USER MANUAL

ScratchDuino

ScratchDuino.Lab

St.Petersburg
2015

JSC “Tyrnet”

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This User Manual explains how to operate ScratchDuino.Lab, which is an electronic device with built-in sensors of sound and light, an adjustable resistor, and interface to attach extra sensors.

The Manual contains the following information:

1. Instructions on installing the software for the three major operating systems (OS).
2. List of the components in the box, the methods for sensors testing and calibration. Essential information about the programming language Scratch needed for the work.
3. Examples of working scripts to use with the sensors.
4. Instructions on registering and placing individual projects at the portal wiki.scratchduino.com, as well as the opportunities of children's and adults' cooperation within the framework of the festival "ScratchDuino Libre Robotics".

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Installing the Software for ScratchDuino.Lab

Windows OS Family

To work successfully with ScratchDuino.Lab under Windows, it is necessary to install at least the visual programming environment for Scratch and Arduino UNO driver. In addition, advanced users might want to install along with the Arduino IDE the Arduino developer’s environment as well.

The software can be obtained from:

- the CD, shipped with ScratchDuino.Lab;
- the file server of the project — http://files.scratchduino.ru/;
- the official developers website.

Installation from the CD or from the File Server of the Project

How to install Scratch: run the installation file ../windows/Scratchduino.exe from CD or or download and run the installation file from the file server — http://files.scratchduino.ru/Software/Windows/Scratchduino.exe

The Installation Wizard will ask you to choose a language — choose English, then press Ок, Next, and Install. In a few seconds, two icons will appear at the desktop (or in the application list of the Start button, depending on individual setup)— Scratch and Scratchduino Robot (Fig. 1).

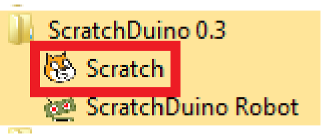


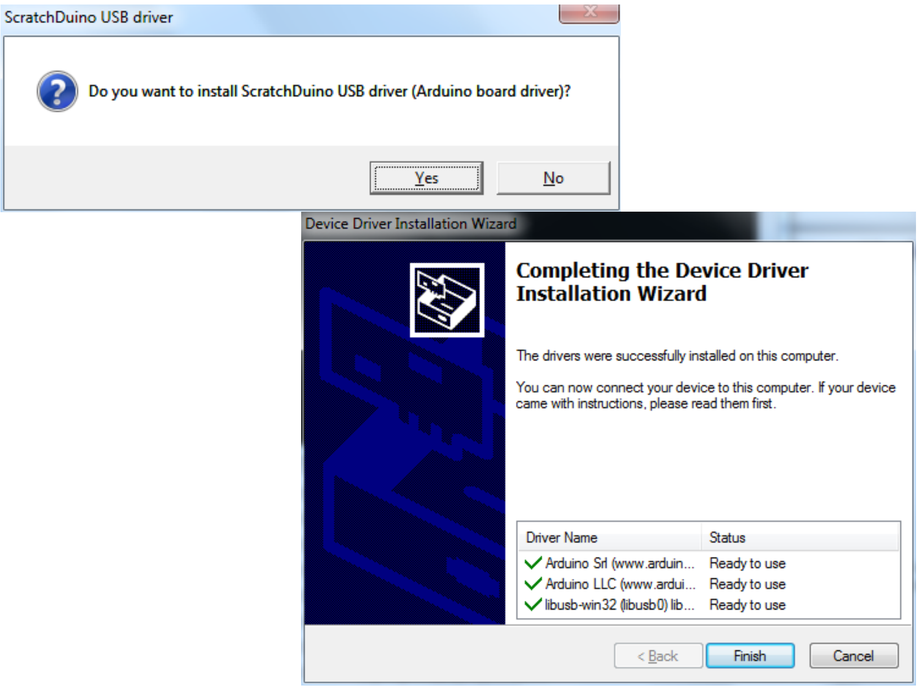
Fig. 1. The icons to appear.

To operate Scratchduino.Lab, the Scratch software is intended! To launch, click the Cat icon.

How to install the driver: run the executable../windows/ScratchDuino_drivers.exe from CD or download it from the file server —

http://files.scratchduino.ru/Software/Windows/ScratchDuino_drivers.exe.

and run.
In the dialog boxes of the Installation Wizard, click Yes, then Next, Install, and Finish.



ScratchDuino USB driver

Do you want to install ScratchDuino USB driver (Arduino board driver)?

Device Driver Installation Wizard

Completing the Device Driver Installation Wizard

The drivers were successfully installed on this computer.

You can now connect your device to this computer. If your device came with instructions, please read them first.

Driver Name	Status
✓ Arduino Srl (www.arduin...	Ready to use
✓ Arduino LLC (www.ardui...	Ready to use
✓ libusb-win32 (libusb0) lib...	Ready to use

Fig. 2. Dialog boxes of Installation Wizard.

A note for users: You will not find any Arduino IDE software either on the CD or on the file server of the project. This is intentional, as with Arduino IDE installed it is possible to reprogram the pre-programmed Arduino UNO cartridge. To avoid confusions, we do not recommend Arduino IDE installation for inexperienced users. Advanced users can install the Arduino IDE software from the developer’s website (see the next section).

How to Install the Software from the Developer’s Website

1. Download the installer for Scratch 1.4 from the developer’s website: http://download.scratch.mit.edu/ScratchInstaller1.4.exe.

Run the installer, choose English as installation language and follow the instructions of Installation Wizard. After a successful installation you’ll see the Scratch icon (Cat).

2. Download the fresh version of the Arduino IDE software from the developer’s website https://www.arduino.cc/en/Main/Software and follow the installation instruction — https://www.arduino.cc/en/Guide/Windows.

How to Connect ScratchDuino.Lab via USB Cable

Plug the USB cable, shipped along with ScratchDuino.Lab, into the USB port of the PC and into the Arduino UNO cartridge. To ensure the communication between the Scratch and ScratchDuino.Lab, you need to know the number of serial port connecting ScratchDuino.Lab to the PC. For this purpose, go to Device Manager, usually found at Control Panel.

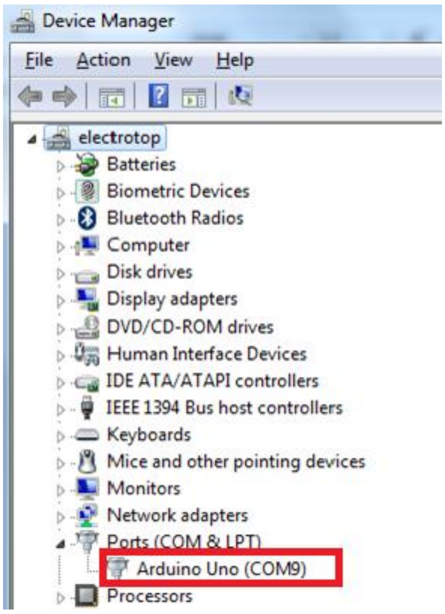


Fig. 3. A snapshot of Device Manager window, showing the number of serial (COM) port, to which the device is connected automatically.

Remember the number of the COM port! It is the port you'll need to select in Scratch. In Fig. 3, Arduino UNO matches the port COM9.

Connecting Scratchduino.Lab and Selecting a Port in Scratch
Launch Scratch. In the Scratch window that opens, select a blue block Sensing, then right-click on the block Sensor and select show ScratchBoard watcher (Fig. 4).

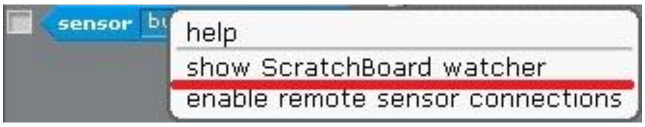


Fig. 4. Right-click menu of the Sensor block.

Right-click on the grey background and choose select serial/usb port (Fig. 5).

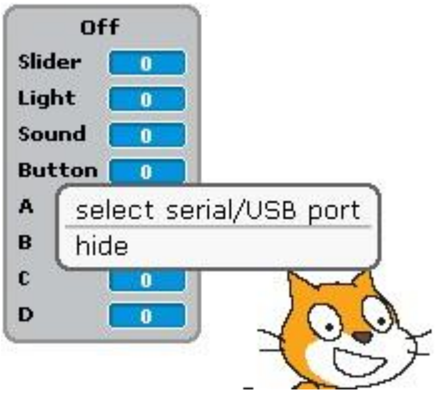


Fig. 5. Right-click menu of the ScratchBoard.

Select the port, to which ScratchDuino.Lab is connected, in the drop-down list.

Linux OS Family

There are three ways to install the ScratchDuino.Lab software for GNU/Linux OS family:

- Use the CD, shipped with the kit;
- Download the packages from the file server of the project http://files.scratchduino.ru/;
- Install from a dedicated repository containing the installation packages for ScratchDuino.Lab software: http://download.opensuse.org/repositories/home:/scratchduino/.

It is not recommended to install scratch_1.4 and virtual machine squeak-vm via the official repositories of your Linux distribution or download from the developer's website. In such a case, Scratch will not work with a serial port, and therefore, you will not be able to program ScratchDuino.Lab in Scratch. The version of the package for the virtual machine squeak-vm, based on which Scratch 1.4 operates, must be 4.0.3-2202.

Installation from the CD

The packages for installing the software under an OS of Linux family are on the CD in the ../linux folder. Installation packages are built for some of the most common Linux distributions (RHEL/CentOS, Fedora, Scientific Linux, Ubuntu, Debian, openSUSE, SLED), and found in a folder with the appropriate name mentioning the version of the distribution. If there is no distribution you need, select a distribution, closest to the desired. For example, to install ScratchDuino on Linux Mint 17, use the packages from the ../linux/xUbuntu14.04/ folder.

For Deb-based distributions, install the packages scratch 1.4.0.7, squeak-vm 4.0.3, and squeak-plugins-scratch.

For RPM-based distributions, install the packages squeak-vm 4.0.3 and scratch 1.4.0.7.

After the successful installation, you will find the launcher icons for Scratch (Cat) at your graphical desktop.

Besides you can run Scratch and ScratchDuino from the console; for this, type scratch at the command prompt.

Installation from the File Server of the Project

The installation is similar to the installation from the CD. Download the packages that match your Linux distribution, from

http://files.scratchduino.ru/Software/Linux/, and install them.

Installation from a Repository

— Add the repository for your distribution as described below:

— for openSUSE and SLE, type in the console the line

```
$ sudo zypper addrepo
http://download.opensuse.org/repositories/home:/scratchduino/XXXXXXX/
ScratchDuino
```

— for CentOS, RHEL, Fedora, and ScientificLinux, add a file /etc/yum.repos.d/scratchduino.repo, with the following contents:

```
[scratchduino]
name=ScratchDuino
type=rpm-md
baseurl=http://download.opensuse.org/repositories/home:/scratchduino
/XXXXXXX/
gpgcheck=1
gpgkey=http://download.opensuse.org/repositories/home:/scratchduino/
XXXXXX/repodata/repomd.xml.key
enabled=1
```

— for Debian and Ubuntu, add a line to the file /etc/apt/sources.list:

```
deb
http://download.opensuse.org/repositories/home:/scratchduino/XXXXXXX/ /
```

In all cases, XXXXXXX must be replaced with the name and version of your Linux distribution.

For Deb-based distributions, install the packages scratch 1.4.0.7, squeak-vm 4.0.3, and squeak-plugins-scratch from the added repository.

For RPM-based distributions, install the packages squeak-vm 4.0.3 and scratch 1.4.0.7 from the added repository.

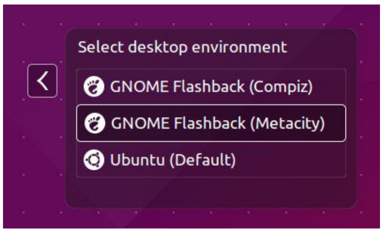
Post-Installation Configuring

After successful installation of the software to operate ScratchDuino.Lab, you will need to make some post-installation configuring.

— Arduino UNO is accessed via /dev/ttyACM<номер>. By default, the /dev/tty* devices are available to the users from the dialout group only. Therefore, the user who is going to work with ScratchDuino.Lab must belong to the dialout group.

! Add the user to the dialout group!

— If your Linux distribution is either Ubuntu 12.04 and later or an Ubuntu-based distribution (for example, Mint), you need to check your windows manager (WM). By default, it is Compiz. Unfortunately, Compiz can cause conflicts with Scratch. That's why it is recommended to install the package gnome-session-fallback (for Ubuntu 14.04 and later — gnome-session-flashback), so that the WM choice would be available at the login window (Fig. 6).



Select desktop environment

- GNOME Flashback (Compiz)
- GNOME Flashback (Metacity)
- Ubuntu (Default)

Fig. 6. Login window.

! When logging in, select the Metacity WM!

Connecting ScratchDuino.Lab and Selecting a Port in Scratch

Launch Scratch from the GUI or from the console. In the Scratch window that pops up, select the blue block Sensing, then right-click on the block Sensor and select show ScratchBoard watcher (Fig. 7).

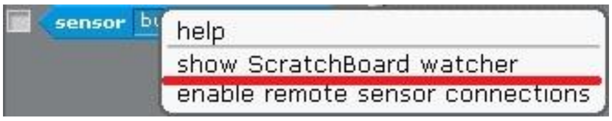


Fig. 7. Right-click menu of the block sensor.

Then right-click on the grey background and choose select serial/usb port (Fig. 8).

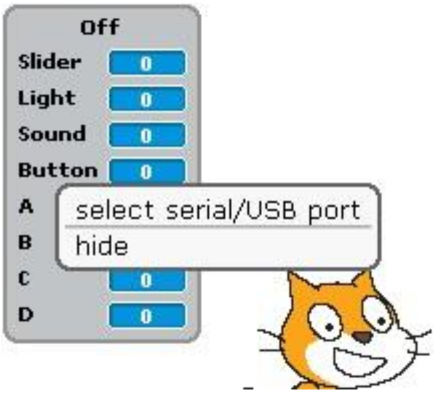


Fig. 8. Right-click menu of the ScratchBoard.

Select /dev/ttyACM0 in the drop-down list.

Mac OS Family

To install the software for Mac OS, it is possible to use the CD, shipped with ScratchDuino.Lab, or to download the installation files from the file server of the project.

On the CD, the installation file is in the ../mac/Scratch.dmg folвer.

The link to download from the file server is http://files.scratchduino.ru/Software/Mac/Scratch.dmg.

To install the software, just open Scratch.dmg and drag the Scratch folder into the Application folder (Fig. 9).

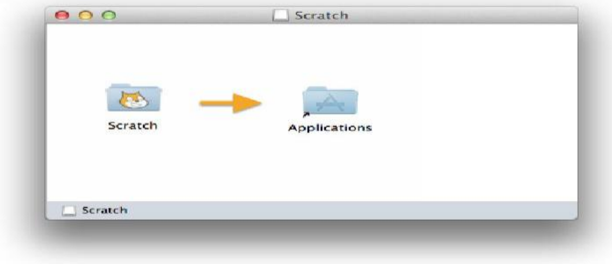
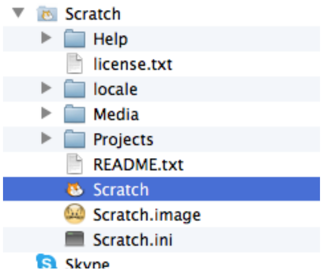


Fig. 9. The window looks like that.

