HO
GENT

# Deel 2: Input/Output

interfacing

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# Signalen versterken

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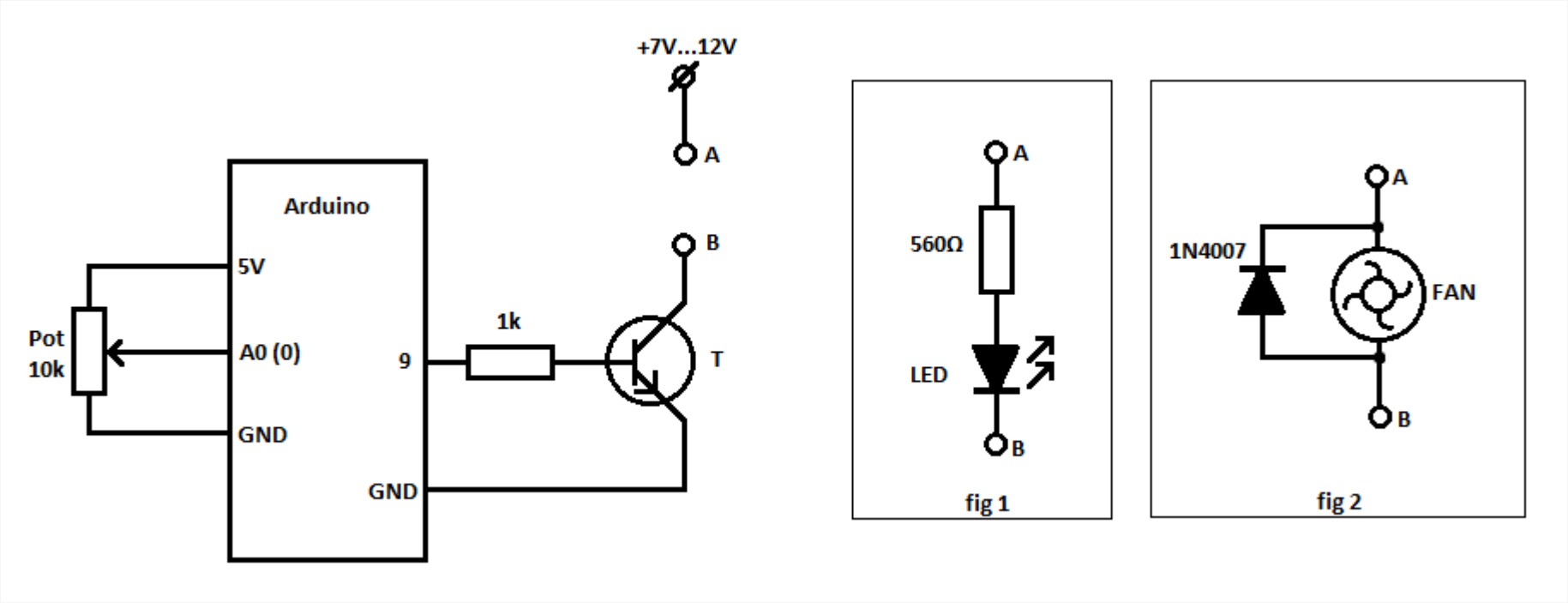
# Klein vermogen



