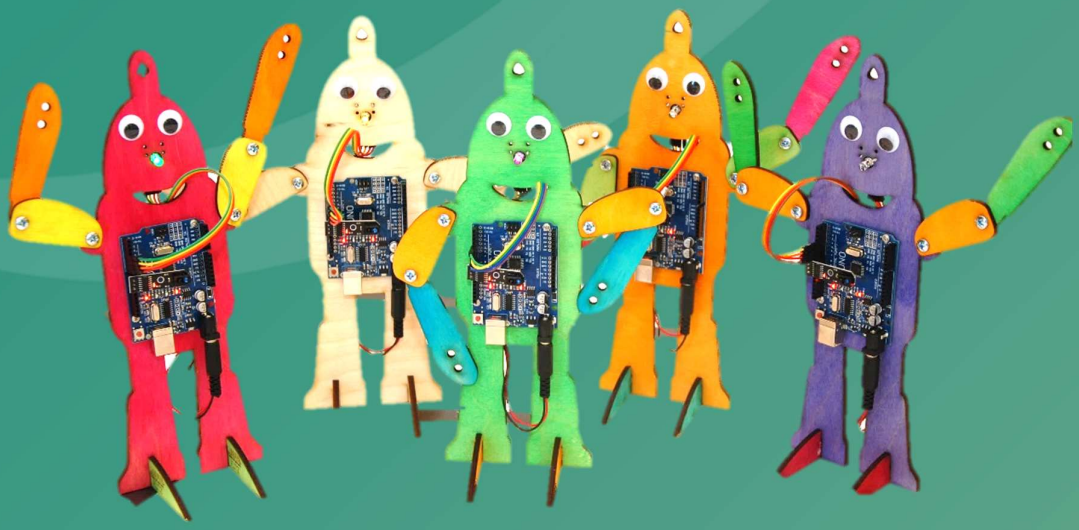
Leaphy Flitz Workbook



LEAPHY

Robotica voor iedere leerling

Leaphy Flitz - Workbook - Introduction

How does this booklet work?

In this booklet you'll find the lessons on how to learn to work with the Leaphy Flitz robot. By completing the different assignments at the different levels, you will automatically learn how to program the Flitz robot. In this way you're off to a good start in the world of robots and technology!

Problem solved!

Leaphy Flitz doesn't always do what you want. That's why you can learn so much from it.
So:
Try things out.
Don't worry if you make mistakes.
And: just go on!

Arduino-technique

The Leaphy Flitz has a mini computer called "Arduino Uno". This computer is used a lot by technicians all over the world. That's because you can easily learn to work with it and it can do a lot, while still being very affordable. Work with it carefully and you will enjoy it for a long time.

And for now: get busy…have fun!

The team of Leaphy

Robot design Leaphy Flitz: Olivier van Beekum

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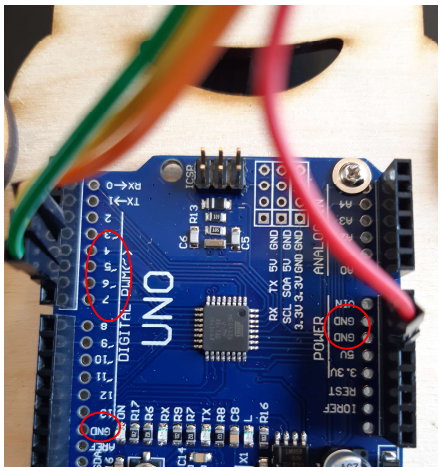
Level 1 – Loose wire?

The Leaphy Flitz has a light in three colors, a belly sensor and a hand sensor. You made the Leaphy Flitz with the help of the instructional videos. In this level you will check whether everything is properly connected

Level 1.1 – Loose wire?

The computer on your Leaphy Flitz has two rows with black holes. We call them gates. You can connect sensors and lights to it.

Assignment: First check that the light is properly connected. Use the photo on the right and the diagram below. Note: the colors of the wires in the photo may differ from the wires on your own Flitz. That's okay.



Level 1.2– Connection Light

With the diagram on the right you can check whether the connection of the RGB-Led (light) is correct.

On the back of the RGB-led are the signs:
- \- Ground
- R Red
- G Green
- B Blue

The gates in the diagram refer to the holes on the computer. The numbers can be found next to the small holes on the computer.

There are three "Gnd" gates on the Uno computer, it doesn't matter which one you use.

RGB-Led	Uno computer
-	Gnd
R	Gate 3
G	Gate 5
B	Gate 6

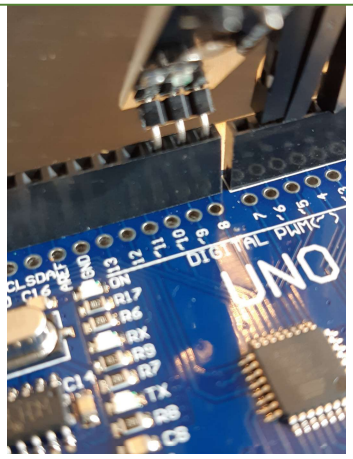
Level 1 – Loose wire?

Level 1.3 - Belly sensor connection

The pins of the belly sensor are directly plugged into the gates of the computer.

Assignment: Check whether the belly sensor is properly connected. Use the picture on the right and the diagram below.

Assignment: There are two types of belly sensors, usually you have type 1. The difference is in the order of the pins "Gnd", "Vcc" and "Out". What type of belly sensor do you have?



