

Lecture 15

Michael Brodskiy

Professor: M. Onabajo

November 14, 2024

- Digital Logic Fundamentals
 - Analog Circuits
 - * Process “real world signals” like radio waves, sensor outputs, recorded speech, etc.
 - * Signal values can take on a continuous range
 - Digital Logic Circuits
 - * Binary Representation of Information
 - Logical “1” (high, true, on)
 - Logical “0” (low, false, off)
 - Binary variables can represent real world information (*e.g.* open or closed switch, temperature “or”, etc.)
 - * Grouped variables (words) can represent quantized analog signals
 - Example: $AB = 0$ when V_{sig} is $0 - 1[V]$, $AB = 01$ when V_{sig} is $1 - 2[V]$, and so on
 - Bit: a single digit (“0” or “1”)
 - Byte: a word with 8 bits
- Transition Times
 - Finite rise/fall times are caused by RC delays
 - C_L depends on the fan-out
 - Common timing specifications
 - * t_r is the rise time (typically 10% to 90% of the difference)
 - * t_f is the fall time (typically 90% to 10% of the difference)
 - * t_{PLH} is the low-high propagation delay (50% completed)
 - * t_{PHL} is the high-low propagation delay (50% completed)
 - * $t_{PD} = (t_{PLH} + t_{PHL})/2$ is the average propagation delay