

System Level Design of Time-Hopping Impulse Modulation

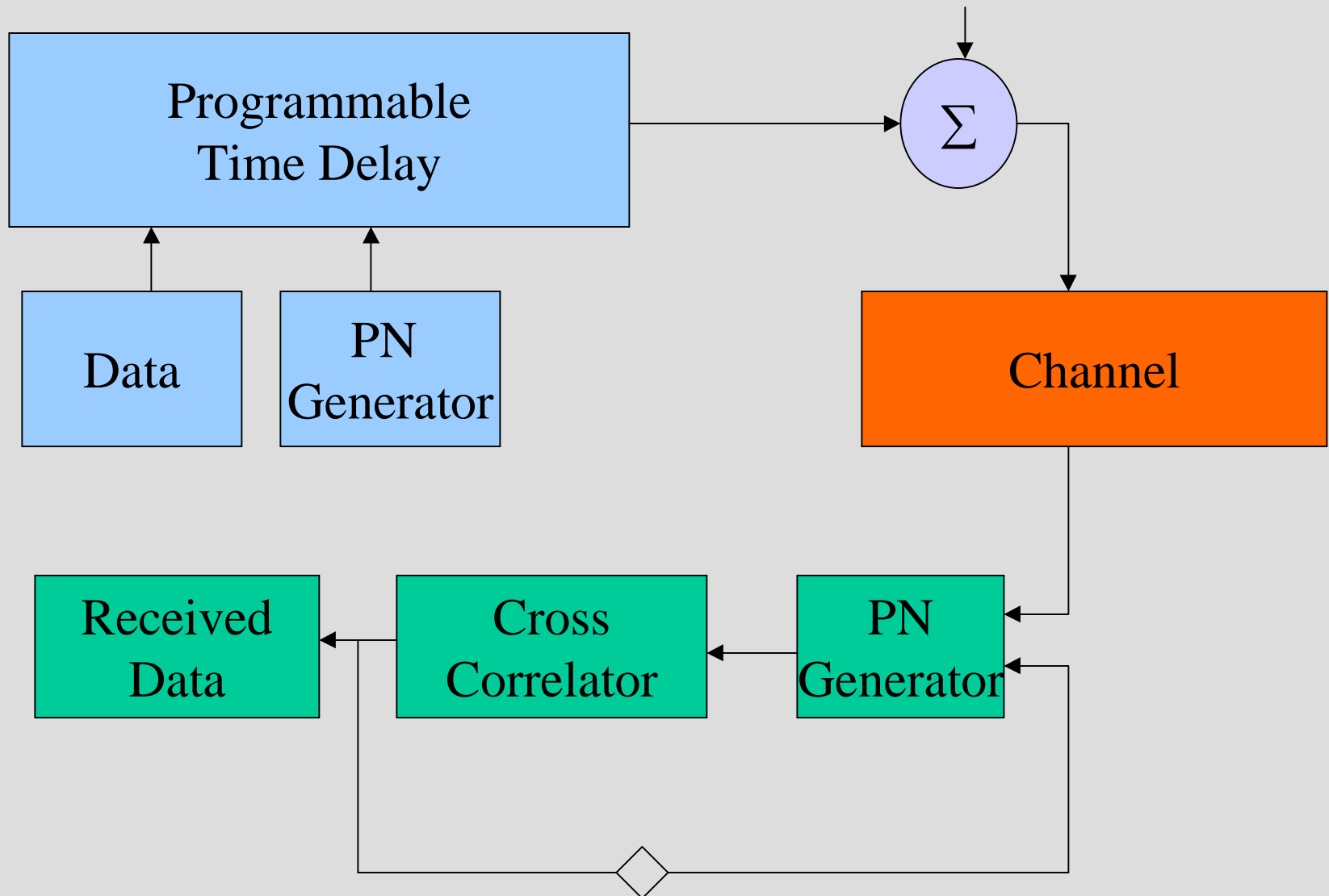
Mohit Jalori

Raghu Raj

The University of Texas at Austin

Problem Statement

- Objectives:
 - To implement the transmitter, receiver and channel for the multi user time hopping system.
 - To evaluate the performance of the system for different pulse shapes and channel impairments



