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Date : December 27, 1995

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Message

RE : ***MTR Codes for Data Storage Systems***
U of MN Docket No. 96025

Enclosed is a copy of the letter and invention summary sent to the NSIC members as you requested. We have not decided yet if we are going to patent this technology, although Samsung has stated their interest in covering the cost of patenting. We will notify the members 30 days before filing if that is what we decide to do.

Best Regards,

Nathan A. Malek

Nathan A. Malek

UNIVERSITY OF MINNESOTA

Patents and Technology Marketing
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December 20, 1995

RE : ***MTR Codes for Data Storage Systems***
U of MN Docket No. 96025
NSIC/DARPA Ultra-High-Density Recording (UHDR) Project
Magnetic Disk Component, Contract No. 972-93-1-009

Dear NSIC Member :

Enclosed is a one-page nonconfidential summary outlining the above referenced technology developed at the University of Minnesota by Professor J. Moon as part of the Ultra-High-Density Recording (UHDR) Project for NSIC.

If you are interested in reviewing the entire confidential report, please send your name, full company or University name, and full legal address to my attention within 30 days of receipt of this letter. I will forward our standard nondisclosure agreement for signature.

A decision concerning patent protection has not yet been made. We are looking for sponsors who would be willing to help cover the cost of filing the patent. If you are interested, please contact me at your earliest convenience. I can be reached at (612) 625 - 7569 or by e-mail (nathan@ortta.umn.edu).

Sincerely,

Nathan A. Malek
Technology Transfer Assistant

Enclosure

Invention Summary

MTR Codes for Data Storage Systems U of MN Docket No. 96025

The demand for greater densities in magnetic storage devices has created a need for data retrieval techniques with improved performance. A wide variety of detection and equalization methods have been proposed to address this need. This technology, developed by a team of Electrical Engineers here at the University, is a novel coding technique capable of significantly improving the reliability of sequence estimation detectors, such as fixed-delay tree search (FDTS).

This coding scheme, designated maximum transition run (MTR), eliminates certain error-prone binary data patterns from the allowable set of input data patterns that are to be recorded in the storage medium. As a consequence, the final bit error rate, the most important performance measure of any digital recorder, is improved significantly when the original data bits are reproduced. This improvement in the bit error rate can also be traded for an increase in storage density if the error rate performance of the recorder is already satisfactory. More specifically, this new class of codes prohibit certain crowded transition patterns that can occur in a recorded sequence. This improves the detector performance by increasing the minimum distance for sequence estimator detector methods.

Computer simulations have been used to demonstrate the performance advantage of the MTR code combined with a specific detector known as the fixed delay tree search (FDTS) with decision feedback over the existing code / detector combinations.

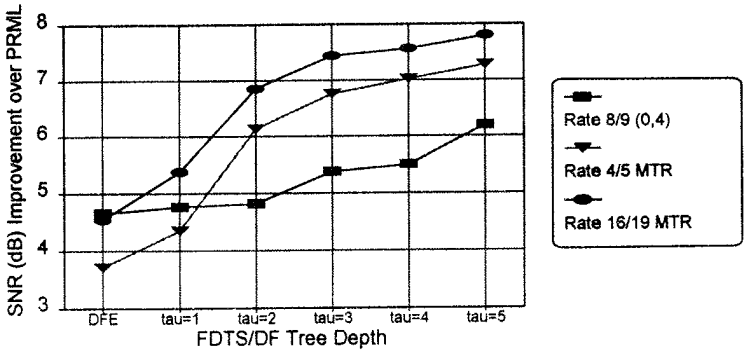

Figure 1 : Summary of FDTS/DF Performance at BER = 10^{-5}

For a user density of $D_u = 2.5$, simulation results in Figure 1 show up to a 2 dB improvement in detector performance over the conventional (0,k) code. This novel coding technique results in significant performance gains (estimated 20% to 40% increase in storage capacity), without a corresponding increase in hardware complexity.

< TRANSACTION REPORT >

12-27-1995(WED) 13:35

[TRANSMIT]

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				3	0°01'30"		