

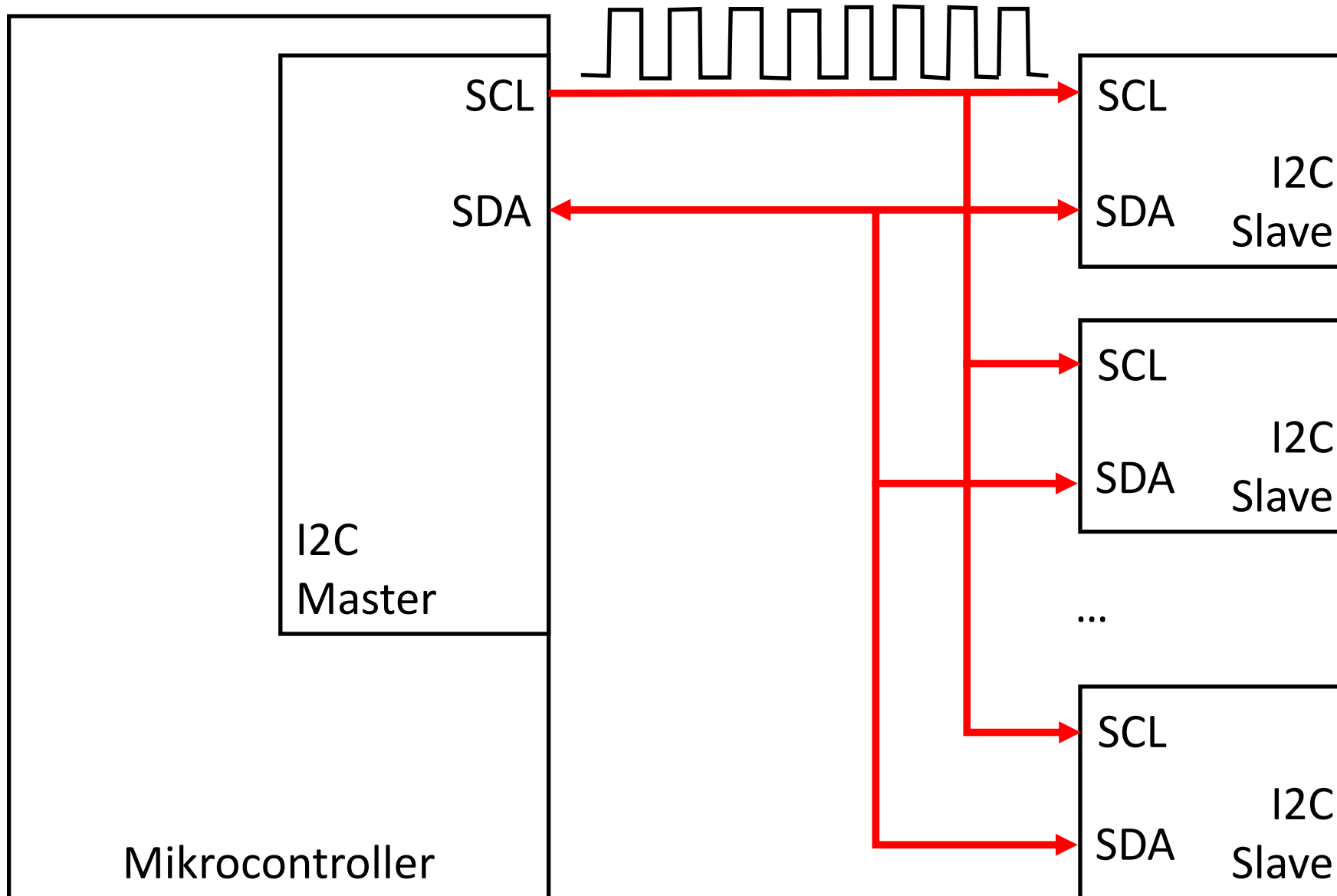
I2C Inter-Integrated Circuit



Smalltalk auf der
Leiterplatte



I2C Inter-Integrated Circuit

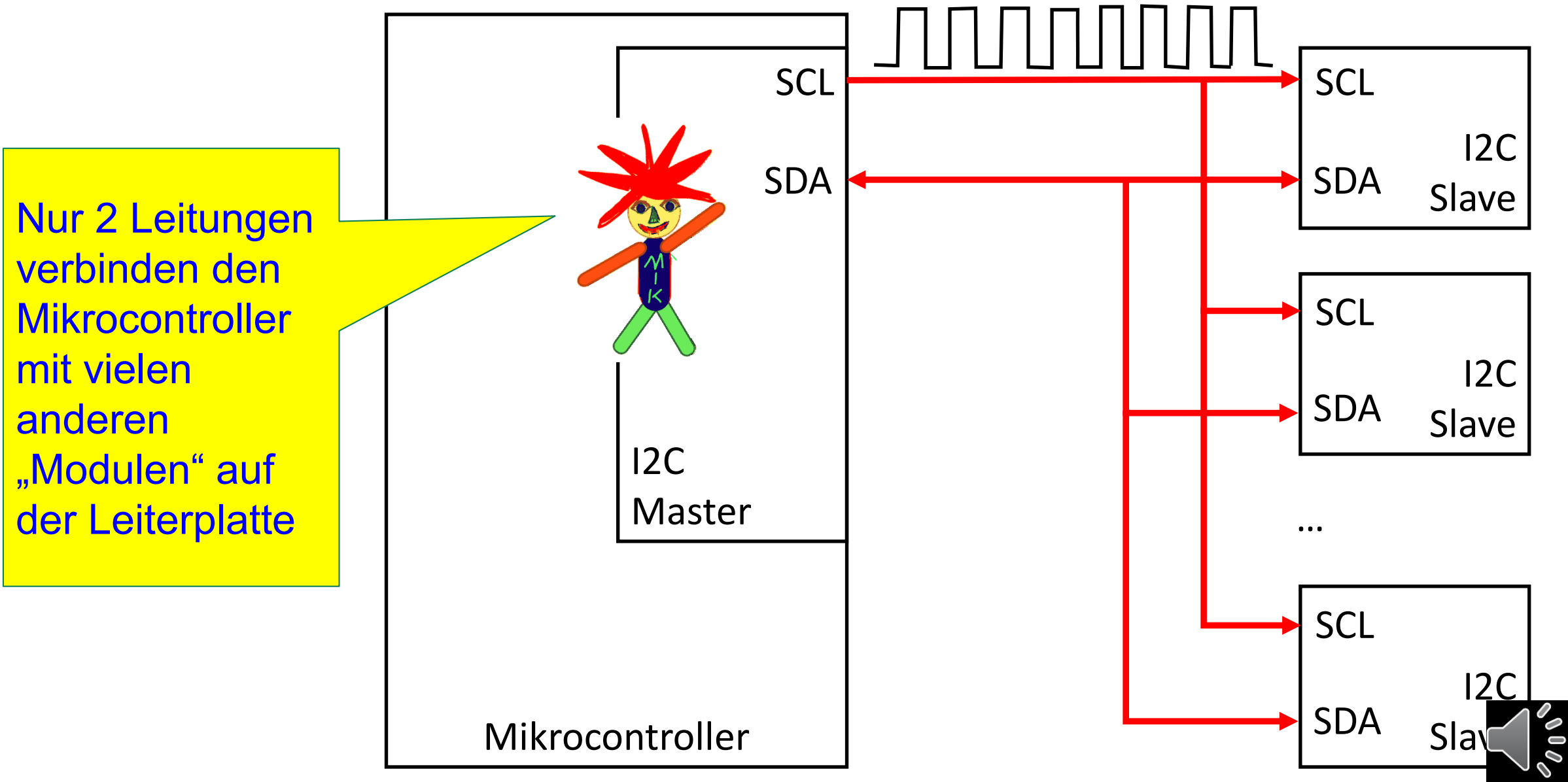


Z.B.

- Realtime Clock
- EEPROM
- ...
- Luftdrucksensor



I2C Inter-Integrated Circuit



I2C Inter-Integrated Circuit

SDA: Serial Data
Bidirektionale
Datenleitung mit
Pullup.

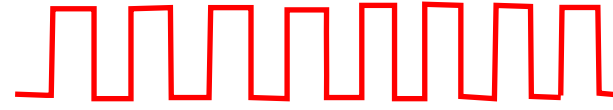
Mikrocontroller

I2C
Master



SCL

SDA



SCL

SDA

I2C
Slave

SCL

SDA

I2C
Slave

...