Our Approach

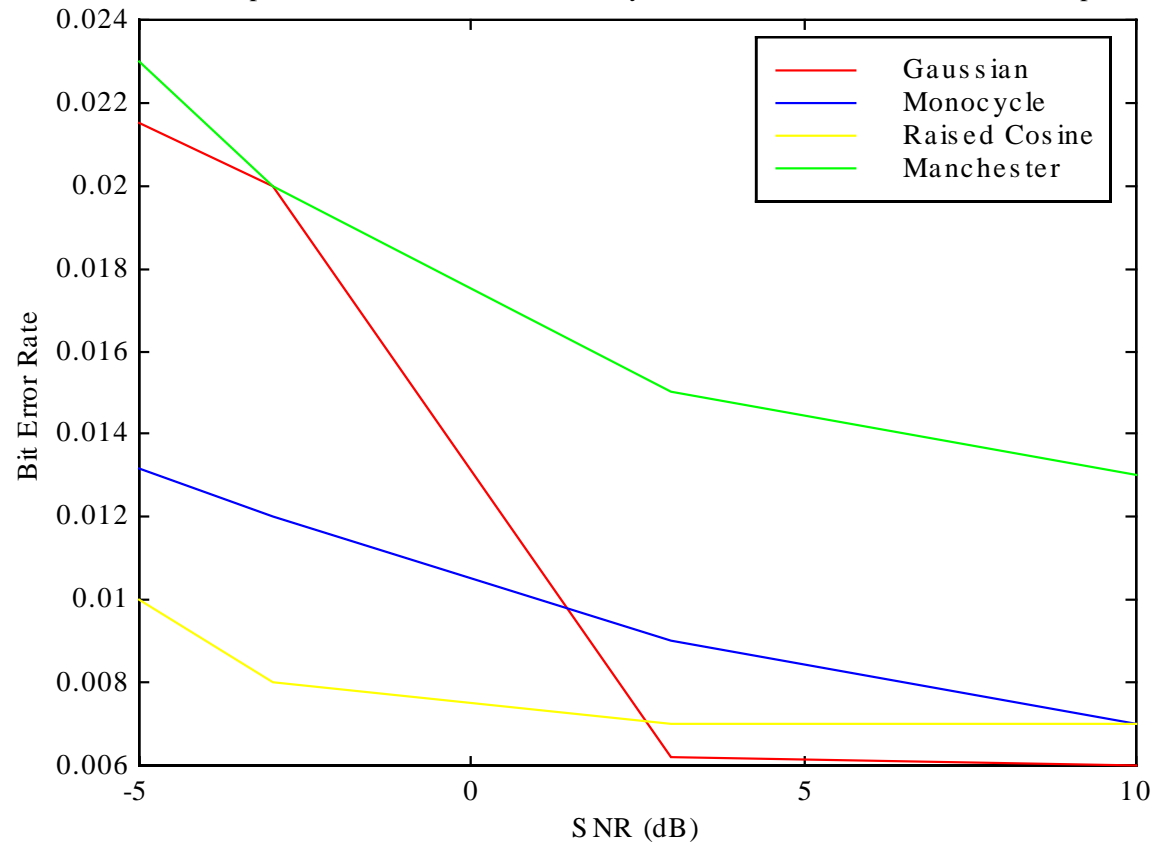
- Multi User Transmitter Section
 - Generates Gaussian Monocycles, Gaussian Pulse, Raised Cosine and Manchester Pulse.
 - Generated gold sequences using 18th order connection polynomial.
- Receiver Section
 - Frame Level Synchronization
 - Sliding Cross-Correlator Implementation

Our Approach (contd.)