Open Application in a file manager, go to the Scratch folder, and run the executable (Fig. 10).



Scratch
Help
license.txt
locale
Media
Projects
README.txt
Scratch
Scratch.image
Scratch.ini
Skype

Fig. 10. Running the executable.

Connecting ScratchDuino.Lab and Selecting a Port in Scratch

In the Scratch window that appears, select the blue block Sensing, then right-click on the block Sensor and select show ScratchBoard watcher (see Fig. 7). Then right-click on the grey background and choose select serial/USB port (see Fig. 8). Select /dev/cu.usbmodem1411 in the drop-down list.

Components of the Kit

ScratchDuino.Lab (“Digital Laboratory”) is intended for laboratorial and illustrating experiments, research projects of the students, and hands-on training at the IT-classes and the lessons on natural sciences in primary and secondary schools, 5–11 grades.

The equipment includes:

- Arduino UNO microcontroller with the options of standalone operation and cinnection to a PC with monitor;
- built-in sensors (see Fig. 13);
- attachable sensors (Fig. 11), designed for metering the parameters of objects at study by the external devices.

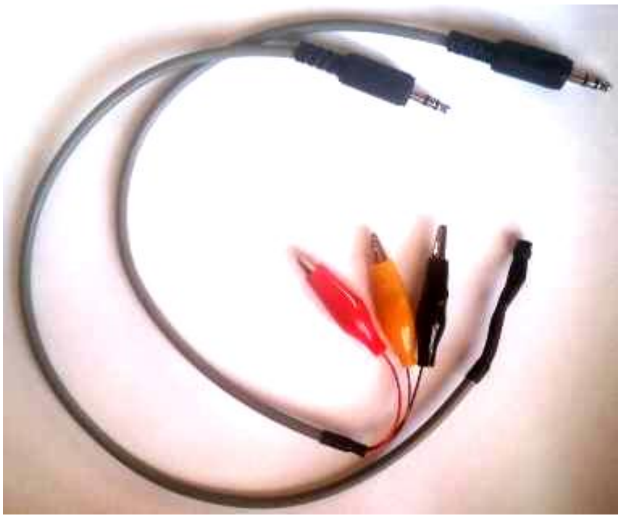


Fig. 11. Attachable temperature sensor and connecting cable with three crocodile clips.

Fig. 12. 180-cm-long cable to connect ScratchDuino.Lab to a PC.

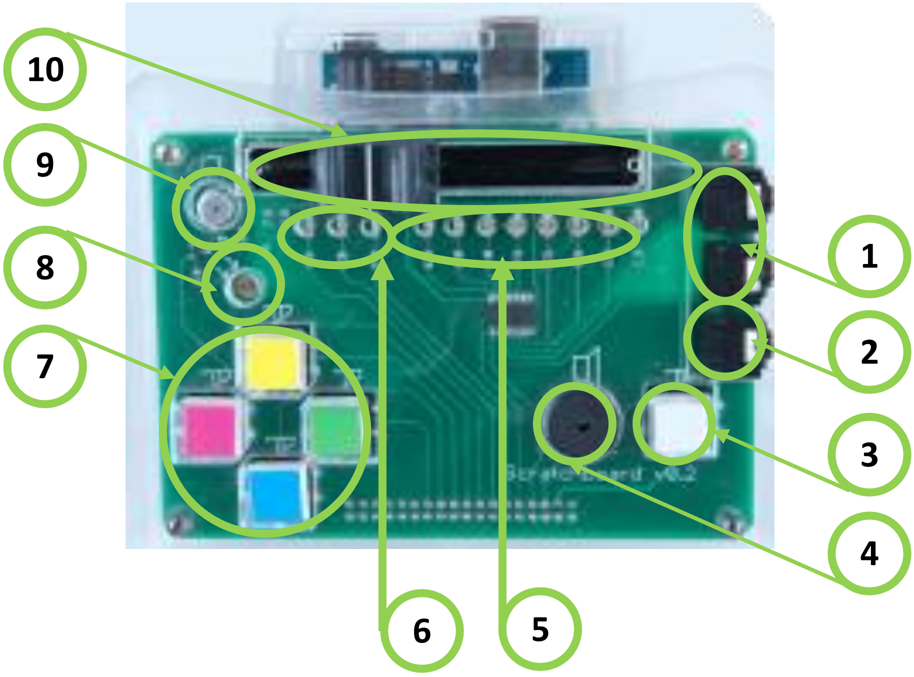


Fig. 13. Components of ScratchDuino.Lab circuit board:
1— Sockets for additional analog sensors
(resistance-A and resistance-B variables[1]);
2 — Digital input for an external device; 3 — Button (Button variable);*
4 — Speaker; 5 — Controllable matrix of eight LEDs;*
6 — Three LEDs (red, yellow, and green), each at its own digital input;*
7 — Four buttons (resistance-A, resistance-B, resistance-C,
and resistance-D variables);
8 — Light sensor (Light variable); 9 — Sound sensor (Sound variable);
10 — Adjustable resistor (Slider variable).

* Additional items, for which a modified version of ScratchBoard is needed.

The kit also includes:

- the cable to connect the ScratchBoard to a PC (see Fig. 12);
- a CD with the software;
- User Manual;
- written guarantee.

[1] The said variables are used in the Scratch programming language, which is considered later.

Sensors Testing and Calibration

To be able to compose the programs, it is important to study the response of the sensors and the values taken by the buttons of ScratchDuino.Lab. Despite their being standard, the sensors in different kits of ScratchDuino.Lab can have their own individual ranges of sensitivity.

Table 1. Sensitivity Ranges and Values Taken by the ScratchDuino.Lab Buttons

Sensor or button (name of the variable)	Min	Max
Light sensor (Light variable)	12	98
Sound sensor (Sound variable)	23	100
Adjustable resistor (Slider variable)	0	100
Black button (Button variable)	false	true
Four buttons (resistance-A, resistance-B, resistance-C, and resistance-D variables)	0	100
Temperature sensor (when connected, uses the resistance-A variable)	0,6	22,5

Calibration of Light Sensor
To calibrate a light sensor, a meter of illuminance is used. In our case, it is digital luxmeter LX101. The measurements shown in Table 2 and in Fig. 14.

Table 2. Relation between the Meterage of ScratchDuino.Lab Light Sensor and Luxmeter LX-101

Luxmeter LX-101, lx	1	3	11	22	37	42	53	63	75	83	92	110	220	320	440	562
Light sensor	12	47	60	65	67	67	69	70	70	71	72	73	75	82	86	90

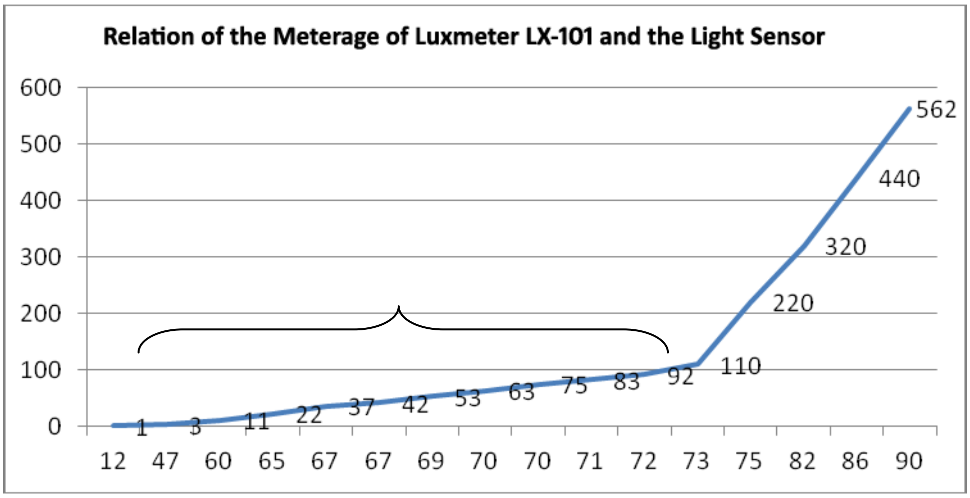


Fig. 14. Area of linear dependency (confidence range) between the Luxmeter LX-101 and the light sensor of ScratchDuino.Lab meterage curves.

Using the Luxmeter LX-101 user manual's guidelines on recommended level of luminance at working places (Fig. 15), it is possible to assume that the built-in light sensor of ScratchDuino.Lab can be with great confidence used as a luxmeter at a luminance of up to 100 lx calculated by Formula 1. This formula is obtained as per a trend line (approximation of the function) for the light sensor values from 12 to 73.

$$y = x - 15{,}62 \qquad (1)$$

confidence range of the sensor

LOCATION	RECOMMENDED LUMINANCE AT WORKING PLACE, lx															
	1000	5000	3000	2000	1500	1000	750	500	300	200	150	100	75	50	30	20
OFFICE				Typing Drawing works	Office work			Conference hall Canteen Reception office			Corrifor Stairways	Entrance Stock- room	Inner escape stairways			
HOME				Sewing		Reading Learning		Face- painting	Dining table	All kinds of relaxat- ion	Laun- dering					
HOSPITAL		Eyesight testing			Operation theatre Emergency aid		Examination room Canteen			Reception room	Doctor's office Stock- room	Stair- ways	Escape stairways			
SCHOOL					Drafting room Library		Classrooms		Gym Restroom Lecture halls				Escape stairways			

Fig. 15. Recommended luminance at working places and the confidence range of ScratchDuino.Lab light sensor.

Calibration of Sound Sensor

The measurements are made in a room at complete silence. In this case the sensor indicates the value 23. The natural sounds (voice, music etc.) correspond to a range of 60–80. A maximum of 100 can be achieved when you make a vigorous breathing-out into the sensor. To identify the functional dependence of the sensor sound in decibels (dB), you need to use a digital phonometer. Methods of measurements and the derivation of a formula are similar to those described for the calibration of light and temperature sensors.

The Values Taken by Adjustable Resistor Slider

At the leftmost position it reads as 0, at the rightmost position — as 100.

The Values Taken by Black Button

On pressing this button, its value toggles from false to true and vice versa.

The Values Taken by Coloured Buttons

On pressing any of these buttons, its value toggles from 0 to 100 and vice versa. All the buttons have a usual group of contacts: a couple of fixed contacts and a movable contact between them. At the movable contact, a rod is fastened that protrudes out of the case of the circuit board.

Calibration of Temperature Sensor

To calibrate a temperature sensor, we are going to measure the temperature of water being continuously heated up, and we put the readings, taken from a thermometer and from a sensor panel, into Table 3. Make a graphical plot based on the data of the table (Fig. 16).

Table 3. Relation between the Values Taken from the Attachable Temperature Sensor and the Household Thermometer

Термометр, градусы	0	5	10	15	20	25	30	35	40	45	50
Датчик температуры, ед.	0,6	2,2	4,3	6,7	9	11,1	13,7	15,8	17,9	20,2	22,5

The trend line (approximation of the function) shows that the relation between the values taken from the attachable temperature sensor and from the household thermometer is *linear* and can be expressed by Formula 2:

$$y = 0,4497x - 0,4165 \qquad (2)$$

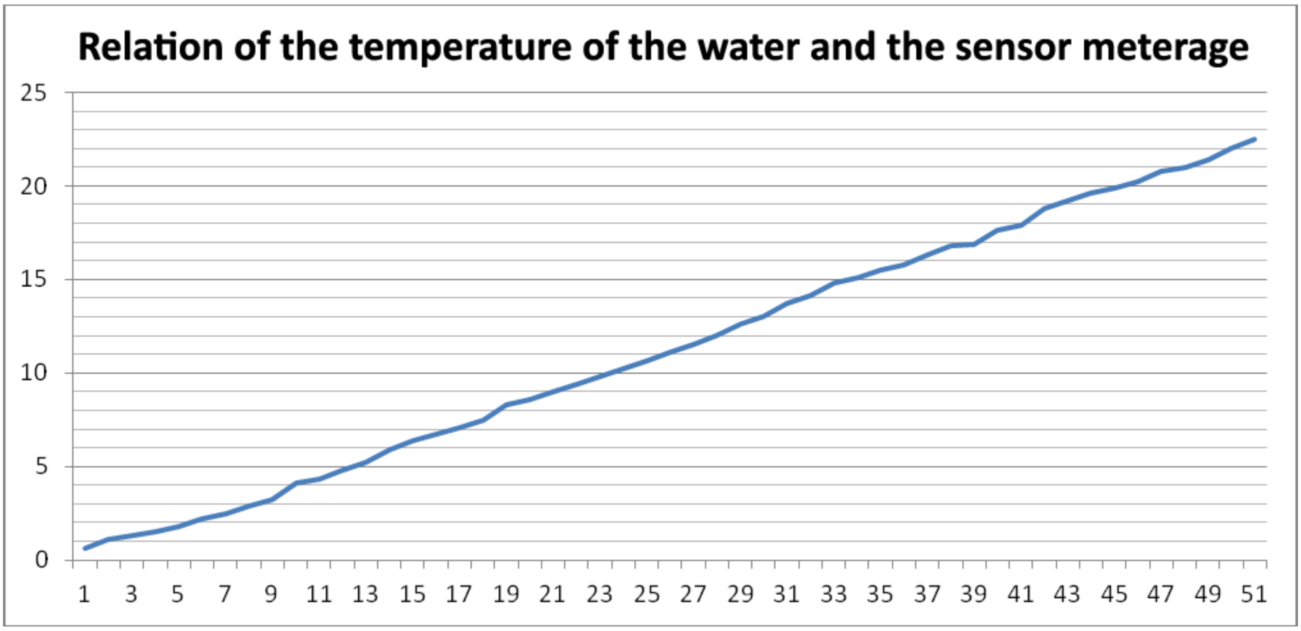


Fig. 16. The relation between the data obtained from the attachable temperature sensor and from the household thermometer.

For a whole host of projects, not only direct but also an inverse dependency of the said meterages can be required. To that effect, just derive the inverse relationship, expressing x by y:

$$x = 2{,}2237y + 0{,}9261 \qquad (3)$$

Sensors calibration Calibration of the sensor is a specific area of educational research performed using the ScratchDuino.Lab. The measurements can be made by different meters and following different methods. The measurement errors also can differ. Within the framework of ScratchDuino community (see about it below), you can offer your own meterage and formulas. You can also share with other members of this community the experience concerning the calibration of the sensors, the ones shipped with the kit or additional.

Basic Concepts of Scratch

Scratch is a computer model of the real world. Its environment with the items of graphical user interface (GUI) is shown in Fig. 17.

