

# Mikrovaldikliai, virtualios laboratorijos ir daiktų internetas

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"...Mokslininkai tiki, kad ateityje kiekvienas vaikas bus išradėjas. šiuo metu jiems suteikiamos visos reikalingos priemonės bandyti, ieškoti, atrasti ir patikrinti. Mikrovaldikliai yra unikalūs, delno dydžio, lengvai perprantamas ir sudėtingas operacijas atlikti galintis kompiuteris, kurį pamėgo viso pasaulio programuotojai, robotikos specialistai bei tie, kurie nori mokytis. ..."

Citata iš "ANODAS.LT"

# Mikrovaldikliai



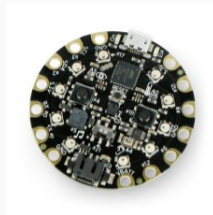
(a)



(b)



(c)



(d)



(e)



(f)



(g)



(h)

# Mikrovaldikliai, pagrindinės jų savybės

1. Centrinio procesoriaus gamintojas, pvz.:
  - Atmell, AVR
  - STMicroelectronics, ST
  - Microchip, PIC
  - Kiti ...
2. Centrinio procesoriaus taktinis dažnis, MHz
  - 16 MHz
  - 46 MHz
  - 120 MHz
  - Kiti ...
3. Operatyvioji atmintis (RAM) buna nuo kelių kB iki šimtai MB
4. Programos kodui skirta pastovioji atmintis nuo kelių kB iki šimtai MB

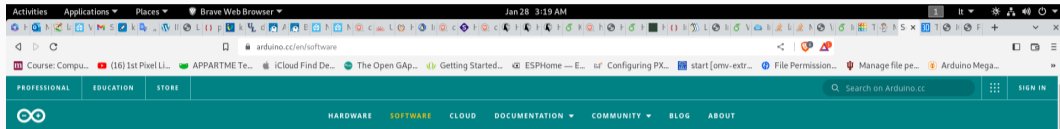


## Mikrovaldikliai, pagrindinės jų savybės

1. Mikroprocesorius: SAM3X8E
2. Maitinimo įtampa: 7-12V per DC jungtį (didžiausios ribos 6-16V)
3. Loginių signalų įtampa: 3,3V DC
4. Procesoriaus dažnis: 84 MHz
5. Analoginio signalo išvesties jungčių kiekis: 2 (A/D keitiklio kanalai)
6. Analoginio signalo įvesties jungčių kiekis: 12
7. Skaitmeninio signalo jungčių kiekis: 68 (12 iš jų PWM)
8. Bendra išėjimo jungčių tiekiamą srovė: <130 mA
9. 3,3V jungties leistina srovė: 800mA
10. 5V jungties leistina srovė: 800mA
11. Išmatavimai: 101 x 53 mm
12. Serijinės sąsajos: UART, SPI, I2C
13. Išoriniai pertraukimai

# Mikrovaldiklių programavimo įrankiai: URL nuoroda

Nuoroda: <https://arduino.cc/>



## Arduino Web Editor

Start coding online and save your sketches in the cloud. The most up-to-date version of the IDE includes all libraries and also supports new Arduino boards.

[CODE ONLINE](#)

[GETTING STARTED](#)



## Downloads



### Arduino IDE 2.0.3

The new major release of the Arduino IDE is faster and even more powerful! In addition to a more modern editor and a more responsive interface it features autocompletion, code navigation, and even a live debugger.

For more details, please refer to the [Arduino IDE 2.0 documentation](#).

Nightly builds with the latest bugfixes are available through the section below.

#### SOURCE CODE

The Arduino IDE 2.0 is open source and its source code is hosted on [GitHub](#).