Belly sensor diagram type 1

The numbers in the diagram can be found next to the small holes on the computer. Note: the belly sensor signs "Out", "Vcc" and "Gnd" may appear on the bottom of the sensor!

Belly sensor type 1	Uno computer
Gnd	Gate 8
Vcc	Gate 9
Out	Gate 10

Belly sensor diagram type 2

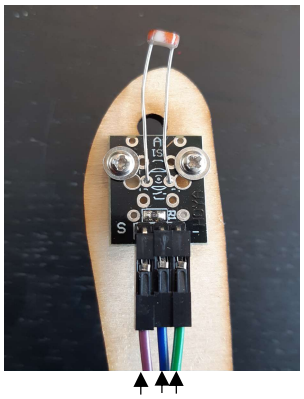
The numbers in the diagram can be found next to the small holes on the computer. Note: the belly sensor signs "Out", "Vcc" and "Gnd" may appear on the bottom of the sensor!

Belly sensor type 2	Uno computer
Out	Gate 8
Vcc	Gate 9
Gnd	Gate 10

Level 1 – Loose wire?

1.4 –Hand sensor connection

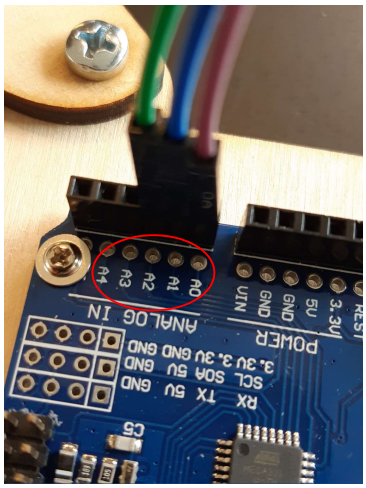
The picture on the right and the diagram below shows how to connect the hand sensor. Note: the color of the wires on your Flitz may differ from the wires in the photo, that is all right.



A0 A1 A2

Level 1.5 - Hand sensor connection

On the right is a picture of the connection of the wires from the hand sensor to the computer. The left wire in the picture above is in gate A0, the middle wire in gate A1 and the right wire in gate A2.



Level 1.6 - Hand sensor scheme

The wires of the hand sensor are connected according to the diagram on the right.

Hand sensor type	Uno computer
S	Gate A2
Middle pin	Gate A1
-	Gate A0

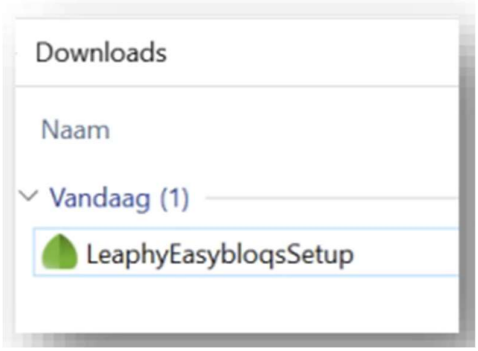
Level 2 – Installing

Before you can get started with programming you need to install "Leaphy Easybloqs", the software for programming Leaphy robots. In this level you will learn how.

Level 2.1 - Install software

Go to Leaphy.nl and download the installation package at www.leaphy.nl/software

Go to the downloaded file in your "downloads" folder and double click on it. The installation will start.



Level 2.2 - Notification

If you get the message "Your PC is being protected", click on "more information" and then on "run anyway".

Level 2.3 - No "run anyway" button?

Still not getting a "run anyway" button? Right click on the downloaded file. In the menu that appears, click "Properties". In the pop-up, tick the "Unblock" box.

If all goes well, the installation will now work!

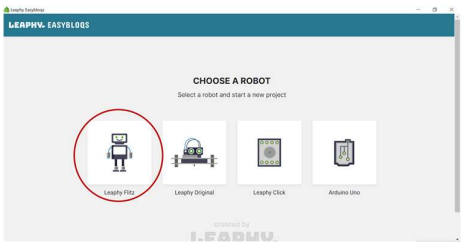
Level 3 – Command Blocks

The Leaphy Flitz is programmed with "Easybloqs", the Leaphy Software's block code.

You will learn more about this in this level.

Level 3.1 - Choose Leaphy Flitz

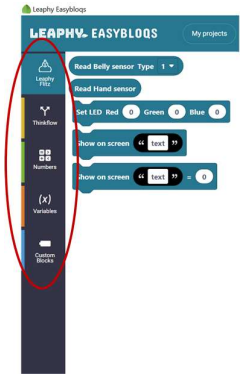
Start the Easybloqs program and click on the Leaphy Flitz image.



Level 3.2 –Different programming blocks

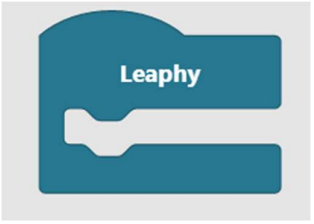
On the left side of your screen you will see different groups of programming blocks below each other. The dark green Leaphy Flitz blocks at the top give do- assignments. Nose light Red, Green and / or Blue on and off, reading belly or hand sensor.

With the "show" blocks you can show the values that the belly sensor or hand sensor transmit to the computer. More on this later.



Level 3.3 - Leaphy block

Programming is done by stacking the different blocks on top of each other in the right order. Pay attention! Only blocks between the "Leaphy" block are sent to the Flitz's computer.