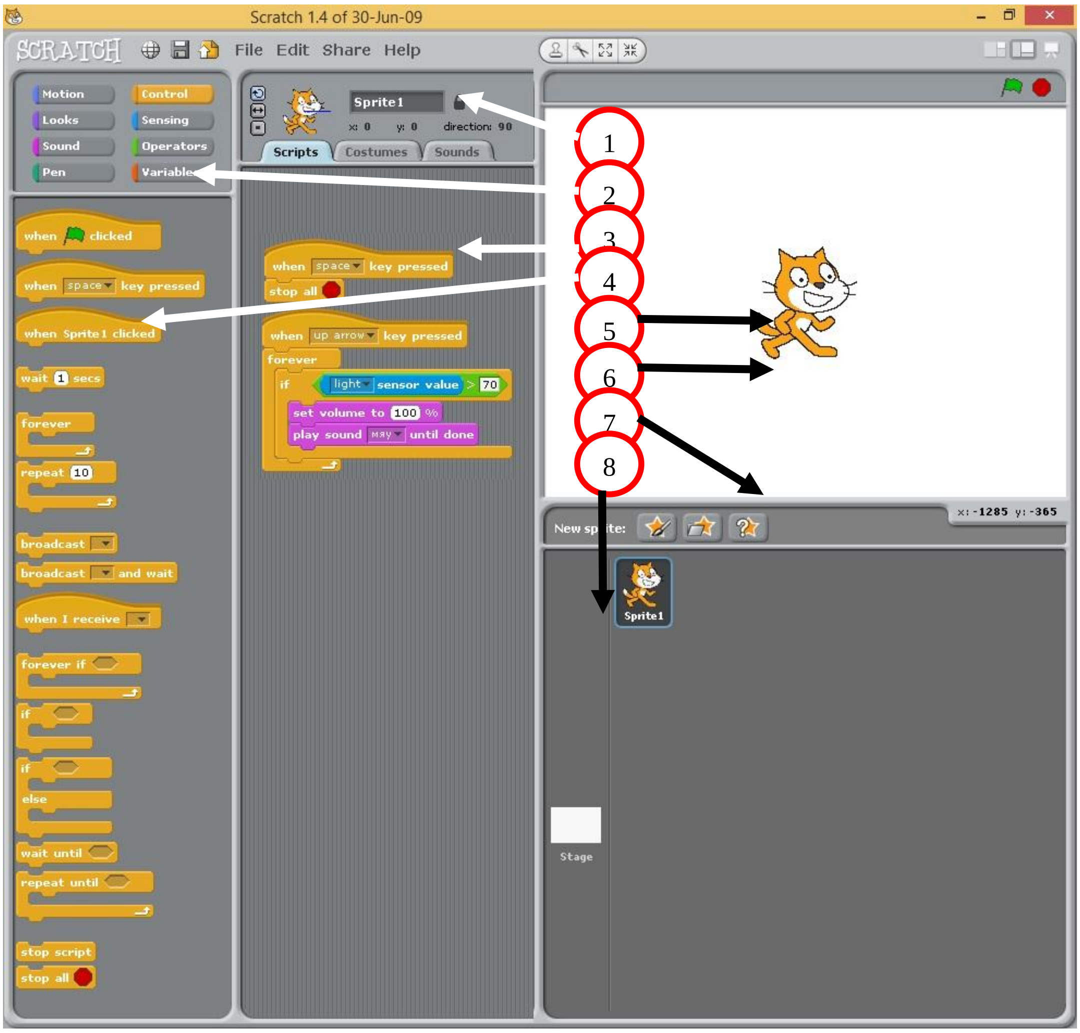


Fig. 17. The Scratch environment:
1 — Info Panel; 2 — the Block Palette (groups of commands);
*3 — the Script Area; 4 —*Control *group; 5 — the Actor (sprite);*
6 — background of current Stage; 7 — the Sprites Panel; 8 — the Stage area.

The world of Scratch consists of many objects (the word “object” stems from Latin *objectum*, which means *a thing*) populating a common space. The *objects* are anything that exists in the nature: people, animals, wind, snow, tree, sun, letters, ice-cream, candies and all.

The objects can also be *Actors* to implement the algorithms.

An *algorithm* is an exact, step-by-step instruction determining the behaviour of the Actor(s) that brings the data (*taken, for example, from the ScratchDuino. Lab sensors*) to a required result. Development of an algorithm is a creative process. An algorithm can be represented as a script.

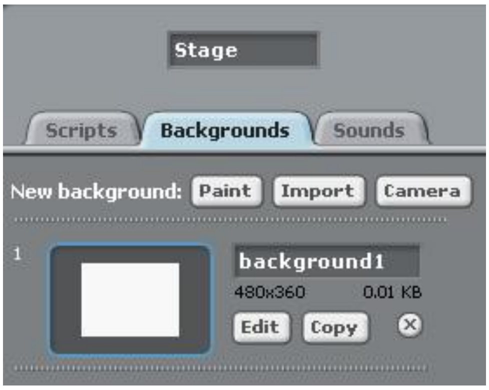
Scripts in Scratch and in *ScratchDuino* are made of ready blocks-commands, resembling the bricks of Lego. This syntax is quite intuitive. To make a script, you have to join several blocks (just snap them together in the Script Area). The blocks and the order they follow each other are important, because they define what an Actor is going to do.

Actors in Scratch are depicted by *sprites* (Sprite is a supernatural creature, an elf), while the space where the events are happening is a *Stage*. The Stage can be an Actor too. The stories in Scratch are described using the algorithms. There are only two kinds of Actors in Scratch: the Stage and the sprites.

Sprites, either created by the users, or downloaded or found in a sprite library, are the Actors that operate within the project. Many projects include, as a minimum, one sprite that can move around the project screen, unlike the stage.

Except for running the commands, a sprite can change its *costume*. The appearance of a sprite can be changed directly or with the commands in the scripts editing area. To change a costume, you need to go to the Costumes tab, found next to the Scripts and Sounds tabs. The Costumes tab contains the whole list of costumes, and the costumes can be modified or imported from a sprite library or from your PC. You can create and add a new costume as well.

The *Stage* includes a set of images found under the Backgrounds tab (Fig. 18), which are background for the sprites' actions. On launching the program, a background image is ready: it is a white rectangle, 480-pixel wide and 360-pixel high. A "pixel" is a dot, a minimal component of rasterized computer graphics.



Stage

background1
480x360 0.01 KB

Fig. 18. The Backgrounds Tab.

The *command set* for the sprites consists of 125 commands, while for the stage there are 85 of them. This set allows for the implementation of a vast variety of algorithms. All the commands are found at the top-left pane of the program window (the Block Palette), distributed into eight groups. The groups are highlighted with different colours: Motion, Looks, Sound, Pen, Control, Sensing, Operators, and Variables.

Projects in ScratchDuino consist of several scripts for the sprites, performed simultaneously (in parallel) using one or more costumes (Fig. 19).

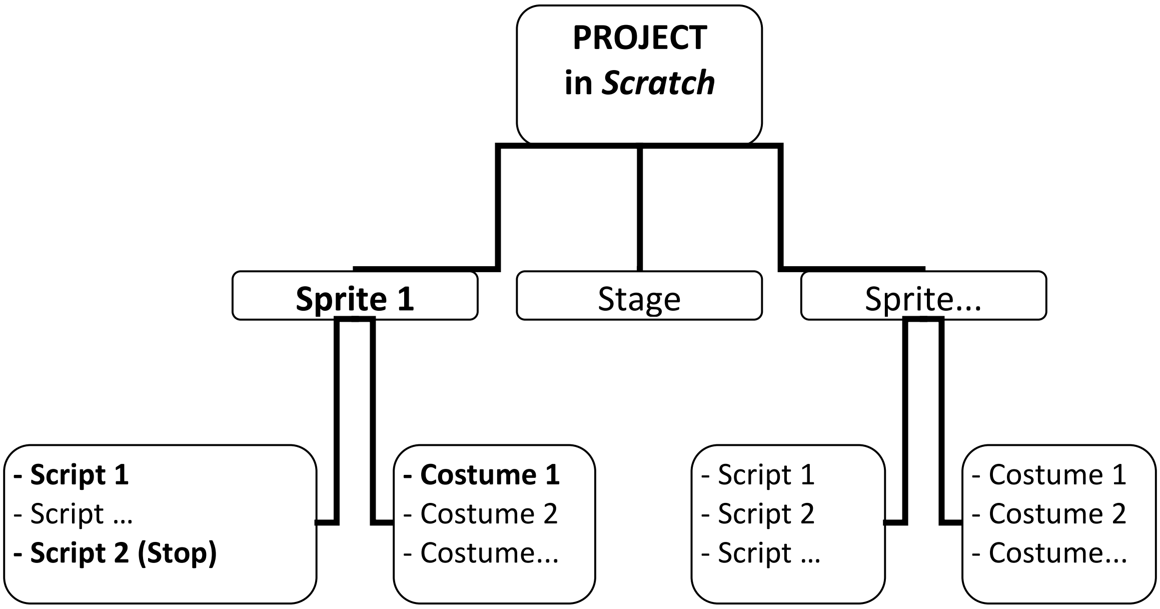


Fig. 19. The structure of a project in Scratch.
Highlighted is the mandatory part.
The rest depends on the author's design.

To describe the projects in Scratch, the following pattern is used:

- theme;
- requirements to meet;
- description of the project progressing and/or explanations for the script;
- the picture of the script.

Basic Algorithms of Scratch

The algorithms can be divided into three kinds as of their structure: *linear*, *branching*, and *loops*.

Linear algorithm is such one, for which all the commands are done one after another and only once. Its script is a sequence of blocks, following from top to bottom in the order of their performing.

Theme: "The Crab Draws the Stairs".

Requirements:

- the Actor is the Crab;
- the drawing is made like in an animated cartoon;
- an easy option to change the number of stair-steps and their size is provided;
- the script runs if the value of Slider variable is greater than 50.

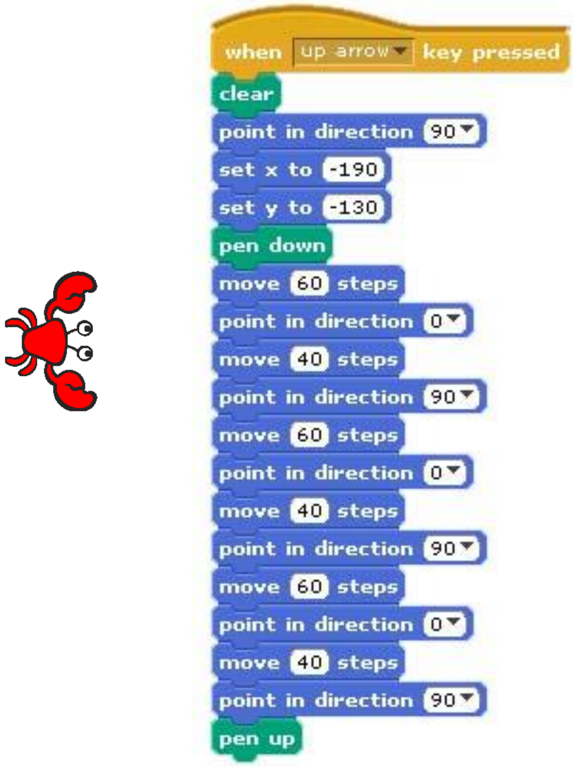
Implementation of the project "The Crab Draws the Stairs"
using a linear algorithm

We have to teach our Crab to draw the stairs. The Crab lives in a rectangular field of a size 480×360 pixels and knows how to locate a place in the field by its *coordinates*[2]. The Crab can make a prescribed number of moves; wait; and point in the directions left and right by 0, 90, and 180 degrees. The Crab has a pen that leaves a line when put down. A script for the Crab is shown in Fig. 20. As per this script, the Crab draws 3 steps (Fig. 21). The script starts running on pressing the "up arrow" key.

If you use a purely linear algorithm:

- the process of "building" the stairs is not visible, but the picture appears instantly;
- changing the number of stair-steps needs to make the script longer and to edit numeric values in each block, so this method cannot be called easy;
- the requirement concerning the Slider cannot be met.

[2] It is reasonable to start studying Scratch since the 5th grade, as the students have to be aware of some mathematical notions, such as "coordinate plane", "positive and negative numbers", "decimal fraction", "degree measure of angles" etc. However, simple projects can be implemented in primary school as well.



```
when up arrow key pressed
clear
point in direction 90
set x to -190
set y to -130
pen down
move 60 steps
point in direction 0
move 40 steps
point in direction 90
move 60 steps
point in direction 0
move 40 steps
point in direction 90
move 60 steps
point in direction 0
move 40 steps
point in direction 90
pen up
```

Fig. 20. Linear algorithm to draw the stairs.

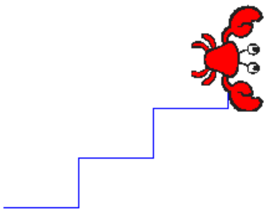


Fig. 21. The result of linear script for Sprite 1 in a Crab costume at a Stage with white background (courtesy of crab1-a collection).

Conclusion 1. When only the *linear algorithm* is used, you cannot meet all the requirements.

Loop algorithms. A loop is a series of commands to be repeated until a specified condition becomes true. Thanks to the operators controlling the loop, the script can be done much shorter. Scratch provides the blocks for four kinds of loops: unconditioned (endless); with a counter; with a pre-condition; and with a post-condition (Fig. 22).

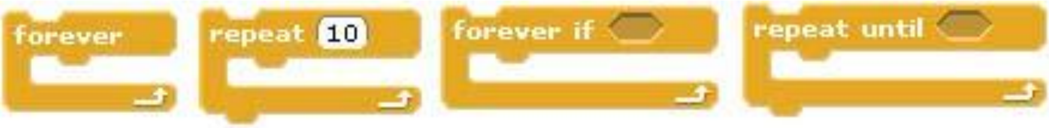
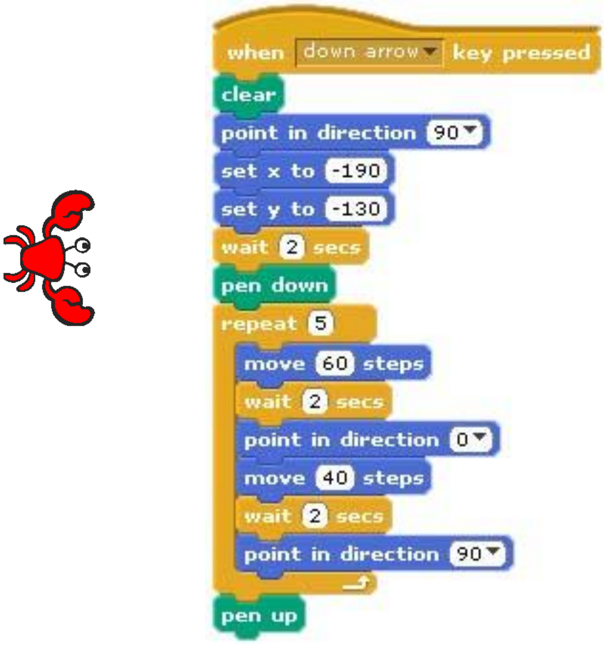


Fig. 22. Loops in Scratch.

