

## DECLARATION OF GORDON MACPHERSON

I, Gordon MacPherson, am over twenty-one (21) years of age. I have never been convicted of a felony, and I am fully competent to make this declaration. I declare the following to be true to the best of my knowledge, information and belief:

- 1. I am Director Board Governance & IP Operations of The Institute of Electrical and Electronics Engineers, Incorporated ("IEEE").
- 2. IEEE is a neutral third party in this dispute.
- 3. I am not being compensated for this declaration and IEEE is only being reimbursed for the cost of the article I am certifying.
- 4. Among my responsibilities as Director Board Governance & IP Operations, I act as a custodian of certain records for IEEE.
- 5. I make this declaration based on my personal knowledge and information contained in the business records of IEEE.
- 6. As part of its ordinary course of business, IEEE publishes and makes available technical articles and standards. These publications are made available for public download through the IEEE digital library, IEEE Xplore.
- 7. It is the regular practice of IEEE to publish articles and other writings including article abstracts and make them available to the public through IEEE Xplore. IEEE maintains copies of publications in the ordinary course of its regularly conducted activities.
- 8. The article below has been attached as Exhibit A to this declaration:
  - A. Wei Liu et al.; "Subband adaptive generalized sidelobe canceller for broadband beamforming", Proceedings of the 11th IEEE Signal Processing Workshop on Statistical Signal Processing, August 8, 2001.
- 9. I obtained a copy of Exhibit A through IEEE Xplore, where it is maintained in the ordinary course of IEEE's business. Exhibit A is a true and correct copy of the Exhibit, as it existed on or about December 29, 2021.
- 10. The article and abstract from IEEE Xplore shows the date of publication. IEEE Xplore populates this information using the metadata associated with the publication.



- 11. Wei Liu et al.; "Subband adaptive generalized sidelobe canceller for broadband beamforming" was published in the Proceedings of the 11th IEEE Signal Processing Workshop on Statistical Signal Processing. The 11th IEEE Signal Processing Workshop on Statistical Signal Processing was held on August 8, 2001. Copies of the conference proceedings were made available no later than the day of the conference. The article is currently available for public download from the IEEE digital library, IEEE Xplore.
- 12. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under 18 U.S.C. § 1001.

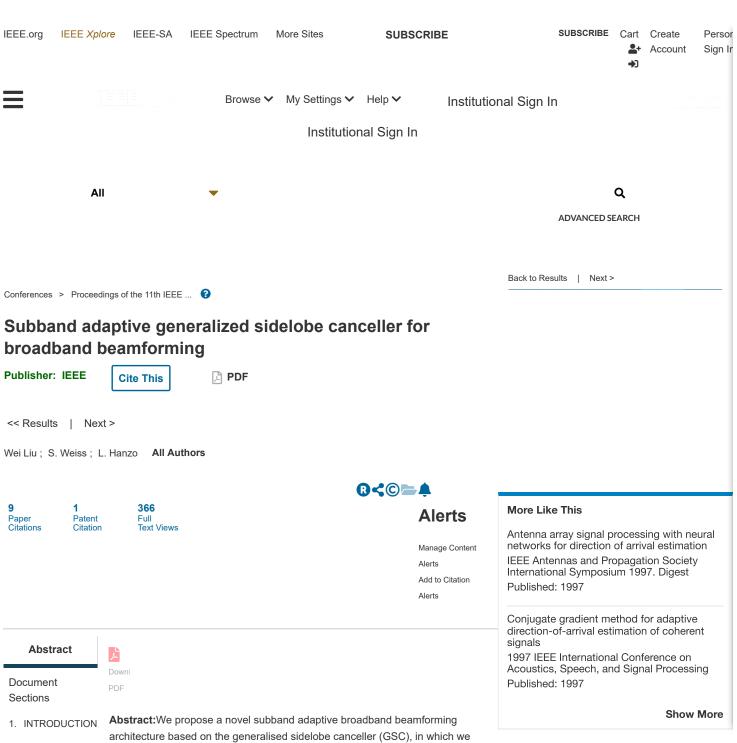
I declare under penalty of perjury that the foregoing statements are true and correct.

Executed on:	1/6/2022	Gordon MacPherson
		E768DB210F4E4EF



## EXHIBIT A





- 2. GENERALIZED **SIDELOBE** CANCELLER
- 3 SUBBAND **ADAPTIVE GENERALIZED SIDELOBE** CANCELLER
- 4. SIMULATIONS AND RESULTS
- 5. CONCLUSIONS

decompose each of the tapped delay-l... View more

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### Abstract:

We propose a novel subband adaptive broadband beamforming architecture based on the generalised sidelobe canceller (GSC), in which we decompose each of the tapped delay-line signals feeding the adaptive part of the GSC and the reference signal into subbands and perform adaptive minimisation of the mean squared error in each subband independently. Besides its lower computational complexity, this new subband adaptive GSC outperforms its fullband counterpart in terms of convergence speed because of its prewhitening effect. Simulations based on different kinds of blocking matrices with different orders of derivative constraints are presented to support these findings.



Figures Published in: Proceedings of the 11th IEEE Signal Processing Workshop on Statistical Signal Processing (Cat. No.01TH8563) References Date of Conference: 8-8 Aug. 2001 **INSPEC Accession Number:** 7183284 Citations Date Added to IEEE Xplore: 07 DOI: 10.1109/SSP.2001.955356 Keywords August 2002 Publisher: IEEE Metrics Print ISBN:0-7803-7011-2 Conference Location: Singapore

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## Contents

#### 1. INTRODUCTION

Adaptive beamforming has found many applications in various areas ranging from sonar and radar to wireless communications. It is based on a technique where, by adjusting the weights of a sensor array with attached filters, a prescribed spatial and Sign in to Continue Reading spectral selectivity is achieved. Fig. 1 shows a beamformer with sensors receiving a signal of interest from the direction of arrival (DOA) angle . Fig. 1: A signal impinging from an angle onto a beamformer with sensors.

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