مرکز آموزش نیـــرا سیستم

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# Communications

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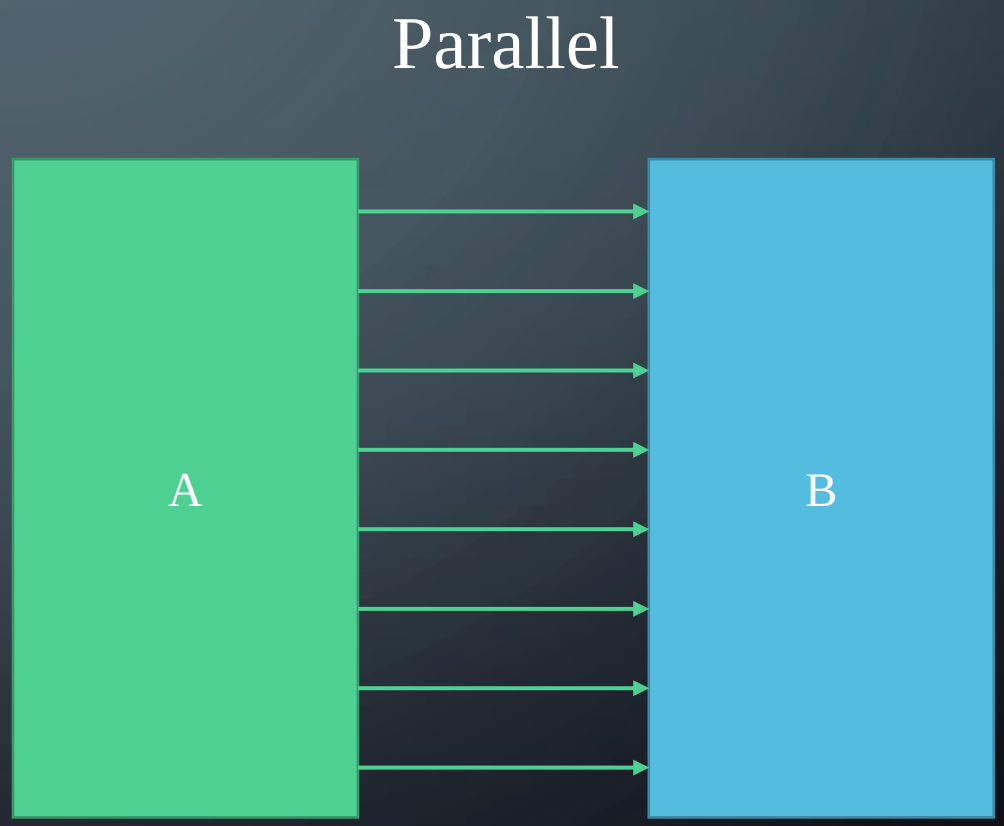
# Communication Categories

- Connection Type
  - Serial
  - Parallel
- Communication Type
  - Simplex
  - Half-Duplex
  - Full-Duplex
- Data Type
  - Bits
  - Byte
  - Packet
- Synchronize
  - Synchronous
  - Asynchronous
- Channel Type
  - Copper Wire
  - Twisted-Pair
  - Coaxial
  - Fiber
  - Air
- Voltage State

# Connection Type: Parallel

Examples:

