

# Ampel

Khatera Naser

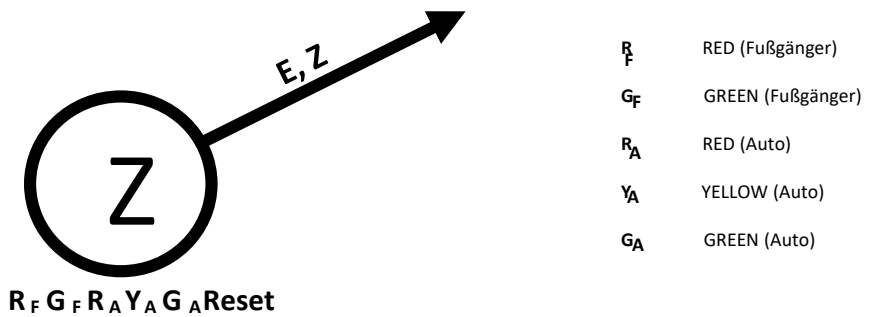
&

Fabian Kahlich

# Funktionstabelle

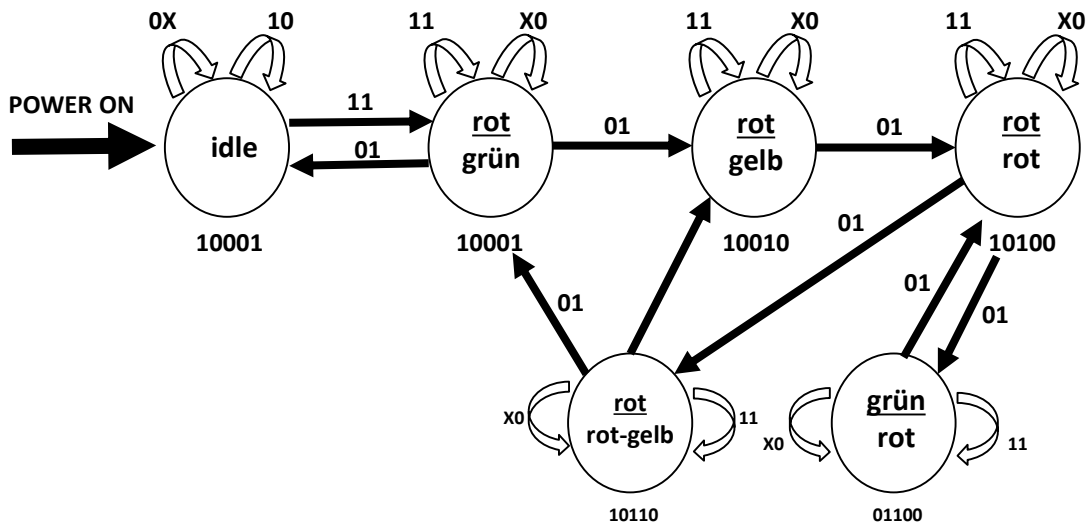
|                     |         |         |         |         |         |         |          |         |
|---------------------|---------|---------|---------|---------|---------|---------|----------|---------|
| <b>Fußgänger</b>    | rot     | rot     | rot     | rot     | grün    | rot     | rot      | rot     |
| <b>Auto</b>         | grün    | grün    | gelb    | rot     | rot     | rot     | rot-gelb | grün    |
| <b>Zeit in s</b>    | idle    | 5       | 1       | 5       | 30      | 5       | 1        | 30      |
| <b>Zeit addiert</b> | 0       | 5       | 6       | 11      | 41      | 46      | 47       | 77      |
| <b>Zeit in Bits</b> | 0000000 | 0000101 | 0000110 | 0001010 | 0101001 | 0101110 | 0101111  | 1001101 |

# Zustandsdiagramm Legende



| Zustand      | Codierung |
|--------------|-----------|
| Idle         | 000       |
| rot/grün     | 001       |
| rot/gelb     | 010       |
| rot/rot      | 011       |
| grün/rot     | 100       |
| rot/rot-gelb | 101       |
| undefiniert  | 110       |
| undefiniert  | 111       |