SCL

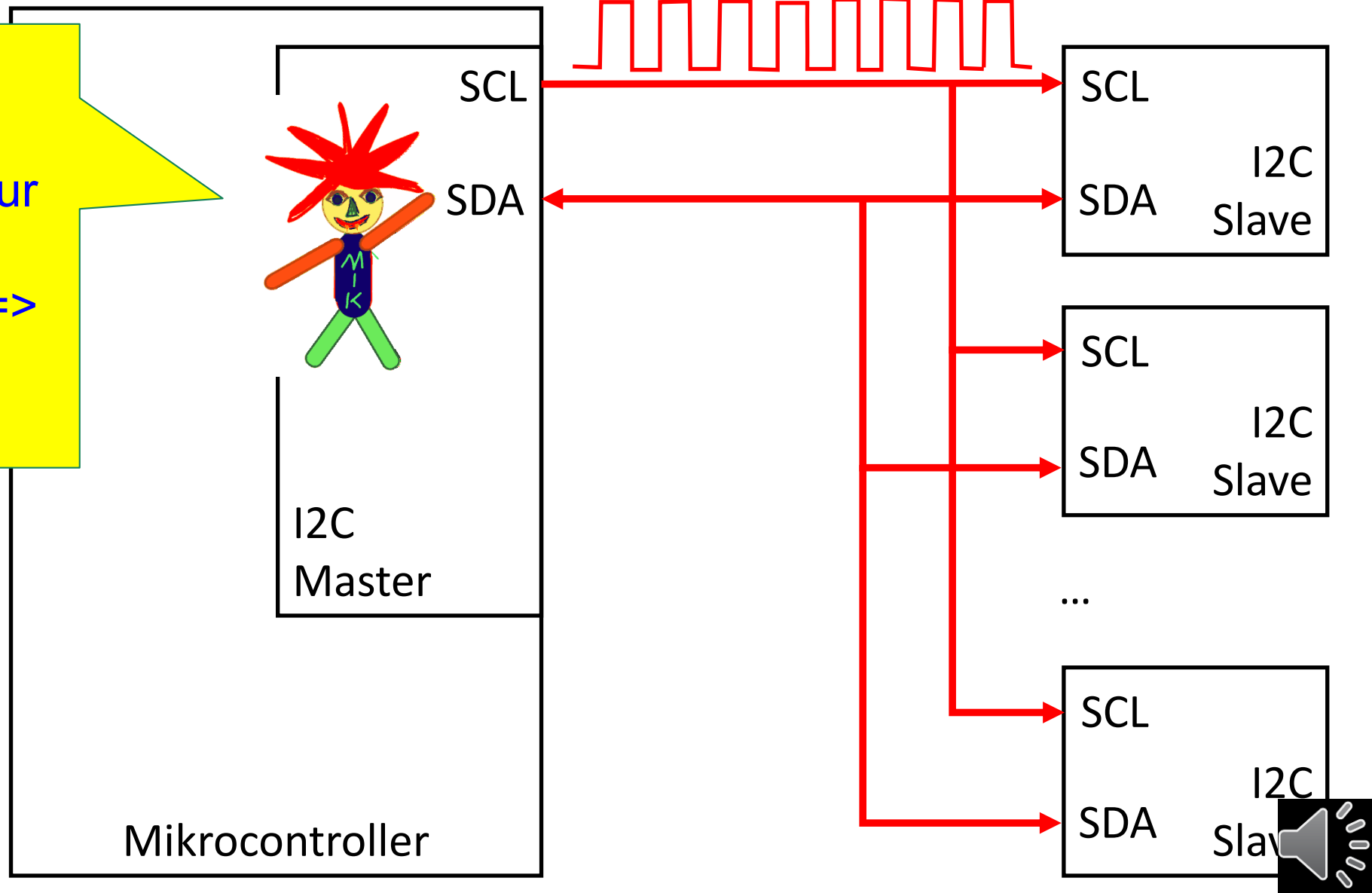
SDA

I2C
Slave



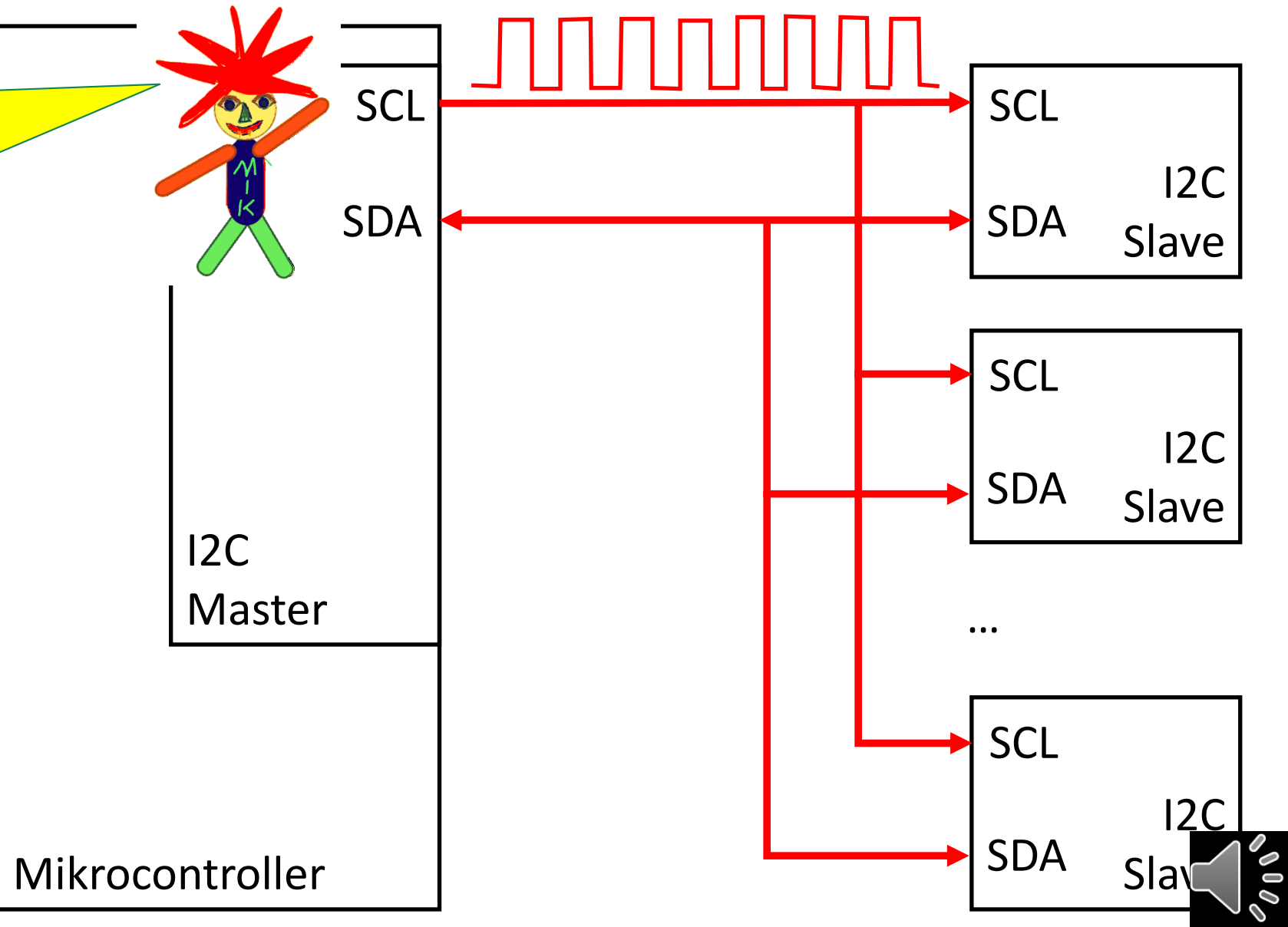
I2C Inter-Integrated Circuit

SDA: Serial Data
Damit kann immer nur
in eine Richtung
übertragen werden =>
Halbduplex



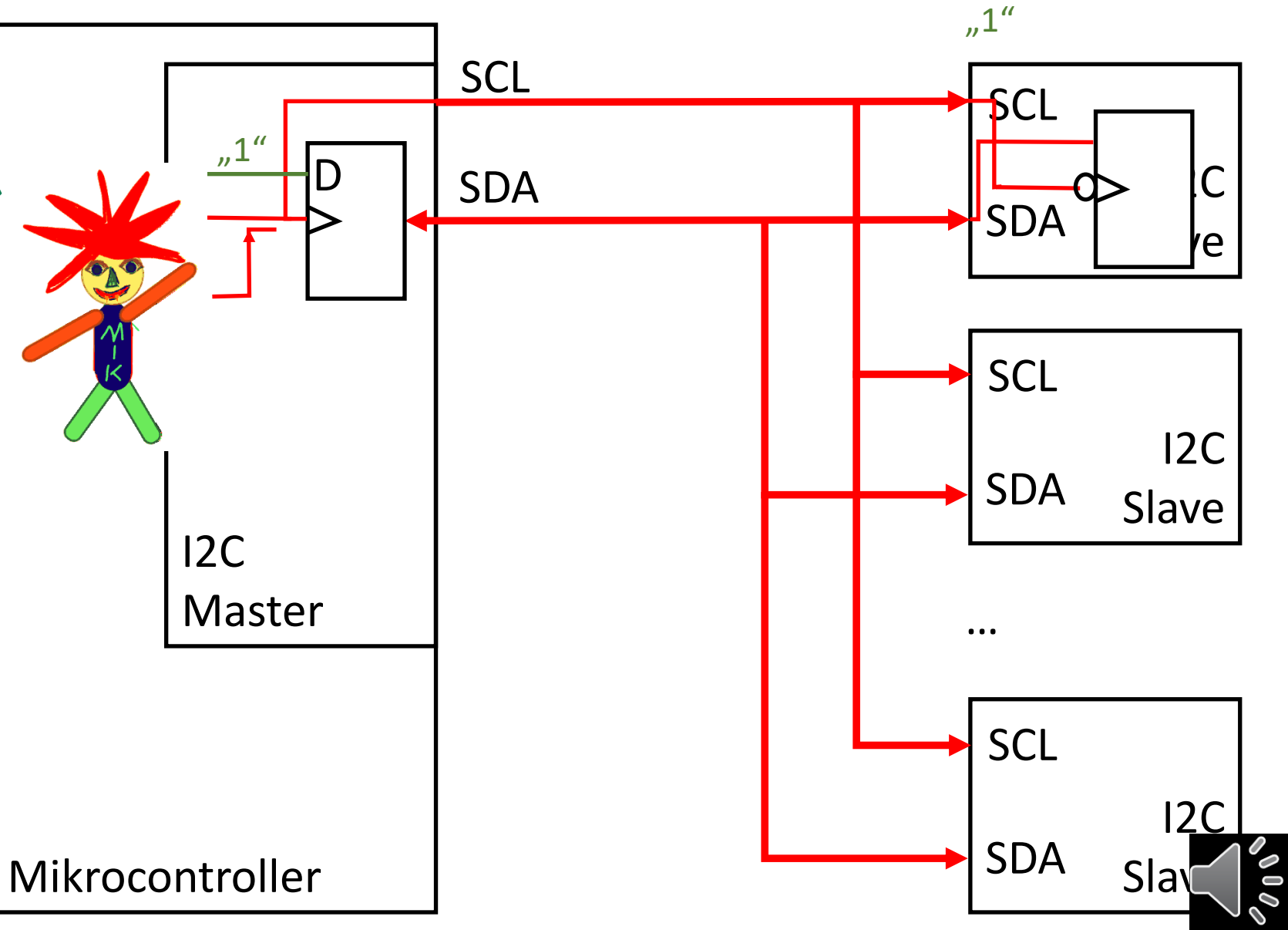
I2C Inter-Integrated Circuit

SCL: Serial Clock
Die Datenübertragung
erfolgt taktsynchron.



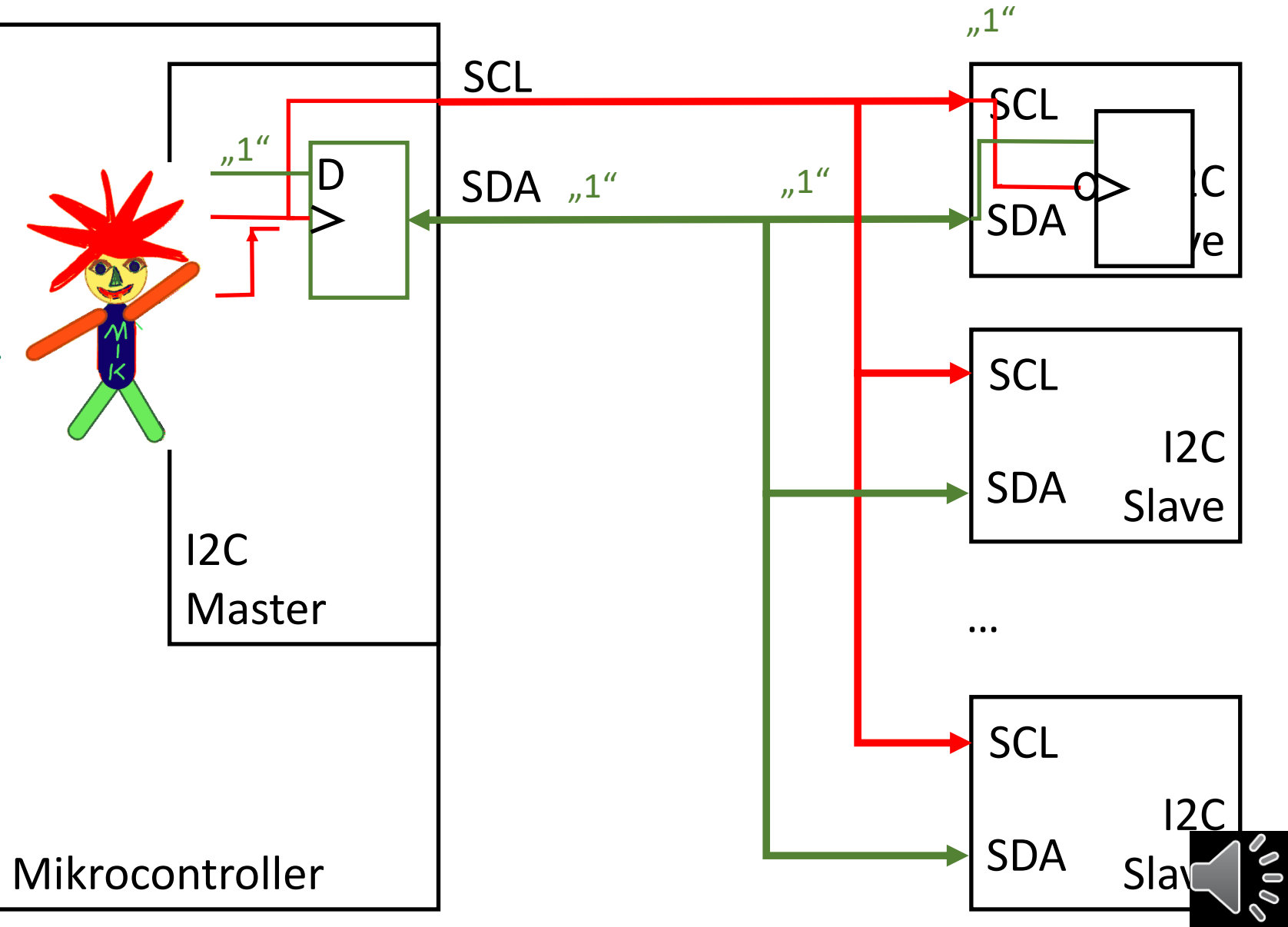
I2C Inter-Integrated Circuit

SCL: Serial Clock
Bei SCL steigende
Flanke wird immer das
nächste Bit bei SDA
ausgegeben

