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Capstone Project – Introduction (PROJ2999), 7th Semester
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Project Title: Exploring OFDM using USRP B210
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Abstract

Orthogonal Frequency Division Multiplexing (OFDM) is a widely used multicarrier modulation technique that enables high-speed data transmission with excellent resistance to noise and multipath interference. The main goal of this project is to simulate and implement an OFDM communication system using the USRP B210 Software Defined Radio platform.

In the simulation phase, OFDM signals are generated and analyzed using software tools such as GNU Radio/MATLAB, focusing on parameters like subcarrier spacing, modulation schemes (QPSK, QAM), and symbol duration. This phase helps in understanding OFDM principles and performance under ideal and noisy conditions.

In the implementation phase, the simulated OFDM system is deployed on the USRP B210 hardware, enabling real-time transmission and reception of signals over the air. The experimental setup demonstrates the complete OFDM chain, including modulation, IFFT processing, cyclic prefix insertion, transmission, reception, FFT processing, and demodulation. Performance is evaluated by observing signal quality, bit error rate (BER), and the effects of channel impairments.

This work bridges the gap between theoretical understanding and practical application, providing insights into real-world challenges such as synchronization, frequency offset, and channel fading. The combination of simulation and hardware implementation offers a comprehensive learning experience in modern wireless communication systems.

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