Physical computing class 4 Agenda

Look ahead at next few weeks

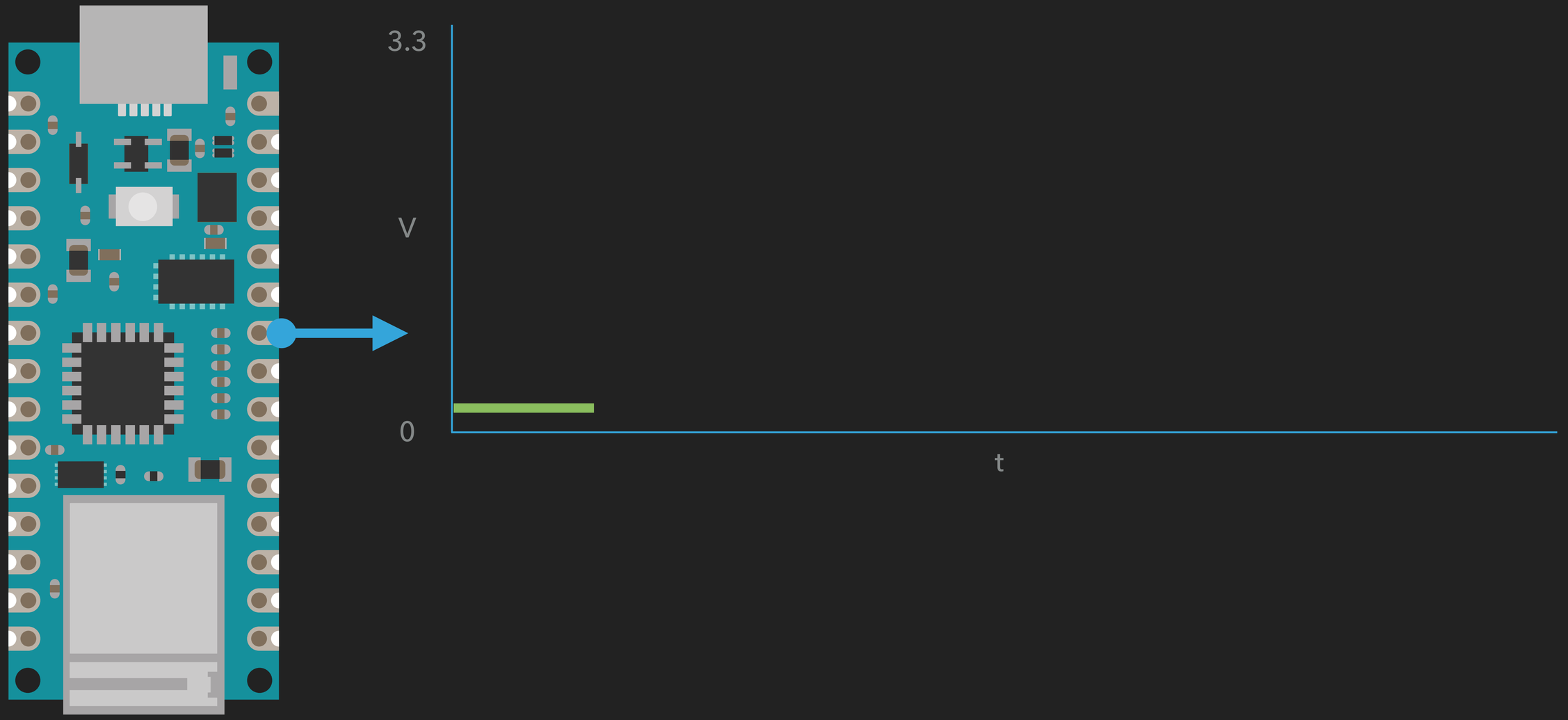
Review digital IO quiz and analog input questions