#### DOWNLOAD OPTIONS

**Windows** Win 10 and newer, 64 bits

**Windows** MSI installer

**Windows** ZIP file

**Linux** AppImage 64 bits (X86-64)

**Linux** ZIP file 64 bits (X86-64)

**macOS** Intel, 10.14 "Mojave" or newer, 64 bits

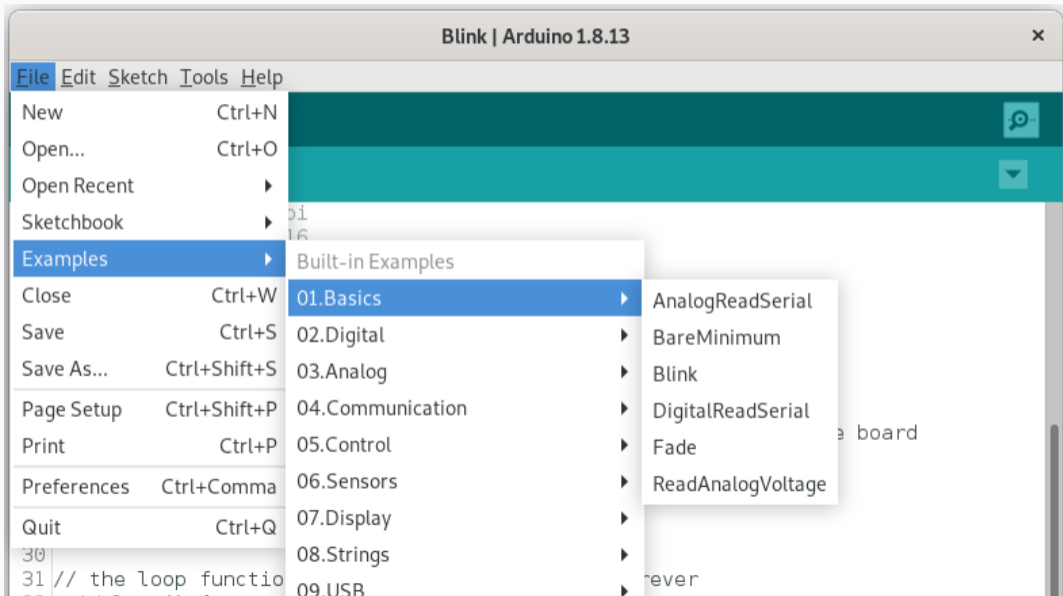
**macOS** Apple Silicon, 11 "Big Sur" or newer, 64 bits

[Release Notes](#)

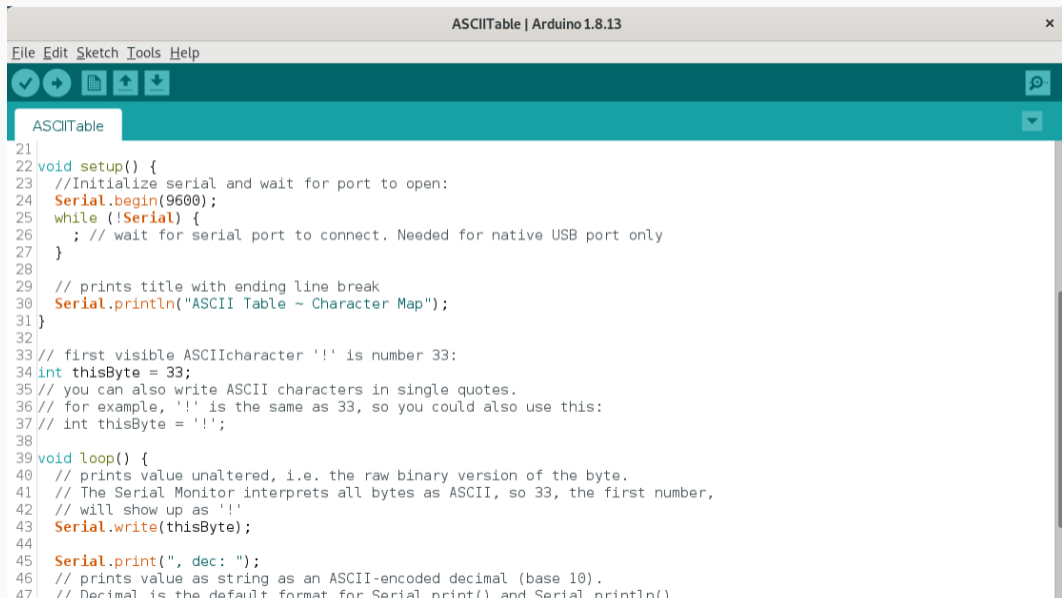
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# Mikrovaldiklių programavimo įrankiai



