

Acoustic sensor (clapper switch)

Goal: Use of an acoustic sensor

Contents: Function
Possible application
Programming



Function

The acoustic sensor recognises loud acoustic signals like knocking or clapping hands. By means of a capacitor microphone, the sound is converted to electrical voltage. The sensitivity of the sensor, i.e. the range in which acoustic signals are to be recognised, can be set by means of a potentiometer.

Beside the supply pins for 5V and Gnd , an output pin is switching from HIGH to LOW if an acoustic signal is recognised.

Info

In general, the module expects a voltage supply of 5V. In many cases, the 3V voltage of the Micro Bit is sufficient. Respectively, 3V are also applied at the output pin.

ATTENTION: If the module is supplied with 5V, the output pin also supplies 3V, which can lead to critical damage at the Micro Bit.

Possible application

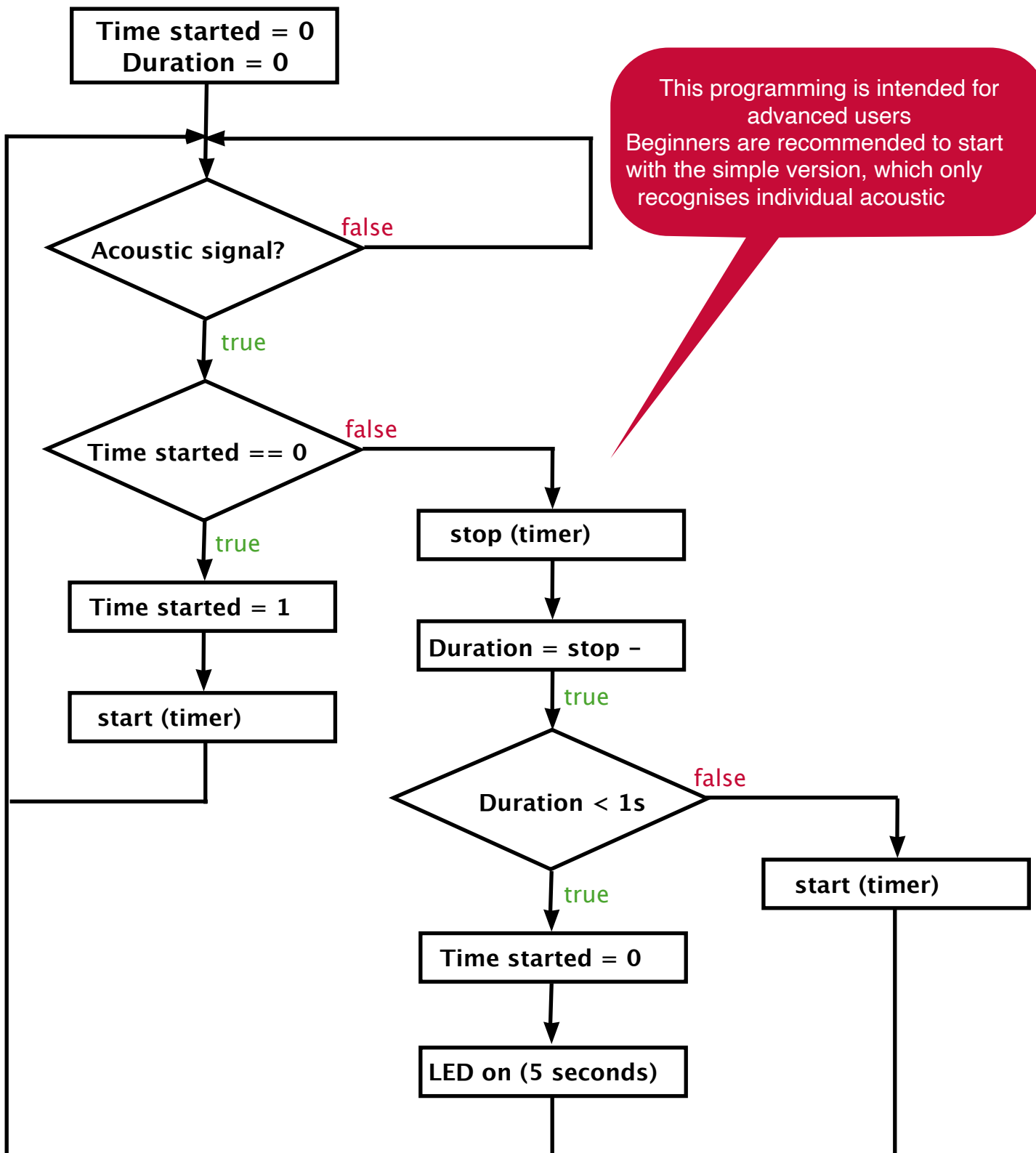
A clapper switch can be used to switch on electrical devices like a lamp, fan, TV, etc. by clapping the hands once, twice or three times.