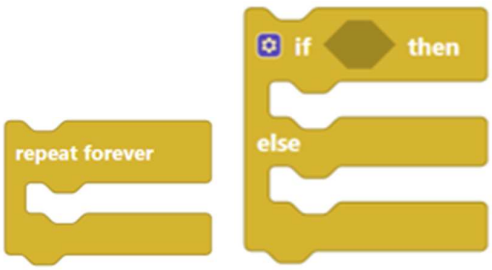


Level 3 – Command Blocks

Level 3.4 - Yellow thinking step blocks

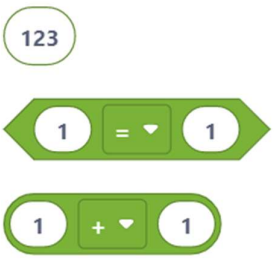
The yellow thinking step blocks tell when, how often and for how long Flitz has to do something.

You can put blocks with "situations" in the empty spaces between the words IF and THEN. You will also use the repeat forever block a lot.



Level 3.5 - Green number blocks

You use these blocks to compare a value is less than < or greater than > or equal to = the value that the hand sensor measures, for example.

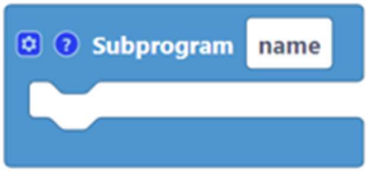


Level 3.6 - Orange variable blocks

The orange variable cubes are special because you can give them a name yourself. These blocks are like boxes in which the Flitz stores numbers, so you can give each box its own name. In level 8 you will learn how to work with it.

Level 3.7 – Your own blocks

With the light blue custom blocks you can merge a program that you have made into one block. Very useful when you are going to make longer programs.



Level 4 – Stacking Blocks

Now that everything is properly connected you can make your first program in this level and learn how to get it on the Leaphy Flitz.

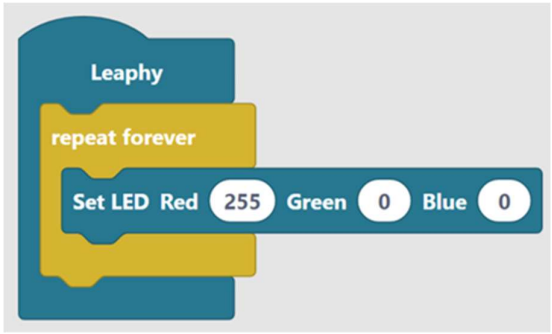
Level 4.1 - Programming

All separate parts of the program have been explained, but how do you make a program?

The different groups are shown on the left of the screen. Click on the group from which you need command blocks. You always start with the blue-green starting block "Leaphy", which is already ready. Then you stack the blocks you want to use between it.

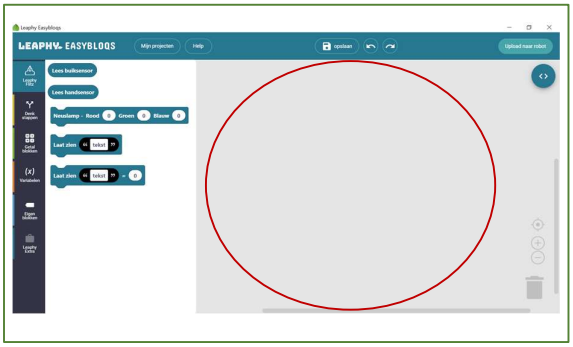
Tip: always use only one starting block.

(Flitz can run multiple Start Blocks at the same time, but gets confused if you don't do it correctly.)



Level 4.2 - Building

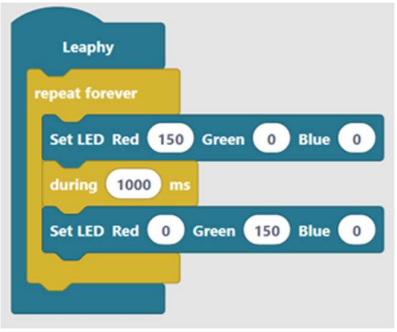
Drag the separate command blocks to the center of the screen. This is the programming field, this is where you build your program. You do this by sliding the different blocks on top of each other and sometimes in each other.



Level 4.3 – Repeat and wait

Put a "Repeat forever" block around each program. Otherwise, the Flitz will only do everything once.

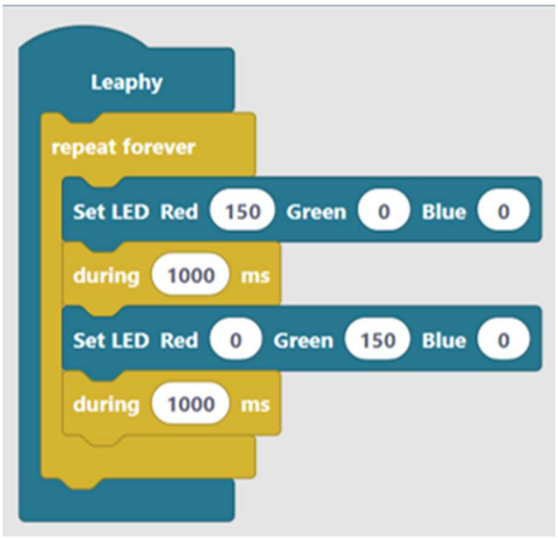
Use ‘during’ blocks. The green LED light in the example on the right will turn on so briefly that you won't see it. Then it goes to red again. Which block do you have to add to see the green light?



Level 4 – Programming Colors

Level 4.4 - Are the colors correct?