# Zustandsdiagramm



# Übergangsschaltnetz

| Z2 | Z1 | Z0 | E | Z | Z2+ | Z1+ | Z0+ |
|----|----|----|---|---|-----|-----|-----|
| 0  | 0  | 0  | 0 | 0 | 0   | 0   | 0   |
| 0  | 0  | 0  | 0 | 1 | 0   | 0   | 0   |
| 0  | 0  | 0  | 1 | 0 | 0   | 0   | 0   |
| 0  | 0  | 0  | 1 | 1 | 0   | 0   | 1   |
| 0  | 0  | 1  | 0 | 0 | 0   | 0   | 1   |
| 0  | 0  | 1  | 0 | 1 | 0   | 1   | 0   |
| 0  | 0  | 1  | 1 | 0 | 0   | 0   | 1   |
| 0  | 0  | 1  | 1 | 1 | 0   | 0   | 1   |
| 0  | 1  | 0  | 0 | 0 | 0   | 1   | 0   |
| 0  | 1  | 0  | 0 | 1 | 0   | 1   | 1   |
| 0  | 1  | 0  | 1 | 0 | 0   | 1   | 0   |
| 0  | 1  | 0  | 1 | 1 | 0   | 1   | 0   |
| 0  | 1  | 1  | 0 | 0 | 0   | 1   | 1   |
| 0  | 1  | 1  | 0 | 1 | 1   | 0   | 0   |
| 0  | 1  | 1  | 1 | 0 | 0   | 1   | 1   |
| 0  | 1  | 1  | 1 | 1 | 0   | 1   | 1   |
| 1  | 0  | 0  | 0 | 0 | 1   | 0   | 0   |
| 1  | 0  | 0  | 0 | 1 | 0   | 1   | 1   |
| 1  | 0  | 0  | 1 | 0 | 1   | 0   | 0   |
| 1  | 0  | 0  | 1 | 1 | 1   | 0   | 0   |
| 1  | 0  | 1  | 0 | 0 | 1   | 0   | 1   |
| 1  | 0  | 1  | 0 | 1 | 0   | 0   | 1   |
| 1  | 0  | 1  | 1 | 0 | 1   | 0   | 1   |
| 1  | 0  | 1  | 1 | 1 | 1   | 0   | 1   |
| 1  | 1  | 0  | 0 | 0 | X   | X   | X   |
| 1  | 1  | 0  | 0 | 1 | X   | X   | X   |
| 1  | 1  | 0  | 1 | 0 | X   | X   | X   |
| 1  | 1  | 0  | 1 | 1 | X   | X   | X   |
| 1  | 1  | 1  | 0 | 0 | X   | X   | X   |
| 1  | 1  | 1  | 0 | 1 | X   | X   | X   |
| 1  | 1  | 1  | 1 | 0 | X   | X   | X   |
| 1  | 1  | 1  | 1 | 1 | X   | X   | X   |

# KV – Diagramm + Funktionsgleichungen (ÜS)

Das KV-Diagramm wird in Logisim leider nicht dargestellt.

$$Z0+ = (E \wedge Z0 \wedge \neg Z1 \wedge Z2) \vee (S \wedge \neg Z2) \vee (S \wedge Z1)$$

$$Z1+ = (\neg S \wedge \neg E \wedge Z0 \wedge \neg Z1 \wedge Z2) \vee (E \wedge \neg Z0) \vee (E \wedge Z1) \vee (S \wedge \neg Z0 \wedge \neg Z1 \wedge Z2)$$

$$Z2+ = (\neg S \wedge \neg E \wedge Z1 \wedge Z2) \vee (Z0 \wedge Z1) \vee (E \wedge \neg Z0 \wedge \neg Z1 \wedge Z2) \vee (E \wedge Z0 \wedge \neg Z2) \\ \vee (S \wedge \neg Z1 \wedge Z2) \vee (S \wedge Z0)$$