Implementation of the project "The Crab Draws the Stairs"
using a linear algorithm and a loop

It is easy to notice that in Fig. 20, a set of commands is repeated: make 60 moves, point in the direction 0° (upwards), make 40 moves, point in direction 90°. That means we can use a loop.



```
when down arrow key pressed
clear
point in direction 90
set x to -190
set y to -130
wait 2 secs
pen down
repeat 5
    move 60 steps
    wait 2 secs
    point in direction 0
    move 40 steps
    wait 2 secs
    point in direction 90
pen up
```

Fig. 23. A loop.

Notice that the script in Fig. 23 is shorter than in Fig. 20, and the Crab has drawn 5 stair-steps (Fig. 24). Now it will be enough to change the value in the repeat box, and you will have as many stair-steps as you like. If we change the number of the moves (the height of a stair-step) from 40 to 20 in just one block, all the stair-steps will change.

When we use a loop:

— the process of "building" the stairs is not visible anyway;

- we have managed to meet the requirement about easily changing the number and the size of the stair-steps;
- the requirement concerning the Slider cannot be met yet.

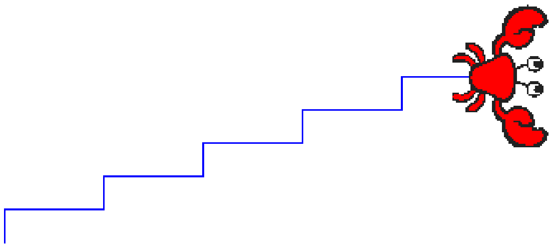


Fig. 24. The result of script with a loop for Sprite 1 in a Crab costume at a Stage with white background (courtesy of crab1-a collection).

Conclusion 2. When only the *linear algorithm and a loop* is used, you cannot meet all the requirements of the project “The Crab Draws the Stairs”.

Branching algorithms. An algorithm is called branching if it has several options to choose for a further action. The choice can be simple (in case of two alternative options) or complicated (when there are more than two options) (Fig. 25).

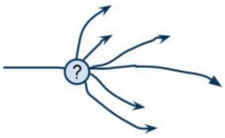


Fig. 25. A complicated choice.

The moment of a choice is called the branching point. Branching is one of the three basic structures of algorithms (along with the linear flow of commands and the loop). All the programming languages have special operators (or commands) — conditional operators, to implement an action depending on a stated condition. *Scratch* has three conditional operators in its Control group: complete branching (IF-THEN-ELSE), incomplete branching (IF-THEN), and pause (WAIT UNTIL) (Fig. 26).

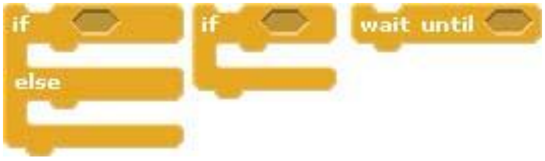


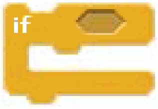
Fig. 26. Conditional operators in Scratch.

Implementation of the project "The Crab Draws the Stairs"
using a linear algorithm, a loop, and a branching

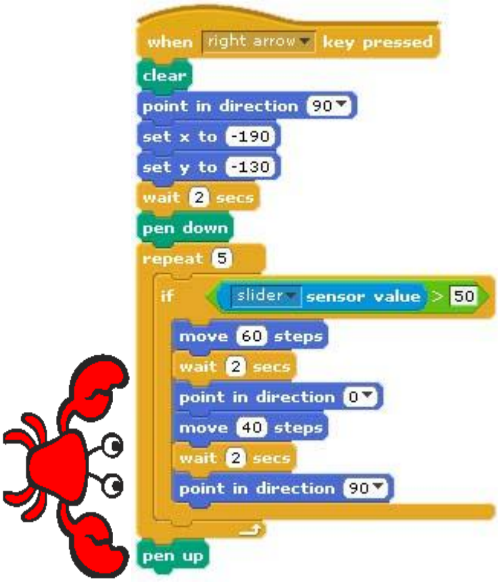
As shown in Fig. 27, the ready script (Fig. 23) was added by:

1) two blocks of pauses

, enabling you *to see (like in an animated cartoon*[3]*)* the process of drawing the stairs;

2) a block of incomplete branching 

, that checks the value of the Slider variable from the connected ScratchDuino.Lab. In accordance with the specified condition, the script runs if the Slider rests at the right-hand side of its "lane", that is, the value of the Slider variable is greater than 50.



```
when [right arrow] key pressed
clear
point in direction 90
set x to -190
set y to -130
wait 2 secs
pen down
repeat 5
    if <[slider] sensor value > 50>
        move 60 steps
        wait 2 secs
        point in direction 0
        move 40 steps
        wait 2 secs
        point in direction 90
pen up
```

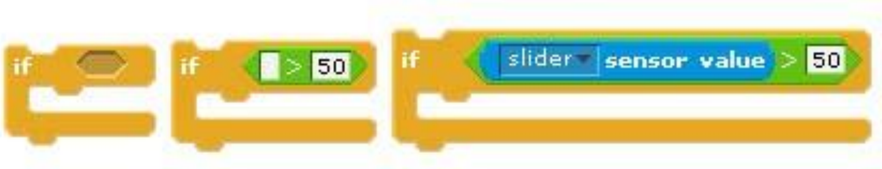
Fig. 27. An algorithm with branching.

Conclusion: The project can be implemented in full only in case when all three kinds of algorithms (*linear*, *loop,* and *branching*) are used.

[3] Such delay, convenient for human eye, belongs to the methods of developing the projects with animation.

How to “build” a block checking a condition

Fig. 27 shows a block checking a condition. Such block is “built” as follows: you “drag”, one after another, the block IF-THEN (from the Control group), a logical expression (from the Operators group), and the sensor value (from the Sensing group) (Fig. 28).



```
if
if [ ] > 50
if slider sensor value > 50
```

Fig. 28. How to “build” a block checking a condition.

The numeric value can be changed in the Edit field.

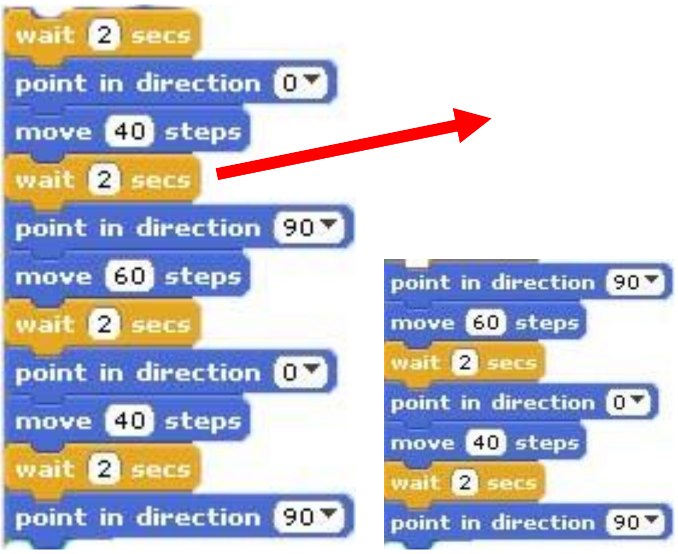
Editing the script

If you need to remove a block from a ready script, the rule “Detach at the bottom” is used. As an example, to remove a block from the script in Fig. 29 (the block is marked by a red arrow), you have to:

1) “tear away” the piece of the script below the block that you want to remove, putting this piece aside;

2) “tear away” the said block in the same way;

3) bring back the former “torn away” piece and snap it to the bottom of the upper piece of the script.



```
wait 2 secs
point in direction 0
move 40 steps
wait 2 secs
point in direction 90
move 60 steps
wait 2 secs
point in direction 0
move 40 steps
wait 2 secs
point in direction 90
```

```
point in direction 90
move 60 steps
wait 2 secs
point in direction 0
move 40 steps
wait 2 secs
point in direction 90
```

Fig. 29. The way to remove a block from the script.

Projects To Make Use of the ScratchDuino.Lab Components

Buttons

ScratchDuino.Lab allows you to operate virtual Actors. Consider using the buttons (*resistance-A*, *resistance-B*, *resistance-C, and resistance-D variables*).

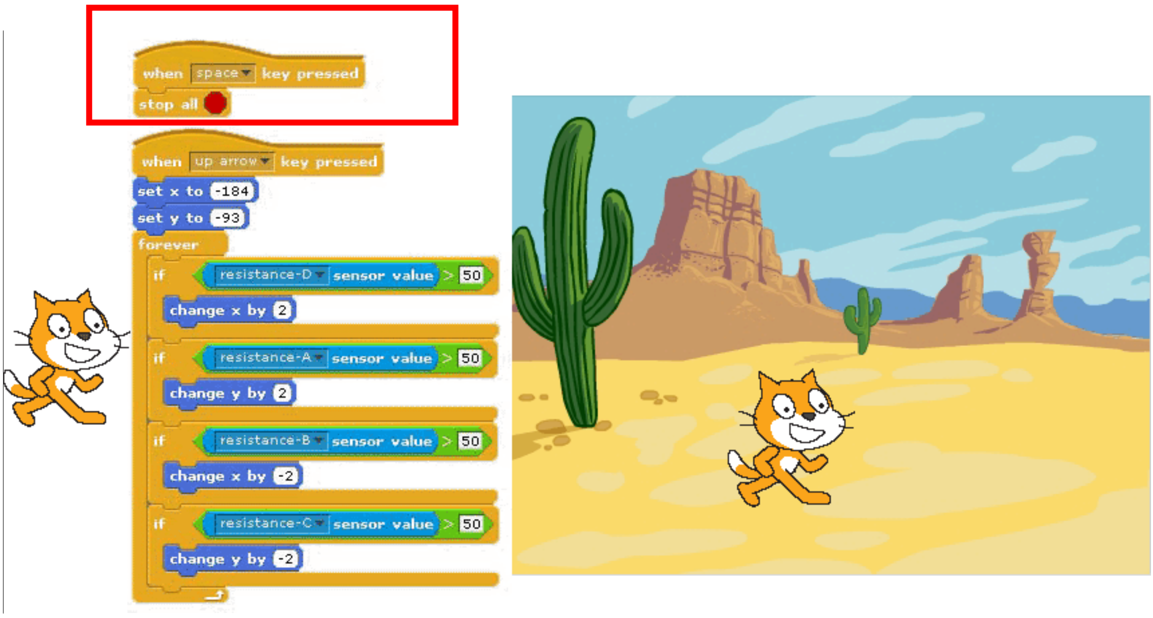
Theme: “The Cat’s Journey”.

Requirements:

- for the “journey”, an appropriate picture is set as a background;
- on pressing the coloured buttons of ScratchDuino.Lab, the Cat must move rightwards, leftwards, upwards, and downwards;
- the script stops on pressing the space bar of the keyboard.

Implementation

Click on the Stage and select the Background tab. Select New background and click the Import button. A window with ready images will open. Select the Nature folder and in this folder, select the file desert.



```
when space key pressed
stop all

when up arrow key pressed
set x to -184
set y to -93
forever
    if resistance-D sensor value > 50
        change x by 2
    if resistance-A sensor value > 50
        change y by 2
    if resistance-B sensor value > 50
        change x by -2
    if resistance-C sensor value > 50
        change y by -2
```

Fig. 30. Two sample scripts to control a sprite in a Cat costume (file cat1-a) with the ScratchDuino.Lab keys. Framed is the first script that stops all scripts on pressing the space bar.

Slider

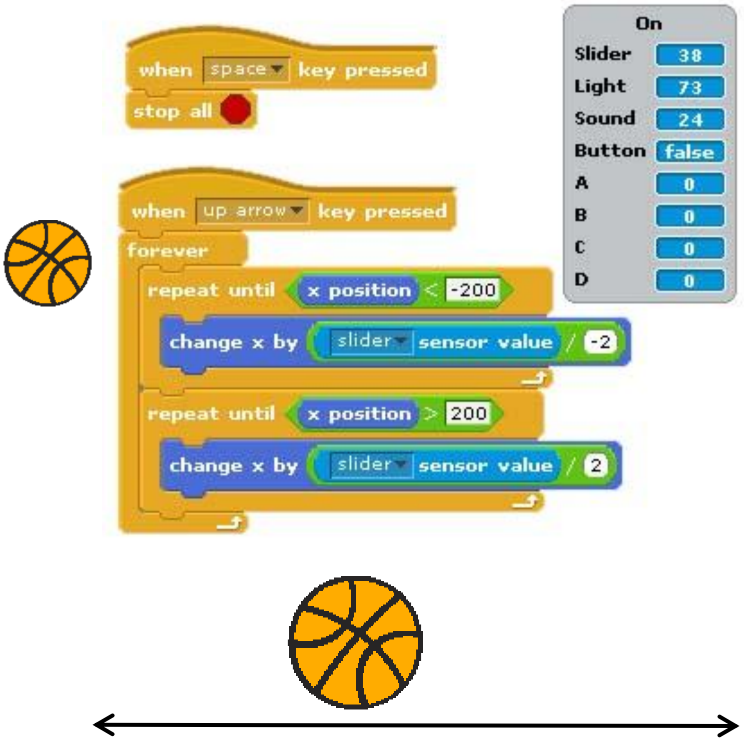
Theme: “Varying the Speed of the Ball by Slider”.

Requirements:

- the Actor is the Ball;
- launching the script, the Ball starts to move horizontally “back and forth”, bouncing from the walls within the Stage;
- the speed of the Ball is controlled with Slider;
- the script stops on pressing the space bar of the keyboard.

Implementation

The key idea of the solution is to change the coordinate step along the x axis. The effect of bouncing at the border of the Stage is implemented through a comparison of the current coordinate of the Ball (x position) and the coordinates of the left and right borders of the Stage: 200 and -200.



```
when [space] key pressed
stop all

when [up arrow] key pressed
forever
  repeat until <(x position) < -200>
    change x by ((slider sensor value) / -2)
  repeat until <(x position) > 200>
    change x by ((slider sensor value) / 2)
```

```
On
Slider   38
Light    73
Sound    24
Button   false
A        0
B        0
C        0
D        0
```

Fig. 31. The script and the result of its performance.

Sound Sensor

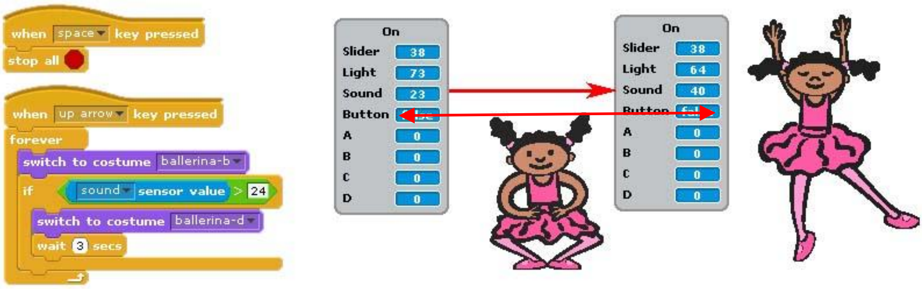
Theme: “Hop on a Signal (a clap or a word uttered)”.

Requirements:

- the Actor is the Dancer;
- when the script is launched, you can see the Dancer ready to hop;
- on a loud shriek (or a clap of your hands), the Dancer hops and returns to initial position in 3 seconds;
- if the noise level in the room is greater than 24 all the way (for example, some music is playing), the Dancer still returns to initial position in 3 seconds (to have a rest) and then hops again;
- the script stops on pressing the space bar of the keyboard.