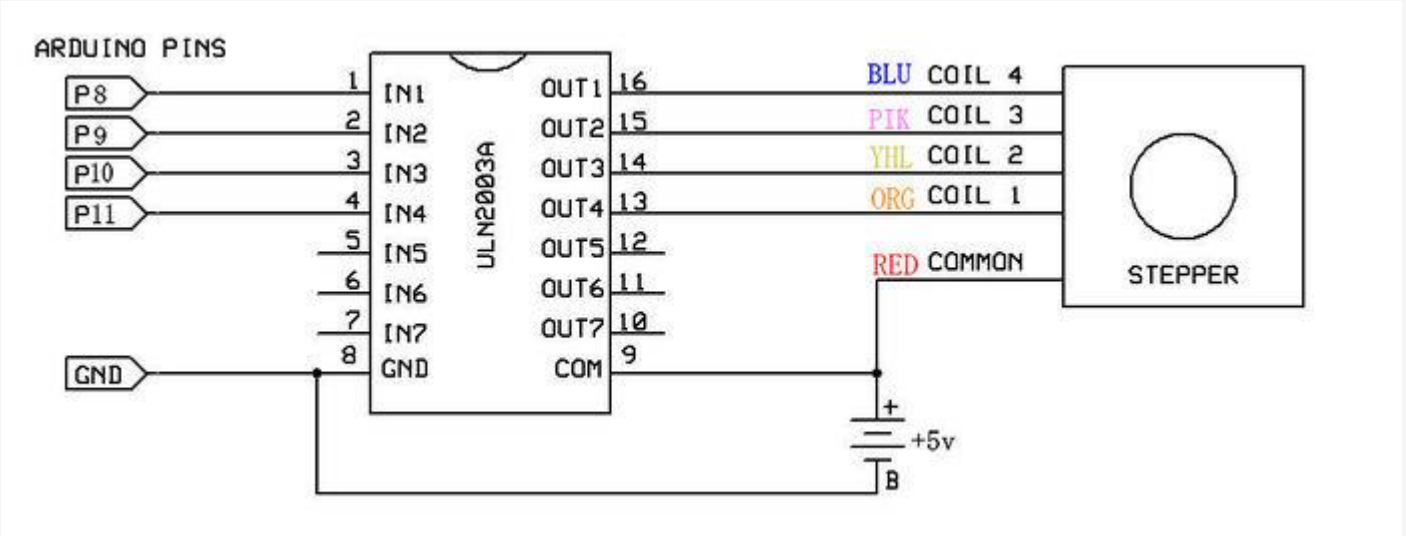

Transistor: bv BC547.

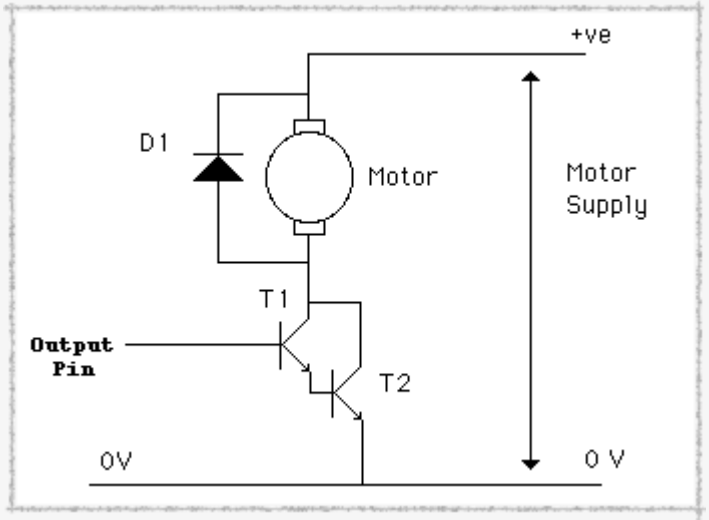
Wat is de maximale stroom?

# Groter vermogen

Darlington array: bv ULN2003.

Wat is de maximale stroom?