Assignment: We are going to test with the program on the right whether the Green light works. Make a stack of cubes like the one on the right

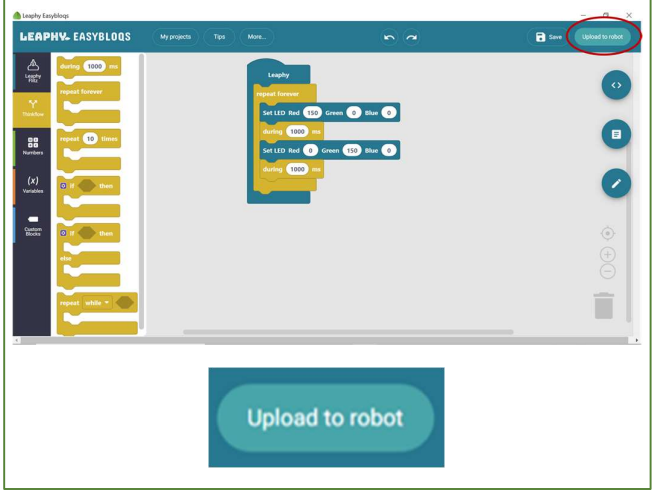


Level 4.5 - Upload

Finished stacking? You can now upload the program to your Leaphy Flitz. But how do you do that? It's very easy:

> Connect Leaphy Flitz to your laptop with the USB cable.

> Click the "Upload to Robot" button and you're done! The nose light of the Flitz should now light up.

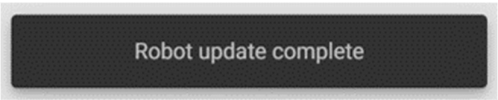


Level 4 – Testing and Saving

Level 4.6 - Testing

You often have to wait a while during the upload, but hopefully you will get this message at the bottom of your screen: "upload completed". Congratulations, you have now put your first program on the Flitz!

Exercise: How many colors can you make? Yes exactly, all! Mix colors with light! Try making purple or even pink.



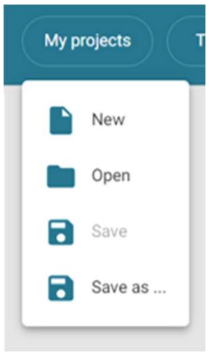
Level 4.7 - Saving

Some programs take a lot of time to make, sometimes you want to keep them for later use. You can save a program in the following way:

> Go to "my projects" at the top left of the text bar

> Go to "save project as" and save your file

> You can also open it in this screen, via "Open project"

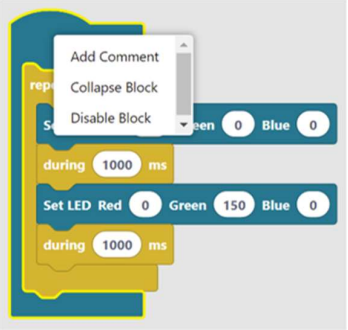


Level 4.8 - Adding comments

When you share a program with others, it is sometimes useful to add comments to the command blocks. This can be done in the following way:

> Position the arrow on the command block and press the right mouse button

> Click on "Add Comment" and write!



Level 4 – Disco-nose

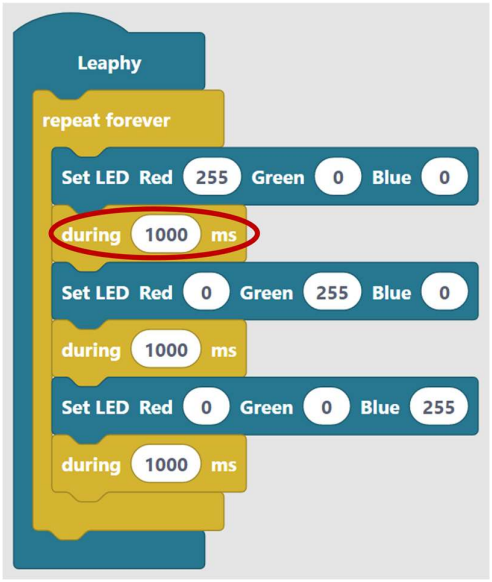
Level 4.9 - Disco nose

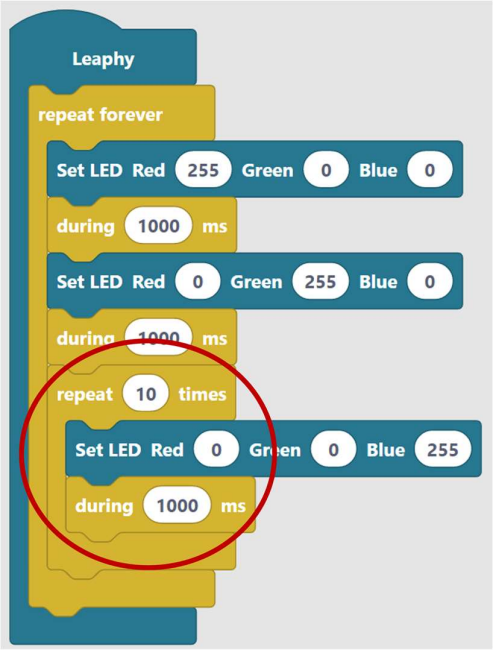
We are going to do experiments with the nose light as a disco nose. You can see an example on the right, but much more is possible!

Assignment: Put the same color on 50 or 255 to see the difference. You can also let different colors flash in succession.

If you want the nose light to flash faster, you can work in the waiting block with numbers and milliseconds (the block says "ms"). There are 1000 milliseconds in 1 second. If you want a waiting time of 1 second, then that's 1000 ms in the block. Half a second is 500 ms.

On the right is how to add a short repeat loop within the "Repeat forever" loop.