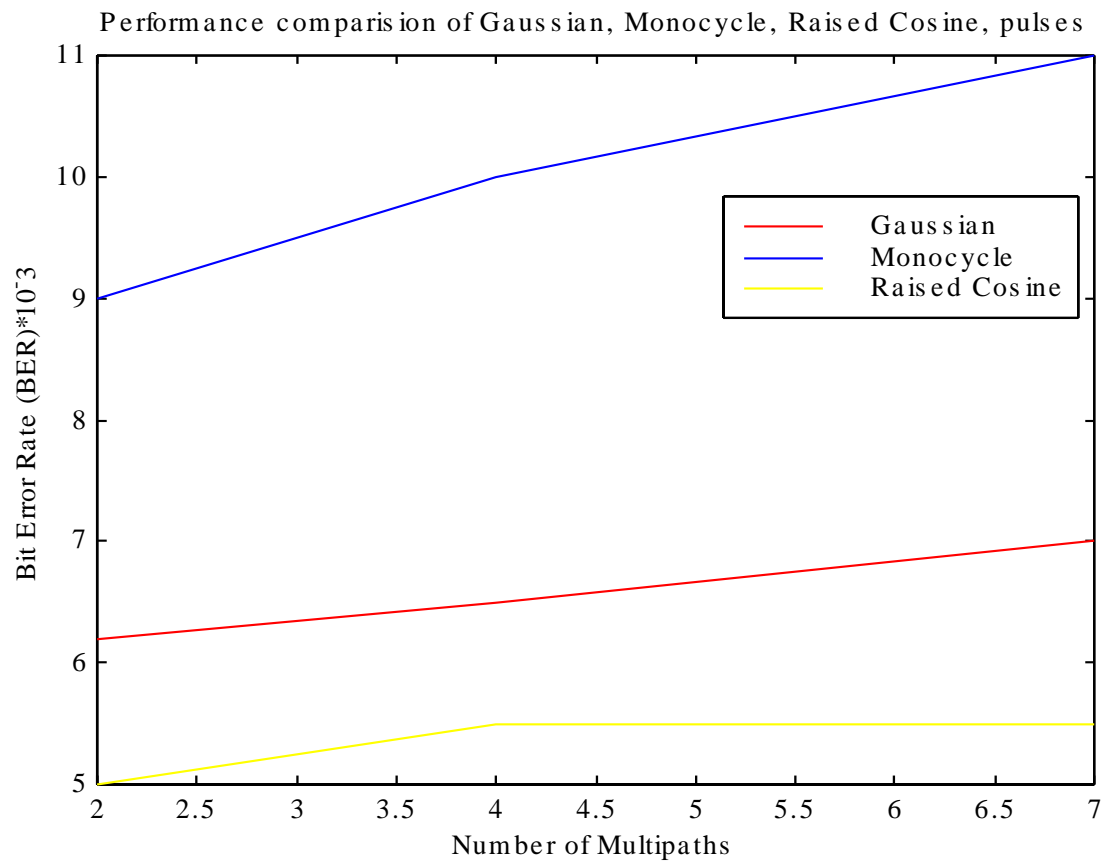
- Channel
 - Simulated Rayleigh Fading due to multipath propagation
 - Added White Gaussian noise to the transmitted Signal
 - Neglected Effects due to Doppler frequency shifts

Results

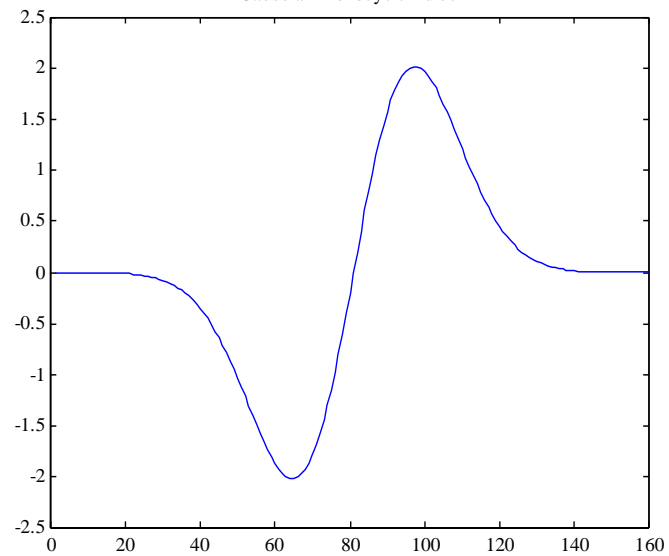
Performance comparison of Gaussian, Monocycle, Raised Cosine, Manchester pulse shapes



