FELLOW GRADE NOMINATION FORM B-27

(SUBMIT BY 15 MARCH, 2000)

THE INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC.
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Before completing this form please read carefully the "IEEE Fellow Grade Nominations Kit" dated 2000. All information must be typewritten or printed (cut and pasted, if necessary). Limit copy to the space provided; type size smaller than 10 point not allowed.

1. **NAME OF CANDIDATE** Messer-Yaron, Hagit
Last (Family Name) First Middle

PRESENT OCCUPATION Professor — Tel Aviv University
Position Organization

BUSINESS ADDRESS Dept. of Electrical Eng. - Systems, Tel Aviv University
Tel Aviv 69978 ISRAEL
City/State/Province Zip/Postal Code Country

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BIRTHDATE May 13, 1953 IEEE MEMBER GRADE & NUMBER SM 07202013

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2. **EDUCATION**

Educational Institution	Location	Degrees	Year
Tel Aviv Univ.	Tel Aviv, Israel	B.Sc	1977
Tel Aviv Univ.	Tel Aviv, Israel	M.Sc	1979
Tel Aviv Univ.	Tel Aviv, Israel	Ph.D	1984

3. **PROFESSIONAL HISTORY**. Current position first. Limit copy to space provided; if necessary cite only most recent positions.

From (year) to (year)	Name of Company	Position Held and Responsibilities
2000-	Ministry of Science, State of Israel	Chief Scientist
1986-	Tel Aviv Univ., Faculty of Eng.	Professor
1996-2000	Tadiran Ltd.	Head, Algorithm Dept.
1996-1999	Public Utilities Authority - Electricity	Commissioner
1991-1992	New Jersey Inst. of Technology	Visiting Professor
1985-1986	Yale University	Post Doc.

4. **PROPOSED CITATION** (not more than thirty words)

For contributions to statistical signal processing, time delay estimation and sensor array processing.

5. **NOMINATOR**

NAME ______________________ DATE ______________
(signature)

NAME (Prof./Dr./Mr./Ms.) Prof. Alfred Hero
(Print)

ADDRESS Dept. EECS
University of Michigan, Ann Arbor, MI 48109-2122

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NOTE: if the above nominee is elected to Fellow grade, the nominator agrees to release the contents of this form to authorized IEEE committees of the Awards Board for the purpose of recommending candidates for IEEE Awards. Only the B-27 form will be released for this purpose.

6. INDIVIDUAL CONTRIBUTIONS. Specify succinctly. LIMIT COPY TO SPACE PROVIDED; TYPE SIZE SMALLER THAN 10 POINT NOT ALLOWED.

A. Identify the most significant contribution which qualifies the candidate for Fellow Grade. Choose one and describe.

[X] Engineer/Scientist [ ] Technical Leader [X] Educator

Over the past 15 years Hagit Messer has made significant contributions to time delay estimation and sensor array processing. Her work in these areas has encompassed important but difficult operating conditions such as: wideband sources; non-Gaussian sources or noise processes; low signal to noise ratio; signal propagation in multipath channels; and undersampling conditions. Her publications are technically rigorous and of exceptional clarity and have led to important insights into the intrinsic limitations on estimator performance, robustness and complexity for these problems.

Dr. Messer's research has been reported in more than 100 papers which have been published in scientific journals or in international conferences. She has involved more than 30 graduate students in her research program over the years. Most of them are now in leading positions in Israeli high-tech industry.

B. Explain why the contribution is significant and why it indicates individual performance substantially better than that of the average IEEE Senior Member.

The usefulness of signal processing algorithms is determined by the balance between their performance, complexity and robustness. Professor Messer's research established generic tools to evaluate this balance in important statistical signal processing and array signal processing problems. She distinguishes herself in her ability to identify relevant and tractible research problems, develops the appropriate physical and mathematical model, and cleverly uses statistical and mathematical tools to find a solution. Rather than proposing specific algorithms, much of her work focusses on inherent limitations which direct the algorithm designer to areas in which his or her efforts will have highest payoff. As a specific example, simple direction finding algorithms (e.g., beamforming or MUSIC) do not employ prior information on the transmitted signal or its spectrum. In order to investigate the conditions under which additional prior information might be useful, Dr. Messer used fundamental lower bounds to derive explicit conditions for which the resulting performance gain would be negligable, regardless of the estimator employed. If these conditions were satisfied there would be no use in developing more complicated algorithms which do use such prior information. In deriving these conditions she used a clever device which relates the measurement's deviation from Gaussianity to the presence of prior information and accounts for the complexity increase of any algorithm which might exploit such deviation. Her research approach is original and creative. Its use has led to innovations in emerging applications such as localization of cellular sources.