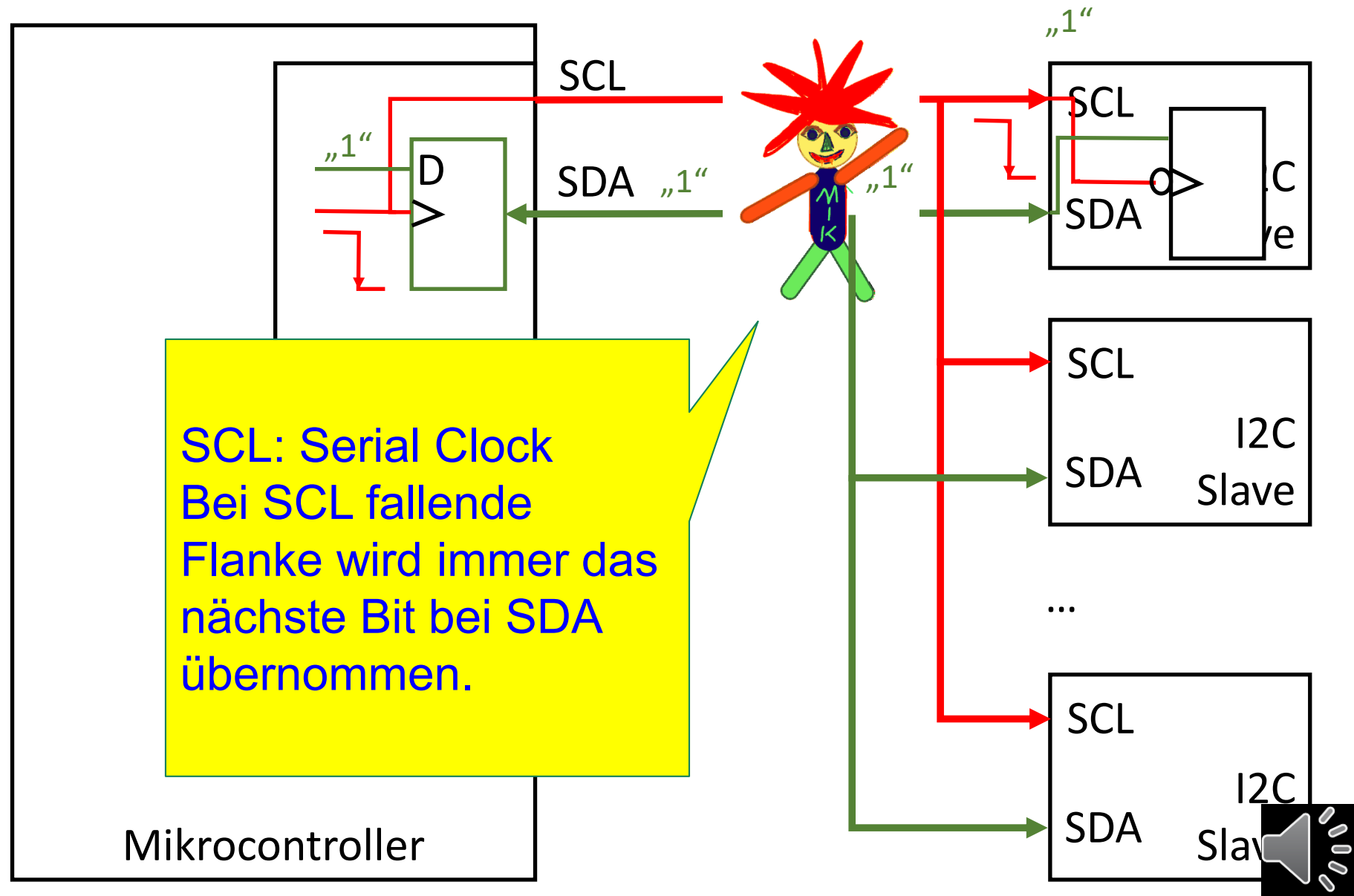


I2C Inter-Integrated Circuit

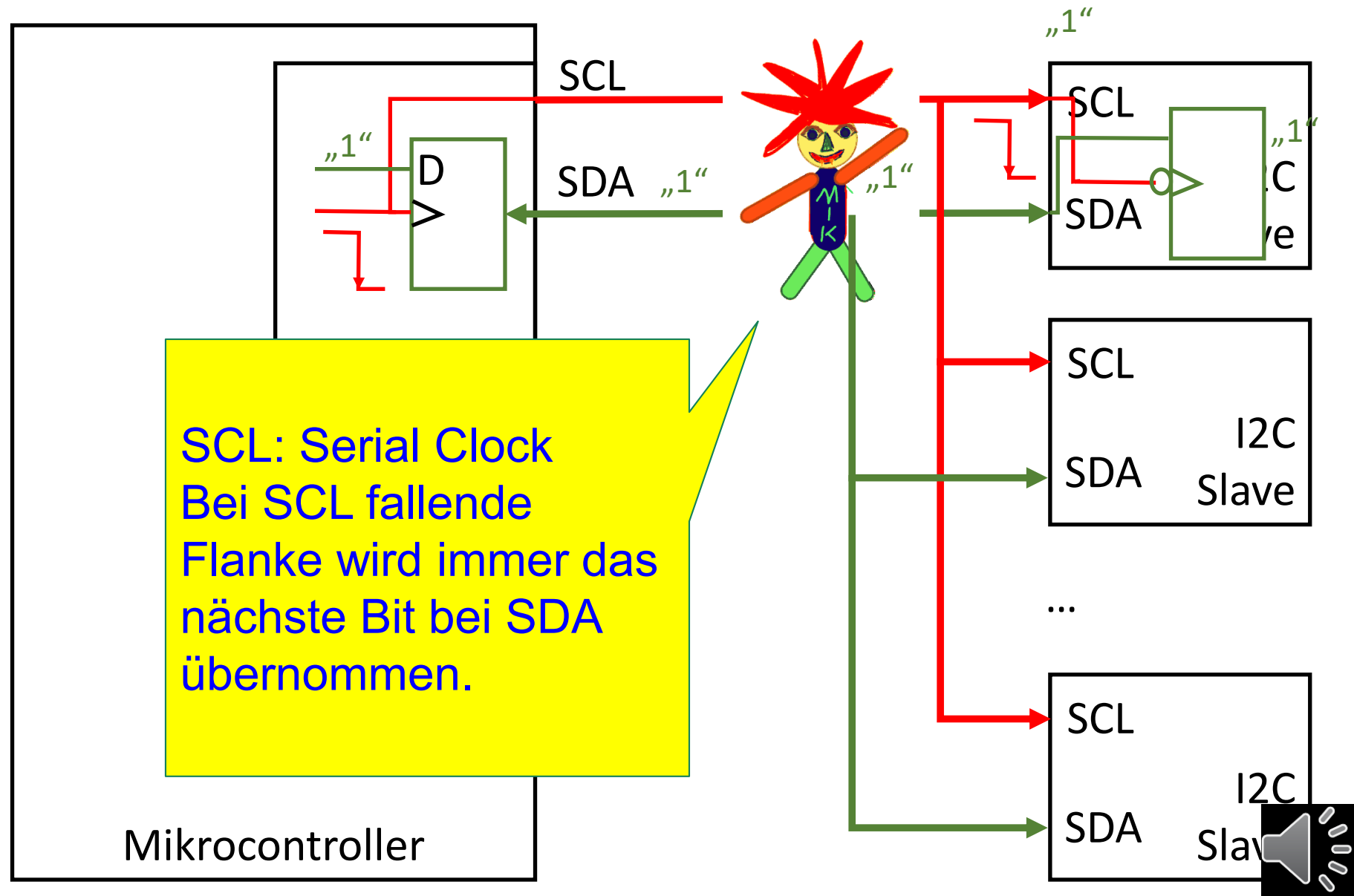
SCL: Serial Clock
Bei SCL steigende Flanke wird immer das nächste Bit bei SDA ausgegeben. SDA wird z.B. „1“