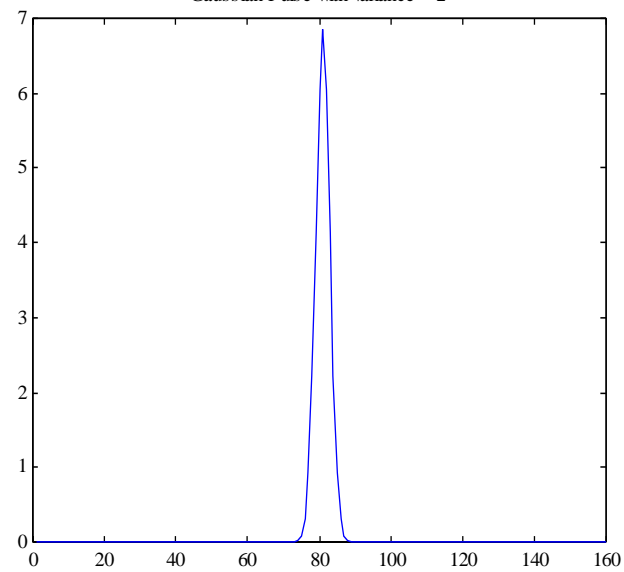
Results



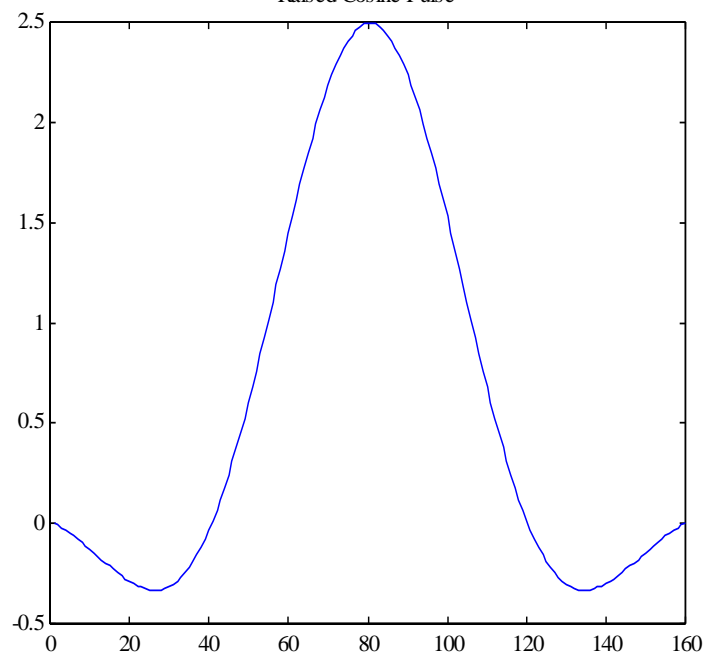
Gaussian Monocycle Pulse



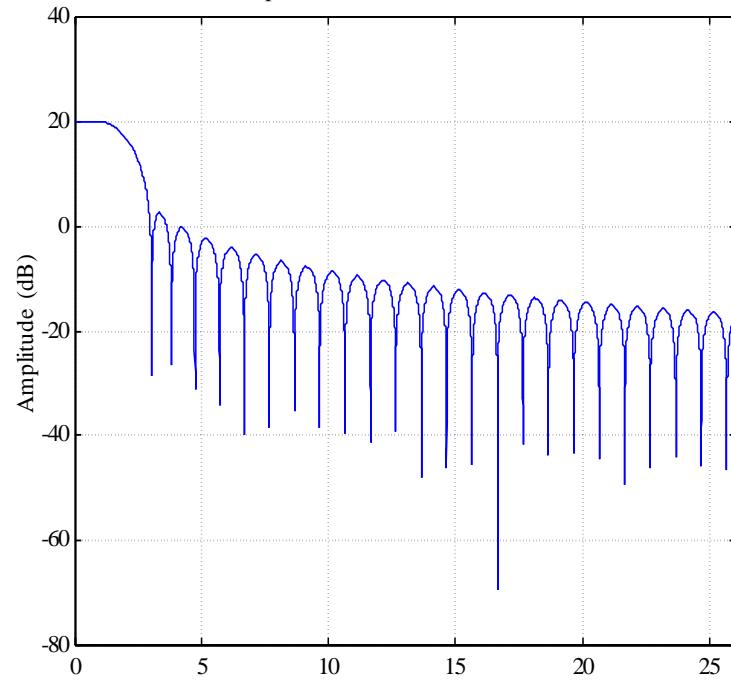
Gaussian Pulse with variance = 2



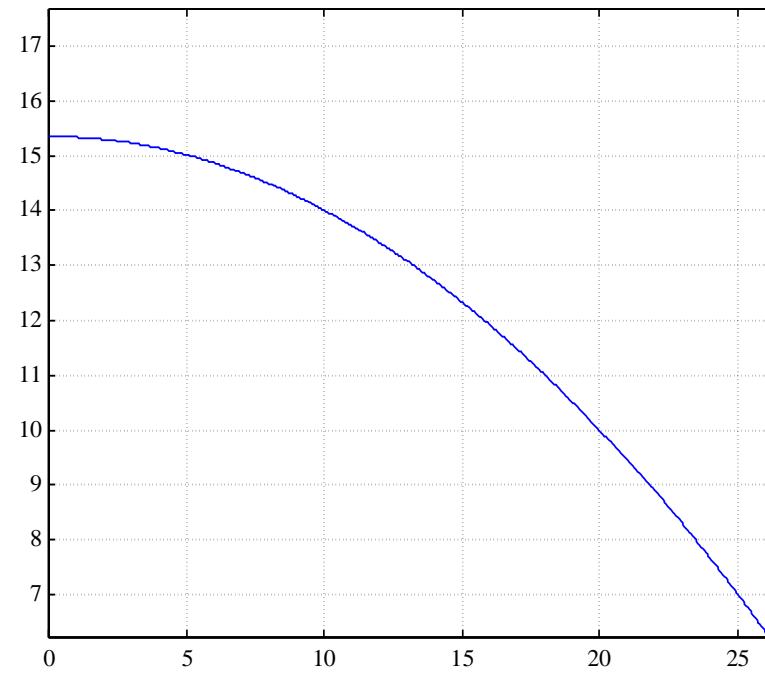
Raised Cosine Pulse



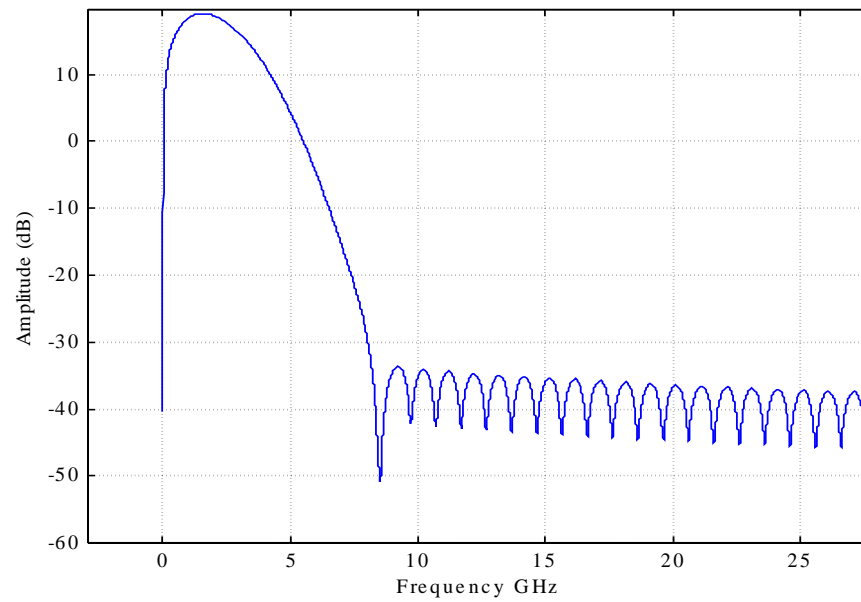
Spectrum of Raised Cosine Pulse



Spectrum of Gaussian pulse



Spectrum of Gaussian Monocycle



Future Work

- Including the effect of Doppler frequency shifts
- Including the forward error correction codes
- Feasibility of developing systems capable of generating Gaussian and Raised cosine pulses upto the accuracy of nanoseconds.