Implementation

Knowing the value at which the sound sensor reacts to a loud sound (a clap), you can choose the value to be put into the condition box. The solution is to change the costume of one sprite depending on the result of the check. Fig. 32 shows that on changing the sensor value (greater than 24) the costume is changed.



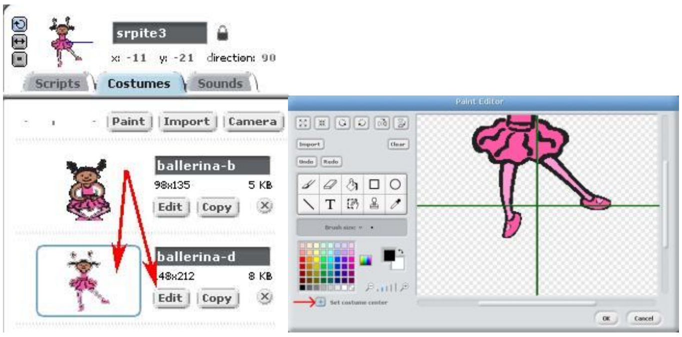
```
when space key pressed
stop all

when up arrow key pressed
forever
  switch to costume ballerina-b
  if sound sensor value > 24
    switch to costume ballerina-d
    wait 3 secs
```

On	
Slider	38
Light	73
Sound	23
Button	[illegible]
A	0
B	0
C	0
D	0

On	
Slider	38
Light	64
Sound	40
Button	[illegible]
A	0
B	0
C	0
D	0

Fig. 32. The script and the result of its performance.

The effect of a hop is achieved by changing the center of the second costume (Fig. 33).



srpite3
x: -11 y: -21 direction: 90

ballerina-b
98x135 5 KB

ballerina-d
48x212 8 KB

Fig. 33. Location of the new center for the costume ballerina-d.

Theme: “Show Your Magnitude!”

Requirements:

- two Actors are the Recorder and the Bat;
- the Recorder draws a red line which is the sound magnitude;
- the Bat hovers somewhere, “hears” the sounds, and “remembers” the maximal value of the Sound variable, displaying it in a cloud (Fig. 34);
- the value of the move is varied by the Slider;
- on pressing the space bar, all the scripts stop running, the picture disappears, and the Recorder is sent to initial position (bottom-left corner of the Stage).

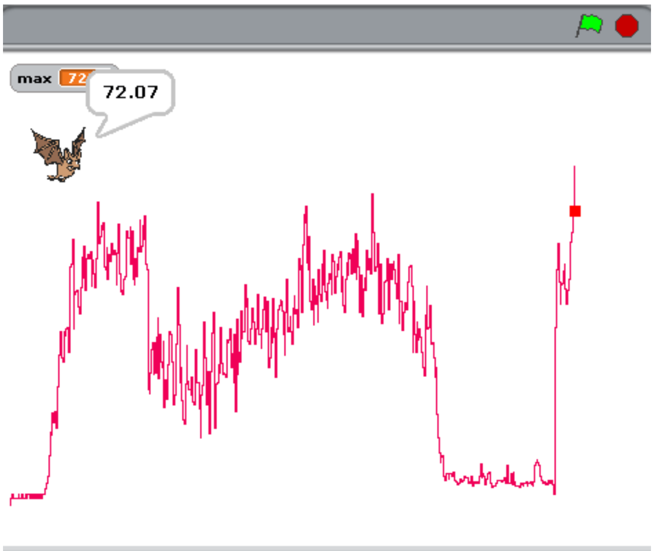


Fig. 34. The magnitude shown when the song Ohne dich (Rammstein) is played. The maximal magnitude is 72.

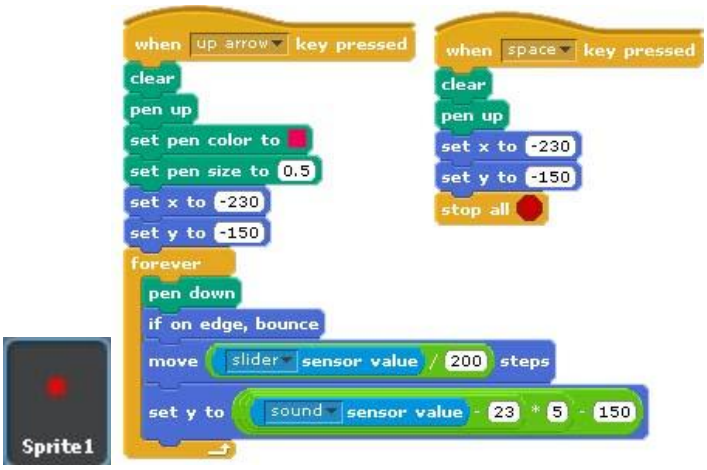
Implementation

Create two sprites (Fig. 35):

- on your own, make a red square which is the Recorder;
- take the Bat from the collection.

Fig. 35. Sprites for the project “Show Your Magnitude!”

As per our study of the sound sensor (see above), its minimal value at silence is 23. Therefore, you need to subtract this number so that the magnitude in the field would be zero. The sensitivity range is 23 to 93, that is, approximately 70 units, while the Stage to show the magnitude is 360-pixel high. Dividing 360 by 70, we obtain the multiplier for the magnitude to fit into the Stage. "-150" is the value of the step to move the picture downwards along the y axis, as the coordinate center of the sprite (a point of (0;0) coordinates) is in the middle of the Stage. The Slider's range is 0 to 100. Dividing by 200 allows to vary the step from 0 to 0.5.

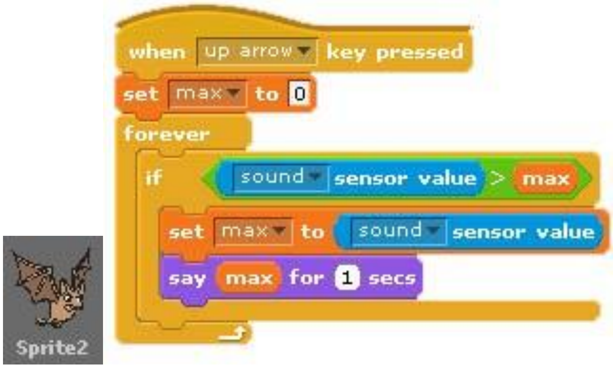


```
when [up arrow] key pressed
clear
pen up
set pen color to ■
set pen size to 0.5
set x to -230
set y to -150
forever
    pen down
    if on edge, bounce
    move ([slider] sensor value / 200) steps
    set y to ((([sound] sensor value - 23) * 5) - 150)
```

```
when [space] key pressed
clear
pen up
set x to -230
set y to -150
stop all ●
```

Fig. 36. Two scripts for Sprite 1: one "draws", while the other, if the space bar is pressed, "erases" the picture and sets the Self-Recorder to the initial position.

The Bat's task requires to use a variable *max*[4]. Before the loop, it is set to 0. If within the loop the sound sensor value exceeds zero, the value of variable *max* is updated and displayed in the cloud for 1 second.



```
when [up arrow] key pressed
set [max] to 0
forever
    if [sound] sensor value > max
        set [max] to [sound] sensor value
        say max for 1 secs
```

Fig. 37. Script for Sprite 2.

[4] The variables are created in the Variables group.

External Temperature Sensor

Theme: “Household Thermometer”.

Requirements:

- Two Actors are the Scale and the Red Arrow;
- the Scale of the household thermometer is placed on the left;
- the Red Arrow moves along the Scale, while on the left a numeric value of the temperature is displayed in an output window (Fig. 39);
- you have to determine the size of one degree in pixels at the Scale.
- on pressing the space bar, all the scripts stop running, and the Scale is sent to initial position (bottom-left corner of the Stage).

Implementation

On your own, make both sprites: the temperature Scale ranging 0 to +50 and the Red Arrow (Fig. 38).

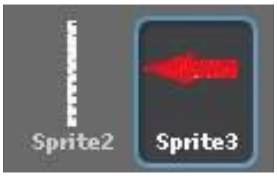


Fig. 38. Sprites for the project.

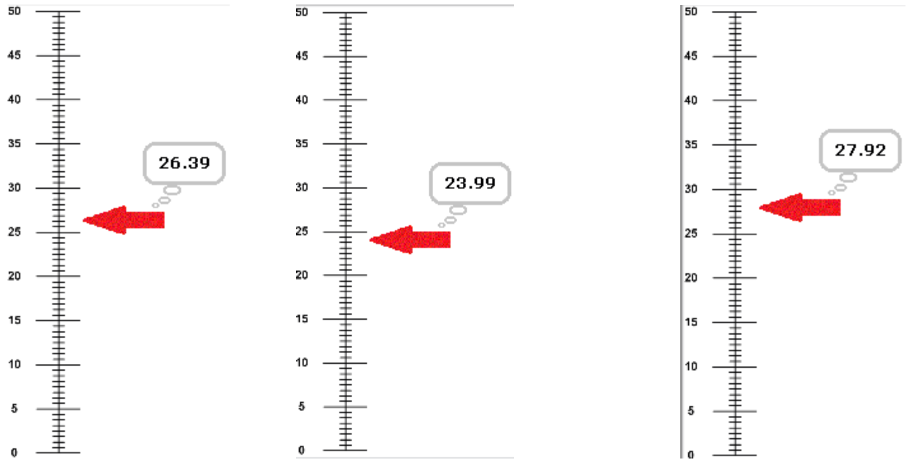
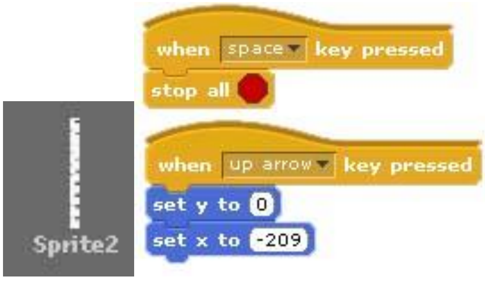


Fig. 39. Three views of the screen, showing the results of the project. You can see a dynamic change of the measured temperature of the ambience.

We are going to make two scripts for Sprite 2 (Scale): a standard stop on pressing the space bar, while on launching the project (on pressing the “up arrow” key) the Scale is placed in the bottom-left corner of the Stage (Fig. 40).



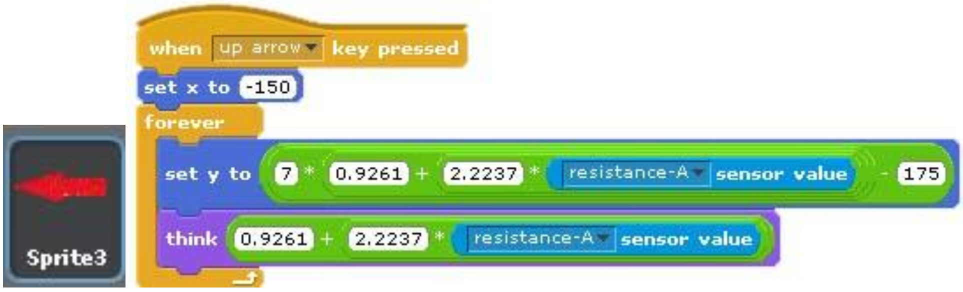
```
when space key pressed
stop all

when up arrow key pressed
set y to 0
set x to -209
```

Fig. 40. Script for the sprite Scale.

Explanations on the formula for the Red Arrow.

1. Express one degree of the scale in pixels. For that, measure the scale in pixels and divide this value by 50. Set the mouse pointer at a zero value of the Scale (the bottom-left corner). Notice the numeric value at the Info Panel. In our case, it is “– 175”. On pointing at the maximal value of the Scale, notice the co-ordinate **175**. Therefore, the value of a move by one degree can be calculated by the formula (175+175)/50=**7**. It is the scale interval in pixels to set Red Arrow coordinates in Fig. 39.

2. For the dependency of the sensor meterage on the thermometer readings, use Formula 2 derived before: x = **2,2237**y + **0,9261**. Apply these coefficients to set the Red Arrow coordinates (Fig. 41).



```
when up arrow key pressed
set x to -150
forever
    set y to (7 * (0.9261 + 2.2237 * resistance-A sensor value) - 175)
    think (0.9261 + 2.2237 * resistance-A sensor value)
```

Fig. 41. Script for the sprite Red Arrow.

Note: The sensor was calibrated by a household thermometer, which is never too exacting. That’s why during the project implementation it was noticed that the sensor showed the temperature value higher than our own senses suggested. You have to calibrate your temperature sensor using a thermometer of a better precision.

External sensors

Theme: “The Voltmeter To Measure the Voltage Drop at Direct Electric Current, within the Range of 4–20V”.

Requirements:

- made the Voltage Divisor of three resistors of 91KΩ each (Figs. 42 and 43);
- calibrate the Voltage Divisor using a digital voltmeter;
- use two actors in the script: the Voltmeter Scale and the Red Arrow;
- the Voltmeter Scale is placed on the left;
- the Red Arrow moves along the Voltmeter Scale;
- the measured numerical value of the voltage is shown in the variable output window (Fig. 42);
- on pressing the space bar, all the scripts stop running.

Implementation

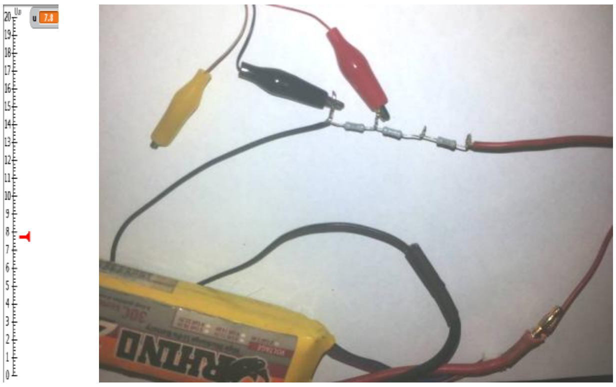


Fig. 42. Measuring the battery voltage using the Device, and a view of the screen.

ScratchDuino.Lab kit includes a connecting cable with three crocodile clips. The black clip is for “minus”, the red one is for “analog input”, while the yellow one is powering the sensor (4.36V). You can check it with a voltmeter.

Use the black and the red clips. For a voltage range of 4–20V, make a “Voltage Divisor”. The resistance of a voltmeter must be sufficiently high. To avoid complicated calculations and determining the internal resistance of the analog input, calibrate the device by experiments. Take three resistors of a 91KΩ each. Fig. 43 shows that the voltage drop is actually measured on a resistor. Calibrate the Voltage Divisor.

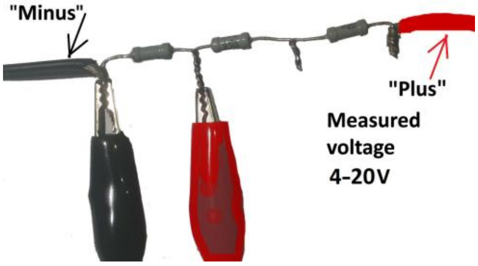


Fig. 43. The Voltage Divisor made of three resistors of a 91KΩ and crocodile clips.