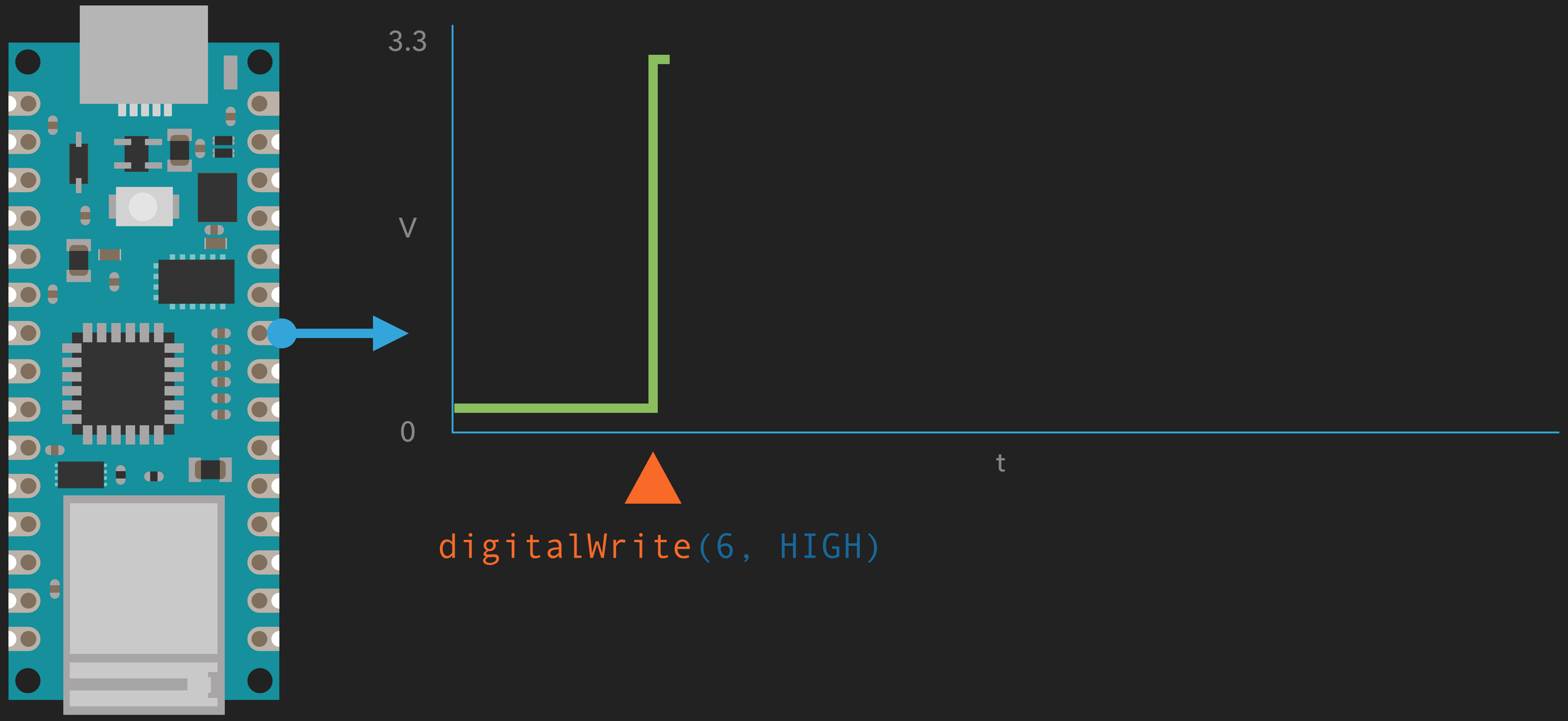
Assign midterm groups

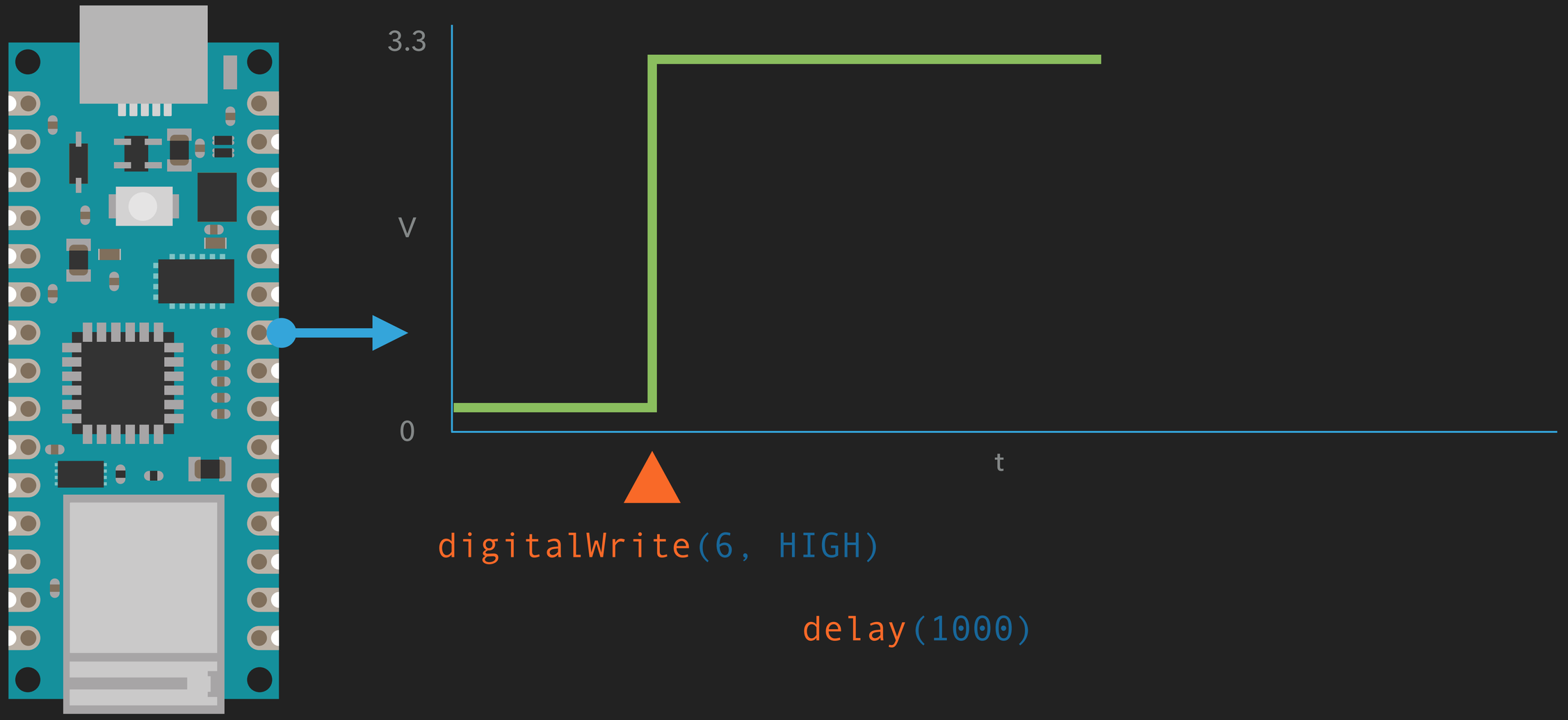
Oscilloscope intro

Analog output