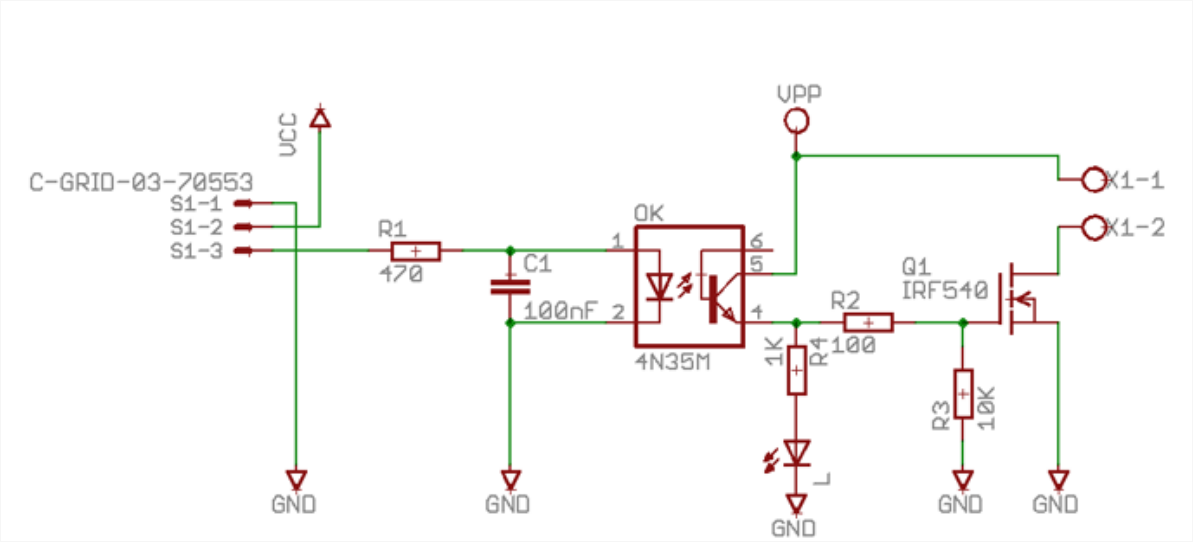


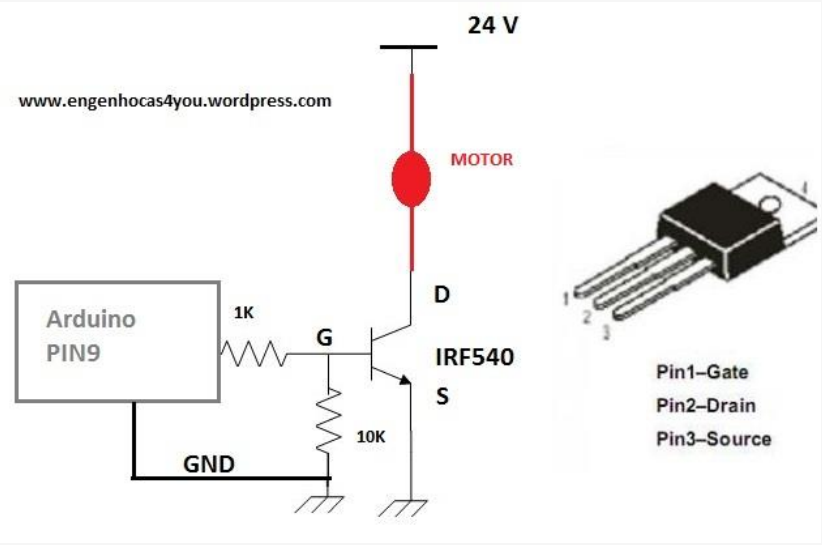



# Groot vermogen

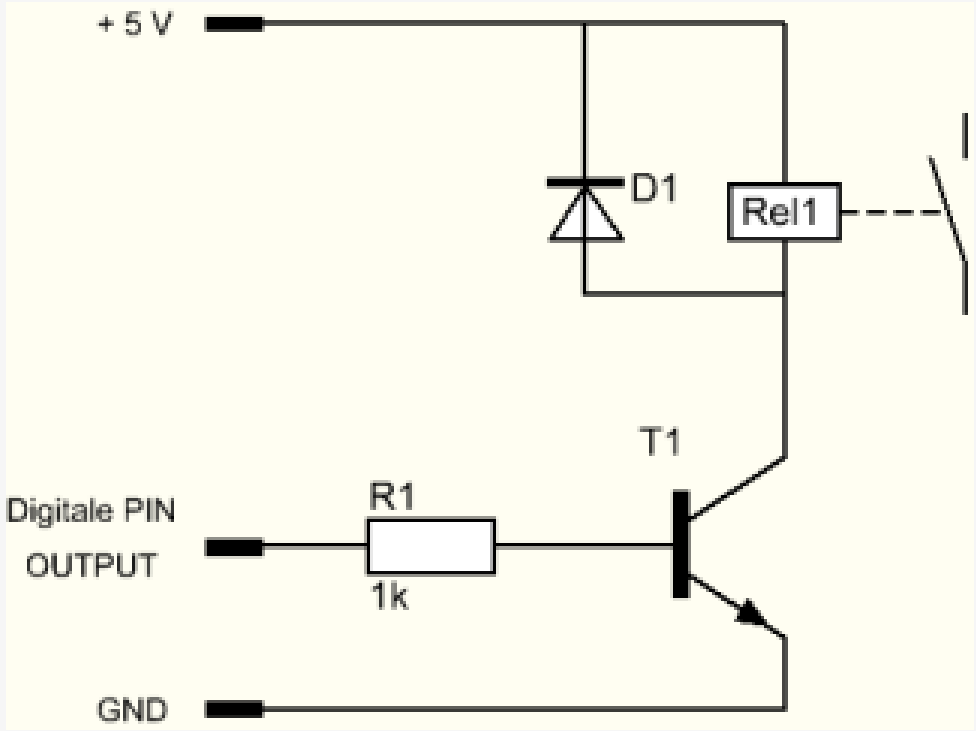
MOSFET : bv IRF540.

