Transmitter

The transmitter consists of a pattern and pulse generator. The pattern generator will generate a sequence of 1's and 0's representing a bit of data. Each edge of the pattern generator’s signal represents a 1. The pulse generator will generate a pulse corresponding to each 1.

Pattern Generator

Comparator:
- Sets a threshold to distinguish pulse from noise
- Digitizes pulses

RAKE:
- Stores digital samples of received data
- Compares received data to stored pattern
- Discards false positives if patterns don’t match
- Outputs logic 1 if patterns match

Receiver

Simulation and Experimental Results

The transmitter and receiver were built using discrete devices wire-wrapped to a circuit board. The circuits were tested under low noise and noisy conditions.

Simulation:

- Blue: Clock
- Green: Recovered digital data (output)
- Purple: Digital output
- Red: Noise-less input
- Yellow: Digital pulses moving down the delay line

Experimental results: Low noise
- The RAKE is tuned for a 110110 pattern
- Pulses are much larger than noise
- Pulses are digitized without difficulties
- The RAKE recognizes the pattern
- Data is recovered at the output of the circuit

Experimental results: Noisy signal
- The RAKE is tuned for a 110101 pattern
- The RAKE eliminates “false” pulses due to noise since they don’t fit the pattern
- The correct pattern is detected and digital data stored in one finger of the RAKE

Conclusion

- Computer simulations have shown data transmission under low noise conditions
- Testing of the transmitter and receiver have shown promising results
- Timing issues are the most persistent problems
- Despite these problems data was recovered successfully

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