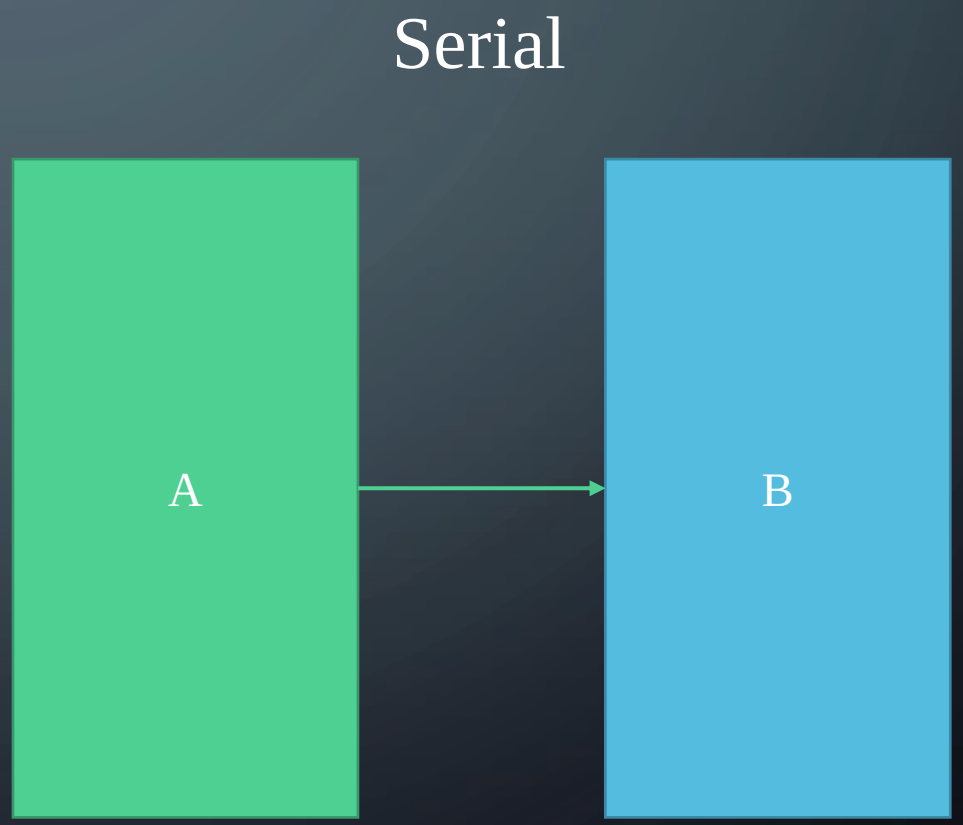
- CPU Memory Bus
- LCD
  - TFT
  - ALCD
  - GLCD
- MMC



# Connection Type: Serial

Examples:

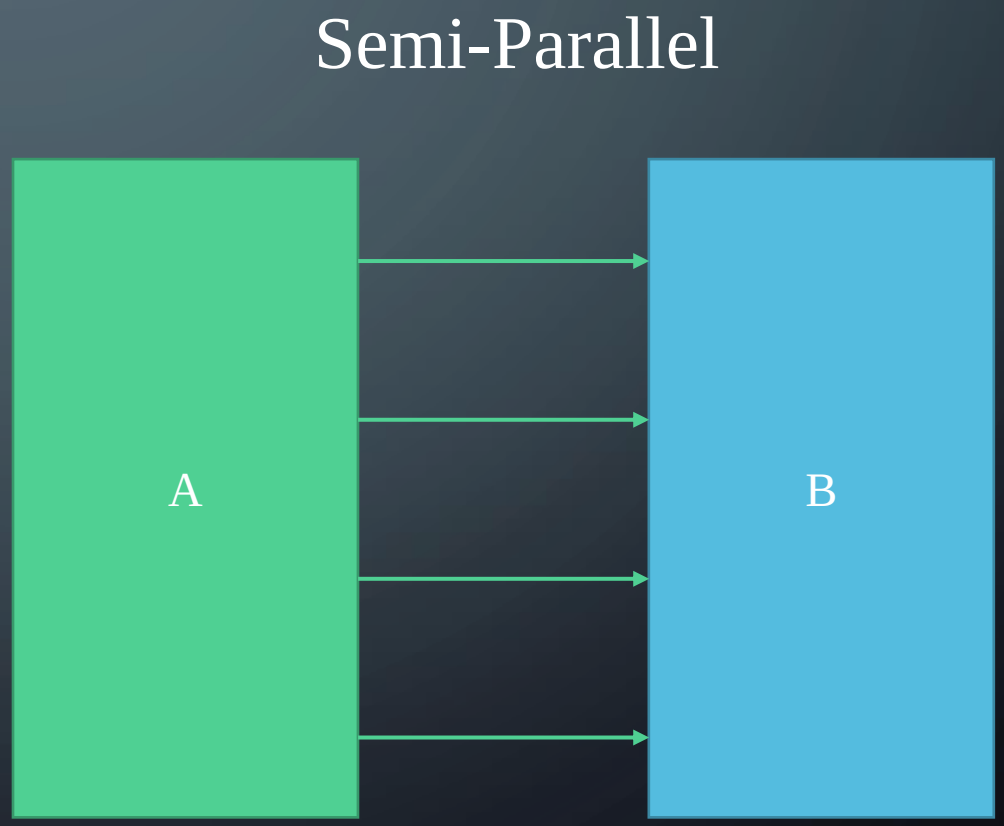
- USART
- I2C
- SPI
- USB
- CAN



# Connection Type: Semi-Parallel

Examples:

