Conference Paper Critique

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1 Introduction

The following is a critique of “DFT-Spread OFDM Joint Radar-Communication System”, a conference paper by Dylan Boland. The requirements for this critique, based on the M.E. Research Project Handbook, are:

(1) Provide the details of the targeted conference, and explain why this conference is suitable.

(2) Explain any novel contributions. These can be either in the form of new methods, or new conclusions from existing methods.

(3) Provide a comparison with other works in the field.

2 Conference Details

Conference Name: International Conference on Intelligent Signal Processing and Communication Systems, London, United Kingdom.

Conference Theme: OFDM

Paper Submission Deadline: March 31st, 2022

Conference Date: October 13-14, 2022

Conference Location: London, United Kingdom

3 Suitability of Conference

I had initially wanted to choose the 2022 European Radar Conference (EuRAD) that is due to be held in Milan, Italy, from the 28th to the 30th of September. This is because the theme R10 “Spectrum Sharing and Joint Radar and Communication” matches up excellently with the topic of focus of my project. Unfortunately, the

submission deadline for papers was the 25th of March, 2022. As a result, I have instead opted for the International Conference on Intelligent Signal Processing and Communication Systems. I chose this conference as it is concerned with methodologies in signal processing and communications. I thought this was relevant, as my project involves various signal processing techniques. It is also based around the OFDM waveform, which is widely used throughout wireless communications. This conference has the following themes:

- “OFDM and CDMA”
- “Signal processing and applications”

I feel that my project topic would not be too unsuitable for these themes. As well as that, the conference is in London, which is an accessible location. One drawback is the submission deadline of the 31st of March. This deadline would not allow too much time for adjusting the paper, or adding in new results.

4 Novel Contributions

The results obtained and discussed in the paper show some minor level of novelty. From my research to date, the use of the DFT-Spread technique with the reciprocal filter receiver is novel, and the results obtained are promising.

5 Paper’s Strengths

- The results obtained so far look quite promising.
- The paper gives a reasonable overview of the correlation-based radar receivers, as well as the method of DFT spreading.
- There are various areas in which further work could be done: the DFT-Spread technique could be used with different OFDM radar receivers; different

modulation schemes could be used, such as QPSK or BPSK; different mapping schemes between the DFT and IDFT block could be investigated.

6 Paper's Weaknesses

- The results obtained so far are only for the reciprocal filter receiver. It would have been good to test the effectiveness of the DFT-Spread technique with other receivers. For example, those based on the periodogram.
- The simulations used an additive White Gaussian noise (AWGN) channel. It would have been good to include results obtained using other, more realistic channel models.
- The paper could have given a greater focus on the mathematical analysis side of things. For example:
    (1) How is the bandwidth of the system changed when the DFT-Spread technique is used?
    (2) How does the power needed during transmission change when the DFT-Spread technique is used?
    (3) Is the signal-to-noise ratio improved in any way by using the DFT-Spread technique?

7 Comparison to Other Works

This paper builds on the reciprocal filtering method discussed in [1]. It also references [2] and [3], and makes use of the methods of interleaving and localised mapping. In this way, it uses a technique used in wireless communications to improve an already existing correlation-based receiver. It also re-uses (with credit given) the transmit and frame notation given in [4], which hopefully makes the block-by-block processing easier for the reader to imagine. Lastly, the results

presented in the paper are promising, and they cover both the cases when interleaving and localised mapping are used. The last result in the paper suggests that one might be able to achieve a similar or better result, with less subcarriers in use. The paper shows that the heat map generated when N = 16 and DFT-Spread is implemented is as good (if not slightly improved) as that generated when 64 subcarriers are used, and no DFT-Spread is employed.

References

[1] "Comparison of Correlation-based OFDM Radar Receivers"

[2] "PAPR reduction of BF-OFDM waveform using DFT-Spread technique"

[3] "Analysis of PAPR Reduction of DFT-SCFDMA System using Different Sub-carrier Mapping Schemes"

[4] "OFDM Radar Algorithms in Mobile Communication Networks"