The number of claps required and in which time period is set in the software.

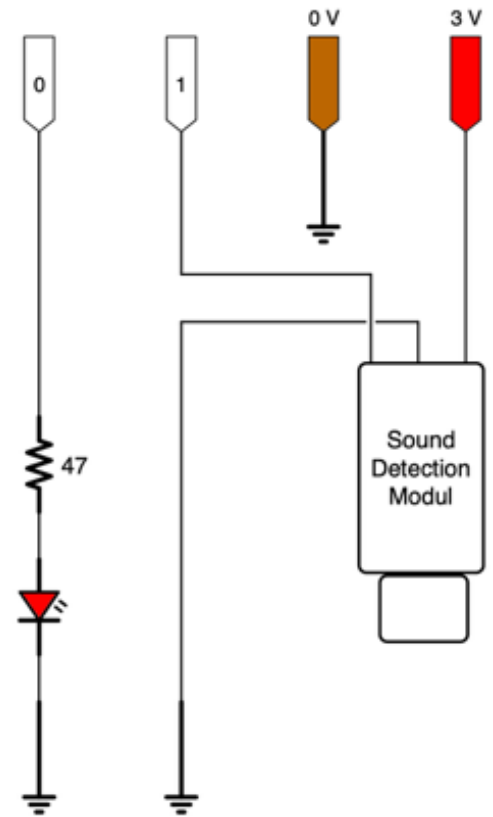
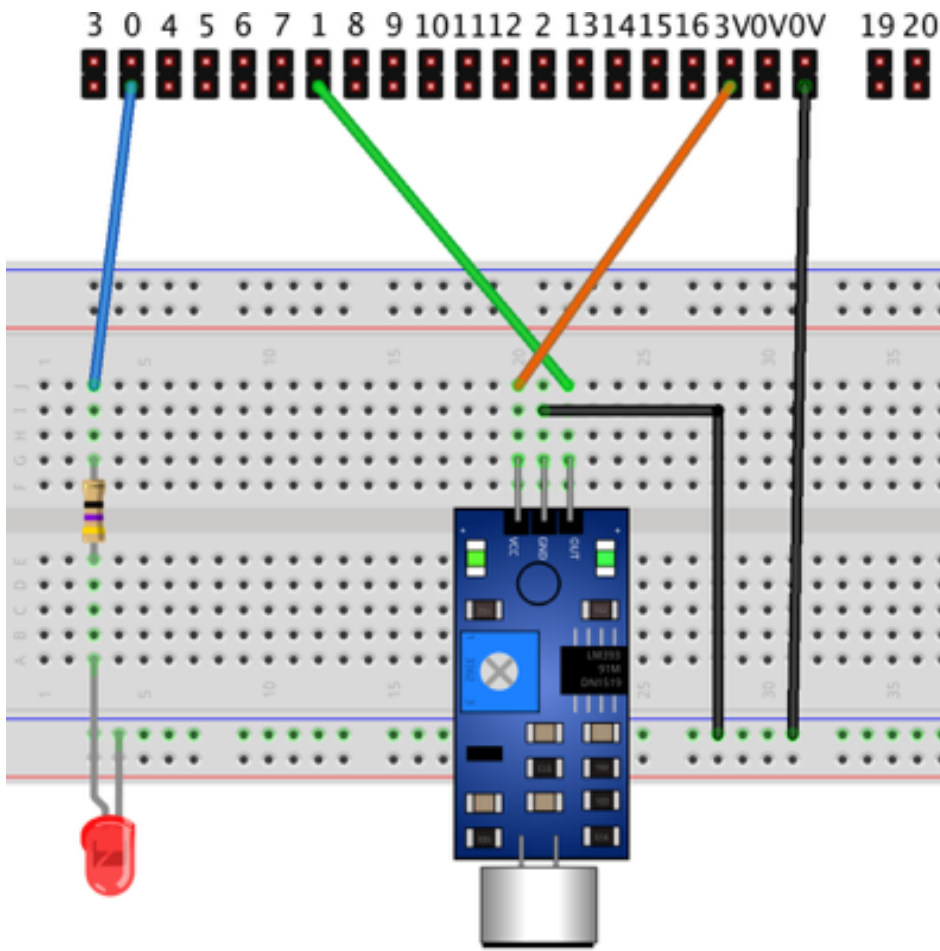
Programming

To prevent the acoustic sensor from being triggered by any signals, programming is realised in such a way that two claps are required within a specific time. For this time, one second is assumed (this can be changed any time in the program).