# Mikrovaldiklių programavimo įrankiai



The screenshot shows the Arduino IDE interface with a sketch titled "ASCIITable" open. The code is as follows:

```
ASCIITable
21
22 void setup() {
23   //Initialize serial and wait for port to open:
24   Serial.begin(9600);
25   while (!Serial) {
26     ; // wait for serial port to connect. Needed for native USB port only
27   }
28
29   // prints title with ending line break
30   Serial.println("ASCII Table ~ Character Map");
31 }
32
33 // first visible ASCII character '!' is number 33:
34 int thisByte = 33;
35 // you can also write ASCII characters in single quotes.
36 // for example, '!' is the same as 33, so you could also use this:
37 // int thisByte = '!';
38
39 void loop() {
40   // prints value unaltered, i.e. the raw binary version of the byte.
41   // The Serial Monitor interprets all bytes as ASCII, so 33, the first number,
42   // will show up as '!'
43   Serial.write(thisByte);
44
45   Serial.print(", dec: ");
46   // prints value as string as an ASCII-encoded decimal (base 10).
47   // Decimal is the default format for Serial.print() and Serial.println()
```



# Mikrovaldiklių programavimo įrankiai



(l)



(m)



(n)

# Mikrovaldiklių programavimo įrankiai



# Mikrovaldikliai turintys interneto WiFi sąsajos galimybes



(p)



(q)



(r)



(s)

# Mikrovaldikliai ar mikrokompiuteriai



(t)



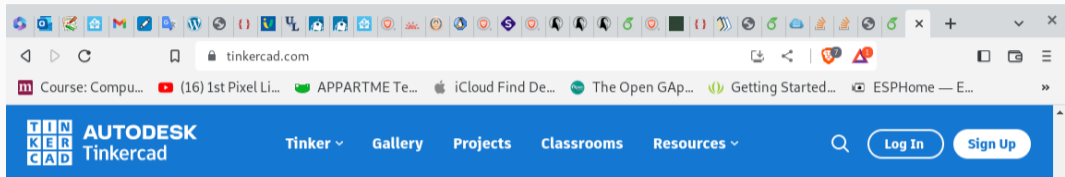
(u)



(v)

# Virtualios mikrovaldiklių laboratorijos: URL nuoroda

Nuoroda: <https://www.tinkercad.com/>

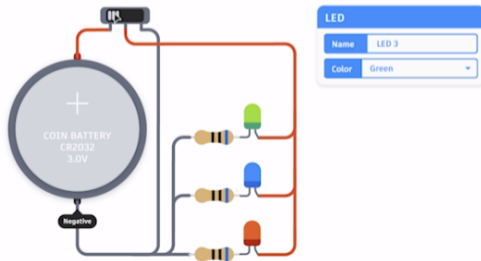


## Circuits

### Power up your imagination

From blinking your first LED to reimagining the thermometer, we'll show you the ropes, buttons, and breadboards of electronics.

[Explore Circuits](#)



# Virtualios mikrovaldiklių laboratorijos: URL nuoroda

Nuoroda: <https://wokwi.com/projects/276825819240727048>

The screenshot shows a web browser window displaying a Wokwi project page. The browser's address bar shows the URL <https://wokwi.com/projects/276825819240727048>. The page title is "calculator.ino by urish". The main content is divided into two sections: a code editor on the left and a simulation on the right.