Wat is de maximale stroom?

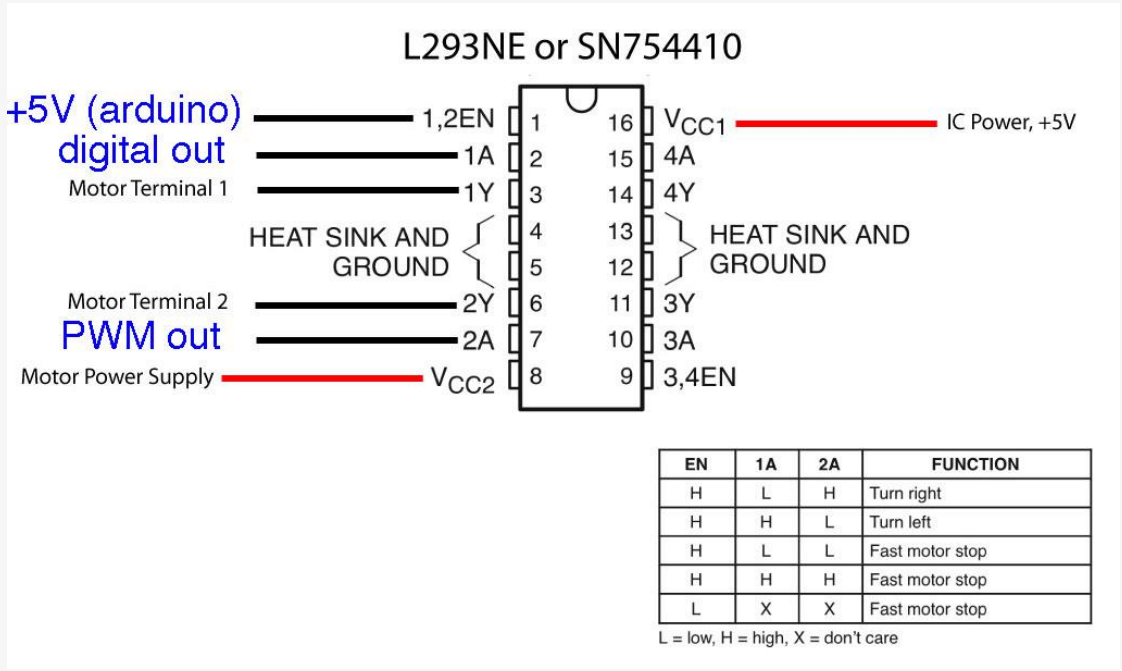


# Groot vermogen/AC

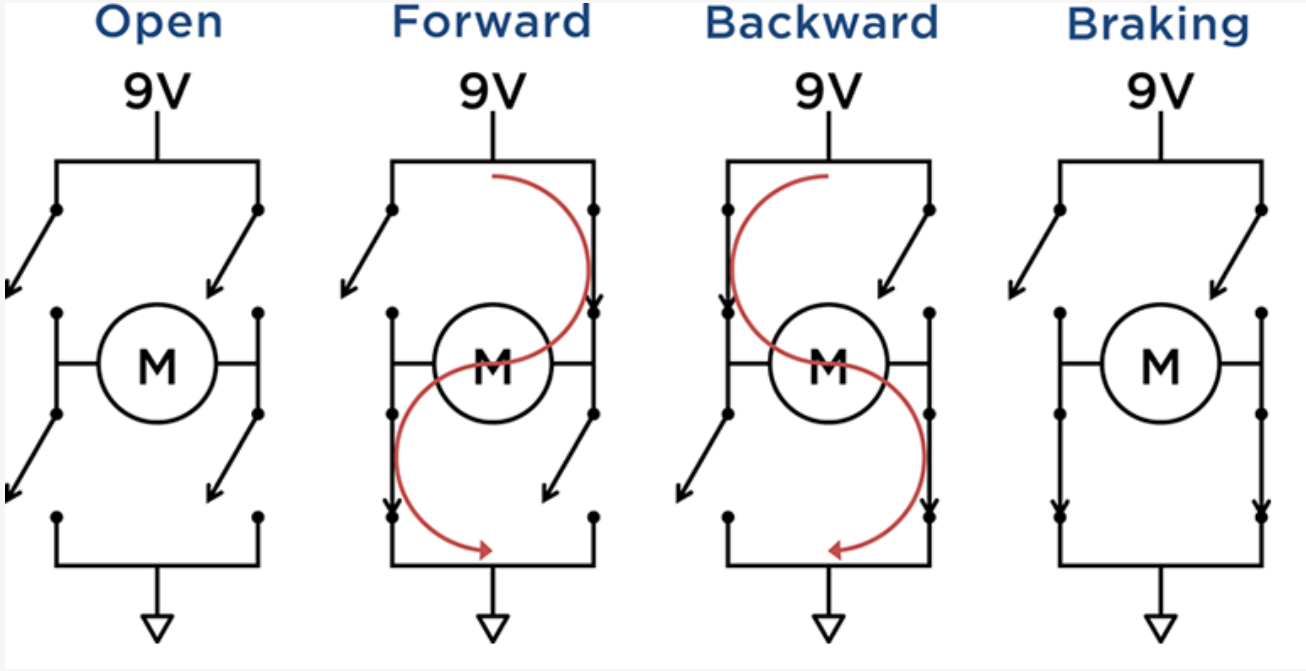


# DC – beide richtingen: de H-brug




| EN | 1A | 2A | FUNCTION |
|---|---|---|---|
| H | L | H | Turn right |
| H | H | L | Turn left |
| H | L | L | Fast motor stop |
| H | H | H | Fast motor stop |
| L | X | X | Fast motor stop |