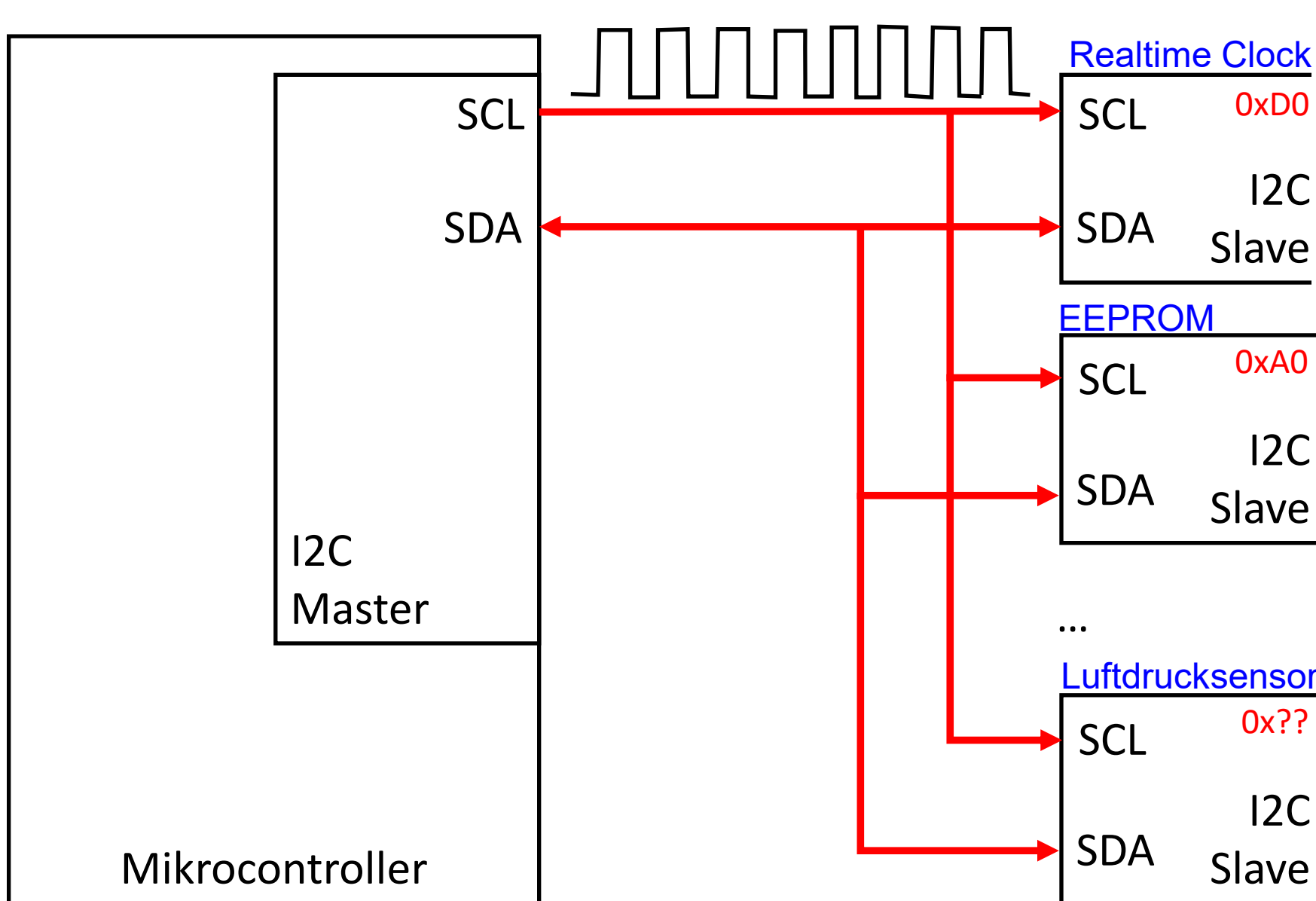
I2C Inter-Integrated Circuit



I2C Inter-Integrated Circuit



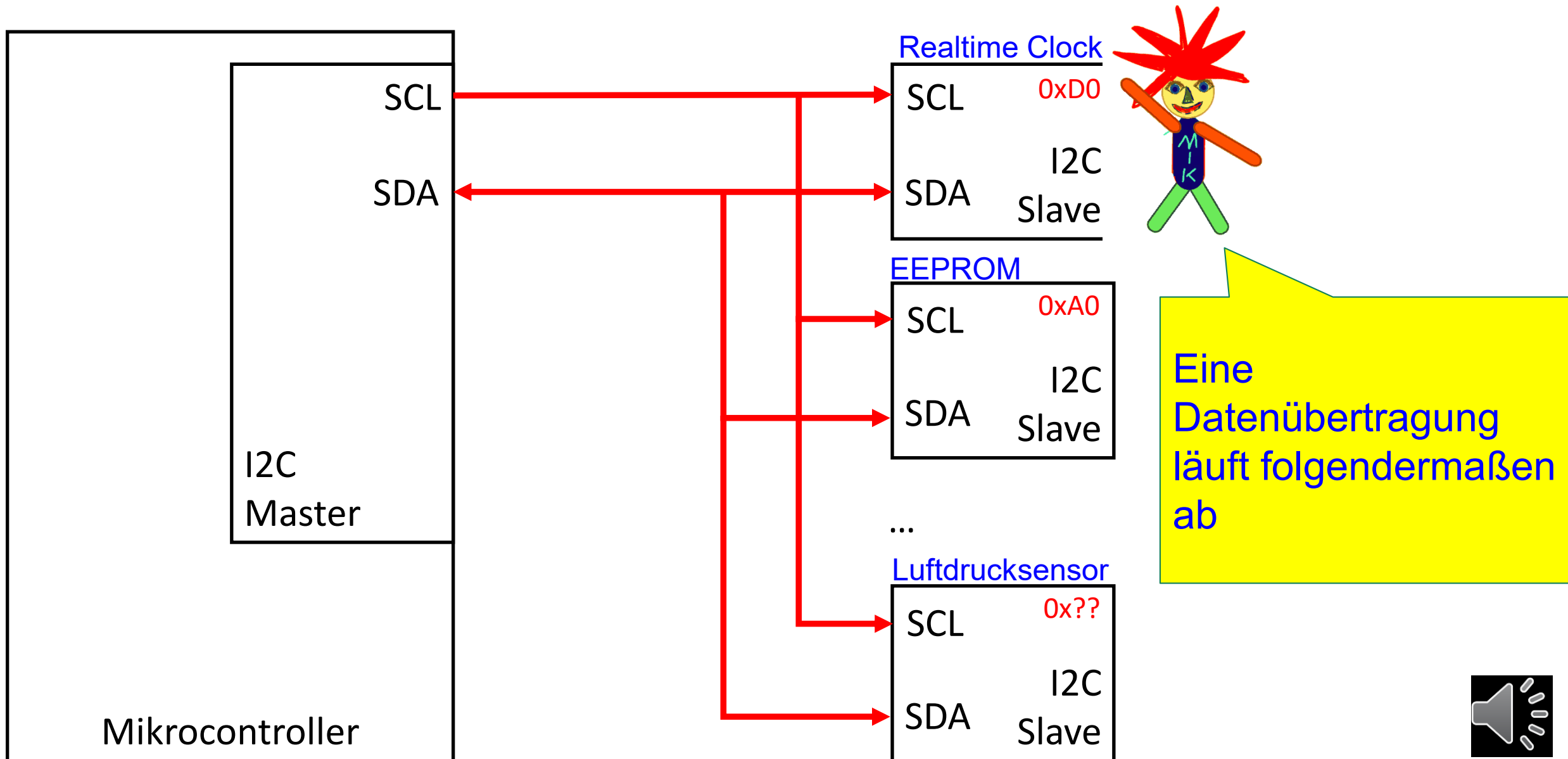
I2C Inter-Integrated Circuit



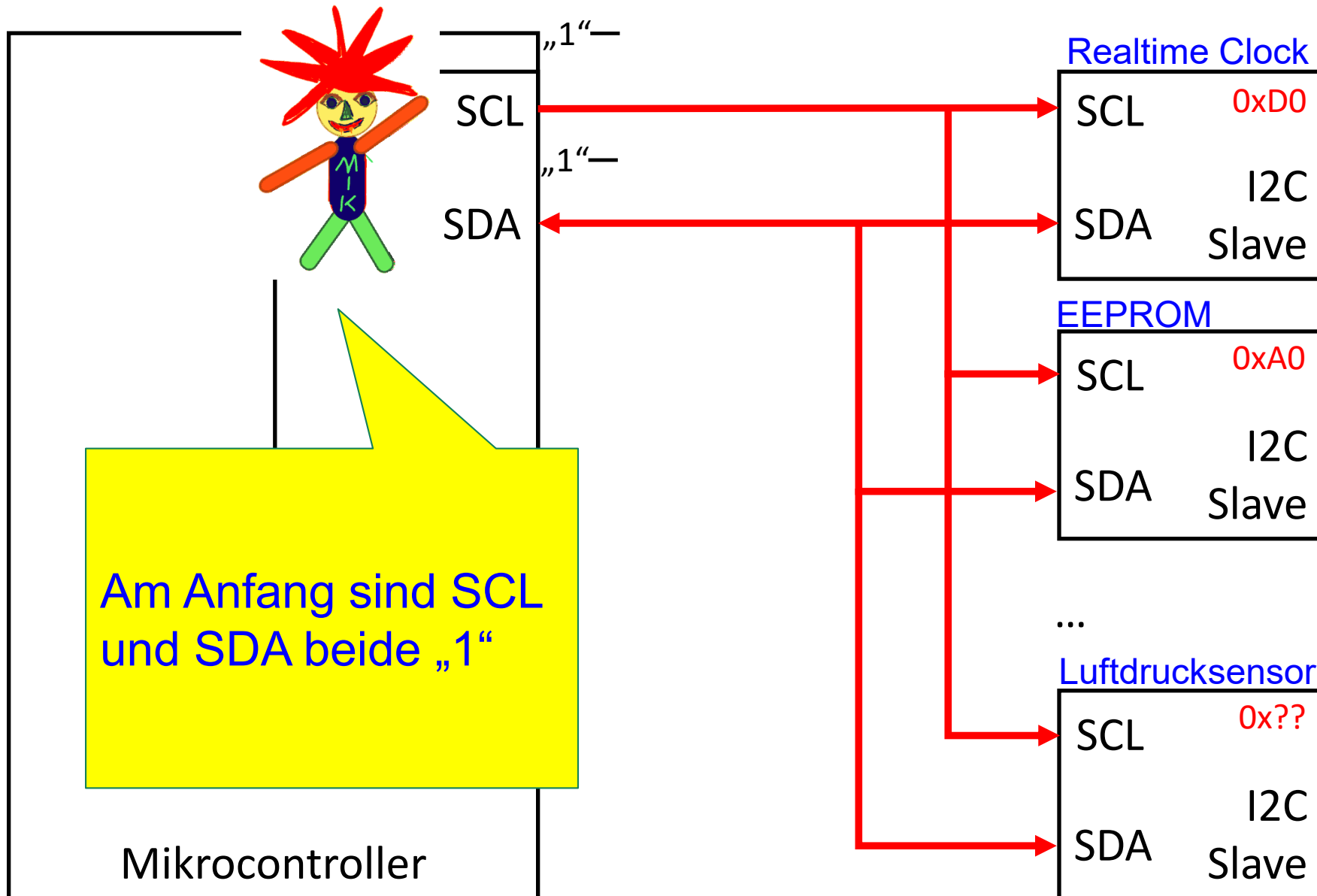
Jeder Slave verfügt über eine 7 stellige Adresse. Die Adresse kann oft beim Slave eingestellt werden.



