Aufbau µC-Systeme

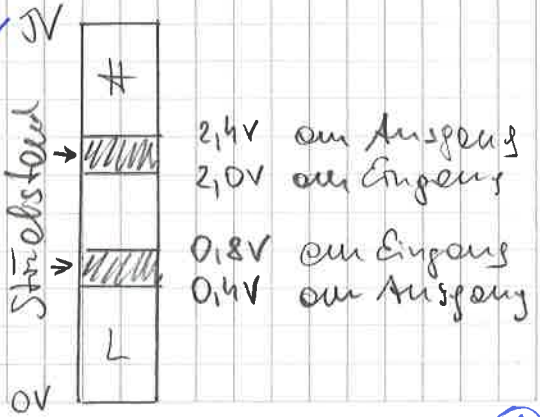
- CPU:
  Rechenwerk (ALU), Steuerwerk, Register
- Systemtakt, Spannungsversorgung
- RAM: variabel, Zwischenergebnisse, Prozessvariablen
  → flüchtig
  → Prozessvariablen werden zuerst geladen
- ROM: Programmdaten — Flash-PROM, EEPROM
  → nicht flüchtig — Programm, Festwerte
- I/O-Komponenten:
  - Tastaten, Maus
  - Port-Pins
  - Outputs: LEDs, Display
  - Serielle Schnittstelle, Bus, Ethernet
- Systembus:
  - Datenbus
  - Adressbus
  - Steuerbus

- Pegel Standard-TTL 5V

Spannungsbereich

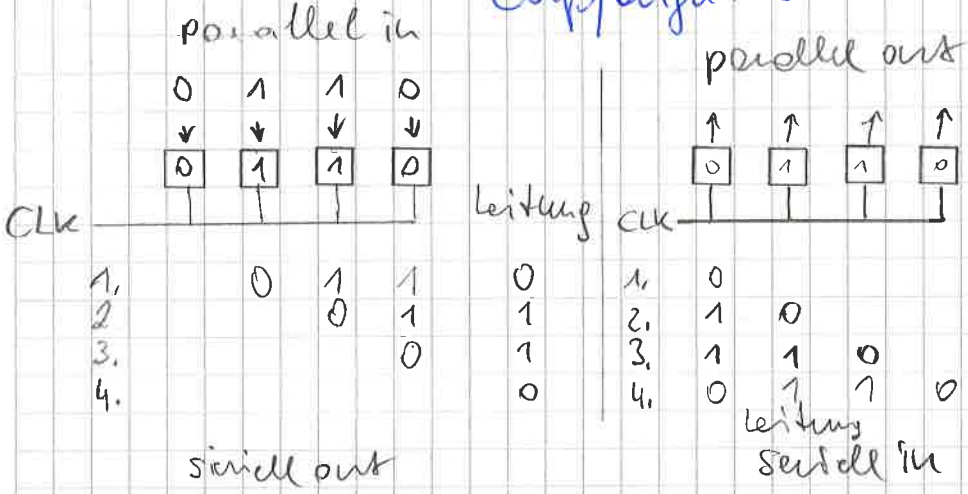
→ HIGH: am Ausgang 2,4V
  am Eingang 2V

→ LOW: am Ausgang 0,4V
  am Eingang 0,8V



Grundlagen serielle Kommunikation

Schieberegister: Senden: parallel in, seriell out
Empfangen: seriell in, parallel out



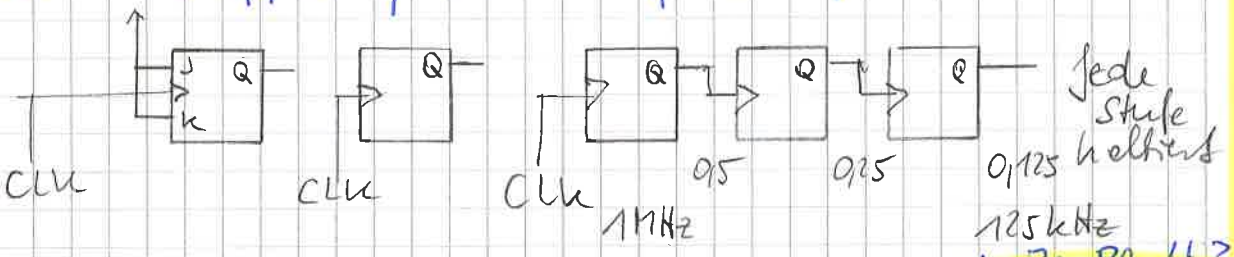
Bei USB, Ethernet, RS-232, RS-485

- Taktgenerator:
  - Schwingquarz-System mit Oszillator-Steuerung
  - Schwingschaltungen (stabile Kippstufe)
  - RC-Oszillatorschaltungen