Level 5 – Morse

Even before the telephone was invented, people could "talk" to each other remotely. One of those ways was via Morse code. Different short or long signals for each letter were sent to each other via long power cables between cities and were then deciphered.

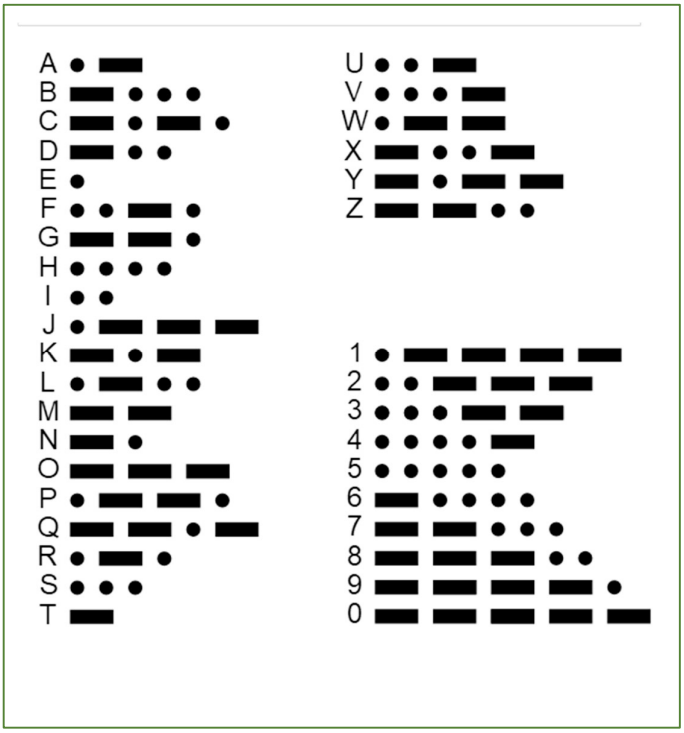
Level 5.1 - "Talk" to Morse

With Morse you can make sentences, but abbreviations also work: you probably know SOS in an emergency, which means “Save Our Souls”.

Assignment: Try to figure out how you could make the Flitz say something with Morse code.

On the right is the real Morse code as it is still used today. For example, the letter A is a short flash followed by a long flash with the lamp.

In this way you can "make" all letters and numbers with the light.



Level 5 – Morse and Code

Level 5.2 - Long code

Sending a message on one end of the line also means that someone on the other end is receiving the message.

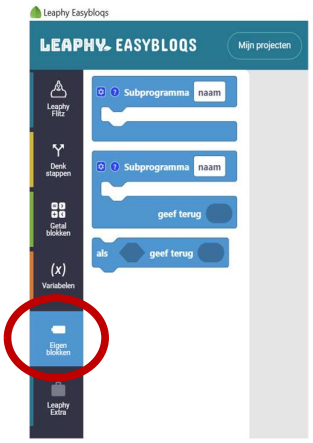
Assignment: Try to find out what the Flitz "says" when the program on the right is used.

Indeed, "HI". You can see that a Morse code of two letters immediately results in very long code. Can´t that be done in another way?

Certainly, with the "own blocks" function

Level 5.3 - Own blocks

Click on the "Own blocks" group and move the top "subprogram" block to the right, to your work field.

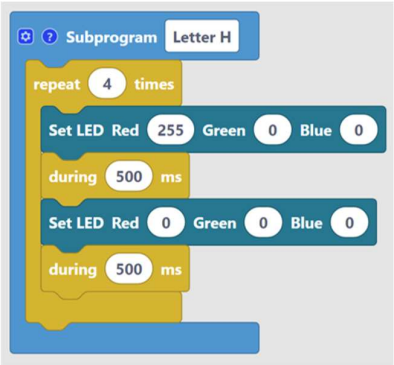


Level 5 – Make letter

Level 5.4 –Subprogram block

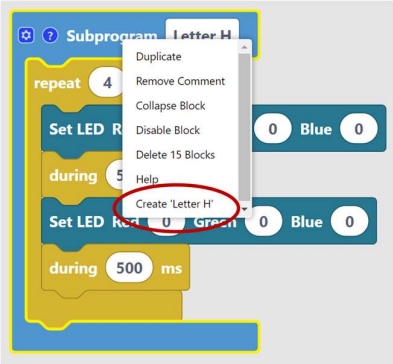
Now paste the code for the letter H, blink four times in the subprogram block.

At the top right you can give the block a name, for example 'Letter H'.



Level 5.5 – Make letter

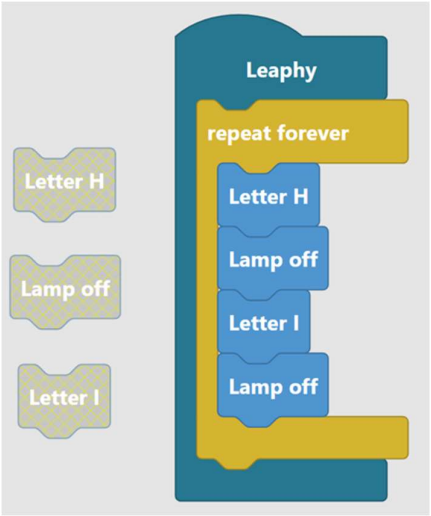
Move your arrow to the blue subprogram block and click on your right mouse button. Select 'Create letter H'.



Level 5.6 – Whole alphabet

Move your arrow to the blue subprogram block and click on your right mouse button. Select 'Make letter H'.

A new block will now appear containing your code. You can do this for each letter. Together with a 'light off' block, you can now easily program Morse code.



