Abstract

Ultra-wideband (UWB) is a wireless transmission standard that will revolutionize consumer electronics. UWB is interesting because of its inherent low power consumption, high data rates of up to 480 Mbps, and simple receiver structure. Furthermore, the power spectral density is low enough to prevent interference with other wireless services. This new standard has been approved by the FCC for unlicensed use and has been gaining interest throughout the consumer electronics industry. The main goal of the project is to investigate the UWB technology, and to design and build an indoor UWB communication system that can be used for message and digital data transmission.

Features and Objectives

Features

Nowadays, the most common indoor wireless technologies are Bluetooth and Wi-Fi, but they still have not been able to fully satisfy consumer demands. In many medium-size indoor environments that require high speed data transmission, often Bluetooth can not provide solid connection and Wi-Fi can not provide high enough data rate, a UWB communication system seems to be the cure.

<table>
<thead>
<tr>
<th>Comparison between indoor wireless communication systems</th>
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<tbody>
<tr>
<td>Bluetooth 1.0</td>
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<tr>
<td>Transmission Rate</td>
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<td>Power Consumption</td>
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<td>Interference</td>
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<td>Security</td>
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Objectives

Build an UWB Communication System which can achieve approximately 500MHz bandwidth having a power spectral density of -41.3dBm/MHz.

Two implementations are considered : analog and digital UWB pulse generators. Overall system evaluation obtained using Multisim and Matlab simulation methods. System implementation realized using custom-made printed circuit boards.

Methodology

I. Design the system block diagram

II. UWB system simulation

III. UWB PPM system (Analog approach)

IV. UWB PPM system (Digital approach)

Results

- Results of Matlab simulation
- Results of Simulink simulation
- Results of Multisim simulation

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References