C. Other individual contributions are:

Hagit Messer's scientific leadership was recognized by her recent appointment to the position of Chief Scientist at the Ministry of Science of the State of Isreal. She has also made contributions to activities related to women in science and engineering in Israel and in the European Community. In particular, she is the founding member of the forum of "women in engineering" in Tel Aviv University and represents Israel in the working group on "Women and Science" in the European Community.

NAME OF CANDIDATE Messer-Yaron, Hagit

7. EVIDENCE OF TECHNICAL ACCOMPLISHMENT. Supply the following information in two parts. PART 1: List the three most important items of tangible and verifiable evidence of technical accomplishment such as: technical publications; technical reports and presentations; patents; development of products, applications and systems, and application of facilities and services. State the engineering significance of each. PART 2: List not more than 15 additional items subdivided into categories of distinct areas of contributions. (See Item 7 of the "Guide for IEEE Fellow Grade Nominations" for method of listing and documenting accomplishments.) Where possible, identify their individual importance. List titles of publications in English. DO NOT EXCEED THE SPACE PROVIDED ON THIS PAGE. TYPE SIZE SMALLER THAN 10 POINT NOT ALLOWED.

Part 1:

The following papers have had significant impact on the fields of signal detection, signal sampling theory, array processing, and estimation theoretic lower bounds.

* D. Kletter, H. Messer, "Sub-Optimal Detection of Non-Gaussian Signals by High-Order Spectral Analysis", IEEE Trans. on Acoustic, Speech and Signal Processing, Vol. ASSP-38, No. 6, pp. 901-909, June 1990.
* I. Sharfer, H. Messer: "The Bispectrum of Sampled-Data: Part I - Detection of the Sampling Jitter", IEEE Tran. Signal Processing, Vol. 41, No. 1, pp. 296-312, January 1993.
* H. Messer: "The Potential Performance Gain in Using Spectral Information in Passive Detection/Localization of Wideband Sources", IEEE Trans. on Signal Processing, Vol. 43, No. 12, pp. 2964-2974, Dec. 1995.
* I. Reuven, H. Messer: "On the Effect of Nuisance Parameters on the Threshold SNR Value of the Barankin Bound", IEEE Trans. on Signal Processing, vol. 47, no. 2, pp. 523-526, Feb. 1999.

Part 2:

1. Innovative approaches to array processing

* H. Messer: "The Use of Spectral Information in Optimal Detection of a Source in the Presence of a Directional Interference", IEEE Journal on Oceanic Engineering, Vol. 19, No. 3, pp. 422-430, July 1994.
* J. Tabrikian, H. Messer: "Three Dimensional Source Localization in a Waveguide", IEEE Trans. Signal Processing, Vol. 44, No. 1, pp. 1-12, January 1996.

2. Establishment of theoretical limits of performance in time delay estimation.

* P.M. Schultheiss, H. Messer, G. Shor: "Maximum Likelihood Time Delay Estimation in non-Gaussian Noise", IEEE Trans. on Signal Processing, vol. 45, no. 10, pp. 2571-2575, Oct. 1997.
* A. Bartov, H. Messer: "Lower Bound on the Achievable DSP Performance for Localizing Step-Like Continuous Signals in Noise", IEEE Trans. on Signal Processing, vol. 46, no. 8, pp. 2195-2201, August 1998.

3. Introduction of new algorithms and analysis methods for non-Gaussian/non-stationary signal processing.

* M. Frisch, H. Messer: "The Use of the Wavelet Transform in the Detection of an Unknown Transient Signal", IEEE trans. Information Theory, pp. 892-897, March 1992.
* M.J. Hinich, H. Messer: "On the Principal Domain of the Discrete Bispectrum of a Stationary Signal", IEEE trans. of Signal Processing, Vol. 43, No. 9, pp. 2130-2134, September 1995.