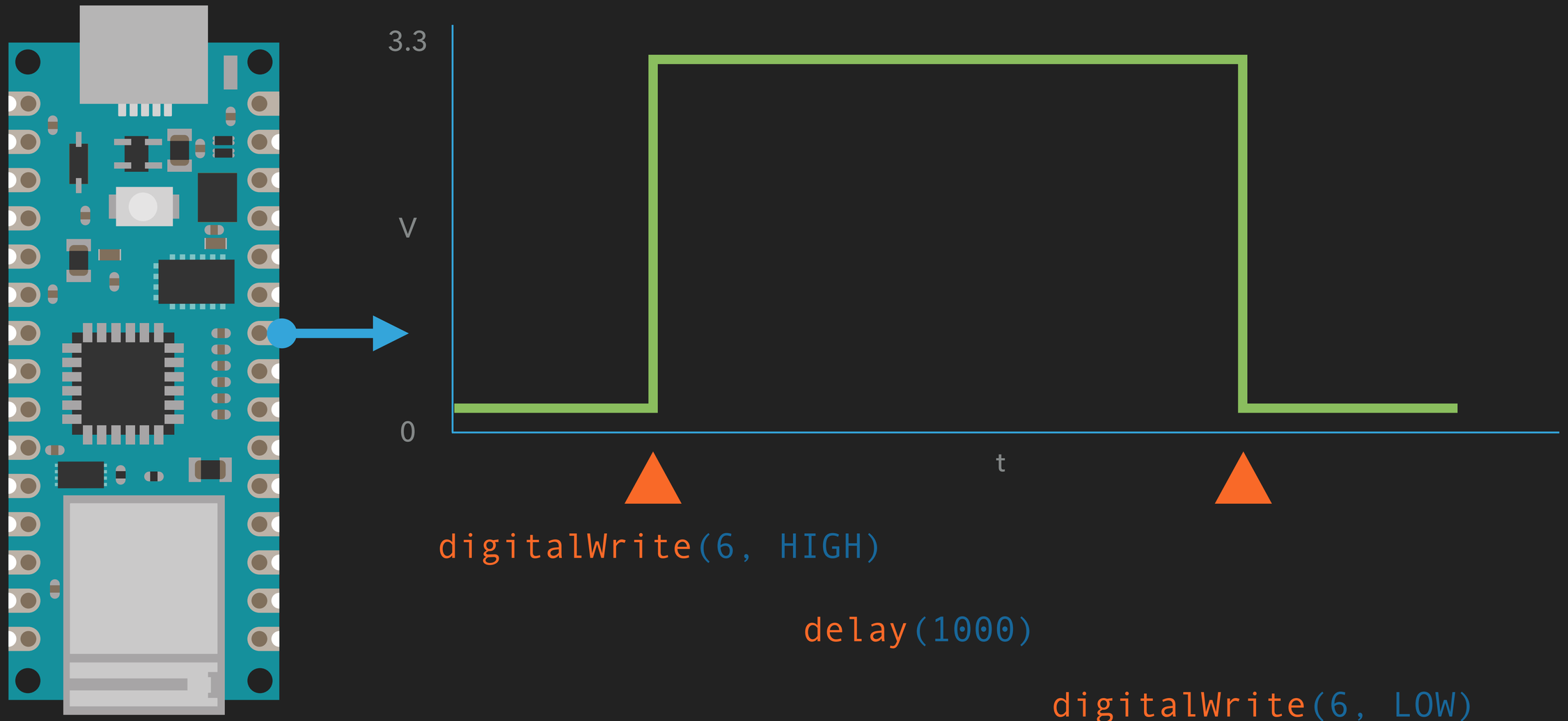
Libraries and external files in the IDE


3.3
V
0
t

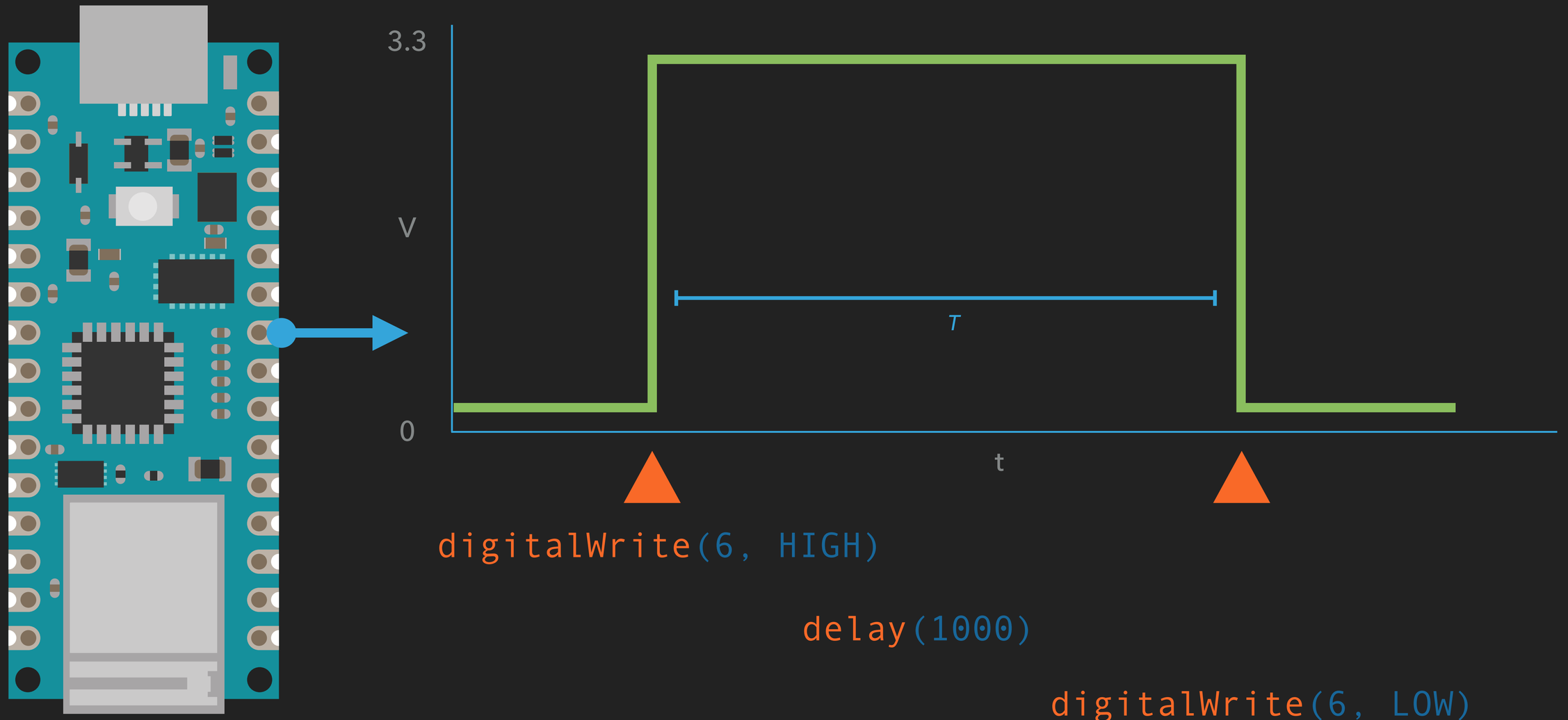