Table 4. Relation between the Values of the ScratchDuino.Lab Sensor and the Digital Voltmeter

The voltage applied to the device measured by the digital voltmeter	Sensor value	Coefficient
3.94	18.57	4.71
4.95	23.4	4.73
5.9	28	4.75
6.97	33	4.73
8.03	38.03	4.74
9	42.72	4.75
10.02	47.51	4.74
11.08	52.49	4.74
12	56.9	4.74
13.02	61.68	4.74
14.03	66.57	4.74
15.77	74.7	4.74
	AVERAGE	**4.74**

As Table 4 shows, the dependency is linear. The average coefficient is **4.74**.

On your own, make two sprites: the Voltmeter Scale ranging from 0 to 20V and the Red Arrow (Fig. 44).

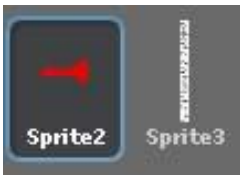
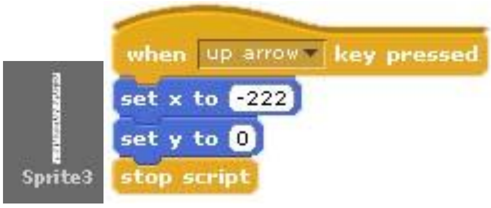


Fig. 44. Sprites for the project.

Make the script for the Voltmeter Scale, so that on launching the project (on pressing the “up arrow” key) the Voltmeter Scale is placed in the bottom-left corner of the Stage (Fig. 45).

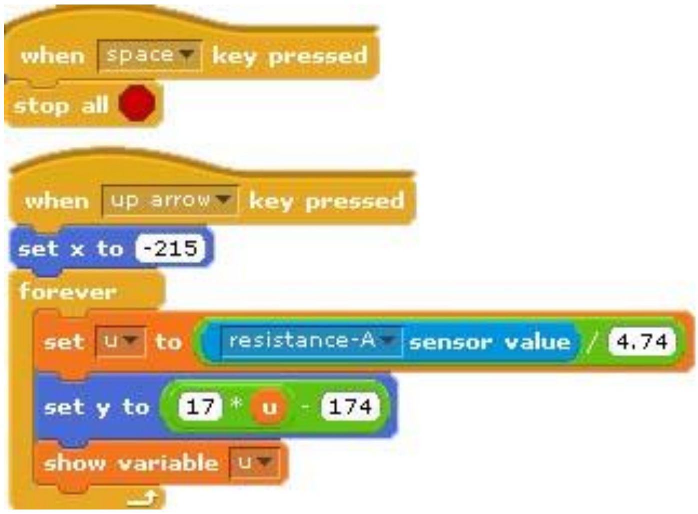


```
when [up arrow] key pressed
set x to -222
set y to 0
stop script
```

Fig. 45. Script for the sprite Scale.

Explanations on the formula in the script for the sprite Red Arrow:

- place the Arrow closer to the Scale picture;
- use variable u for the measured voltage;
- place the Arrow at the y axis according to the variable value;
- show the variable.



```
when [space] key pressed
stop all

when [up arrow] key pressed
set x to -215
forever
    set [u] to ([resistance-A] sensor value / 4.74)
    set y to (17 * u - 174)
    show variable [u]
```

Fig. 46. Script for the sprite Red Arrow.

Test the Voltage Divisor. Measure the battery voltage as shown in Fig. 42. The dynamic changes of the value will be displayed.

Note: Using this device, you can measure a voltage of 0 to 4V. However, your meterage is not going to be very precise. At the same time, measuring a voltage of 0 to 4V is not difficult, as no divisor is needed: it is enough to connect a power source of up to 4V to the black and the red clips. It is important to make the calibration following the above-mentioned methods and make a separate script.

Promoting the Community of the Like-Minded

Each lucky owner of ScratchDuino.Robokit project constructor, be it a teacher or parents, with time starts to feel some disappointment: what is next? As a rule, their ideas of creating new projects quickly come to an end. However, if there is a place where you can show off your projects and get them commented, or watch the ready projects of other people, your creativity gets a new impetus. The Internet communities are just about that, and they resemble the thematic clubs where there are no differences caused by the age or the level of skills. For Project ScratchDuino, the place for such socializing is the Wiki portal wiki.scratchduino.com. In this section, we consider the recommendations for new members of this community.

Wiki Portal of Project ScratchDuino: Signing up

1. Navigate to http://wiki.scratchduino.com and and in the top-right corner find a link Log in / create account (Fig. 47).

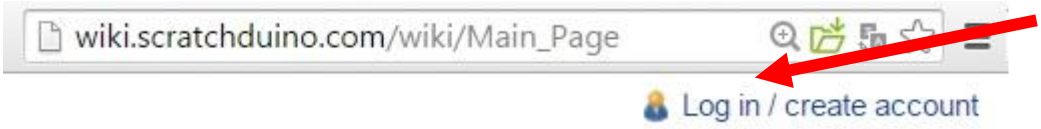
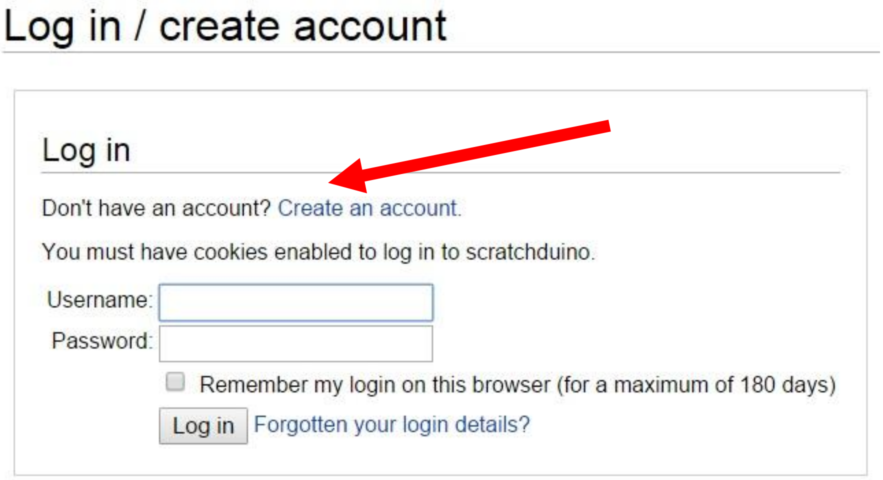


Fig. 47. Signing up at http://wiki.scratchduino.com.

2. The login page opens, where you are going to enter your login and password later on. For the first time, select the link Create an account (Fig. 48).



Log in / create account

Log in

Don't have an account? Create an account.

You must have cookies enabled to log in to scratchduino.

Username:

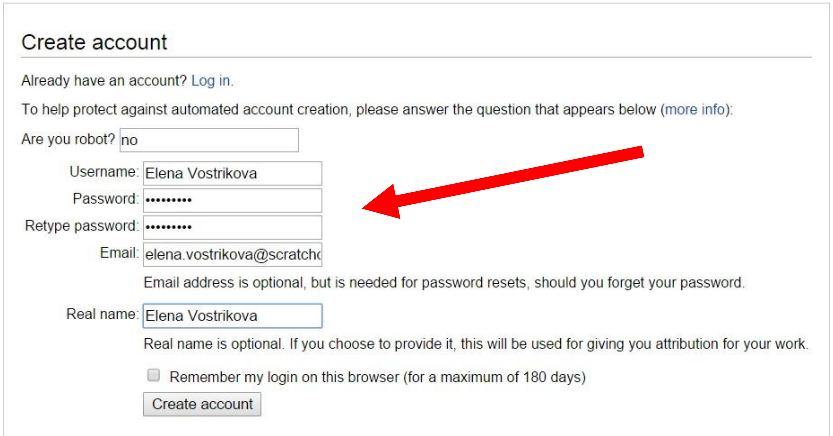
Password:

□ Remember my login on this browser (for a maximum of 180 days)

Fig. 48. Login page (with the link to get to creating of an account).

3. Fill in the information about yourself. Keep in mind that the login of your account is going to represent you at the website. By this reason, choose the login as your nickname that makes you recognizable. For example, if your name is

John Doe, your login can be John Doe, John, Doe etc. Avoid the impersonal names. Click the Create account button.



Create account

Already have an account? Log in.

To help protect against automated account creation, please answer the question that appears below (more info):

Are you robot? no

Username: Elena Vostrikova

Password: •••••••••

Retype password: •••••••••

Email: elena.vostrikova@scratchd

Email address is optional, but is needed for password resets, should you forget your password.

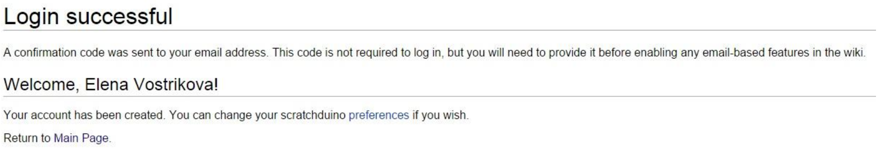
Real name: Elena Vostrikova

Real name is optional. If you choose to provide it, this will be used for giving you attribution for your work.

□ Remember my login on this browser (for a maximum of 180 days)

Fig. 49. The fields to fill in at creating an account.

4. If all the fields are filled correctly, you will see a notification similar to shown in Fig. 50:



Login successful

A confirmation code was sent to your email address. This code is not required to log in, but you will need to provide it before enabling any email-based features in the wiki.

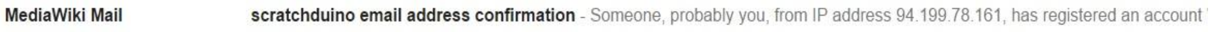
Welcome, Elena Vostrikova!

Your account has been created. You can change your scratchduino preferences if you wish.

Return to Main Page.

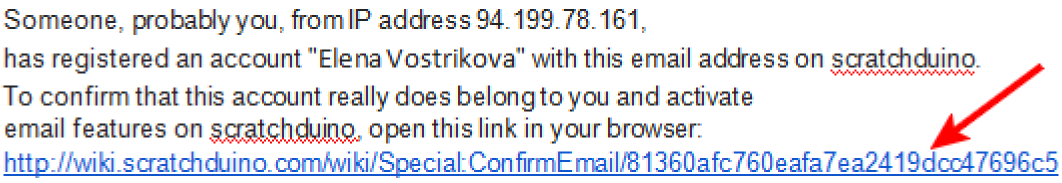
Fig. 50. A notification about successful creation of an account.

5. Check your Inbox and make sure that the message has not got into Junk Mail. The sample body of the message sent to your email address is shown in Fig. 64. Click the link within the message (Figs. 51 and 52).



MediaWiki Mail scratchduino email address confirmation - Someone, probably you, from IP address 94.199.78.161, has registered an account

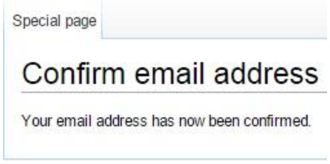
Fig. 51. The subject of the message in your Inbox folder.



Someone, probably you, from IP address 94.199.78.161,
has registered an account "Elena Vostrikova" with this email address on scratchduino.
To confirm that this account really does belong to you and activate
email features on scratchduino, open this link in your browser:
http://wiki.scratchduino.com/wiki/Special:ConfirmEmail/81360afc760eafa7ea2419dcc47696c5

Fig. 52. The body of the message in your Inbox folder.

6. On clicking the link in the message, you get to the project website at a page with the wording shown in Fig. 53:



Special page

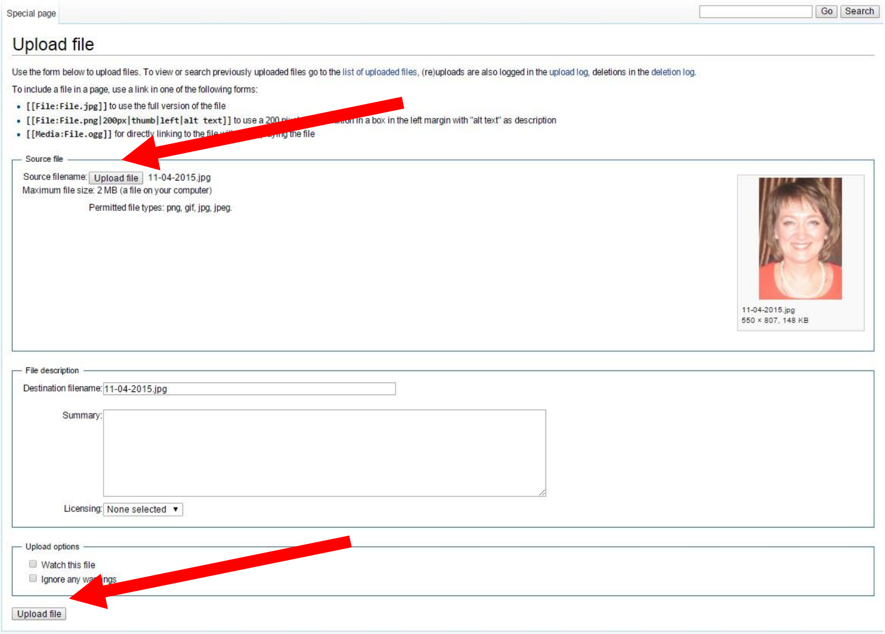
Confirm email address

Your email address has now been confirmed.

Fig. 53. The page appearing after the confirmation of your email address.

7. Proceed with creating your personal page, where you can upload your projects for the sake of ideas exchange and discussions. Many of the members of ScratchDuino Wiki portal have never met each other, so it would be nice to place at the page a photo portrait of yours. It is advisable to choose the one showing you in a good mood, as making the robotic projects is a pleasure after all! The size of the photo file must not exceed 2MB. Accepted are file formats PNG, GIF, JPG, JPEG.

8. Select the link Upload file in the left menu of the portal. At the page that opens find and click the upper button Upload file. Browse your PC to choose the appropriate photo file. This file will be displayed at the page. However, it isn't uploaded yet! At the bottom left of the page, find the Upload file button. Click it.



Special page

Upload file

Use the form below to upload files. To view or search previously uploaded files go to the list of uploaded files, (re)uploads are also logged in the upload log, deletions in the deletion log.

To include a file in a page, use a link in one of the following forms:

- `[[File:File.jpg]]` to use the full version of the file
- `[[File:File.png|200px|thumb|left|alt text]]` to use a 200 pi[illegible]ion in a box in the left margin with "alt text" as description
- `[[Media:File.ogg]]` for directly linking to the file [illegible]ying the file

Source file

Source filename: Upload file 11-04-2015.jpg

Maximum file size: 2 MB (a file on your computer)

Permitted file types: png, gif, jpg, jpeg.

11-04-2015.jpg
550 × 807, 148 KB

File description

Destination filename: 11-04-2015.jpg

Summary:

Licensing: None selected ▼

Upload options

□ Watch this file

□ Ignore any wa[illegible]ings

Fig. 54. The Upload file buttons.

