**AWARD TITLE:** IEEE SPS 2012 Signal Processing Magazine Best Paper Award

**PAPER TITLE:** Mean Squared Error: Love it or Leave it? A New Look at Signal Fidelity Measures

**AUTHORS:** Z. Wang and A.C. Bovik

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**NOMINATING TECHNICAL COMMITTEE:** IVMSP

**NAME, ADDRESS, E-MAIL ADDRESS, PHONE AND FAX OF NOMINATOR:**

Prof C.-C. Jay Kuo
Media Communications Lab
USC Viterbi School of Engineering
University of Southern California
3740 McClintock Ave. EEB 400
Los Angeles, CA 90089-2564, USA
(213) 740-4658
cckuo@sipi.usc.edu

**NAME, CURRENT ADDRESS, E-MAIL ADDRESS, PHONE, AND FAX OF AUTHORS:**

Zhou Wang
Dept. of ECE, Univ. of Waterloo
200 University Ave. W.
Waterloo, ON N2L 3G1, Canada
(519) 888-4567
Z.Wang@ece.uwaterloo.ca

Al Bovik
Dept of ECE, University of Texas
ENS 439B
Austin, TX 78712 USA
(512) 471-5370
bovik@ece.utexas.edu

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(Supporting statement should be limited to at most one page. Material more than one page will not be forwarded to the Awards Board.)

# Nomination
## IEEE Signal Processing Society Best Magazine Paper Award

"Mean Squared Error: Love it or Leave it? A New Look at Signal Fidelity Measures"
Z. Wang and A.C. Bovik
Published in *IEEE Signal Processing Magazine*, 26 (1), 98-117, January 2009

This inspiring and highly educational paper greatly deserves consideration for the Best Magazine Paper of the IEEE SPS for its excellent and accessible tutorial explanation of state-of-the-art signal fidelity measures. It casts the topic against the venerable mean squared error (MSE) which is studied and examined with regards to its great historical value as well as its current shortcomings. The topic is of very high interest to many branches of electrical engineering and is core to nearly all areas of signal processing. The paper has reached and affected a large audience as evidenced by the very high number of cites it has received which indicates the exceptional timeliness of the field of signal fidelity measurement and the excellent accessibility and teaching treatment of the paper.

The authors promote and explain modern approaches to signal fidelity measurement which rely on recent statistical models of signals and of perception. The authors render the topic familiar by making an analogy with information transmission, and casting the signal fidelity measurement problem as one of modeling the source from which the original signal arises, of the receiver that will interpret the receiver, and of a channel that distorts the signal. These models often do not admit the MSE as a useful solution to the fidelity measurement problem owing to the nonlinear, non Gaussian, and specific properties of the signal source and of the receiver. Classic examples that are discussed include audio fidelity measurement and image and video quality measurement, where the signal arises from a natural source obeying a specific model or statistics and the receiver requires.

The nominated paper uses a wide variety of important and timely examples of practical applications to capture the reader's attention. These include palmprint verification, pattern recognition, perceptual optimization of image compression algorithms, face recognition, and others. The article is amply illustrated by pictorial examples and explanatory figures better enabling the readership to understand the new theories. The authors make powerful arguments that new measures of signal fidelity, such as the SSIM index, should be applied to many other domains, such as digital audio processing.

The paper is written in easy and accessible language while surveying and explaining the state-of-the-art in depth. The paper could easily be used for instruction in classes in industry or academia as well as propelling the general readership towards reassessing classic but less effective methods such as MSE in favor of newer methods.

The great deal of attention and citations as that this paper has received (312 up to 6/25/2012, which is the most cites of any paper published in the magazine during that year) powerfully attests to its topical relevance, its technical contribution, and its tutorial success. This paper should be strongly considered for the Best Magazine Paper Award of the IEEE SPS.