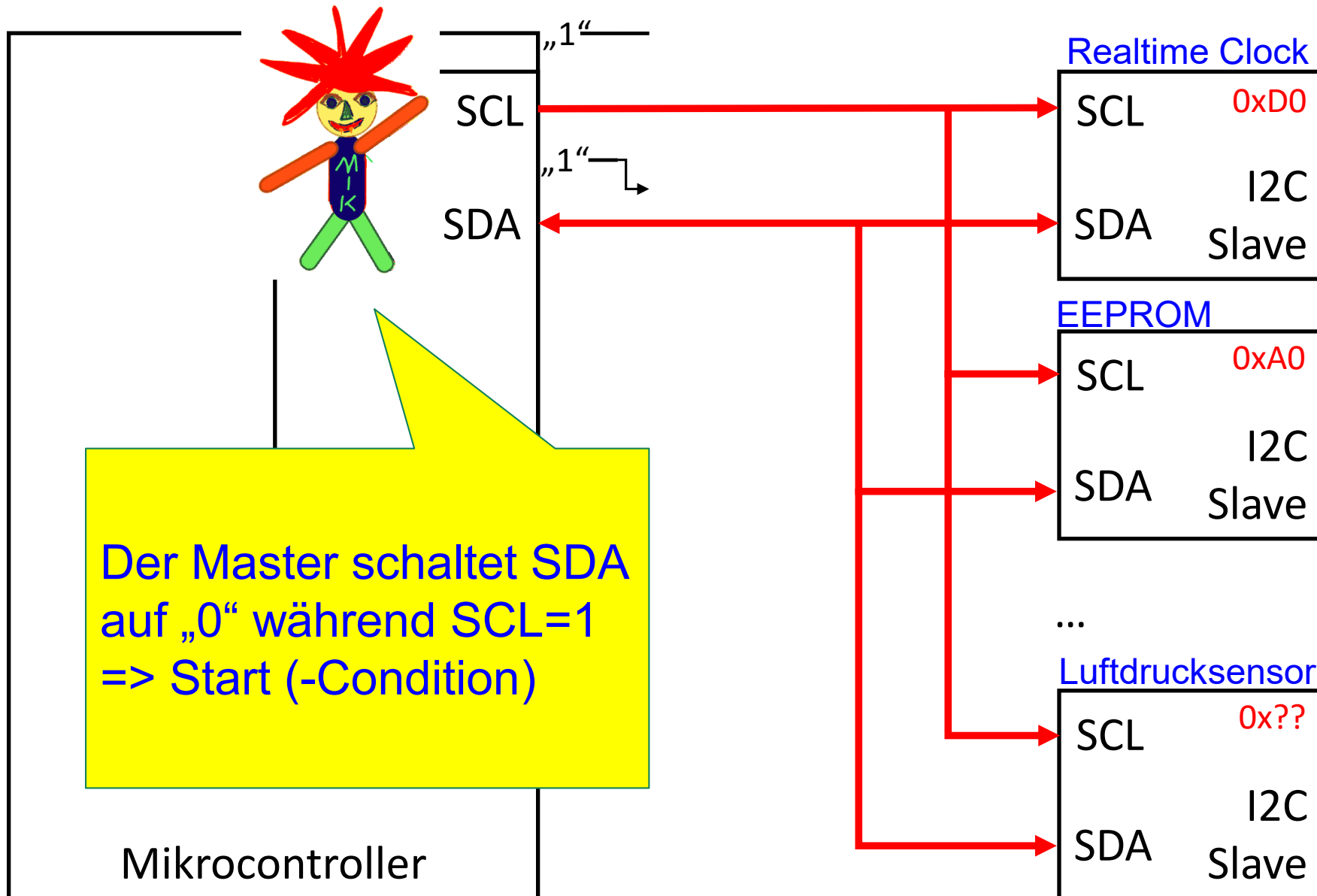
I2C Inter-Integrated Circuit



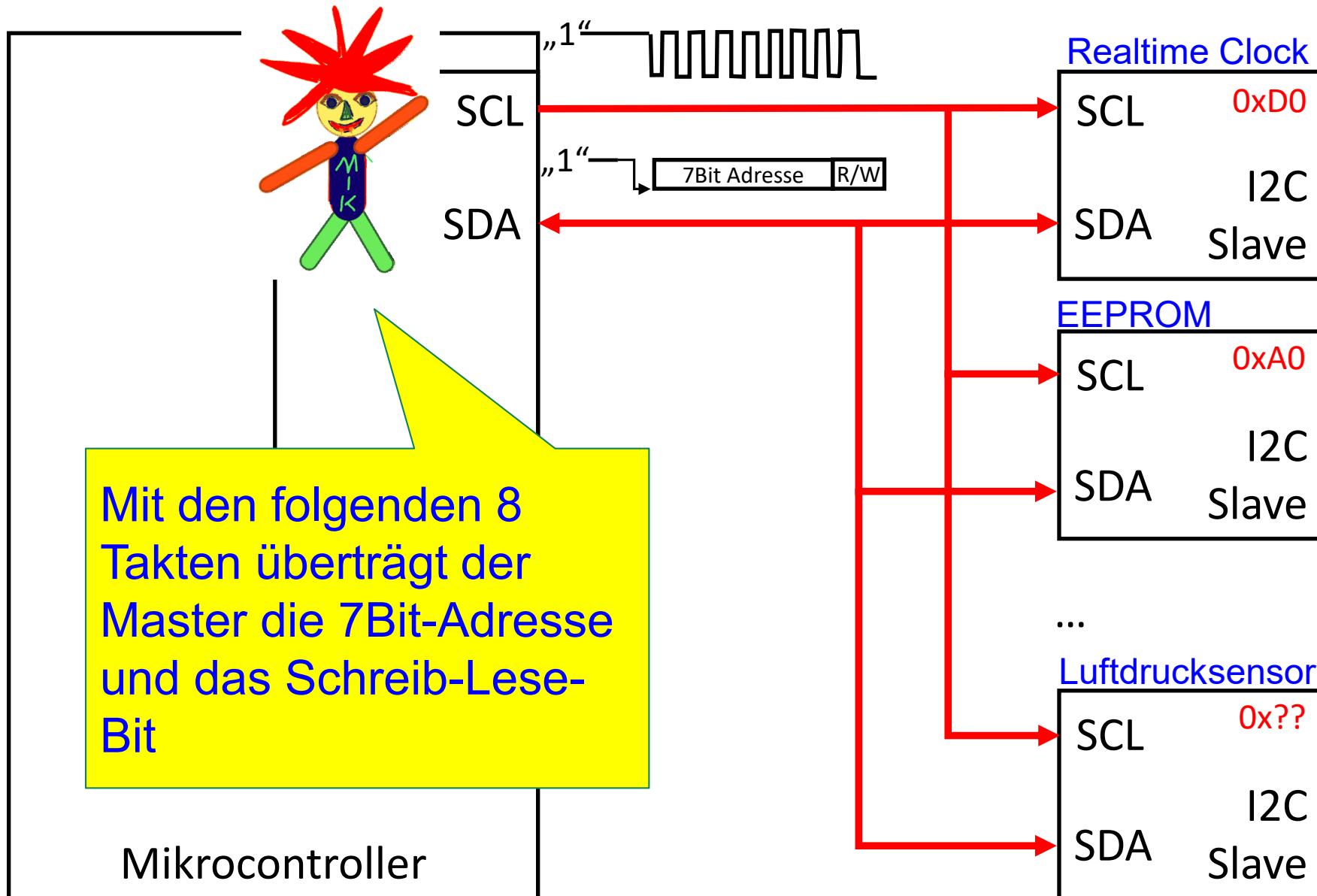
I2C Inter-Integrated Circuit



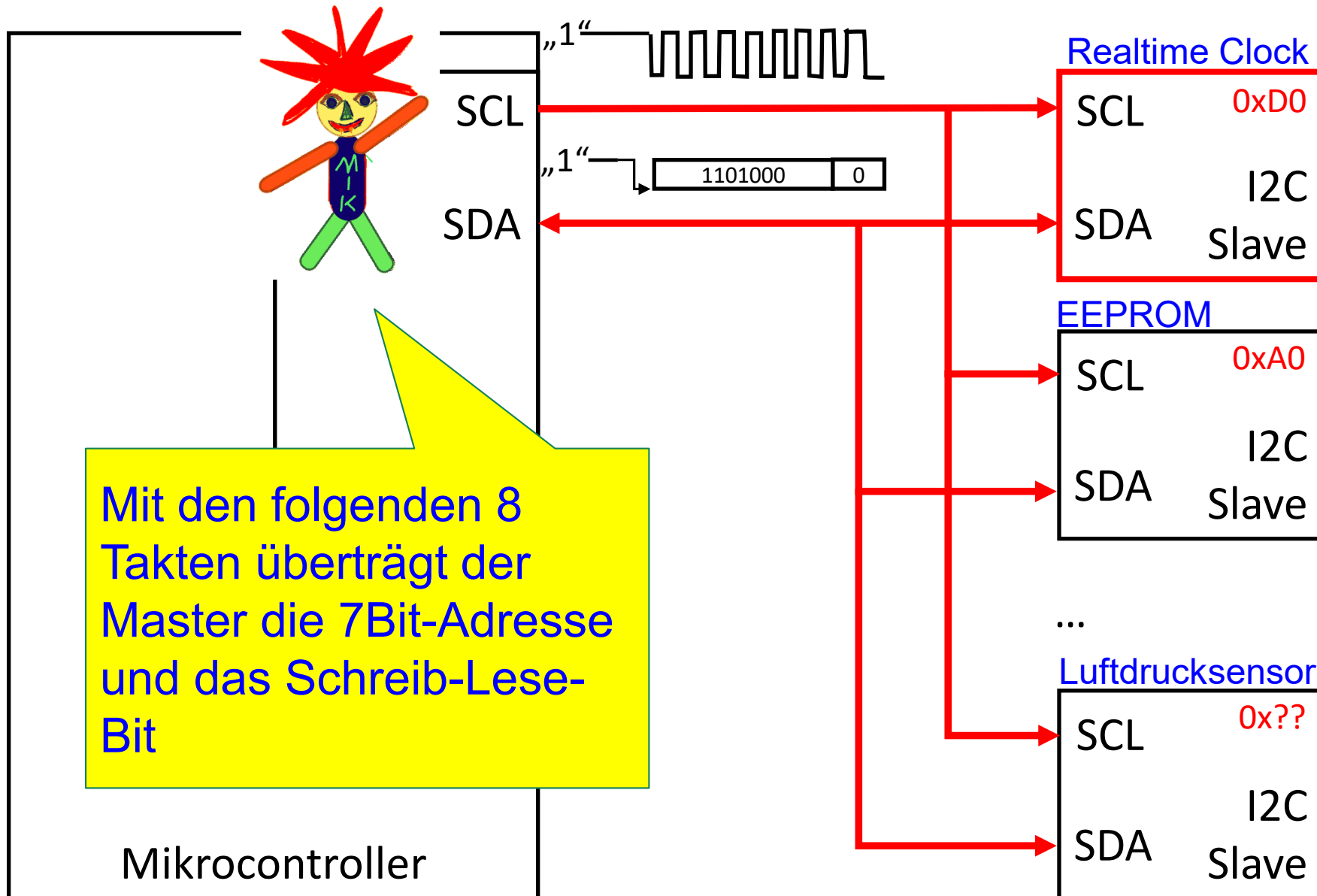
I2C Inter-Integrated Circuit



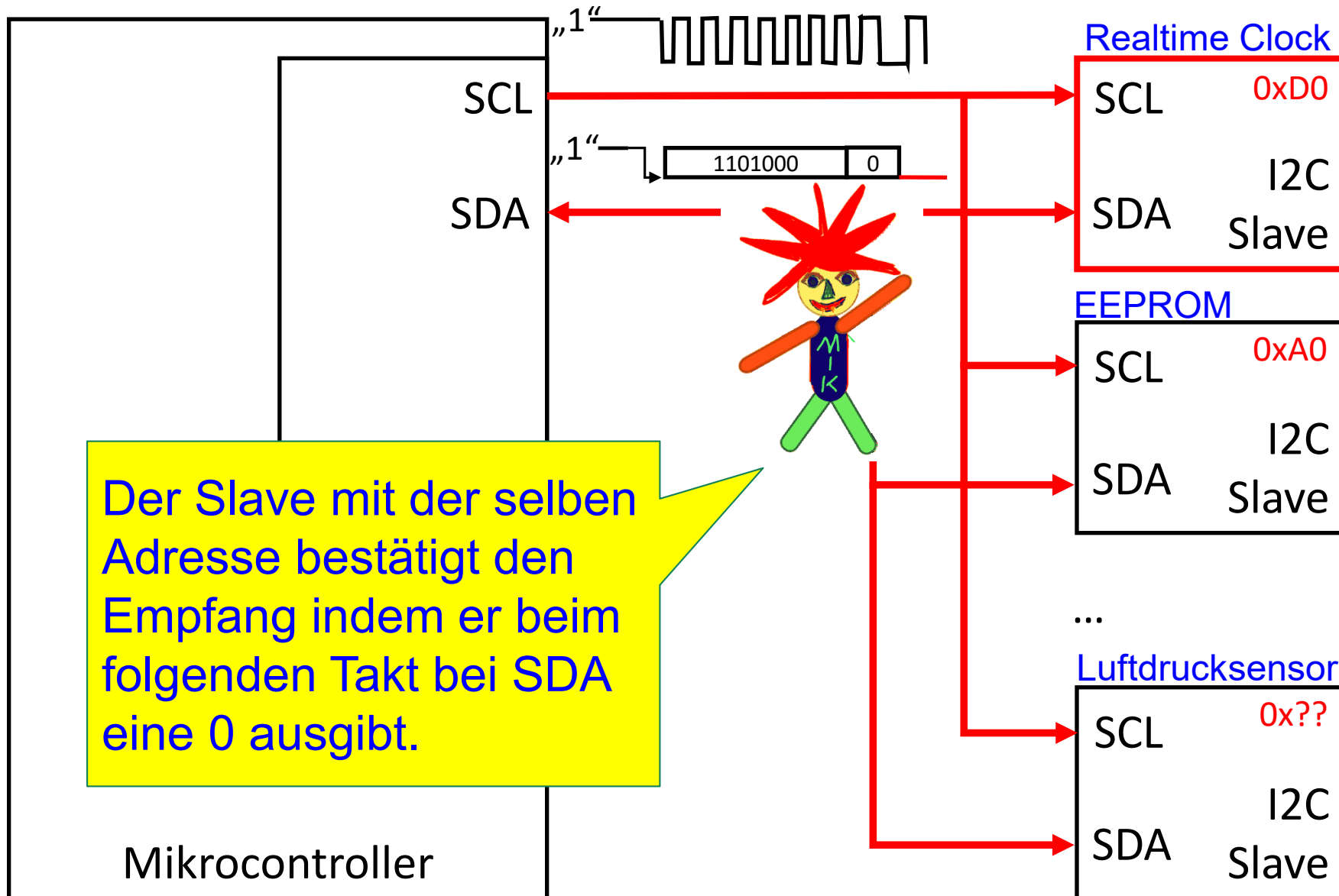
I2C Inter-Integrated Circuit



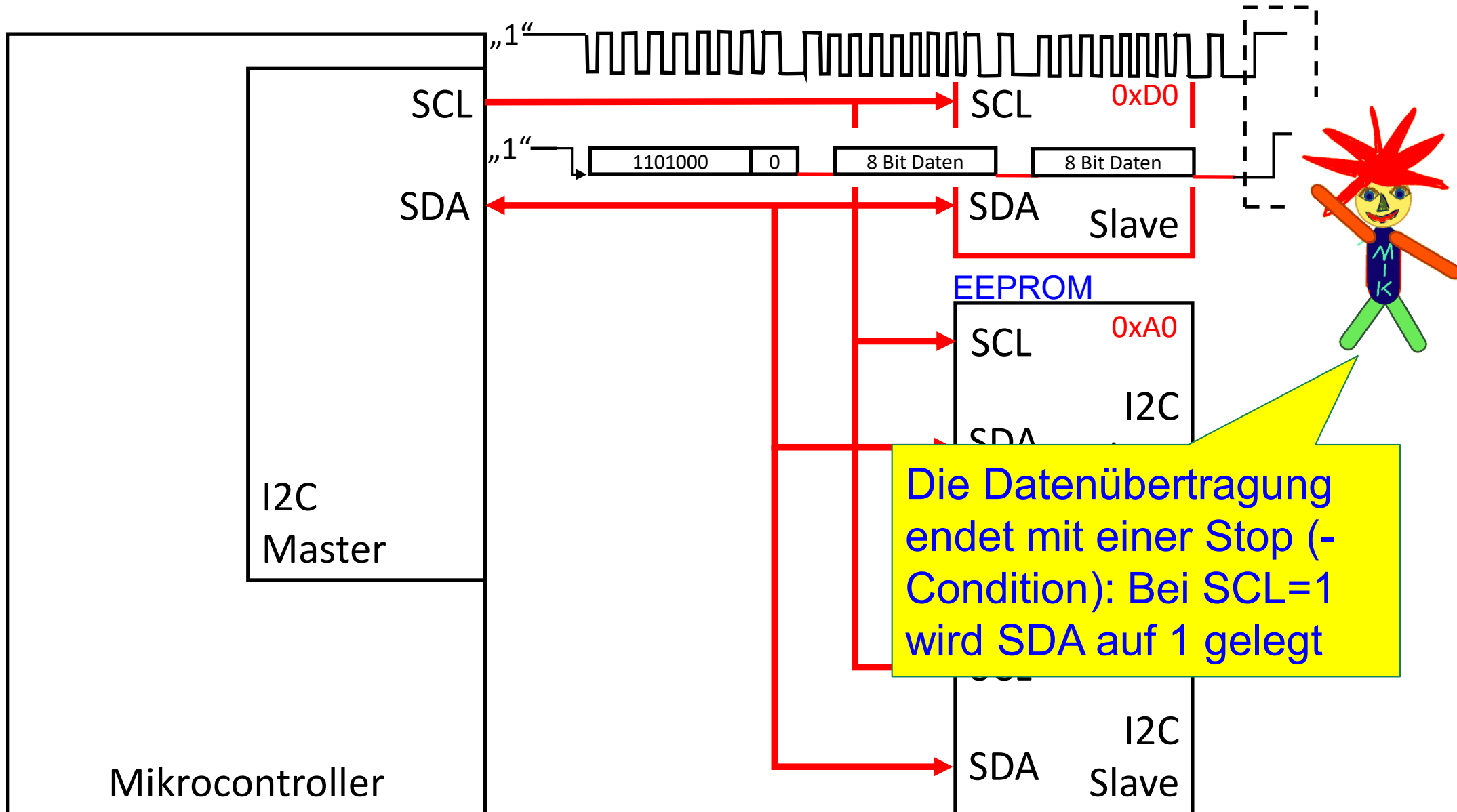
I2C Inter-Integrated Circuit



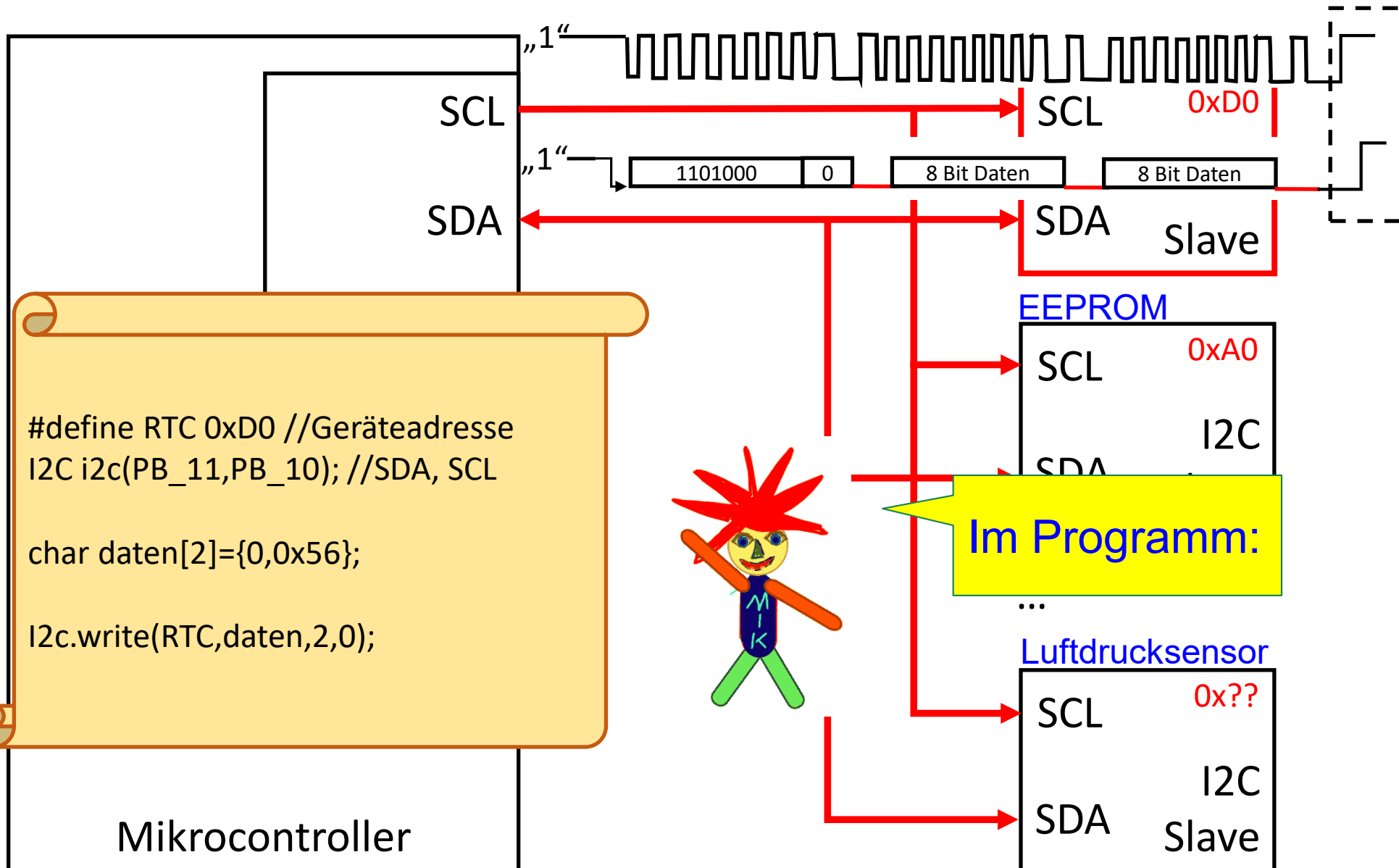
I2C Inter-Integrated Circuit



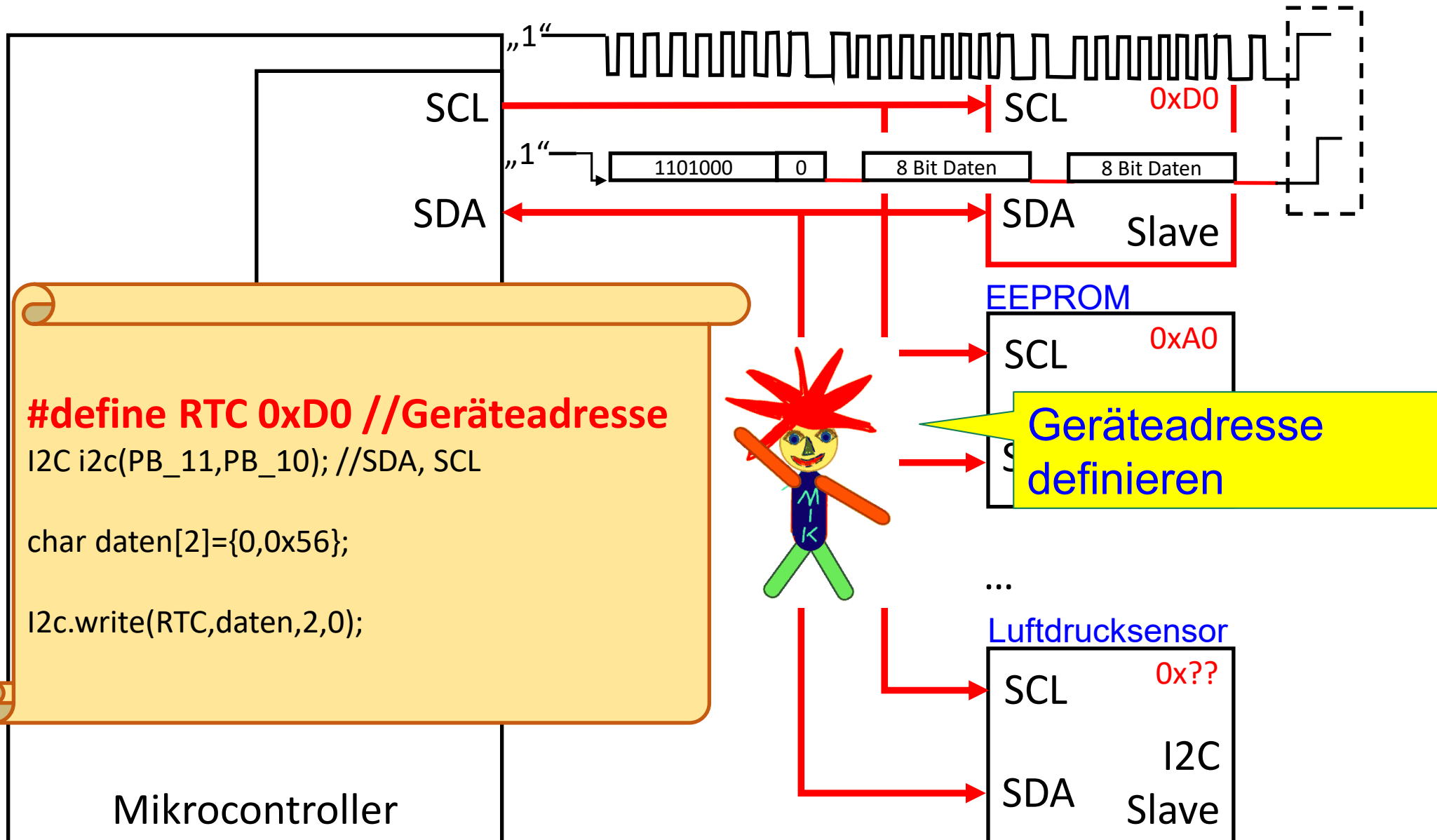
I2C Inter-Integrated Circuit



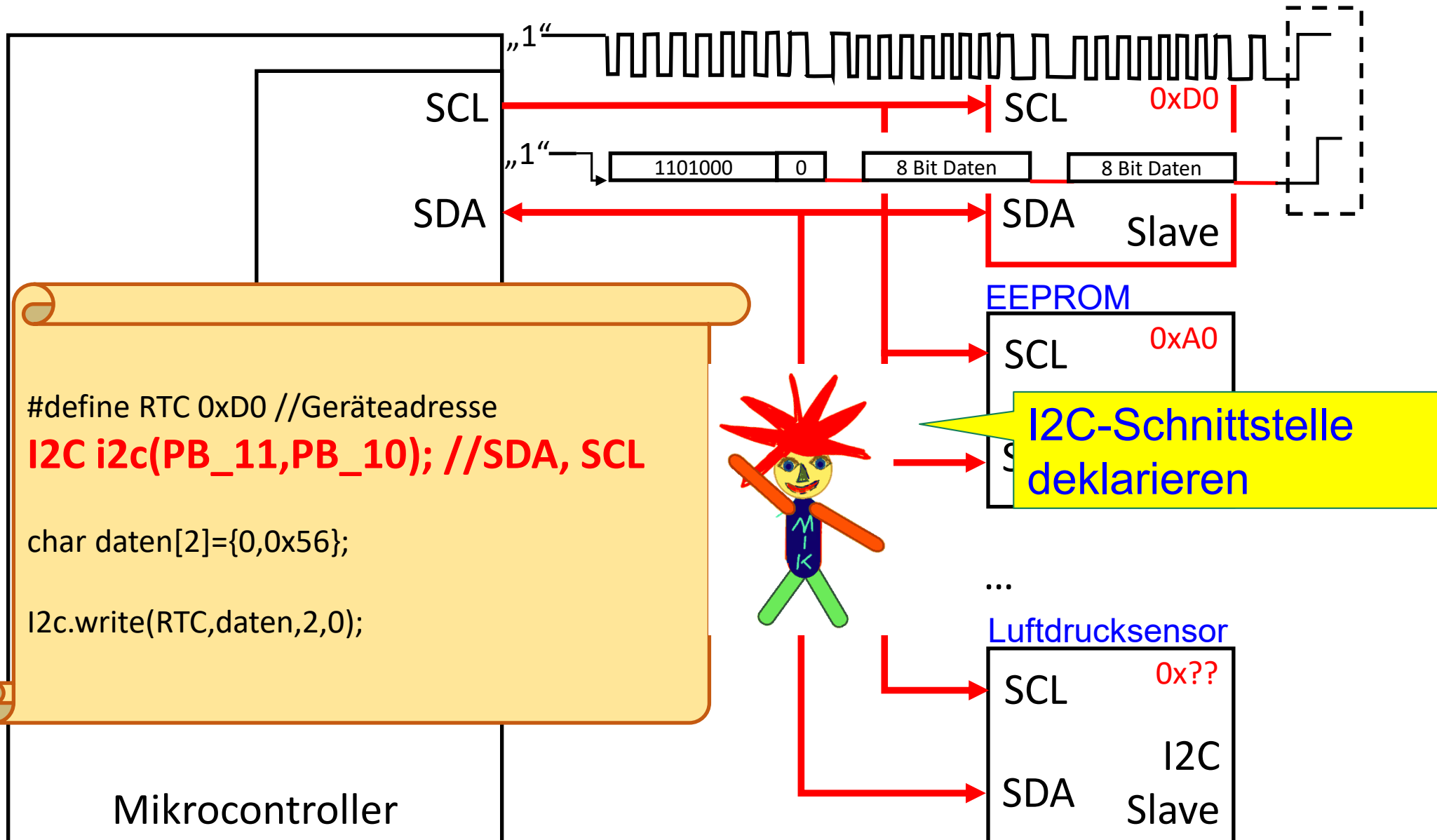
I2C Inter-Integrated Circuit



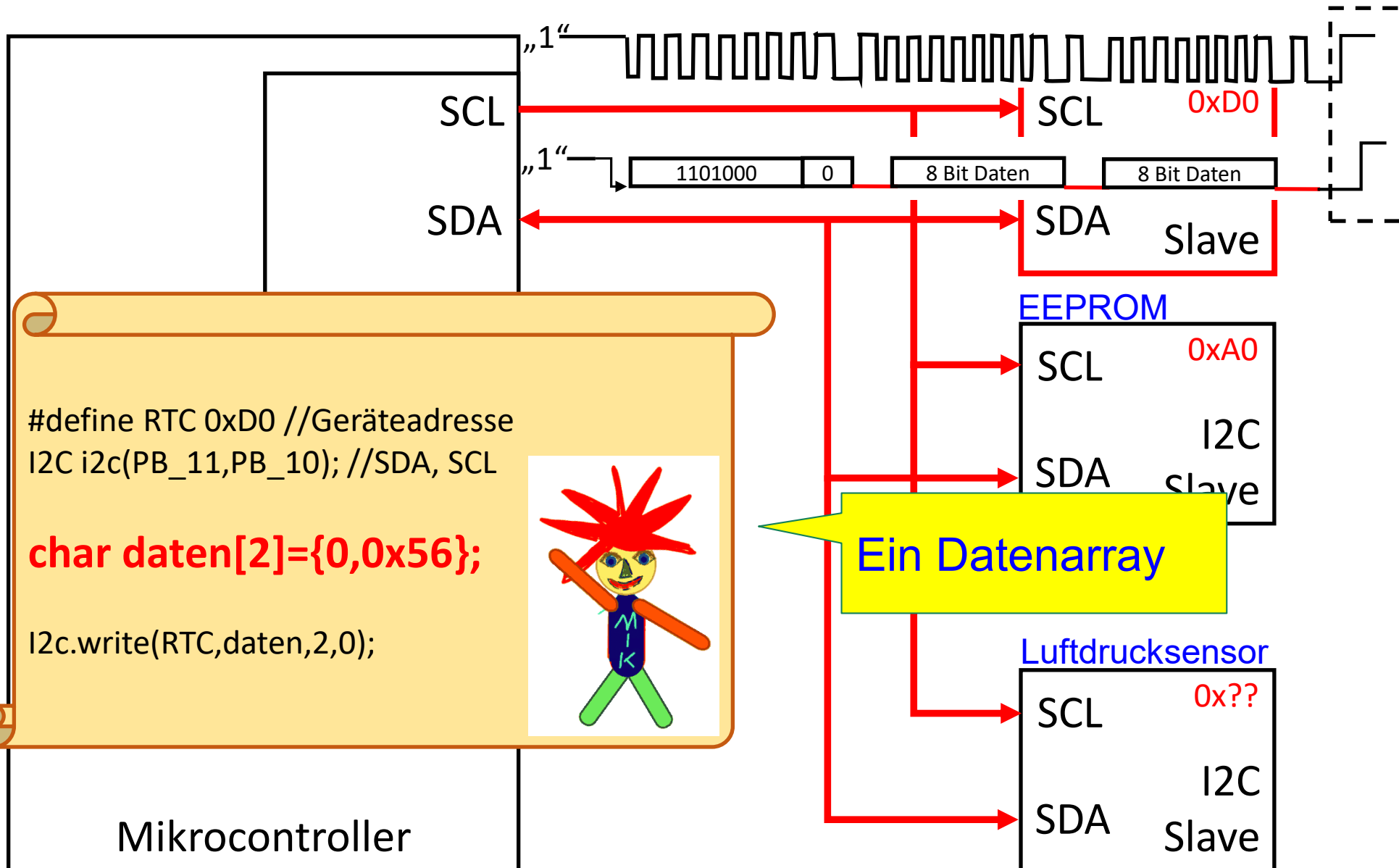
I2C Inter-Integrated Circuit



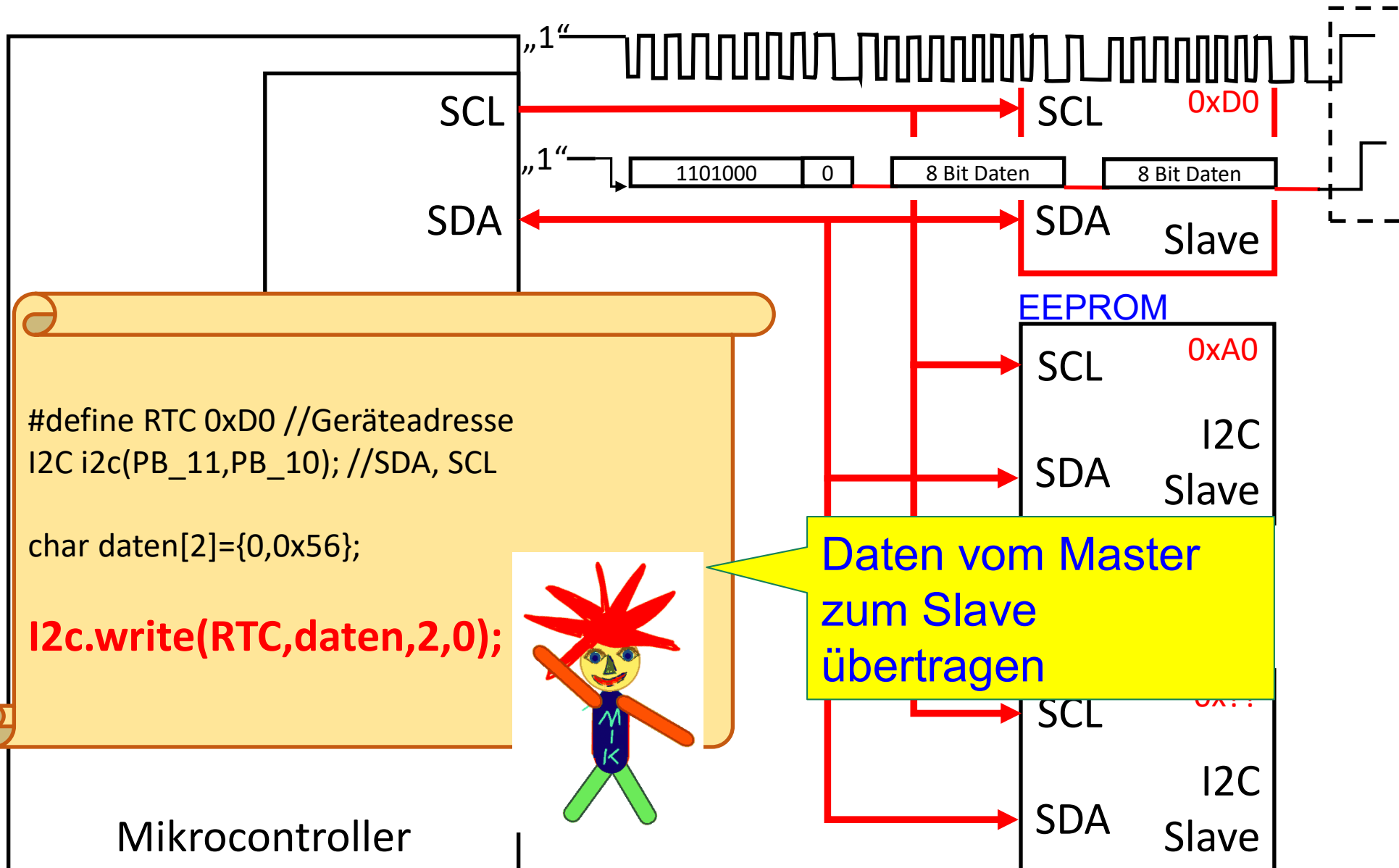
I2C Inter-Integrated Circuit



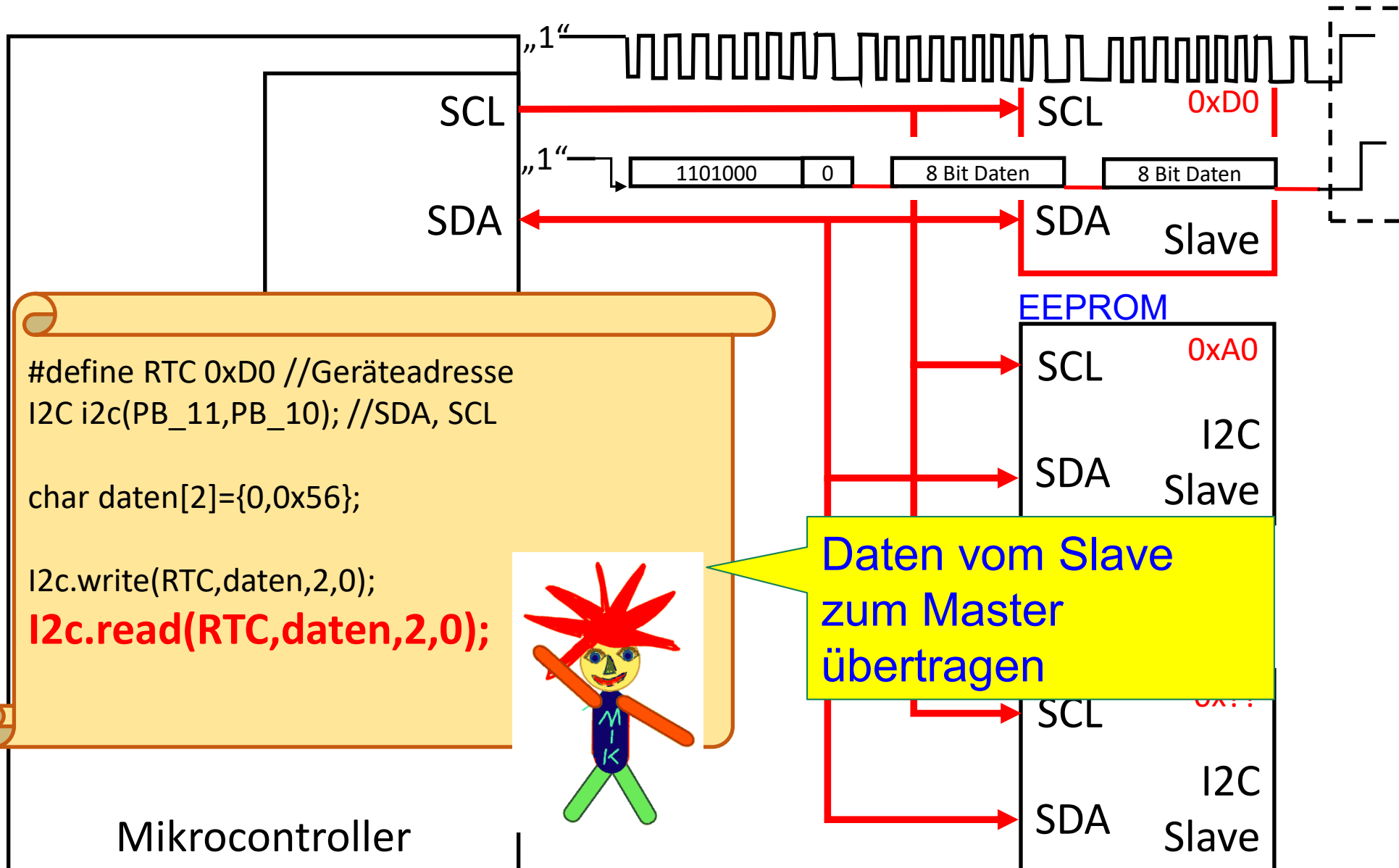
I2C Inter-Integrated Circuit



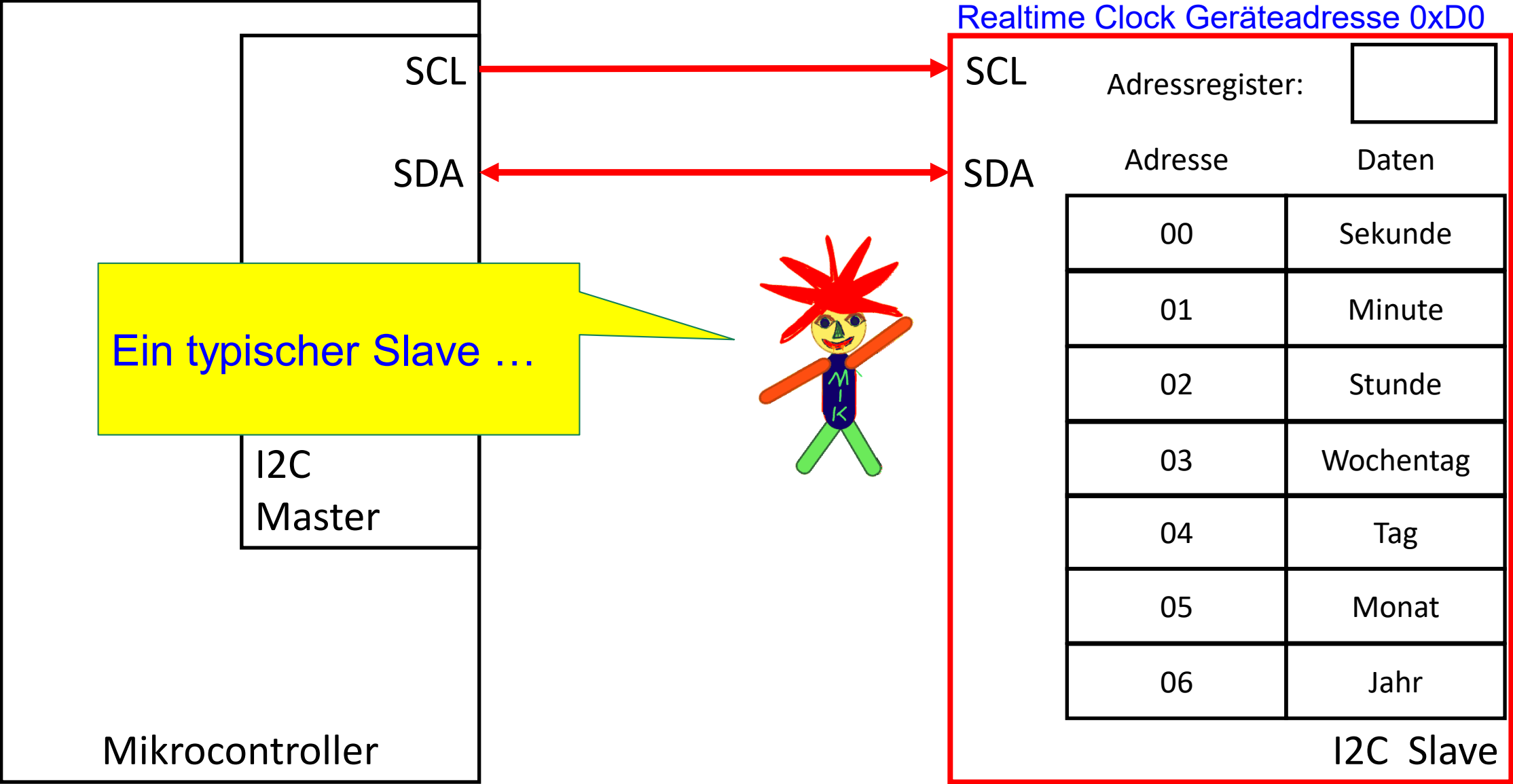
I2C Inter-Integrated Circuit



I2C Inter-Integrated Circuit



I2C Inter-Integrated Circuit



I2C Inter-Integrated Circuit

```
#define RTC 0xD0 //Geräteadresse