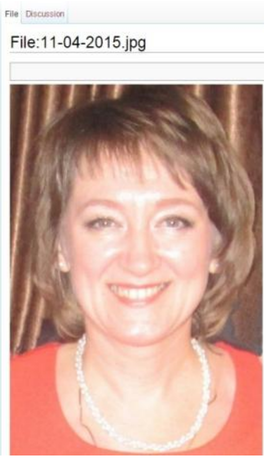


Fig. 67. The name of the page that bears your photo.

9. As a result, the page with the uploaded file will look like shown in Fig. 55. Скопируйте имя страницы Copy the title of the page. In our example it is File:11-04-2015.jpg.

10. Now, create the proper page of ScratchDuino community member at the portal http://wiki.scratchduino.com. Take notice that your account name at the top of the page is highlighted red (Fig. 56). It means that the page has got a title, but isn't created yet! Click on the account name.

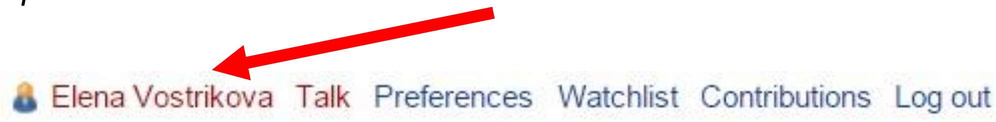
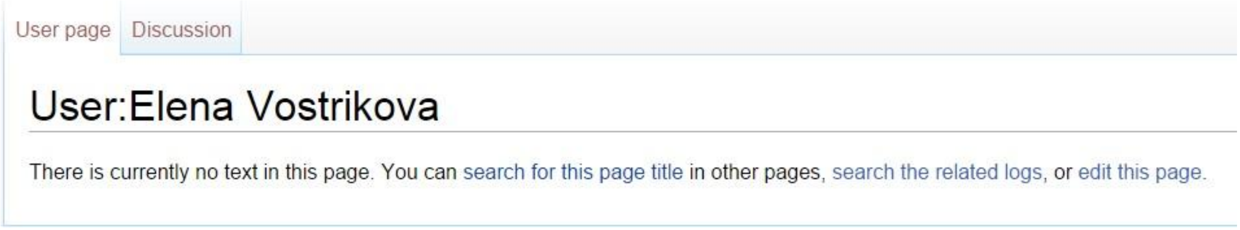


Fig. 56. From now on, your page has a title, but is not created so far.

11. You'll get to the page with the message shown in Fig. 57.



User:Elena Vostrikova

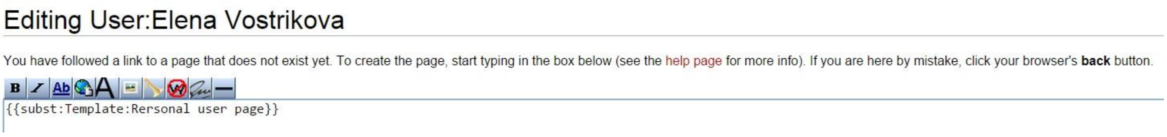
There is currently no text in this page. You can search for this page title in other pages, search the related logs, or edit this page.

.

Fig. 57. The page where you are offered to create a personal page.

Select the link Edit this page.

12. A window of a text editor will open.



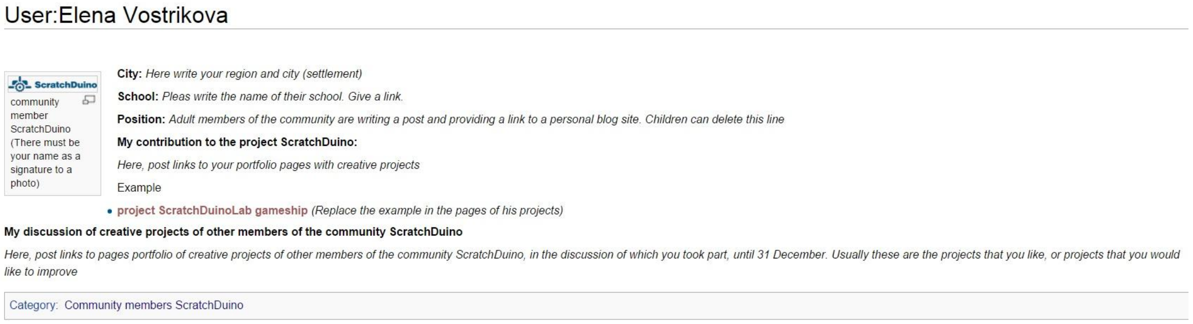
Editing User:Elena Vostrikova

You have followed a link to a page that does not exist yet. To create the page, start typing in the box below (see the help page for more info). If you are here by mistake, click your browser's **back** button.

```
{{subst:Template:Rersonal user page}}
```

Fig. 58. Your page in the Editing mode.

For members of the community, a template of personal page is provided. To create a page, it is enough to enter the phrase {{subst:Template:Personal user page}} very carefully (without any mistake) and click the Save page button. As a result, your page will be created with a standard content (Fig. 59).



User:Elena Vostrikova

community member ScratchDuino (There must be your name as a signature to a photo)

City: *Here write your region and city (settlement)*

School: *Pleas write the name of their school. Give a link.*

Position: *Adult members of the community are writing a post and providing a link to a personal blog site. Children can delete this line*

My contribution to the project ScratchDuino:

Here, post links to your portfolio pages with creative projects

Example

- **project ScratchDuinoLab gameship** *(Replace the example in the pages of his projects)*

My discussion of creative projects of other members of the community ScratchDuino

Here, post links to pages portfolio of creative projects of other members of the community ScratchDuino, in the discussion of which you took part, until 31 December. Usually these are the projects that you like, or projects that you would like to improve

Category: Community members ScratchDuino

Fig. 59. Standard content of your page.

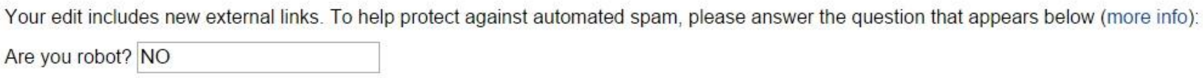
13. Go to the Edit tab. Fill in the mandatory lines at Personal page of Community member ScratchDuino. Replace the filename Logo-1024be1-300x54.png with the filename of your own photo. Instead of “Community member ScratchDuino”, type in your Name and Surname etc.

For example, in the Editing mode a personal page can be made as follows:

```
[[File:11-04-2015.jpg|thumb|100px|left|Elena Vostrikova]]
'''City:''' [https://en.wikipedia.org/wiki/Novokuznetsk Novokuznetsk] Russia
'''School:''' [http://ipknk.ru municipal autonomous educational institution of additional education "Training Institute"]
'''Position:''' department manager
'''My contribution to the project ScratchDuino:'''
[[Project ScratchDuinoLab gameship]]
'''My discussion of creative projects of other members of the ScratchDuino community'''
null
[[Category: Community members ScratchDuino]]
```

14. Click the Save page button.

For the sake of security, the system will ask you to enter a codeword (Fig. 60). Type it in and click the button Save page again.

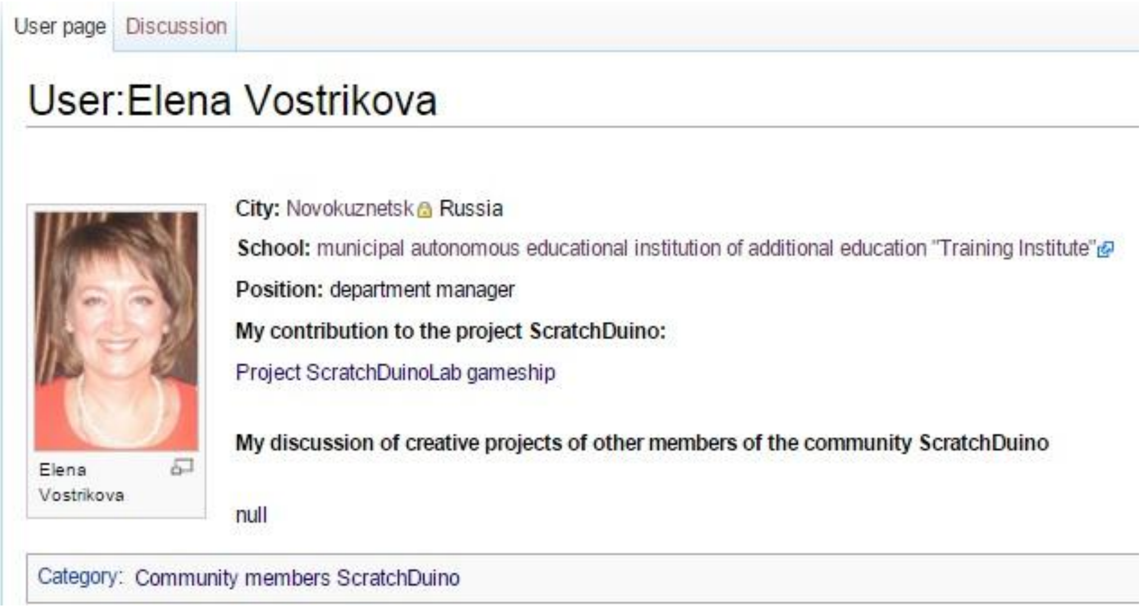


Your edit includes new external links. To help protect against automated spam, please answer the question that appears below (more info):

Are you robot? NO

Fig. 60. A check to ensure that the portal is addressed by a human and not by a bot.

On saving the changes, a standard page will be your very own and individual!



User:Elena Vostrikova

City: Novokuznetsk Russia

School: municipal autonomous educational institution of additional education "Training Institute"

Position: department manager

My contribution to the project ScratchDuino:

Project ScratchDuinoLab gameship

My discussion of creative projects of other members of the community ScratchDuino

null

Category: Community members ScratchDuino

Fig. 61. Your page with personal content.

Click on the category Community members ScratchDuino, and you’ll get to the page with the list of those who have created their pages and are preparing (or are ready) to upload their projects. Now you can explore the community members’ pages and participate in the discussions on completed projects.

wiki.scratchduino.com: Uploading a Project

If you have created a project that you think exciting and you are ready to share it with the community, then send your brainchild to the annual ScratchDuino Libre Robotics Festival.

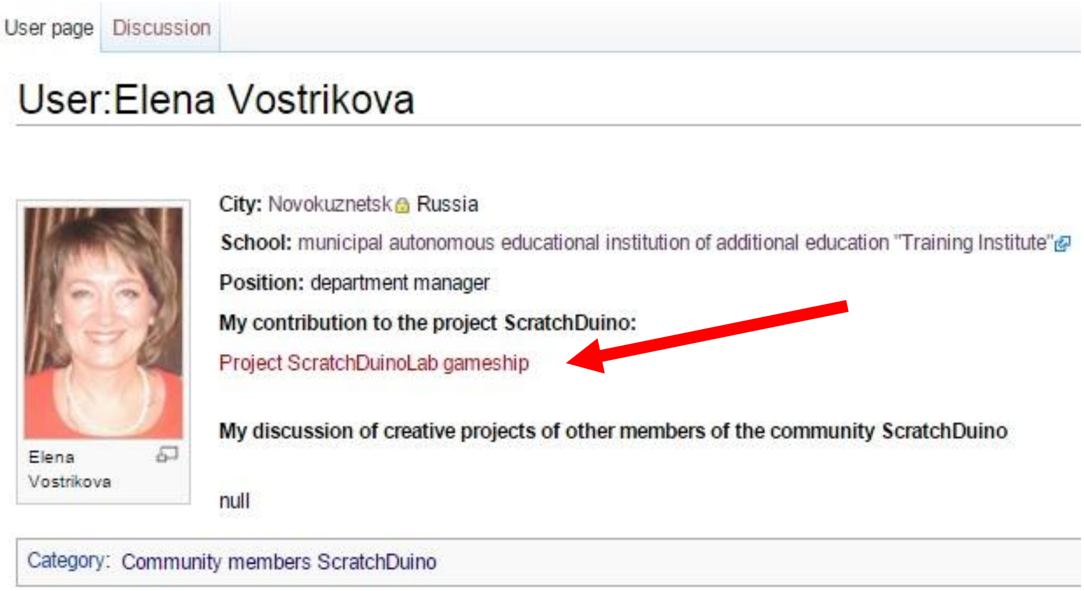
At your personal page in the Editing mode, add a name of the page to place your project at. For this, you need to type in the name adherent to following conventions:

1) The name must begin with the word Project.
2) After a blank space, mention the nomination relevant to your project.
3) The name must be unique and not coinciding with the name of any other project. To ensure this, go to [[Category: Projects]] and check if the name is not used by anybody else.

An example of such a name follows:

* '''[[Project ScratchDuino.Lab gameship]]'''

Click the button Save page!



User:Elena Vostrikova

City: Novokuznetsk Russia

School: municipal autonomous educational institution of additional education "Training Institute"

Position: department manager

My contribution to the project ScratchDuino:

Project ScratchDuinoLab gameship

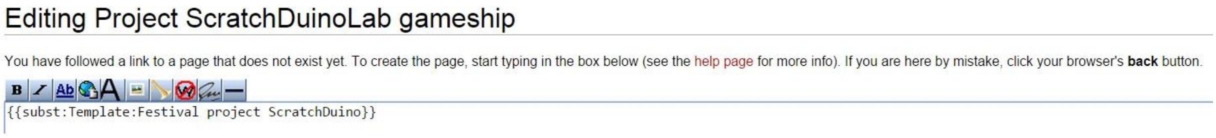
My discussion of creative projects of other members of the community ScratchDuino

null

Category: Community members ScratchDuino

Fig. 62. The page of project portfolio has got a name, but hasn't been created yet.

Click the newly-created link and go to the Editing mode for the new page.



