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ECE251 Assignment 2 explanation

1. -
2. I noticed that there is some signal scaling because of the filter, so I tuned a scaling parameter to adjust for this so that the decision device in part 6 can be made using similar value ranges as the source signal. Not sure whether or not this is expected.
3. –
4. I’m noticing that the eye diagram does not look quite right, but after playing around with it and the SRRC filter I can’t quite figure out why this is. When alpha = 1, my understanding is that the levels should converge to a single value in the eye diagram if there is no ISI, but this is not the case for my received signal y(t). There is always a range of voltage values corresponding to a single symbol, but there are noticeable eyes still, so I’m pretty sure my eye diagram is being generated correctly. My only other guess is that there is ISI despite having confirmed that the combination of the two filters obeys the Nyquist criterion. I’m a bit stumped, but I can proceed because there are still open eyes for alpha = 0.2.
5. –
6. I had to add an additional delay of .5\*sps to the start of the sampling train to ensure that the center of each symbol in y(t) is being sampled, rather than the edge.
7. I had to get rid of the last number of symbols equal to the span of the SRRC filter because they get pushed out due to the filter delay. Otherwise they will artificially drag down the bit-error-rate. When I run the script with an alpha of 0.2, I usually get 2 to 4 errors. As far as I know, these errors are random and not corresponding to a systematic mistake. When I run the script with an alpha of slightly greater than 0.2, (e.g. 0.25) these errors go away. 0.2 seems to be just on the threshold of where these errors arise.