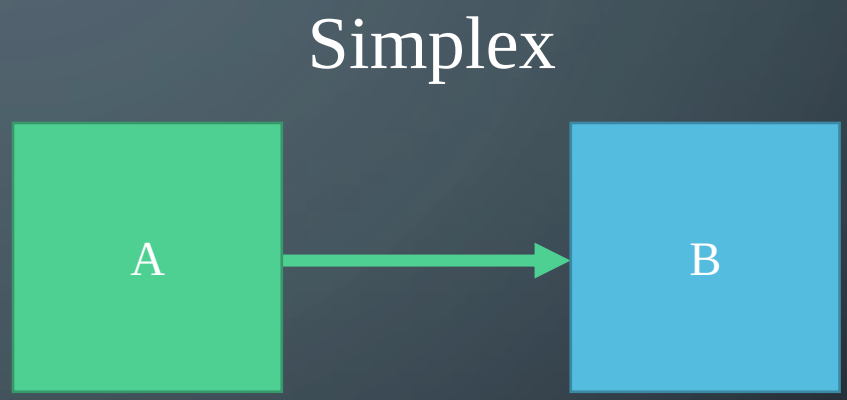
- SDIO
- QSPI



# Communication Type: Simplex

Examples:

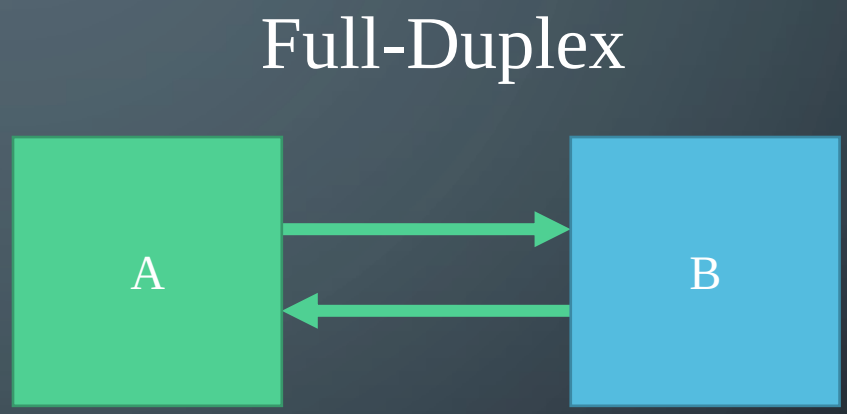
- RF Remotes
- Radio
- TV



# Communication Type: Full-Duplex

Examples:

- USART
- SPI
- USB3

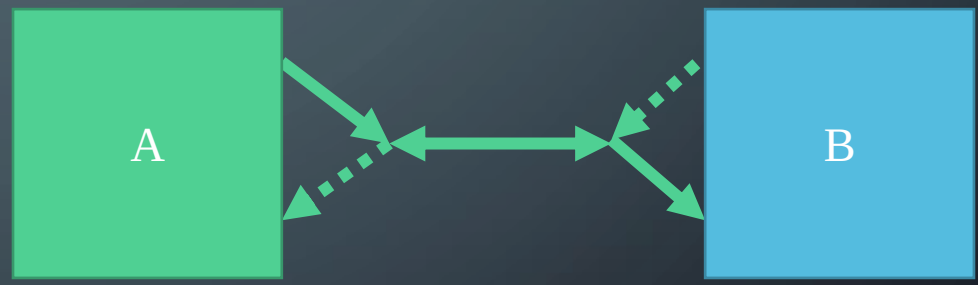


# Communication Type: Half-Duplex

Examples:

- I2C
- OneWire
- USB2
- CAN
- RS-485

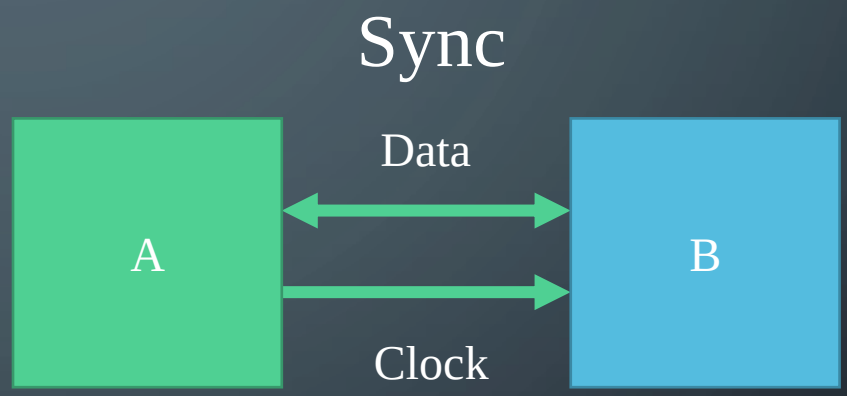
Half-Duplex



# Synchronize: Sync

Examples:

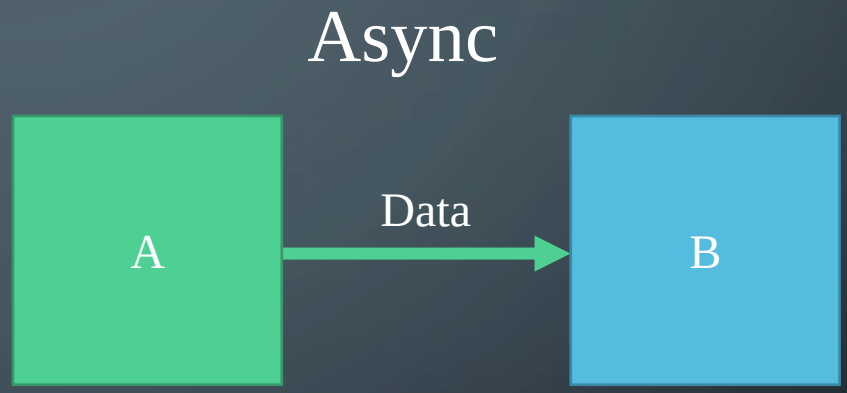
- I2C
- SPI
- USART



# Synchronize: Async

Examples:

- UART
- CAN
- OneWire
- USB



# Data Type: Bit

Examples:

- Raw GPIO
  - Switch
  - Dip-Switch
  - Led
- RF Remotes

# Data Type: Byte

Examples:

- USART
- I2C
- SPI
- OneWire

Byte (8x Bit)

# Data Type: Packet

Examples:

- CAN
- Ethernet
- USB

Packet (N Byte)

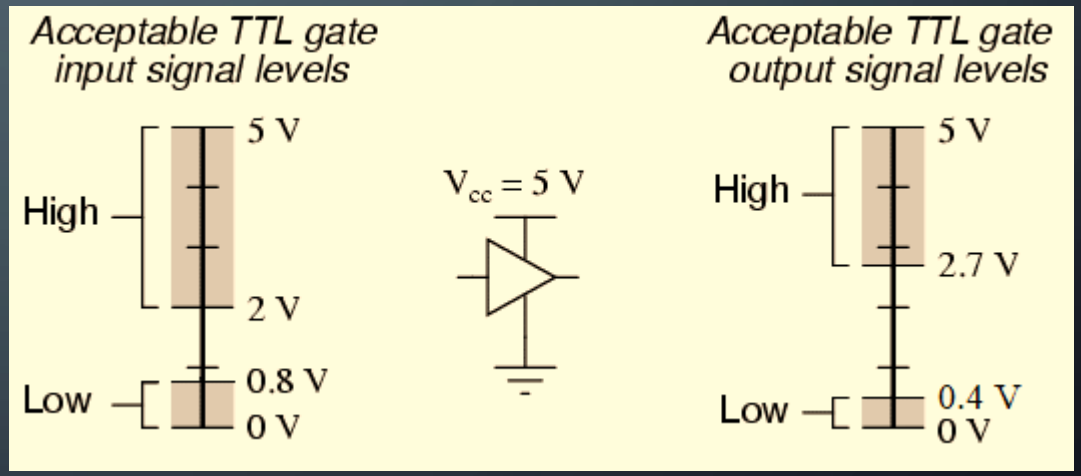
# Channel Type

- Copper Wire
  - On-Board Tracks
  - USART
- Twisted-Pair
  - RS-485
  - RS-422
  - LAN
- Coaxial
  - Radio frequency
  - Video Signal
  - Data signal
- Fiber
  - Ethernet
- Air
  - GSM
  - GPS
  - Wi-Fi

# Voltage State: TTL (Transistor-Transistor Level)

Examples:

- USART
- I2C
- SPI
- QSPI



# Voltage State: RS-232

- Examples:
  - UART

- **1** Logic: -3v ~ -15v
- **0** Logic: +3v ~ +15v