3.3
V
0
t
digitalWrite(6, HIGH)




```
digitalWrite(6, HIGH)

delay(1000)
```

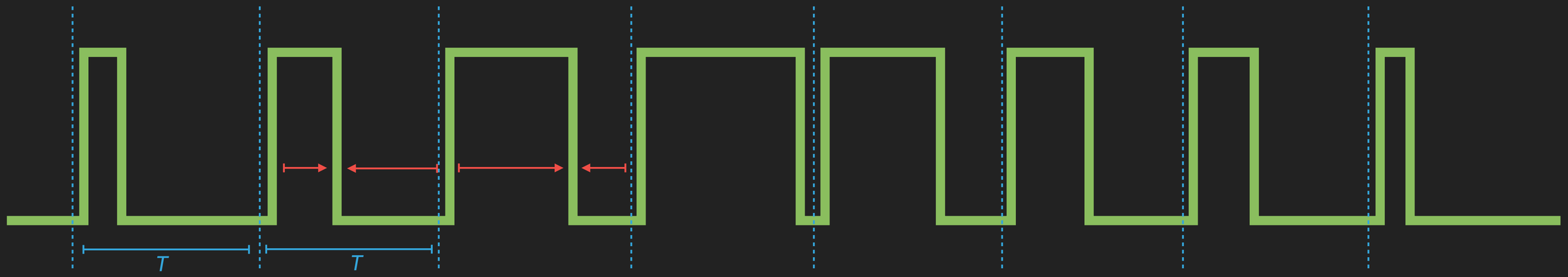



```
digitalWrite(6, HIGH)

delay(1000)

digitalWrite(6, LOW)
```




```
digitalWrite(6, HIGH)

delay(1000)

digitalWrite(6, LOW)
```

