**Project 2: Text Transmission using USRP**

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| **Introduction**  **Theory**  For the signal which is transferred, the first step is to encode into bit streams and then encapsulate bit streams into packets. After that, packets is input into PSK modulator and then perform symbol mapping and pulse generation.   1. **Modulation**   Consider a sinusoidal carrier wave given by where means the Amplitude of carrier signal, means the frequency of the carrier signal.  For the n bits which need to transmit, divide equally to parts. If n is equal to 1, then the transmitted signal is . If n is greater than 1, the transmitted signal is .   1. **Demodulation**   The received signal is , where represents white gaussian noise. The received signal goes through two processes to the signal detector. One process is that the received signal is firstly multiplied by and then integrated over a period. Another process is that the received signal is firstly multiplied by and then integrated over a period. In the signal detector, there are thresholds to recover the transmitted bits.    ***Receiver 1***  **Lab results & Analysis**   1. **Transmitter**     First, slicing text into packets and then each packet is encoded as bit streams. After that, the PSK modulator maps and pluses shape the bit streams into the analog signal, which is (n=1) or (n>1).   1. **Receiver**     In the receiver, the first step is to transfer the analog signal to the digital signal by analog-to-digital converter. Then matching filtering and synchronization detection are performed. After that, decode bitstreams into text.     1. **Results**   ***One USRP transmits the signal and the same one receives the signal***    BPSK    QPSK    8PSK    16PSK  ***One USRP transmits the signal and another one receives the signal***    BPSK Transmitter    BPSK Receiver    QPSK Transmitter    QPSK Receiver    8PSK Transmitter    8PSK Receiver    16PSK Transmitter    16PSK Receiver | |
| **Experience**   1. In this project, I complete the construction of the receiver, help complete the construction of the transmitter, help study the method of cutting text into packets, and tentative exploration of ASK/FSK. From the progress, I learned three methods of cutting text into packets, including using queues, using USRP and using global variables. What’s more, I have a deep understanding of the relationship between the signal-noise ratio and the bit error rate and he relationship between alpha, bandwidth and bit error rate.   ---(张旭东 Construction of the receiver, Implementation of 2/4/8/16 PSK, PPT making, report writing) | |
| **Score** | 100 |