Episode 8.01 - Intro to Error Detection

(Transcript URL: https://intermation.com/episode-8-01-intro-to-error-detection/)

Show Description: Digital data has many benefits, but what happens if it's in error? Moreover, how can we tell if a bit has been flipped? Our discussion begins with parity.

Podcast Timestamp	Supporting Details

3:12

Using Exclusive-OR Gates to Perform 2-out-of-3 Voting Logic

A-B XOR Output	*B-C XOR Output*	*Condition*
0	0	All three sensors agree
0	1	Sensor C disagrees - go with A or B
1	0	Sensor A disagrees - go with B or C
1	1	Sensor B disagrees - go with A or C

7:44

Computation of Parity Bits

Element to Store	*Binary Representation*	*Number of Ones*	*Computed Odd Parity Bit*	*Computed Even Parity Bit*
Unicode ‘K’	01001011	4 (even)	1	0
Integer 25	00011001	3 (odd)	0	1

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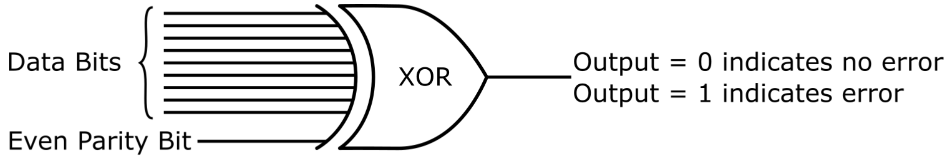
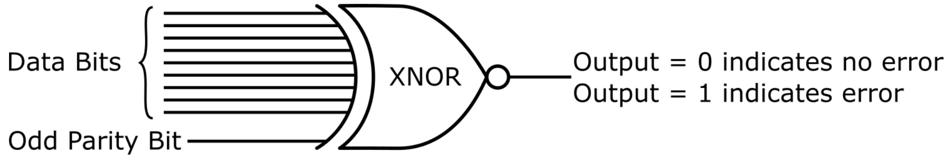
Using Parity to Detect Error

Data Element Retrieved	*Even Parity Bit Retrieved*	*Sum of 1’s Across Data and Parity*	*Even Parity Result*
01100001	1	4 (even)	**No Error**
11011000	1	5 (odd)	**Error**

Podcast Timestamp	Supporting Details
9:38	***Using Digital Logic to Detect a Parity Error***



Error Detection Logic for an Even Parity Bit



Error Detection Logic for an Odd Parity Bit

Sample Problems

1. Identify each of the binary data elements shown below that is in error according to the corresponding even parity bit given.

	Data Element (in Binary)	Even Parity Bit
a.)	`10111101`	1
b.)	`00110010`	1
c.)	`01000001`	0
d.)	`01011101`	1

2. Identify each of the binary data elements shown below that is in error according to the corresponding odd parity bit given.

	Data Element (in Binary)	Odd Parity Bit
a.)	`00011111`	0
b.)	`11100101`	1
c.)	`01010011`	1
d.)	`10010100`	0

3. Generate the even parity bits for the following binary values: `01101101`, `10111110`, `00000000`.

4. Generate the odd parity bits for the following binary values: `01101101`, `10111110`, `00000000`.

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