Program structure



Circuit set-up



- Position the LED as illustrated. The long pin (anode) faces upwards to the series resistor.
- The short pin (cathode) is routed to the common Gnd (- pole).
- The long pin is routed via a series resistor (47 Ohm) to the output pin of the Micro Bit.
[Blue cable – Pin0]
- The VCC pin of the acoustic sensor is routed to the 3V pin of the Micro Bit.
- The output pin of the module is connected to Pin 1 of the Micro Bit.
[Green cable – Pin1]
- The Gnd (pole) of the sensor is now routed to the common Gnd (- pole).
[Black cable – common Gnd]
- In the end, the ground bar (Gnd – 0V) is connected to the Micro Bit.
[Black cable – 0V]

Program code basic version

beim Start

setze Anziehungskraft von Pin P1 auf nach oben

dauerhaft

wenn digitale Werte von Pin P1 = 0 dann

schreibe digitalen Wert von Pin P0 auf 1

pausiere (ms) 2000

schreibe digitalen Wert von Pin P0 auf 0

Information on block code basic version

beim Start

setze Anziehungskraft von Pin P1 auf nach oben

Pullup to draw the input to a defined status (further information in worksheet on "Pulldown")

dauerhaft

wenn digitale Werte von Pin P1 = 0 dann

If a sound is detected by the module at pin 1 ...

schreibe digitalen Wert von Pin P0 auf 1

pausiere (ms) 2000

schreibe digitalen Wert von Pin P0 auf 0

... the LED at pin 0 is activated for 2s.

Program code pro version

dauerhaft

```
wenn digitale Werte von Pin P1 = 0 dann
  wenn Zeit_gestartet = 0 dann
    setze start auf Laufzeit (ms)
    setze Zeit_gestartet auf 1
  ansonsten
    setze stop auf Laufzeit (ms)
    setze Zeitdauer auf stop - start
    wenn Zeitdauer ≤ 1000 dann
      schreibe digitalen Wert von Pin P0 auf 1
      pausiere (ms) 5000
      schreibe digitalen Wert von Pin P0 auf 0
      setze Zeit_gestartet auf 0
    ansonsten
      setze start auf Laufzeit (ms)
  +
  +
  pausiere (ms) 100
  +
```

beim Start

```
setze Anziehungskraft von Pin P1 auf nach oben
setze Zeit_gestartet auf 0
setze Zeitdauer auf 0
```

Information on block code pro version

beim Start

```
setze Anziehungskraft von Pin P1 auf nach oben
setze Zeit_gestartet auf 0
setze Zeitdauer auf 0
```

- In the variable "Duration", the time between two recognised sounds is saved in ms.
- The variable "Time_started" specifies whether the timer was started after the 1st sound.
- In the beginning, both are set to 0.

dauerhaft

```
wenn digitale Werte von Pin P1 = 0 dann
  wenn Zeit_gestartet = 0 dann
    setze start auf Laufzeit (ms)
    setze Zeit_gestartet auf 1
  ansonsten
    setze stop auf Laufzeit (ms)
    setze Zeitdauer auf stop - start
    wenn Zeitdauer ≤ 1000 dann
      schreibe digitalen Wert von Pin P0 auf 1
      pausiere (ms) 5000
      schreibe digitalen Wert von Pin P0 auf 0
      setze Zeit_gestartet auf 0
    ansonsten
      setze start auf Laufzeit (ms)
      pausiere (ms) 100
```

If a sound is recognised by the module at pin 1 ...

Provided it is the 1st recognised sound ...
(variable "Time_started" = 0)

... the variable "start" is set to the current time stamp and the variable "Time_started" is set to 1.

Provided it is the 2nd recognised sound ...

... the variable "stop" is set to the current time stamp and the variable "Duration" is calculated from "stop" minus "start".

If the duration between the 2 recognised sounds is below 1

... the LED at pin 0 is activated for 5s. Afterwards, the variable "Time_started" is reset to 0 for a new time measurement.

If the duration between the 2 recognised sounds is more than 1 second, the variable "Time_started" is reset to 0 for a new time measurement.