Level 6– The belly sensor

To know what is happening around us, ‘to perceive’, people have senses such as eyes and ears. Robots can also perceive the environment with senses, which we call: 'sensors'. The Flitz has 2 sensors. You will now learn to use the first: the belly sensor.

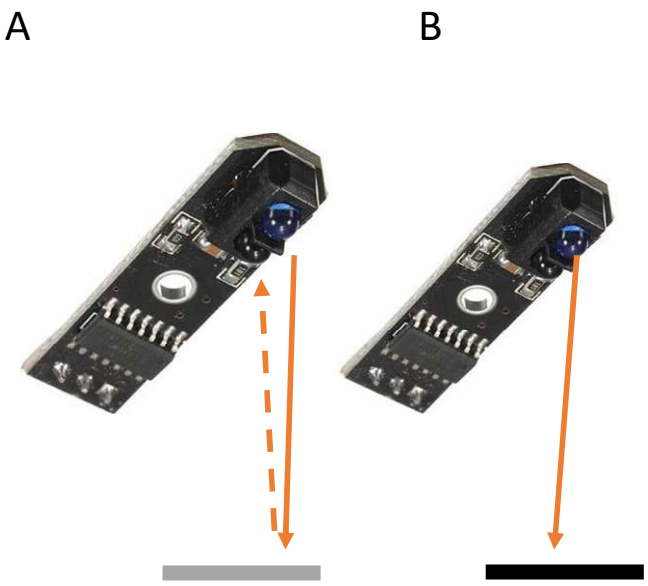
Level 6.1 – How does the belly sensor work?

If you look closely, the belly sensor has two 'lights' on the end, one black and one blue.

The blue light emits invisible (infrared) light. When that falls on a surface, the light bounces back a bit to the black light. That black light is actually not a light but a receiver.

The receiver only sends a signal to the computer of the Flitz when there is reflected light.

The belly sensor can therefore only measure two things: there is reflected light: the value is 1 or there is no reflected light: the value is 0.

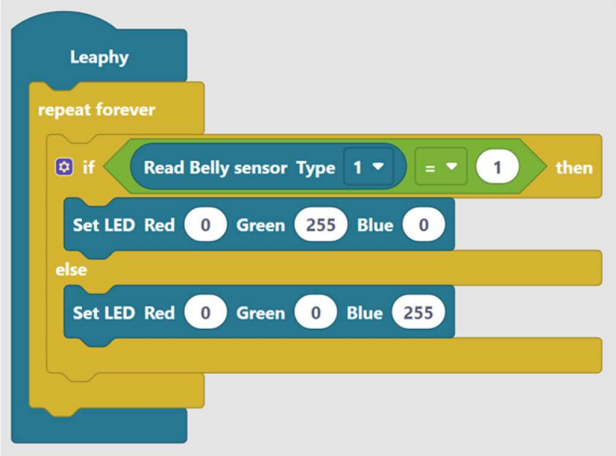


A. Reflected light, value=1
B. No reflected light, value=0

Assignment: make the program on the right and test whether your belly sensor works. What color does the light turn when you put your finger on the sensor?

Note: Daylight can confuse the sensor. Then close the curtains!

Assignment: Can you program the sensor so that the light turns red without changing the blue blocks?



Level 7– The hand sensor

In addition to the belly sensor, the Flitz has another sensor, the hand sensor. The hand sensor works completely differently than the belly sensor. In this level you will learn how the hand sensor is different from the belly sensor and how to program it.

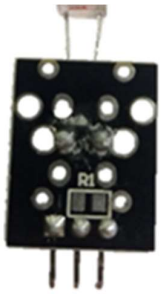
Level 7.1 – What do we measure?

The hand sensor measures brightness. In other words, the hand sensor measures the amount of light in the environment.

The sensor gives a number between 0 and 1024 for the amount of light in the environment. On the right you can see what those values mean.

Digital and Analog

This is different from the belly sensor, which only works with 0 or 1. We therefore call the hand sensor 'analog' and the belly sensor is a sensor that is 'digital'.

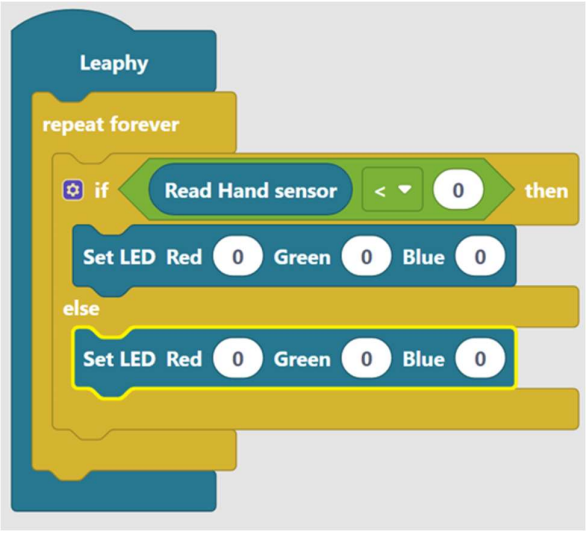


Completely dark	50
Living room daytime	500
Daylight clouded	800
Daylight sunny	900
Flash light closeby	1000

Assignment: Make Flitz's nose change color when it gets dark. Start with the program as shown on the right and enter the values for LED yourself.

Assignment: Try to find out which value to enter for the hand sensor. You can use the diagram above as a starting point.

Assignment: Can you also make the Flitz blink its nose in the dark?



Level 8 – Color dice

Level 8.1 – Blue or Green?