I2C i2c(PB_11,PB_10); //SDA, SCL

char daten[9]={0,0,0x56,0x20,0x00,0x19,0x08,0x20};

I2c.write(RTC,daten,8,0);
```

I2C
Master

Mikrocontroller

Realtime Clock, Geräteadresse 0xD0

SCL

Adressregister:

DA

Adresse

Daten

00	Sekunde
01	Minute
02	Stunde
03	Wochentag
04	Tag
05	Monat
06	Jahr

Zuerst muss die Uhr gestellt werden:
20.56 Uhr und 0 Sekunden
19.08.20 Montag

I2C Slave



I2C Inter-Integrated Circuit

```
#define RTC 0xD0 //Geräteadresse  
I2C i2c(PB_11,PB_10); //SDA, SCL  
  
char daten[9]={0,0,0x56,0x20,0x00,0x19,0x08,0x20};  
  
I2c.write(RTC,daten,8,0);
```

I2C
Master

Mikrocontroller

Realtime Clock, Geräteadresse 0xD0

SCL

Adressregister:

0

DA

Adresse

Daten

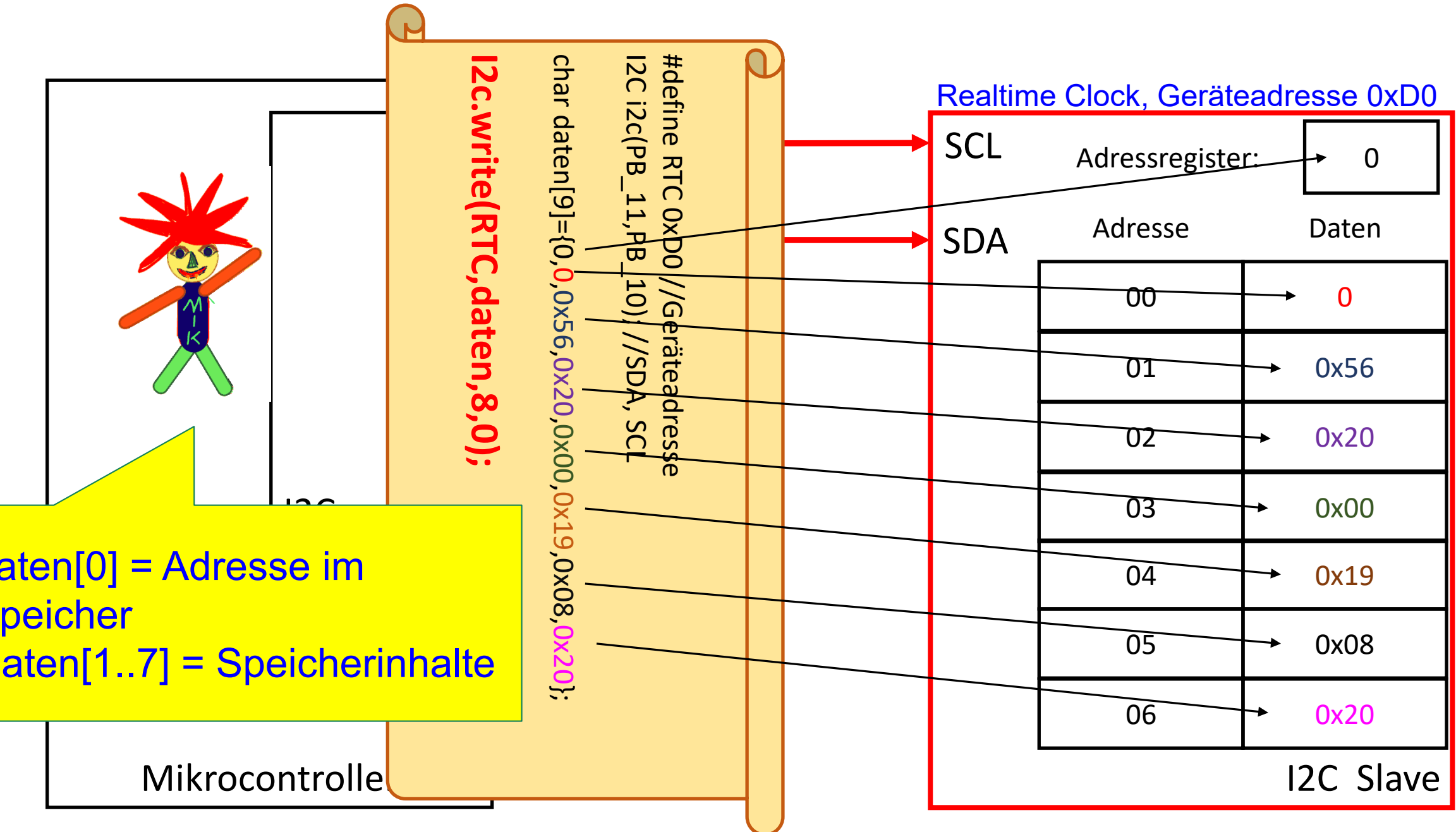
00	0
01	0x56
02	0x20
03	0x00
04	0x19
05	0x08
06	0x20

Zuerst muss die Uhr gestellt werden:
20.56 Uhr und 0 Sekunden
19.08.20 Montag

I2C Slave



I2C Inter-Integrated Circuit



I2C Inter-Integrated Circuit

```
#define RTC 0xD0 //Geräteadresse  
I2C i2c(PB_11,PB_10); //SDA, SCL
```

