

# Optical Engineering

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## Farewell, Lena

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Many of you are probably very familiar with the image of Lena (or Lenna), especially those who work in the image processing field. Over the past 45 years, this image has been a *de facto* standard for qualitatively assessing a variety of image processing and compression algorithms. It is a photograph of the face of a Swedish model, Lena Sjööblom, that exhibits a range of contrast and spatial frequency content that makes for a good test image. Also, as it has been used widely in the image processing community, it has served as a useful point of comparison for assessing the relative performance of new algorithms and image processing techniques.

Unfortunately, the history of the Lena image<sup>1</sup> also contains some controversy that makes its use as a standard inappropriate to some. *Optical Engineering* unwittingly played an interesting role in that history. The image was first produced using a drum wire photo scanner in 1973 by Alexander Sawchuk and colleagues at the University of Southern California Signal and Image Processing Institute (SIPI) from the head-and-shoulders portion of a *Playboy* centerfold photograph. The image was disseminated as part of a SIPI image database, and became a favorite test image across the image processing research community. Numerous processed derivatives of the image have been published throughout a large number of journals, books, and conference papers since then, including those published by SPIE.

In the July 1991 issue of *Optical Engineering*, the Lena image was one of the images shown in the cover art representing a special section of the journal on visual communications and image processing, which drew the attention of *Playboy* magazine and raised the issue of copyright infringement. The editor of *Optical Engineering* at the time, Brian

Thompson, addressed this in his January 1992 editorial as a misunderstanding in the origins of this image, and encouraged authors to ensure that any images included in submitted papers are free of copyright concerns. *Playboy* ultimately decided to overlook the copyright issue and allow the continued use of the image for research purposes, so its widespread use persisted.

In addition to the copyright concerns, use of the Lena image as a standard in the image processing field is regarded by many as degrading to women due to its original source. Despite its historical significance, it arguably has also outlived its utility on technical grounds as well. In today's age of high-resolution digital image technology, it seems difficult to argue that a  $512 \times 512$  image produced with a 1970s-era analog scanner is the best we have to offer as an image quality test standard. The day has come to say farewell to Lena and move on to other more appropriate test images.

The controversy of the Lena image was a recent topic of discussion within the SPIE Board of Editors and the SPIE Publications Committee. While the editors and committee members recognize the useful role the Lena image has served in image processing and compression research, the committee ultimately decided that the right path forward is to discontinue its use in SPIE publications. The new policy approved by the Publications Committee is as follows:

SPIE strongly discourages the use of the Lena (Lenna) image in SPIE publications. Authors are advised to use other suitable images to illustrate and compare image processing algorithms. As of 1 January 2019, authors who submit manuscripts containing the Lena image to any SPIE publication will be encouraged to replace the image with a substitute image. As of 1 July 2019, SPIE journals and books will no longer consider new submissions containing the Lena image without convincing scientific justification for its use.

Details are provided in the author guidelines for *Optical Engineering* and other SPIE publications. Please consider these new guidelines in your future work and submissions to SPIE publications—or even to other scientific publishers.

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Editor-in-Chief

### Reference

1. J. Hutchinson, "Culture, communication, and an information age Madonna," *IEEE Prof. Commun. Soc. Newsletter* **45**(3), 5–7 (May/June 2001).