# Ausgangsschaltnetz

| Z2 | Z1 | Z0 | E | S | R <sub>F</sub> | G <sub>F</sub> | R <sub>A</sub> | Y <sub>A</sub> | G <sub>A</sub> | Reset |
|----|----|----|---|---|----------------|----------------|----------------|----------------|----------------|-------|
| 0  | 0  | 0  | 0 | 0 | 1              | 0              | 0              | 0              | 1              | 1     |
| 0  | 0  | 0  | 0 | 1 | 1              | 0              | 0              | 0              | 1              | 1     |
| 0  | 0  | 0  | 1 | 0 | 1              | 0              | 0              | 0              | 1              | 1     |
| 0  | 0  | 0  | 1 | 1 | 1              | 0              | 0              | 0              | 1              | 0     |
| 0  | 0  | 1  | 0 | 0 | 1              | 0              | 0              | 0              | 1              | 0     |
| 0  | 0  | 1  | 0 | 1 | 1              | 0              | 0              | 1              | 0              | 0     |
| 0  | 0  | 1  | 1 | 0 | 1              | 0              | 0              | 0              | 1              | 0     |
| 0  | 0  | 1  | 1 | 1 | 1              | 0              | 0              | 0              | 1              | 0     |
| 0  | 1  | 0  | 0 | 0 | 1              | 0              | 0              | 1              | 0              | 0     |
| 0  | 1  | 0  | 0 | 1 | 1              | 0              | 1              | 0              | 0              | 0     |
| 0  | 1  | 0  | 1 | 0 | 1              | 0              | 0              | 1              | 0              | 0     |
| 0  | 1  | 0  | 1 | 1 | 1              | 0              | 0              | 1              | 0              | 0     |
| 0  | 1  | 1  | 0 | 0 | 1              | 0              | 1              | 0              | 0              | 0     |
| 0  | 1  | 1  | 0 | 1 | 0              | 1              | 1              | 0              | 0              | 0     |
| 0  | 1  | 1  | 1 | 0 | 1              | 0              | 1              | 0              | 0              | 0     |
| 0  | 1  | 1  | 1 | 1 | 1              | 0              | 1              | 0              | 0              | 0     |
| 1  | 0  | 0  | 0 | 0 | 0              | 1              | 1              | 0              | 0              | 0     |
| 1  | 0  | 0  | 0 | 1 | 1              | 0              | 1              | 0              | 0              | 0     |
| 1  | 0  | 0  | 1 | 0 | 0              | 1              | 1              | 0              | 0              | 0     |
| 1  | 0  | 0  | 1 | 1 | 0              | 1              | 1              | 0              | 0              | 0     |
| 1  | 0  | 1  | 0 | 0 | 1              | 0              | 1              | 1              | 0              | 0     |
| 1  | 0  | 1  | 0 | 1 | 1              | 0              | 0              | 0              | 1              | 0     |
| 1  | 0  | 1  | 1 | 0 | 1              | 0              | 1              | 1              | 0              | 0     |
| 1  | 0  | 1  | 1 | 1 | 1              | 0              | 1              | 1              | 0              | 0     |
| 1  | 1  | 0  | 0 | 0 | X              | X              | X              | X              | X              | X     |
| 1  | 1  | 0  | 0 | 1 | X              | X              | X              | X              | X              | X     |
| 1  | 1  | 0  | 1 | 0 | X              | X              | X              | X              | X              | X     |
| 1  | 1  | 0  | 1 | 1 | X              | X              | X              | X              | X              | X     |
| 1  | 1  | 1  | 0 | 0 | X              | X              | X              | X              | X              | X     |
| 1  | 1  | 1  | 0 | 1 | X              | X              | X              | X              | X              | X     |
| 1  | 1  | 1  | 1 | 0 | X              | X              | X              | X              | X              | X     |
| 1  | 1  | 1  | 1 | 1 | X              | X              | X              | X              | X              | X     |

# KV – Diagramm + Funktionsgleichungen (AS)

Das KV-Diagramm wird in Logisim leider nicht dargestellt.

$$\text{RF} = (\neg Z2 \wedge \neg Z1) \vee (\neg Z2 \wedge \neg Z0) \vee (\neg Z2 \wedge \neg S) \vee (\neg Z1 \wedge \neg E \wedge S) \vee (\neg Z2 \wedge E) \vee (\neg Z1 \wedge Z0)$$

$$\text{GF} = (Z1 \wedge Z0 \wedge \neg E \wedge S) \vee (Z2 \wedge \neg Z0 \wedge \neg S) \vee (Z2 \wedge \neg Z0 \wedge E)$$

$$\text{RA} = (Z1 \wedge \neg E \wedge S) \vee (Z1 \wedge Z0) \vee (Z2 \wedge \neg Z0) \vee (Z2 \wedge \neg S) \vee (Z2 \wedge E)$$

$$\text{YA} = (\neg Z2 \wedge \neg Z1 \wedge Z0 \wedge \neg E \wedge S) \vee (Z1 \wedge \neg Z0 \wedge \neg S) \vee (Z1 \wedge \neg Z0 \wedge E) \vee (Z2 \wedge Z0 \wedge \neg S) \vee (Z2 \wedge Z0 \wedge E)$$

$$\text{GA} = (\neg Z2 \wedge \neg Z1 \wedge \neg Z0) \vee (\neg Z2 \wedge \neg Z1 \wedge \neg S) \vee (\neg Z2 \wedge \neg Z1 \wedge E) \vee (Z2 \wedge Z0 \wedge \neg E \wedge S)$$

$$\text{Reset} = (\neg Z2 \wedge \neg Z1 \wedge \neg Z0 \wedge \neg E) \vee (\neg Z2 \wedge \neg Z1 \wedge \neg Z0 \wedge \neg S)$$