4. Contribution to the theory of detection and parameter estimation

* Frisch, H. Messer: "Passive Transient Signal Detection Using Prior Information in the Likelihood-Ratio-Test", IEEE trans. Signal Processing, Vol. 41, No. 6, pp. 2177-2192, June 1993.
* I. Reuven, H. Messer: "A Barankin-Type Lower Bound on the Estimation Error of a Hybrid Parameter Vector", IEEE Trans. on Information Theory, Vol. 43, No. 3, pp. 1084-1093 May 1997.

NAME OF CANDIDATE Messer-Yaron, Hagit

8. IEEE ACTIVITIES–AWARDS, OFFICES HELD, COMMITTEE MEMBERSHIPS. LIMIT COPY TO SPACE PROVIDED; TYPE SIZE SMALLER THAN 10 POINT NOT ALLOWED.

Chair, Student Paper Competition of IEEE 16th Convention of EE's in Israel (1989)
Member of Technical Committee, IEEE 17th Convention of EE's in Israel (1991)
Member of SSAP Technical Committee of IEEE Signal Processing Soc. (1994-8)
Technical Program Coordinator and member of Organizing Committee, the IEEE 18th Convention of EE's in Israel (1995)
Member of SPTM Technical Committee of IEEE Signal Processing Soc. (1998-)
Associate Editor, IEEE Transactions on Signal Processing (1994-8)
Member of Technical Committee, IEEE SSAP Workshop, Greece (1996)
Member of the Technical Program Committee, IEEE DSP Workshop, Norway (1996)
Associate Editor, IEEE Signal Processing Letters (1998-)
Organizer and co-chair, IEEE HOS Workshop, Israel (1999)
Member of Technical Committee, IEEE SSAP Workshop, PA (2000)

9. NON-IEEE ACTIVITIES–AWARDS, PROFESSIONAL SOCIETY MEMBERSHIPS, COMMITTEE MEMBERSHIP, (Major Professional, Government, or International) Professional ENGINEER's LICENSE. LIMIT COPY TO SPACE PROVIDED; TYPE SIZE SMALLER THAN 10 POINT NOT ALLOWED.

Member of the Mathematics Professional Committee, the National Institute for Testing and Evaluation, Jerusalem (1986-91)
Member of the Organizing Committee, Bat-Sheva Seminar on Advanced in Processing and Pattern Analysis of Biological Signals, Haifa (1995)
Member of the steering committee for technical education, the Ministry of Education, Israel (1995-9)
Chair of a professional committee, the Israel Science Foundation (1995-7, 1999)
Member of committees of the Council for Higher Education, the Ministry of Education, Israel (1995-)
Commissioner, Public Utility Authority - Electricity, State of Israel (1996-1999)
Member of the European Community Committee on "Women and Science" (1999-)

10. IEEE FELLOW GRADE REFERENCES. List alphabetically the complete names of a minimum of 5 (maximum of 8) active Fellows.

Note: *References with Item A checked on the B-29 form stating that the individual is not qualified to judge the candidate will not be considered by the Fellow Committee and therefore will not be counted in the five required references.*

1. Y. Bar-Ness
2. Johann F. Bohme
3. Don H. Johnson
4. Bernard Picinbono
5. Edward J. Powers
6. Arye Nehorai
7. Peter M. Schultheiss
8. Uri Shaked

11. ENDORSEMENT OF NOMINATION. (Optional) Provide name of IEEE Section, Chapter, Committee or non-IEEE organization or non-IEEE individual.

Note: *No more than three endorsements will be considered by the Fellow Committee. Endorsements may not exceed one page in length; if endorsements exceed one page, only the first page will be considered by the Committee.*

12. EVALUATION BY IEEE TECHNICAL SOCIETY/COUNCIL. It is essential that the nomination be evaluated by the Society engaged in the technical field mentioned in the citation. The nominator is required to: (1) list below only the IEEE Society that best reflects the candidate's field of technical accomplishments; (2) solicit from that Society a technical evaluation by forwarding the B-3 Evaluation Form to the designated chair listed in accordance with the deadline requirements.

Name of Society/Council to Evaluate Fellow Candidate (one only):

IEEE Signal Processing Society