

Optical Security

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As we enter the 21st century in a world of increasing automation and technology in the areas of financial transactions, licensing, and entry to secure areas, it becomes increasingly important to positively identify individuals. This marks the second issue of *Optical Engineering* that we have guest edited on optical security, the first one being September 1996. It is still a very active area of business and research. The problems with fraud and counterfeiting continue, with the increase in digital technology and improvements in low-cost devices such as color printers. It is generally accepted that for the ultimate security a biometric pattern must be used—a fingerprint, face, iris image, hand patterns, etc. There are now over 50 companies that make ID systems using fingerprints and access control to secure areas, totaling to over a billion dollar business.

The technology of optical memory has made a strong beginning in this arena: the U.S. Immigration and Naturalization Services has contracted to have 2 million optical memory cards manufactured. This decision was based on the fact that optical memory cards are basically cheaper than the digital chip based “smart cards.” The optical card will also store two complete fingerprints, if needed. Here is a real opportunity and challenge for the optical signal processing community to come up with a low-cost system to compete with the digital processor for doing the verification.

We are fortunate to have 14 papers to present, from many different areas of this technology. We hope the readers will be inspired to try and adapt their own areas of optical technology to this important and ever-growing field.



Joseph L. Horner received his BS degree from Haverford College and an MS degree from Bryn Mawr College, both in physics. After working for three years in industry, he enrolled at the University of Michigan, receiving his PhD degree in 1968. He received a NRC postdoctoral fellowship to NASA/ERC, Cambridge, Massachusetts, which later became the DOT Transportation Systems Center. He left there in 1976 to become a consultant to Dr. Edwin Land at Polaroid Corporation. In 1978 he joined

Rome Laboratory. He holds 25 patents, has published his second book on optical signal processing, received the AF Basic Research Award in 1990, was named to the Aviation Week Laurels List in 1991, and received the 1992 “Inventor of the Year Award” from the Inventors Association of New England. In addition to signal and image processing, Dr. Horner has also done work in holography, which culminated in his invention of a series of holographic optical elements as couplers and demultiplexers for fiber optic systems. He is the co-inventor, with H. John Caulfield, of the phase-only filter. Dr. Horner is a fellow of the Optical Society of America and SPIE.



Bahram Javidi is Professor and Chair of the Computing and Information Systems Group in Electrical Engineering at the University of Connecticut. He is fellow of the Institute of Electrical and Electronics Engineers (IEEE), fellow of the Optical Society of America (OSA), and fellow of the International Society for Optical Engineering (SPIE). In 1990, he was named a Presidential Young Investigator by the National Science Foundation. He is the

editor of *Real-time Optical Information Processing*, published in 1994 by Academic Press, and has published over 160 technical articles in major optical journals and conference proceedings, including over 20 invited papers. He is a topical editor of the *Optical Engineering Journal*, topical editor of the IEEE/SPIE Press Series on Imaging Science and Engineering, Chairman of the IEEE LEOS Technical Committee on Electro-optics Sensors and Systems, member of the IEEE Neural Networks Council and IEEE Committee on IVHS, and Chairman of the Optical Processing and Computing Working Group of Optical Engineering Society (SPIE). He is a panelist for the National Research Council and the National Science Foundation and has served on the program committees of more than a dozen international meetings on information systems sponsored by IEEE, OSA, and SPIE.