“ANALOG” OUTPUT



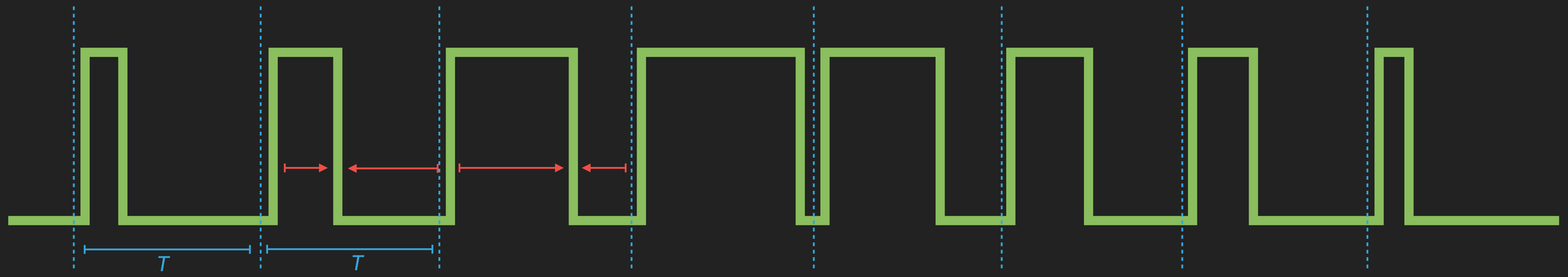
Frequency is fixed: each waveform has overall same duration

Percentage time on and off within a wave form can vary

PULSE WIDTH MODULATION (PWM)

```
analogWrite(pin, value)
```

“ANALOG” OUTPUT



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PULSE WIDTH MODULATION (PWM)

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analogWrite(pin, value)
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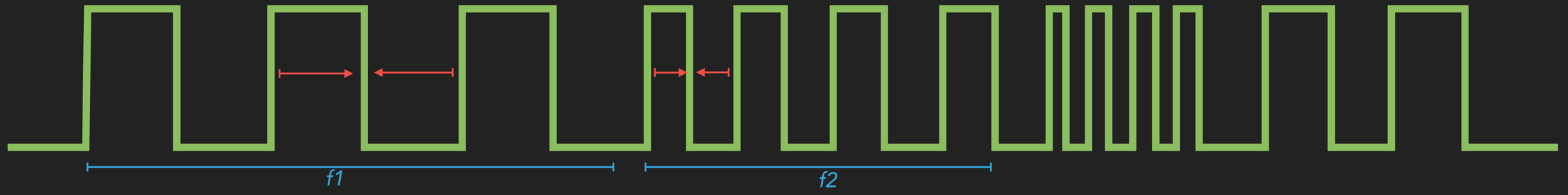


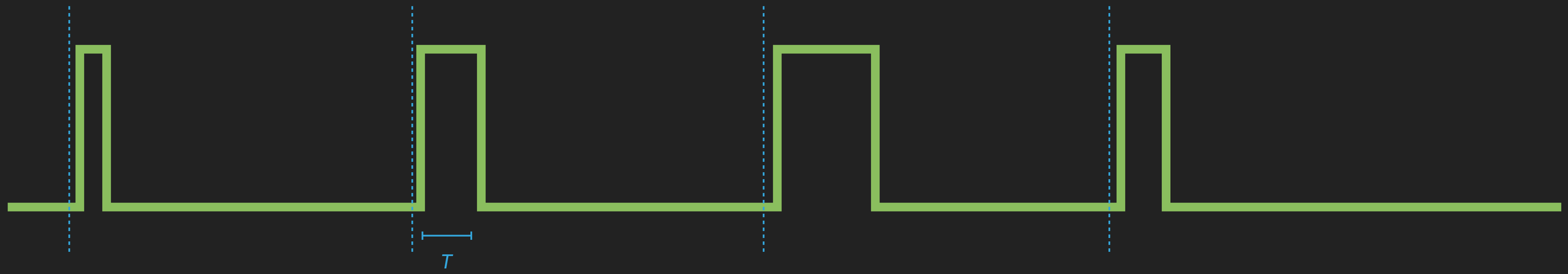
Frequency is variable: waveforms have different duration

Percentage time on and off within a wave is fixed at 50%.

FREQUENCY MODULATION

```
tone(pin, frequency [,duration])
```

"ANALOG" OUTPUT



Frequency is (somewhat) unimportant

Duration of pulse conveys information

PULSE IN/OUT

```
pulseIn(

pulseOut(
```

Used for e.g. control input to servos, or distance data from rangefinders