L = low, H = high, X = don't care



# Pinnen uitbreiden

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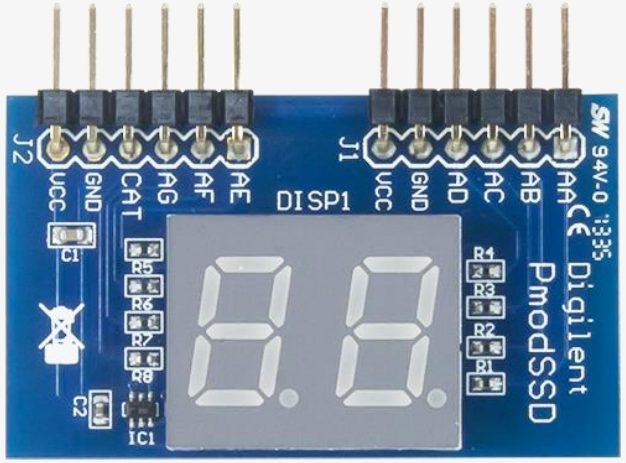
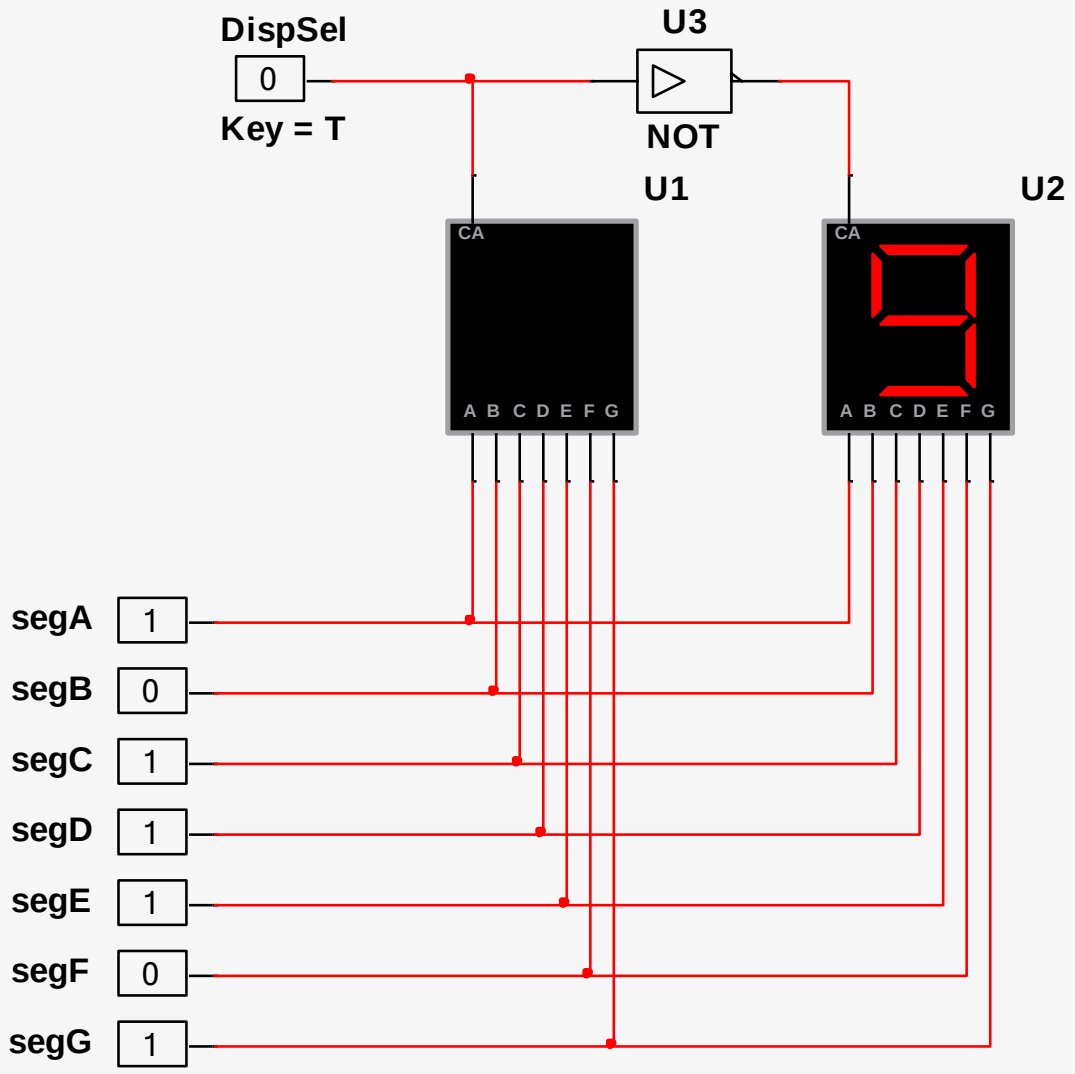
# multiplexen



```
int cijfer[]={B11111100,B01100000,B11011010,B11110010,B01100110,B10110110,B10111110,
B11100000,B11111110,B11110110};
int seg[]={2,3,4,5,6,7,8};
int start;
int waarde=0;
```

