Schedule Report

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Contents

1 Original Plan

2 Summary

3 Summary

4 Plan in Next Two Weeks

Original Plan

Plan A

Complete the unfinished article. And Web page test for bugs.

Original Plan

Plan A

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Plan B

Read aother three pieces of paper on localization based on OFDM modulation, and set about writing Matlab code if possible.

Original Plan

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2 Summary

3 Summary

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Rate of Progress 50%

- *Accomplishment* 1
  Finished the first stage of bug testing. We have found many bugs and submitted them to the website development group.

  However, the amount of test samples is poor. Due to that, we cannot use many functions on the website, and certainly we cannot find bugs.

Contents

1 Original Plan

2 Summary

3 Summary

4 Plan in Next Two Weeks

Rate of Progress 50%

- *Accomplishment* 2

Rate of Progress 50%

- *Accomplishment* 2
  - I have completed the unfinished article named *"Research on the TOA Estimation Techniques in OFDM Wireless Systems"*

Rate of Progress 50%

- *Accomplishment 2*
  - I have completed the unfinished article named *"Research on the TOA Estimation Techniques in OFDM Wireless Systems"*
  - I picked up the methods to realize the distance ranging. We can use the TOA estimation in OFDM Systems. Both in the AWGN channels and multipath channels.

Rate of Progress 50%

- *In AWGN channels*

The traditional TOA estimation algorithms based on the pseudorandom noise (PN) sequences and the phases of continuous waves. And a TOA estimation algorithm based on the correlation property and phase differences between the sub-carriers in the OFDM symbol is proposed. An iterative TOA estimation algorithm based on maximum-likelihood (ML) is proposed according to the properties of the cost function in the ML TOA estimation algorithm for the OFDM signals in the AWGN channels. The proposed sub-carrier phase difference based TOA estimation algorithm consists of a TOA coarse estimation based on sequence correlation and a TOA fine estimation based on the phase differences between the sub-carriers. The algorithm is of a larger non-fuzzy TOA estimation range and higher estimation accuracy, compared with the traditional algorithms. The proposed iterative TOA estimation algorithm is of lower complexity compared with the ML algorithm with exhaustive search, and higher accuracy compared with the proposed sub-carrier phase difference based algorithm.

Rate of Progress 50%

- *In multipath channels*

The cell search scheme and TOA estimation algorithm for the OFDM signals in the multipath channels are investigated for the TOA estimation procedure. A novel cell search signal and cell search scheme based on sequence and signal detection are proposed for the problems of the interference between sectors, multipath fading, frequency offset, and timing offset. The problems of multipath effect and resolution are analyzed for the available sequence correlation based OFDM TOA estimation algorithm, and the problem of high complexity is analyzed for the super-resolution algorithms. Based on the analysis, a novel TOA estimation algorithm is proposed for the OFDM TOA estimation in the multipath channels. In the proposed algorithm, the coarse TOA estimation is achieved with leading edge search. Then the effect of the fractional TOA on the cost function of the coarse estimation is investigated, and the Fine TOA estimation is achieved by defining a spreading function. The simulation results show that the proposed cell search scheme is of low complexity and high efficiency. The proposed OFDM TOA estimation algorithm is of high ability of anti-multipath, and the TOA estimation resolution is not limited by the sampling rate. Although, compared with the ML algorithm, the proposed algorithm is of a lower accuracy, the complexity is much lower than that of the ML algorithm.

Rate of Progress 50%

- *Confusion*

  When I read this article, a problem stroke my mind. As the author used the CAZAC sequence as the OFDM frequency domain sequence.

$$X_l = e^{j\frac{M\pi l^2}{N}} \qquad l = 0, 1, \ldots, N-1$$

  Z_l is received OFDM signal in frequency form.

$$Z_l = ae^{j\phi} X_l e^{\frac{-j2\pi l\tau_f}{NT_c}} + W_l$$

  set υ as the number of sub-carrier interval, then

$$P = \sum_{l=0}^{N-\upsilon-1} Z_{l+\upsilon} X_{l+\upsilon}^* Z_l^* X_l$$

Contents

1 Original Plan

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Goal

1. Read other three pieces of paper on localization based on OFDM modulation, and do some research on the phase differences between the sub-carriers in the OFDM symbol. I think this method is good because it based on the frequency property of the OFDM signal. I want to find out whether ideas occurred in this respect.

Goal

1. Read other three pieces of paper on localization based on OFDM modulation, and do some research on the phase differences between the sub-carriers in the OFDM symbol. I think this method is good because it based on the frequency property of the OFDM signal. I want to find out whether ideas occurred in this respect.
2. Website test for bugs. ...

Acknowledgement

Hello! UWB Lab!