```
char daten[9]={0,0,0x56,0x20,0x00,0x19,0x08,0x20};
```

Daten[0]=0; //Adresse festlegen

I2c.write(RTC,daten,1,1); //Adresse senden

I2c.read(RTC,daten,7,0); //Daten auslesen

I2C
Master

Uhrzeit und Datum auslesen:

```
daten[9]={2,0x11,0x23,0x01,0x20,0x08,0x20,0x20};
```

Realtime Clock, Geräteadresse 0xD0

SCL

Adressregister:

0

DA

Adresse

Daten

00	2
01	0x11
02	0x23
03	0x01
04	0x20
05	0x08
06	0x20

I2C Slave



I2C Inter-Integrated Circuit

```
#define RTC 0xD0 //Geräteadresse  
I2C i2c(PB_11,PB_10); //SDA, SCL
```

```
char daten[9]={0,0,0x56,0x20,0x00,0x19,0x08,0x20};
```

```
Daten[0]=0x03; //Adresse festlegen  
I2c.write(RTC,daten,1,1); //Adresse senden  
I2c.read(RTC,daten,4,0); //Daten auslesen
```

Realtime Clock, Geräteadresse 0xD0

SCL

Adressregister:

0x03

DA

Adresse

Daten

00	2
01	0x11
02	0x23
03	0x01
04	0x20
05	0x08
06	0x20

Nur Wochentag und Datum auslesen:

```
daten[9]={0x01,0x20,0x08,0x20,...};
```

I2C Slave



I2C Inter-Integrated Circuit

```
#define RTC 0xD0 //Geräteadresse  