Systemtakt

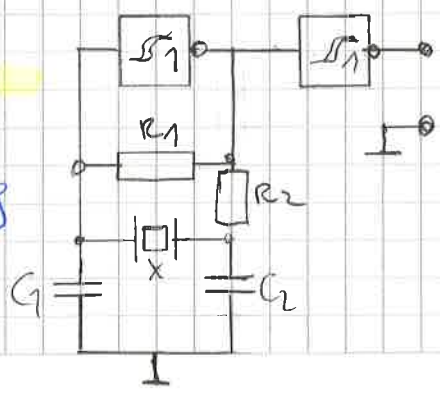
davon abhängig sind:
- Kommunikation, Übertragungsrate
- Arbeitsgeschwindigkeit CPU + Komponenten
- Prescaler

- Bistabile Kippstufen: JK-Flip-Flop

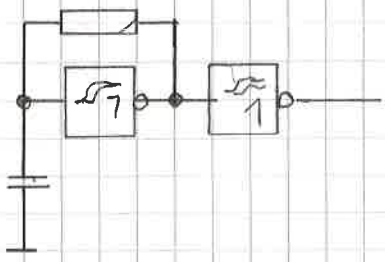


- Schwingschaltungen:

⇒ Oszillatorschaltung mit Schwingquarz



→ Oszillatorschaltung mit RC



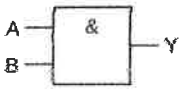
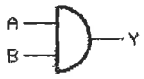
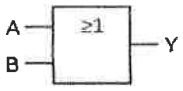
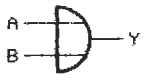
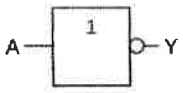
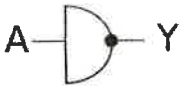
- Monostabile Kippstufen: Zeitschalter, Zeitglieder

- Gatter
  siehe Blatt 3a

- Flip-Flops
  - RS: nicht beide Ausgänge einschalten → undefinierten, verbotenen Zustand
  - JK
  - Toggle - Prescaler
  - Master slave

Logikgatter

W de.wikipedia.org/wiki/Logikgatter

Funktion	Symbol in Schaltplan: IEC 60617-12 : 1997 & ANSI/IEEE Std 91/91a-1991	ANSI/IEEE Std 91/91a-1991	DIN 40700 (vor 1976)	Wahrheitstabelle
Und-Gatter (AND)	$Y = A \wedge B$ $Y = A \cdot B$ $Y = AB$ $Y = A \& B$			
Oder-Gatter (OR)	$Y = A \vee B$ $Y = A + B$			
Nicht-Gatter (NOT)	$Y = \overline{A}$ $Y = \neg A$ $Y = \tilde{A}$			

A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

A	Y
0	1
1	0

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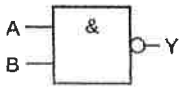
NAND-Gatter (NICHT UND) (NOT AND)

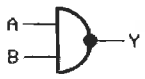
$$Y = \overline{A \wedge B}$$

$$Y = A \overline{\wedge} B$$

$$Y = \overline{A B}$$

$$Y = A \mid B$$





A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

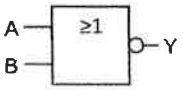
NOR-Gatter (NICHT ODER) (NOT OR)

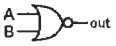
$$Y = \overline{A \vee B}$$

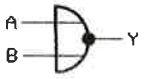
$$Y = A \overline{\vee} B$$

$$Y = \overline{A + B}$$

$$Y = A - B$$





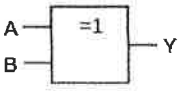


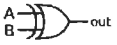
A	B	Y
0	0	1
0	1	0
1	0	0
1	1	0

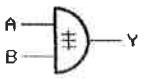
XOR-Gatter (Exklusiv-ODER, Antivalenz) (EXCLUSIVE OR)

$$Y = A \underline{\vee} B$$

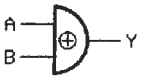
$$Y = A \oplus B$$







oder



A	B	Y
0	0	0
0	1	1
1	0	1
1	1	0

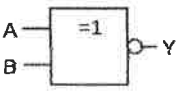
XNOR-Gatter (Exklusiv-Nicht-ODER, Äquivalenz) (EXCLUSIVE NOT OR)

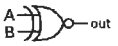
$$Y = \overline{A \underline{\vee} B}$$

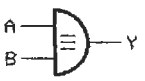
$$Y = A \overline{\underline{\vee}} B$$

$$Y = \overline{A \oplus B}$$

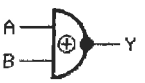
$$Y = A \odot B$$







oder



A	B	Y
0	0	1
0	1	0
1	0	0
1	1	1