You can use the Leaphy Flitz as a color die. The computer on its belly can make random numbers. You can use those numbers to turn the colors on and off.

Assignment: Create a variable. You can do that with the orange blocks. Take a good look at the picture on the right. Click on 'Create variable' and name your variable: 'Color choice'. Now 3 new orange blocks will appear, as shown on the right.

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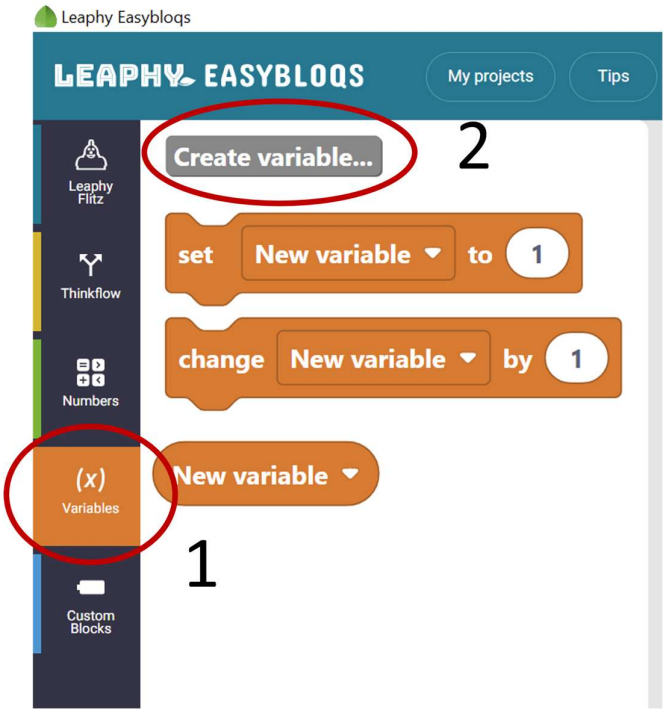

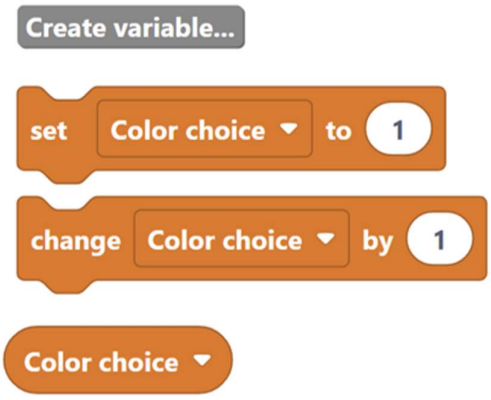

Level 8 – Color dice

Assignment: Now make the program on the right that rolls between two colors. You can see that at the top, the light is turned off every time. See what happens if you don't turn it off.

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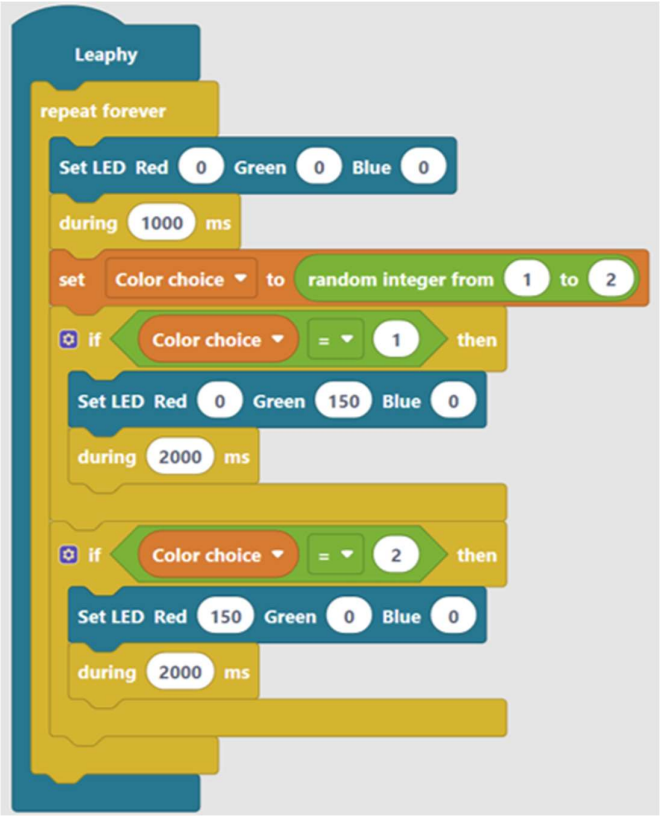


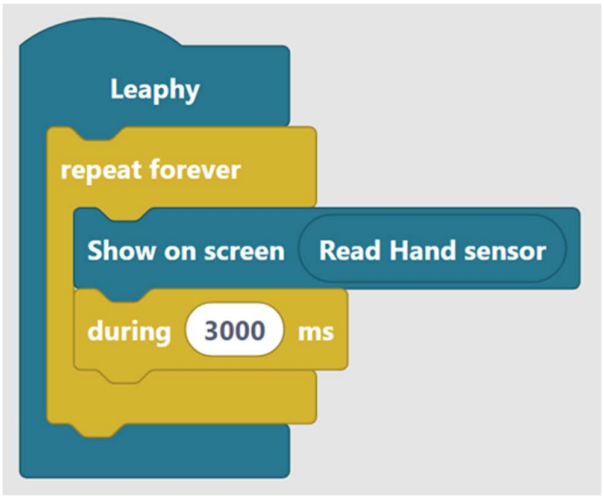
Level 9 – Serial monitor

Level 9.1 – To measure is to know?