I2C i2c(PB_11,PB_10); //SDA, SCL
```

```
char daten[9]={0,0,0x56,0x20,0x00,0x19,0x08,0x20};
```

```
Daten[0]=0x03; //Adresse festlegen  
I2c.write(RTC,daten,1,1); //Adresse senden  
I2c.read(RTC,daten,4,0); //Daten auslesen
```

I2C
Master

Mikrocontroller

Realtime Clock, Geräteadresse 0xD0

SCL

Adressregister:

0x03

SDA

Adresse

Daten

00

2

01

0x11

02

03



Beim Lesen muss bei der RTC zuerst die Speicheradresse eingetragen werden

I2C Slave



I2C Inter-Integrated Circuit

```
#define RTC 0xD0 //Geräteadresse  
I2C i2c(PB_11,PB_10); //SDA, SCL
```

```
char daten[9]={0,0,0x56,0x20,0x00,0x19,0x08,0x20};
```

```
Daten[0]=0x03; //Adresse  
I2c.write(RTC,daten,1,1); //Adresse senden  
I2c.read(RTC,daten,4,0); //Daten auslesen
```



I2C
Master

Mikrocontroller

Realtime Clock, Geräteadresse 0xD0

SCL

Adressregister:

0x03

SDA

Adresse

Daten

00	2
01	0x11
02	0x23

Die letzte 1 zeigt an, dass der Befehl noch nicht zuende ist.

I2C Slave



I2C Inter-Integrated Circuit

