background on Turbo Codes and Modern Coding Theory	11
IV. The Patents at Issue.....	18
A. The ‘710 Patent	18
V. The Prior Art	22
A. Prior Art Considered	22
VI. Construction of Claims	25
A. Level of Ordinary Skill in the Art	26
B. “Repeating” Terms	27
C. “Irregularly”	28
D. “Interleaving” / “Interleaver” / “Scramble”	28
E. “Rate close to one”	29
F. “Stream”	29
VII. Invalidity	31
A. ‘710 Patent, Claim 1: Frey & MacKay – Anticipation	31
‘710 Patent Claim 1	31
B. ‘710 Patent Claim 1: Frey & MacKay – Obviousness.....	38
‘710 Patent Claim 3	42
‘710 Patent Claim 4	44
‘710 Patent Claim 5	46
‘710 Patent Claim 6	47
‘710 Patent Claim 15	49

‘710 Patent Claim 16	58
‘710 Patent Claim 20	60
‘710 Patent Claim 21	64
‘710 Patent Claim 22	65
C. ‘710 Patent Claim 1: Divsalar in Combination with Luby ‘909 Patent– Obviousness	66
‘710 Patent Claim 3	79
‘710 Patent Claim 4	80
‘710 Patent Claim 5	81
‘710 Patent Claim 6	81
‘710 Patent Claim 15	84
‘710 Patent Claim 16	94
‘710 Patent Claim 20	97
‘710 Patent Claim 21	101
‘710 Patent Claim 22	102

I, Henry D. Pfister, declare as follows:

1. I make this declaration based upon my own personal knowledge and, if called upon to testify, would testify competently to the matters contained herein.

2. I have been asked to provide technical assistance in the *inter partes* review of U.S. Patent No. 7,116,710 ("the '710 Patent"). This declaration is a statement of my opinions on issues related to the patentability of claims 1, 3, 4, 5, 6, 15, 16, 20, 21, and 22 of the '710 Patent. I have also reviewed and analyzed U.S. Patents 8,284,833 ("833 patent"), 7,421,032 ("032 patent") and 7,916,781("781 patent").

I. Background and Qualifications

3. My qualifications are stated more fully in my curriculum vitae. Here I provide a brief summary of my qualifications. I was an active contributor and collaborator in the community that included the inventors and subject matter of the '710; '032; '781; and '833 patents before and after May 2000. From 1997-2003, I was a graduate student at the University of California, San Diego (UCSD) studying electrical engineering. During 1998-1999, I took my first sequence of graduate courses on error-correcting codes and my course project for the 1999 winter quarter was on repeat-accumulate codes. This work led to my first conference paper, which was

entitled “The serial concatenation of rate-1 codes through uniform random interleavers,” was presented at the Allerton conference in 1999 and may be referred to herein as “Pfister.”¹ This paper generalized the idea of repeat-accumulate codes to include arbitrary outer codes and multiple inner accumulate codes. I continued my studies and eventually became a professor. Now, I am an associate professor in the Department of Electrical and Computer Engineering at Duke University. Before this appointment, I taught in the Department of Electrical and Computer Engineering of Texas A&M University, College Station from 2006-2014. I received my Ph.D. in electrical engineering from the University of California, San Diego (UCSD) in 2003 and then spent two years in R&D at Qualcomm, Inc., and one year as a post-doctoral researcher at the Swiss Federal Institute of Technology, Lausanne (EPFL). I am a co-author on more than 60 peer-reviewed publications on information theory, error-correcting codes, and wireless communication including the IEEE Communications Society 2007 best paper in Signal Processing and Coding for Data Storage. During my career,

¹ H. D. Pfister and P. H. Siegel, “The serial concatenation of rate-1 codes through uniform random interleavers.” *Proc. 37th Allerton Conf. on Comm., Control and Computing*, Monticello, Illinois, pp. 260-269, Sep. 1999, Ex. 1057.

Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.