In level 7 you saw that you can make Leaphy Flitz measure light. You estimated the light intensity yourself using the table in this book.

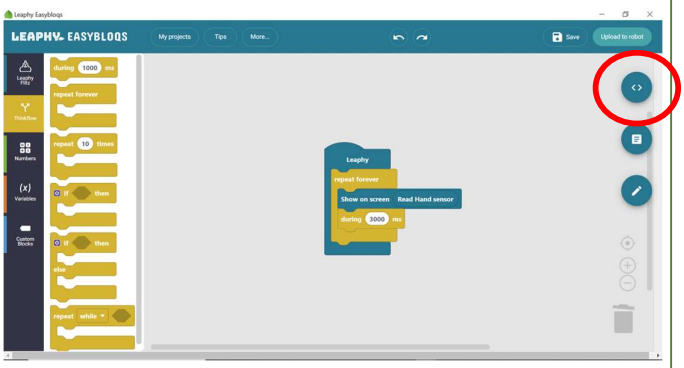
It can also be different. You can show the values that Flitz measures with the light sensor. How? Use the 'show' block. You can find this block in the top group 'Leaphy Flitz'

Assignment: Make the program as shown to the right and upload it to the Flitz.



The task now measures the amount of light in different places in the room. You do this by clicking on the arrow button. Now you can see the values that Flitz measures with the light sensor at the bottom right of the screen.

By clicking on the trash can, Flitz starts measuring again. Where is there more light, by the window or inside by the light?



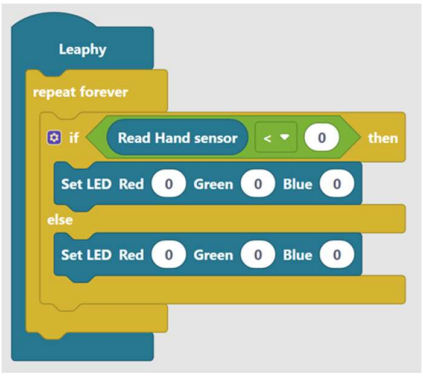
Level 10 – Pass it on!

In this level you will learn how to make the Leaphy Flitz pass its light on to another Leaphy Flitz robot. For this level you need more than 1 Flitz robot!

Level 9.1 – Hand sensor and LED

With the program on the right you can ensure that the nose light turns on when the hand sensor measures more light.

Assignment: Choose a color yourself and make sure the light turns on when it gets lighter. Determine with the serial monitor which value you have to enter. At what value of the hand sensor does the light always stay on for you?

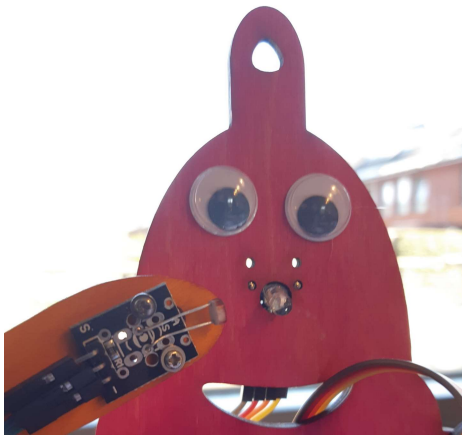


Level 9.2 – Flitz Passes It On!

With the hand sensor of one Flitz robot you can now also measure whether the nose light of another Flitz robot is on or off.

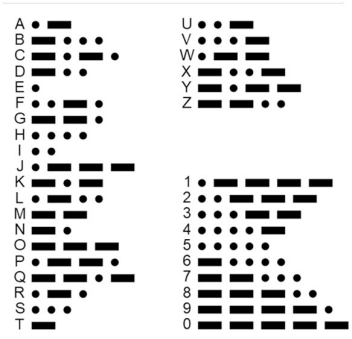
Assignment: Line up as many Flitz robots next to each other as possible. Make sure the hand sensor is close to the light of the Flitz next to it. Make sure your light comes on when the light of the Flitz next to yours comes on.

Can you program the Flitz robots to 'pass' a light from one Flitz to another Flitz?



Level 9.3 – Flitz and Morse code

Assignment: Can you also have the Flitz robots pass on a Morse code? Line up the Flitz robots and at the end of this 'chain' have someone decipher the Morse code that was given by the first robot in line.

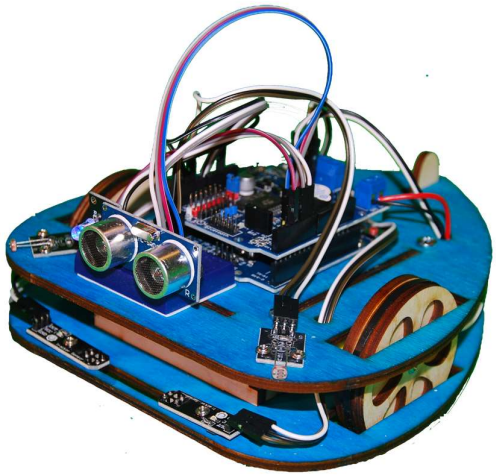


Flitz next level?

So that was it, or not? Have you gotten the hang of it and are you ready for the next level? Then take a look at our other robots on Leaphy.nl. Maybe the Leafy Original is something for you!

Have you come up with something new for the Leaphy Flitz? Let us know by sending an email to contact@leaphy.nl or post a message on our forum at Leaphy.nl.

The Leaphy Team



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