

TITLE: Analog control of LEDs

| LEARNING SCENARIO | |
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| School: | Duration (minutes): 90 |
| Teacher: | Students age: 14 |

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| Essential Idea: | Analog control of LEDs |
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Topics:

- Pupils deepen their understanding of the meaning, potential and risks of programming at a society level.
- Pupils learn to use artificial intelligence.

Aims:

- Pupils are able to design, create, document, and present programs and robots that solve a particular real-life problem. Created programs include search algorithms, tables and automatic functions. Several simultaneous events happen in these programs.

Outcomes:

- Pupils create more complex games, applications or mobile applications that simulate subject matters.
- Pupils learn about the potential and features of more advanced microcontrollers.

Work forms:

- individual work
- work in pairs
- group work

Methods:

- presentation
- discussion
- interactive exercise

ARTICULATION**Course of action (duration, minutes)****INTRODUCTION**

Teacher starts discussion with pupils:

Besides the ability to be turned on or off, we can also control how bright LEDs will shine.

MAIN PART

The next program will slowly increase the intensity of light in the LED, and then decrease it.

```
1 from microbit import *
2
3 while True:
4     for i in range(0,400,10):
5         pin0.write_analog(i)
6         sleep(40)
7
8     for i in range(400,0,-10):
9         pin0.write_analog(i)
10        sleep(40)
```

for i in range(0 , 400, 10):

For loop increases the value of i from 0 to 100 in steps of 10.

So it's 0, 10, 20, 30, ... , 390, 400.

All commands written below it will be repeated until the counter becomes 400

for i in range(400 , 0, -10): counts backwards with a step of -10.

pin0.write_analog(i)

We set the value of i to pin zero.

In this example that value changes from 0 to 400.

The maximum value we could use is 1023.

Micro:bit doesn't regulate the brightness of the LED by regulating the voltage. Instead, it quickly turns the LED on and off.

pin0.write_analog(0) – LED is off, pin0 is inactive.

pin0.write_analog(1023) – LED shines the brightest, pin0 is active.

pin0.write_analog(511) – pin0 is active for a short amount of time, and then inactive for the same amount of time.

EXERCISE

According to the previous example, pupils can design, create and test their own programs.

Examples:

<https://makecode.microbit.org/reference/led>

[plot](#)

[unplot](#)

[point](#)

[brightness](#)

[setBrightness](#)

[stopAnimation](#)

[plotBarGraph](#)

[toggle](#)

[setDisplayMode](#)

[enabled](#)

[plotBrightness](#)

CONCLUSION

Pupils and teacher discuss and evaluate the presented solutions.

Methods

presentation

discussion

work on the text

graphic work

interactive exercise /simulation on the computer

interview

demonstration

role playing

Work forms

individual work

work in pairs

group work

frontal work

Material:

- micro:bit
- LED diode

Literature

- <https://makecode.microbit.org/reference/led>:
 - [plot](#)
 - [unplot](#)
 - [point](#)
 - [brightness](#)
 - [setBrightness](#)
 - [stopAnimation](#)
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PERSONAL OBSERVATIONS, COMMENTS AND NOTES