First day Lecture

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Intro

- Understnad devices and how they are used to create digital circuits

- Design techniques for digital circuits

- Testing and implementing digital desings onto physical hardware

1 Digital Overview

Digital refers to the representation of an element with a set of *discrete* values.
`Analog` represents an element as a set of continous values. to give an example, a sine wavere presents a smooth and conitnous (digital) course of motion

Digital size

Digital information size is determinde by the number of bits, an each bit represents a digit for the digital information. The more digits, the larger the element can be represented, or greater precision.

- An analog value represents with 10 - bits will have less precision than with 12 bits

Advantages of digital

- Easier to use for computing & storing data

- Digital signals are less prone to noise effects

- Fast data transmission with ability to encrypt, modulate, etc.

- multiple functionality in a small form factor device

Started with Analog

- Transistor is base for digital electronics: Analog devices with operates as an ON/OFF switch

- an input voltage sithces the output voltage ON of OFF

- Output voltage of transistor is 0 V or a specific voltage (Vcc, Vdd) -¿ therefore, value is digital output value is also binary

Early logic chips used BJT (bipolar junction) transistors that operated at 5 V. Known as TTL logic (transistor - transistor logic)

MOS Technology

`MOSFET` (metal oxide semiconductor field effect) revolutionized digital logic by allowing miniaturization, high density, and lower power consumption.
  ovetime, transistors were able to be manufactured ever smaller.
Moores law: Density of transistors on a chip doubles about every 2 years. Leads to increased performance, capacity, functionality, etc.

1.1   digital Voltage

Digital voltage levels can be described by different terms

- Low high

- 0,1

- False, True

- Positive logic, Negative Logic

The high voltage level is typically the operating voltage of the logic device

Why Digital Voltage

Digital voltage is analogous to a "yes" or "no" for a logical expression. don't want "maybe", Logical expressions are implemented in logic circuits.
  ogic circuits are the next step in building functions for a digital system (i.e. computer)

Implementing Digital Circuit