Elke 7-segment cijfercombinatie wordt opgeslagen in een array cijfer[]. Elke waarde bestaat uit 8 bits, waarbij bit7 = segA, bit6 = segB, … , bit1 = segG, bit0 = ongebruikt

De verbindingen met de pinnen wordt gedefinieerd in een array seg[].

Variabele start is een tijdsaanduiding.

Waarde is een variabele die van 0 tot 100 telt.

```
void setup() {
  for(int i=2 ; i<10 ; i++) {
    pinMode(i,OUTPUT);
  }
  int start=millis();
}

void loop() {
  int duur=millis()-start;
  if(duur>1000) {
    waarde=waarde+1;
    if(waarde==100) {waarde=0;}
    start=millis();
  }
  schrijf(waarde);
}
```

```
void schrijf(int w) {
  int tientallen=w/10;
  int eenheden=w-tientallen*10;
  digitalWrite(9,HIGH);
  decodeer(tientallen);
  delay(10);
  digitalWrite(9,LOW);
  decodeer(eenheden);
  delay(10);
}
```

```
void decodeer(int w) {
  int runval=128;
  for(int i=0;i<7;i++) {
    if(cijfer[w] & runval) {
      digitalWrite(seg[i],HIGH);
    }
    else
    {
      digitalWrite(seg[i],LOW);
    }
    runval=runval/2;
  }
}
```

```
W       =   B11111100
Runval  =   B10000000   i=0
            B10000000

W       =   B11111100
Runval  =   B01000000   i=1
            B01000000

W       =   B11111100
Runval  =   B00100000   i=2
            B00100000

W       =   B11111100
Runval  =   B00010000   i=3
            B00010000

W       =   B11111100
Runval  =   B00001000   i=4
            B00001000

W       =   B11111100
Runval  =   B00000100   i=5
            B00000100

W       =   B11111100
Runval  =   B00000010   i=6
            B00000000
```