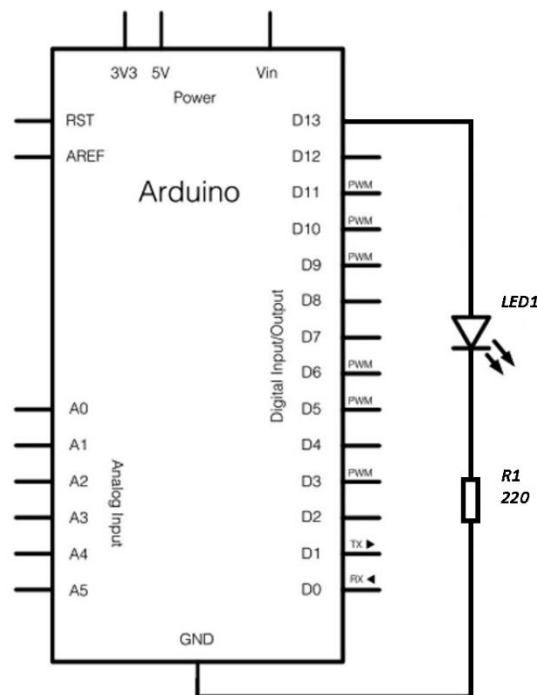| SCENARIO	
Title	**Single LED control using digital output**
Summery	With the help of microcontrollers, it is possible to explain the importance of household electrical appliances for the quality of life, to choose household electrical appliances responsibly, comparing their energy efficiency in order to use electricity sustainably.
Author/s	Kristina Višnevskienė, Pavel Mechovicius	Date:20/03/2020

Didactic objectives

Using a microcontroller, make sure that the LED flashes at the appropriate frequency

Physics☒   Mathematics☒   Information Technology☒   Robotics☒   Programming☒

Education Level: 10-12 years☐   12-14 years☒

Problem Statement

1. To practically apply the acquired theoretical knowledge about the use of a microcontroller and the application of electronic elements - resistors, light emitting diodes - in connecting electrical circuits;
2. Use a microcontroller and programmatically control information transmission processes and conditions in the electrical circuit - programmatically set the conditions of LED functions, change them.

BOM (Bill Of Materials needed)

Computer, Kit Details: Microcontroller Board, Micro Controller Board USB Connection Cable, Layout Board, Layout Cables for Layout Board, LEDs 5 mm (green), Resistor 220 Ω.

Activity description

1. Locate the Arduino IDE application icon on your desktop and launch the application.
2. Connect the microcontroller board to the computer via USB cable.
3. Familiarize with the basic circuit diagram, identify and describe the parts of the circuit shown in the diagram: LEDs, resistors, microcontroller.

„InnoExperiment – Innovative Approach to Teaching through Experiment"
Project Leader: Zespół Szkolno – Przedszkolny w Goniądzu (ZSP)

aiju Technological Institute for children's products & leisure

RCK
REGIONALNE CENTRUM KOMPETENCJI

4. The parts of the electrical circuit are placed on the layout board and connected with connecting wires, connecting them to the microcontroller connectors - digital outputs Pin12, Pin13 and Gnd (ground).
5. The LED conducts electricity in only one direction; when an electric current flows, the LED emits light. The three-characterization scheme of the anode and cathode is used to connect the LED
6. The submitted program code is loaded into the Arduino IDE programming window. The program is checked (Verify button) and uploaded to the microcontroller (Upload button).
7. By monitoring the operation of the electrical circuit (LEDs flash at a frequency of 1 s), the program is analysed. Its main functions are explained: *int, void setup (), void loop (), pinMode, digitalWrite, delay.*
8. The program changes the rhythm and frequency of the LEDs
   a) At a frequency of 200 ms seconds;
   b) heart rate.
9. In practice, the flashing frequency at which a person sees a continuous LED glow is set, for example: 1 ms delay, 2 ms, 3 ms

Resources

According to the schematic diagram of the electrical circuit, the necessary means are selected, the electrical circuit is connected in a consistent, safe and rational manner. Independently uses the microcontroller programming environment, analyses the program, changes it. Performs all scheduled tasks.

Students' Evaluation

1. The student chooses the necessary tools, connects the electrical circuit, determines the parts used in it, using the microcontroller programming environment, and loads the submitted program.
2. In accordance with the circuit diagram of the electrical circuit, it selects the necessary means and connects the electrical circuit in a consistent, secure manner. Uses microcontroller programming environment, analyzes program, and modifies it.

Bibliography

http://www.digikey.com/schemeit

http://fritzing.org/home/

Scalability

Physics: Electrical Circuits.
Information Technology: Programming

More information

Control of several (2-3) LEDs.
Make light bulbs or alarms, organize their competition.