Editing Project ScratchDuinoLab gameship

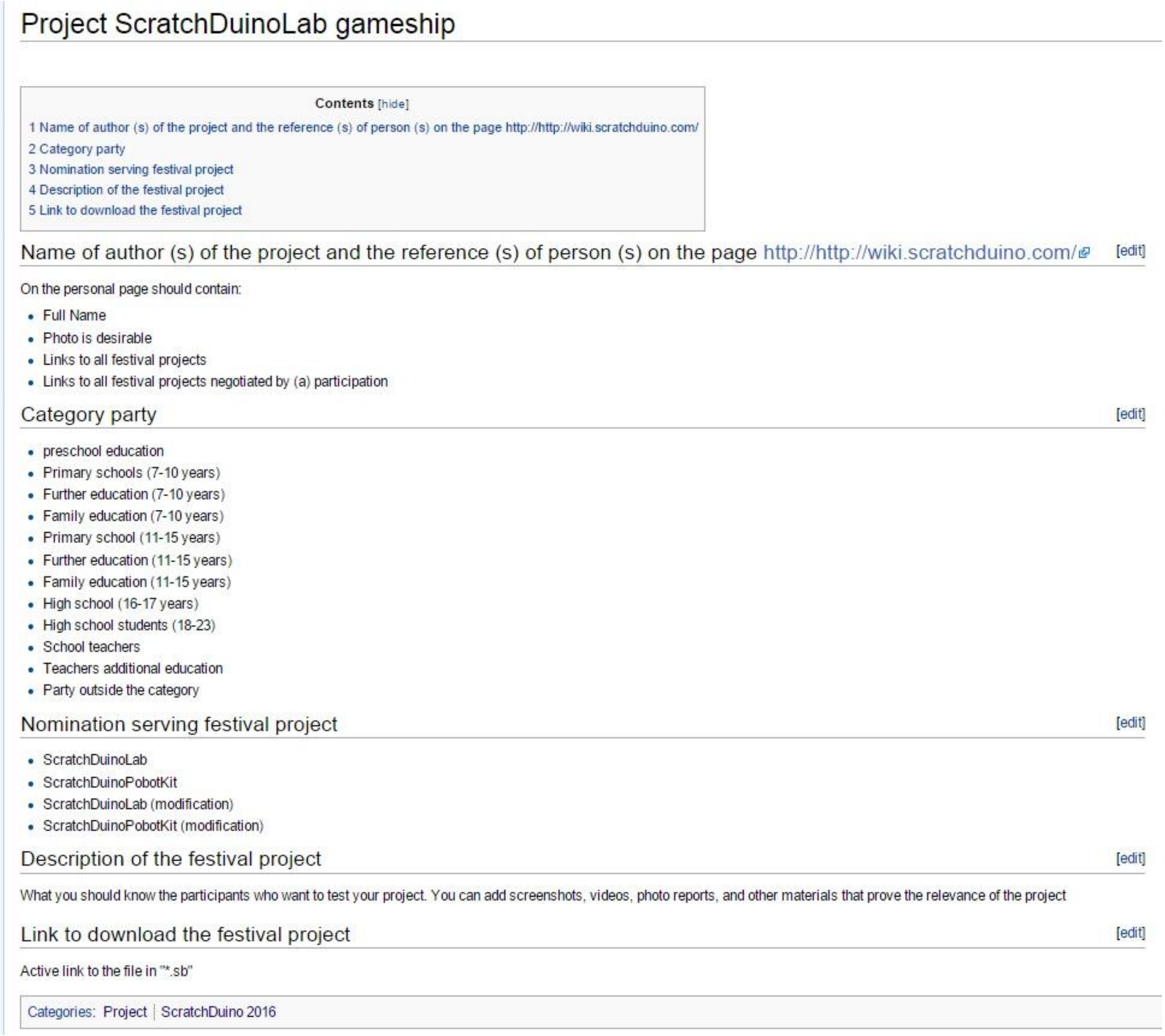
You have followed a link to a page that does not exist yet. To create the page, start typing in the box below (see the help page for more info). If you are here by mistake, click your browser's **back** button.

```
{{subst:Template:Festival project ScratchDuino}}
```

Fig. 63. Editing mode for a new page.

For the Festival participants, the template is provided to make the deployment of a project portfolio easy. To create the page, it would be enough to type in (very carefully, without mistakes) the phrase {{subst:Template:Festival project ScratchDuino}} and click the Save page button.

As a result, the portfolio of the project will be deployed.



Project ScratchDuinoLab gameship

Contents [hide]

1 Name of author (s) of the project and the reference (s) of person (s) on the page http://http://wiki.scratchduino.com/
2 Category party
3 Nomination serving festival project
4 Description of the festival project
5 Link to download the festival project

Name of author (s) of the project and the reference (s) of person (s) on the page http://http://wiki.scratchduino.com/ [edit]

On the personal page should contain:

- Full Name
- Photo is desirable
- Links to all festival projects
- Links to all festival projects negotiated by (a) participation

Category party [edit]

- preschool education
- Primary schools (7-10 years)
- Further education (7-10 years)
- Family education (7-10 years)
- Primary school (11-15 years)
- Further education (11-15 years)
- Family education (11-15 years)
- High school (16-17 years)
- High school students (18-23)
- School teachers
- Teachers additional education
- Party outside the category

Nomination serving festival project [edit]

- ScratchDuinoLab
- ScratchDuinoPobotKit
- ScratchDuinoLab (modification)
- ScratchDuinoPobotKit (modification)

Description of the festival project [edit]

What you should know the participants who want to test your project. You can add screenshots, videos, photo reports, and other materials that prove the relevance of the project

Link to download the festival project [edit]

Active link to the file in "*.sb"

Categories: Project | ScratchDuino 2016

Fig. 64. A template page for a project portfolio.

Next, it is important to fulfill all the sections of the portfolio. Below, a ready portfolio (in editing mode) is shown.

==Name of author (s) of the project and the reference (s) of person (s) on the page http://http://wiki.scratchduino.com/==

[[User:Elena Vostrikova]]

==Category party==

Party outside the category

==Nomination serving festival project==

ScratchDuinoLab

==Description of the festival project==

Once in the era before the advent of computers and the Internet, children were playing Battleship on the slot machines. Now you can play its online version at this address http://morskoy-boy.15kop.ru/game/

We have created a semblance of the game. At the top of the screen, there are sail boats, while at the bottom of the screen there is a gun. The gun is moved by the left and right buttons on ScratchDuinoLab. When you press the upper button, the gun fires and the game pauses. When you press the lower button, the game continues. The game has several levels. Each level increases the speed of the ships. If you miss, your life shortens. At the background of the game the sea creatures are floating.

==Link to download the festival project==

[https://goo.gl/U5RCYx Active link to the file in "*.sb"]

[[Category: Project]]

[[Category: ScratchDuino 2016]]

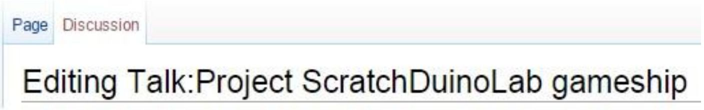
Click the button Save page!

From now on, your project is available for the whole community. The comments can be read and written at the project page, at the Discussion tab.

Rules on Discussing the Projects at wiki.scratchduino.com

The Festival is not a contest but a live exchange of ideas, findings, and ready projects, as well as a permanent search of the best ways to introduce the libre robotics. That is why, along with the number and the quality of the projects uploaded, the Expert Group will consider also the number and the quality of the discussions led by a participant.

The discussion is always a dialogue: one person puts questions and another person answers. If somebody has left a question for you at the Discussion tab (Fig. 65), or there are criticisms or ideas offered to make your project better, it is considered a good practice to thank for the question and give a detailed answer, to agree with a criticism or retort against it, to consider and accept (decline) the suggestions.

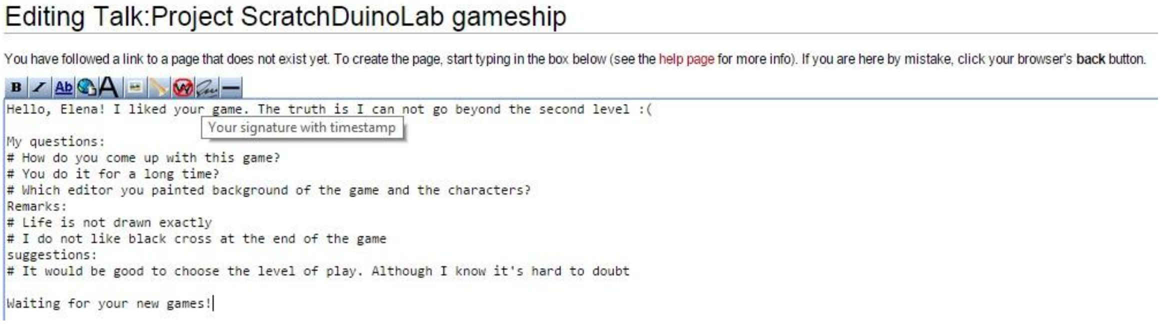


Editing Talk:Project ScratchDuinoLab gameship

Fig. 65. The Discussion tab
at the page of project portfolio.

To not reduce the discussion to just a mutual exchange of emoticons or rather meaningless sentences like "Great!" or "Cool!", we would suggest a *"3-2-1"* strategy. It means that you have to put THREE questions, give TWO criticisms, and offer ONE improvement. An example of a discussion following such strategy is shown in Fig. 67. On completing your message, click the Your signature and timestamp button. You will see a character string --~~~~. Then click the Save the page button.

You should be nice and polite with the people, especially as you are a perfect stranger for them. When discussing a project, avoid the harsh phrases like "Your stuff is nonsense!" in favour of something like "This idea needs certain refinement." It is not easy to start developing a worthy project at once, and it is important to encourage the newbies. A friendly word can lend them wings!



Editing Talk:Project ScratchDuinoLab gameship

You have followed a link to a page that does not exist yet. To create the page, start typing in the box below (see the help page for more info). If you are here by mistake, click your browser's **back** button.

```
Hello, Elena! I liked your game. The truth is I can not go beyond the second level :(

My questions:
# How do you come up with this game?
# You do it for a long time?
# Which editor you painted background of the game and the characters?
Remarks:
# Life is not drawn exactly
# I do not like black cross at the end of the game
suggestions:
# It would be good to choose the level of play. Although I know it's hard to doubt

Waiting for your new games!
```

Fig. 66. An example of a discussion page
in Editing mode.

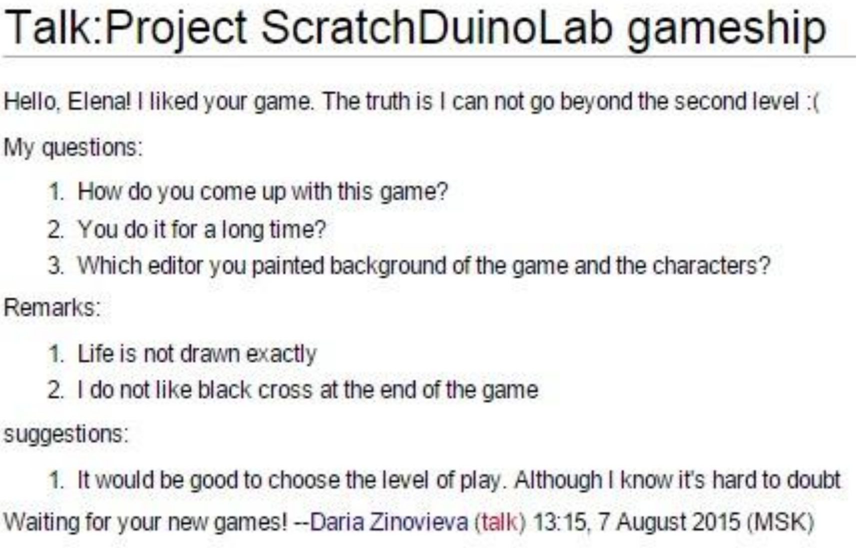
You might begin your questions with:

- When? How? Where? Why?
- Is it right to believe that … ?
- What if … ?
- Is it possible to … ?
- At which line of the script … ?
- etc.

The advisable introductory phrases for your comments might be as follows:

- It would be better if …
- On clicking ..., … (*point to a mistake that the author has not noticed*)
- It’s a pity that ... is missing
- etc.

You should make your suggestions as if you are in the stead of the author. There is always a way of getting the project better. We are looking for the best solutions together, so any useful idea to help the author is welcomed.



Talk:Project ScratchDuinoLab gameship

Hello, Elena! I liked your game. The truth is I can not go beyond the second level :(

My questions:

1. How do you come up with this game?
2. You do it for a long time?
3. Which editor you painted background of the game and the characters?

Remarks:

1. Life is not drawn exactly
2. I do not like black cross at the end of the game

suggestions:

1. It would be good to choose the level of play. Although I know it's hard to doubt

Waiting for your new games! --Daria Zinovieva (talk) 13:15, 7 August 2015 (MSK)

Fig. 67. An example of a discussion page in Read mode.

The Expert Group of the Festival does not deal with the anonymous messages! Having your message complete, always click the button Your signature and timestamp.

Information Sources

Information environment of the project

ScratchDuino official website	http://www.scratchduino.com/
File server	http://files.scratchduino.ru/
ScratchDuino Wiki	http://wiki.scratchduino.com/
ScratchDuino Group at Google+	https://goo.gl/uVRm6D
ScratchDuino video channel at YouTube	https://goo.gl/Y5jDz8
Group at VKontakte social network	http://vk.com/scratchduino
Russian-speaking help desk	support@scratchduino.ru

Appendix

Statutes of ScratchDuino Libre Robotics Festival

1. General Provisions

All-Russia (International, in case of foreign participants) festival "**ScratchDuino Libre Robotics**" (hereinafter, the Festival) shall be held annually, in accordance with the state policy concerning the development of educational robotics and lifelong IT-education in the Russian Federation.

*Founders of the Festival***:** JSC "Tyrnet" and partners.

The objectives of the Festival are:

- generalization and promotion of the experience of applying the libre robotics;
- introduction of libre robotics into the curriculums of primary and secondary educational institutions, as well as in the family form and for self-education.

Participants of the Festival: educators, students, and creative teams of adults and children, ranked by their skills and education level.

2. The Organization of the Festival

2.1. The preparation and holding of the Festival shall be carried out by an Organizing Committee.

2.2. The Organizing Committee shall:

- make a list of the Expert Group;
- notify about the schedule, the procedure, and the results of the Festival;
- examine the projects submitted to the Festival;
- promote the best participants of the Festival.

3. The Content and the Procedure of the Festival

3.1. The Festival shall be held in 3 stages.

Stage 1— Grassroots (September–December):

- the Festival participants are registering on the website http://wiki.scratchduino.ru and uploading the portfolio of their festival projects;

- the Festival participants study each other’s projects, make their comments, and put questions to the authors;
- the participants put their applications into a self-registration sheet at a page of the Festival website;
- ScratchDuino Group at Google+ (https://goo.gl/uVRm6D) runs consultative workshops;
- the information about the Festival is published by the mass media.

Stage 2— Expertise (January):

- the Expert Group is working;
- the best participants of the Festival are being chosen, ranked by educational level within the nominations.

Stage 3 — Final (February 7— International Day of Robotics)

- the best participants of the Festival are announced and awarded.

3.2. The examination of the projects shall be made within two (or four, in case of such kinds of projects) nominations, taking into account the educational level:

- ScratchDuino.Lab
- ScratchDuino.Robokit
- ScratchDuino.Lab (modification)
- ScratchDuino.Robokit (modification)

3.3. The participants themselves shall upload their projects to the portal http://wiki.scratchduino.com/ as a project portfolio, with mandatory indication of the participant category [[Category: Projects]]

[[Category: ScratchDuino 2016]]

3.4. The projects submitted shall have no feedback review of the Expert Group.

3.5. The names of the best participants of the Festival shall be placed at the homepage of the Festival website.

4. Selection Criteria To Choose the Best Participants of the Festival

- number and quality of the projects submitted;
- number and quality of the discussions held by the participant on the projects of other people.

5. The Festival Schedule

5.1. The project portfolio is to be placed at **http://wiki.scratchduino.com/**
by ___ “____” 20__ .

5.2. The list of the best participants mentioning their awards is to be published at the homepage of the Festival website on February 7 — International Day of Robotics.

6. Awards for the Participants of the Festival

6.1. All the participants shall get the electronic certificates.

6.2. Based on the rating of their projects, the PARTICIPANTS, LAUREATES, and WINNERS of the Festival shall be chosen, ranked by educational level within the nominations.

User Manual

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ScratchDuino.Lab

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