The code editor shows the following C++ code for the Arduino Calculator:

```
1  /**
2   * Arduino Calculator
3   *
4   * Copyright (C) 2020, Uri Shaked.
5   * Released under the MIT License.
6   */
7
8  #include <LiquidCrystal.h>
9  #include <Keypad.h>
10 #include <Servo.h>
11
12 /* Display */
13 LiquidCrystal lcd(12, 11, 10, 9, 8, 7);
14
15 /* Keypad setup */
16 const byte KEYPAD_ROWS = 4;
17 const byte KEYPAD_COLS = 4;
18 byte rowPins[KEYPAD_ROWS] = {5, 4, 3, 2};
19 byte colPins[KEYPAD_COLS] = {A3, A2, A1, A0};
20 char keys[KEYPAD_ROWS][KEYPAD_COLS] = {
21   {'1', '2', '3', '+'},
22   {'4', '5', '6', '.'},
23   {'7', '8', '9', '*'},
24   {'.', '0', '=', '/'},
25 };
26
27 Keypad keypad = Keypad(makeKeypad(keys), rowPins, colPins, KEYPAD_ROWS, KEYPAD_COLS);
28
29 uint64_t value = 0;
30
31 void showSpalshScreen() {
32   lcd.print("GoodArduinoCode");
33   lcd.setCursor(3, 1);
34   String message = "Calculator";
35   for (byte i = 0; i < message.length(); i++) {
36     lcd.print(message[i]);
37     delay(50);
38   }
39   delay(500);
40 }
```

The simulation on the right shows a 3D model of an Arduino Uno board connected to a green LCD display and a blue keypad. The keypad has a 4x4 grid of buttons: numbers 1-9, a decimal point, a plus sign, a minus sign, an equals sign, and a forward slash. The LCD display is currently blank.

# Virtualios mikrovaldiklių laboratorijos: URL nuoroda

The screenshot displays a web browser window with the URL [https://lcamboia.github.io/js/picsimlab.html?..picsimlab\\_examples/pzw/board\\_Arduino\\_Uno/atmega328p/ADXL345\\_I2C.pzw](https://lcamboia.github.io/js/picsimlab.html?..picsimlab_examples/pzw/board_Arduino_Uno/atmega328p/ADXL345_I2C.pzw). Below the browser are two software windows:

- PICSimLab - Arduino Uno - atmega328p**: Shows a virtual Arduino Uno board with an ATMEGA328P microcontroller. The interface includes a menu (File, Board, Microcontroller, Modules, Help), a clock speed selector (16 MHz), a speed multiplier (Spd: 1.00x), and a serial terminal window. The serial terminal shows a stream of data: "0.00, 0.00, 8.00" repeated multiple times. The status bar indicates "Running..." and "Serial: /dev/tty2 (ERROR)".
- PICSimLab - Spare parts**: Shows a virtual ADXL345 accelerometer module. It features three digital readout (DRO) displays for ACC X (0.00), ACC Y (0.00), and ACC Z (8.00). Below the displays are labels for various pins: GND, VCC (+5V), CS, INT1 (NC), INT2 (NC), SDO (NC), SDA, PC4/A4, and SCL, PC5/A5. A VTerm window is also visible, showing TX and RX indicators and a small terminal window.

<https://www.tinkercad.com/joinclass/HBPYXL576>



# Daiktų interneto (IoT) galimybės

The screenshot displays a web browser window with a dashboard for an IoT system. The browser address bar shows the URL `ha.i2c.lt:8123/loveface/default_view`. The dashboard has a blue header with navigation tabs: HOME MAIN PANEL, SONOFF, ŠVIESOS VALDYMAS, GROTUVAI, SIURBLYS, AUTOMATIKA, ŽIGBEE ĮRANGA, RFXTRX ĮRENGINIAI, KAMEROS, PRANEŠIMAI, and TESTS. A top status bar contains numerous circular indicators for various sensors and devices, including Worldby Sensor, Home Assistant Versions, HA, Sun, ESP-TX, ESP-PWR-CNT, IPert3, TV-T, TV-O, SRV-T, UPS Battery, UPS Input Voltage, UPS Output Voltage, UPS Load, UPS Status, UPS Time on Battery, UPS Time Left, UPS Transfer Count, Philips Battery, Philips Linkquality, Philips Tempert., Philips Illuminan., Deluge Down speed, Deluge Up speed, Paros suvartojimas kWh, Raspicam, RTSP, Lithuania Coronavirus confirmed, and Lithuania Coronavirus deaths.

The main content area is divided into several panels:

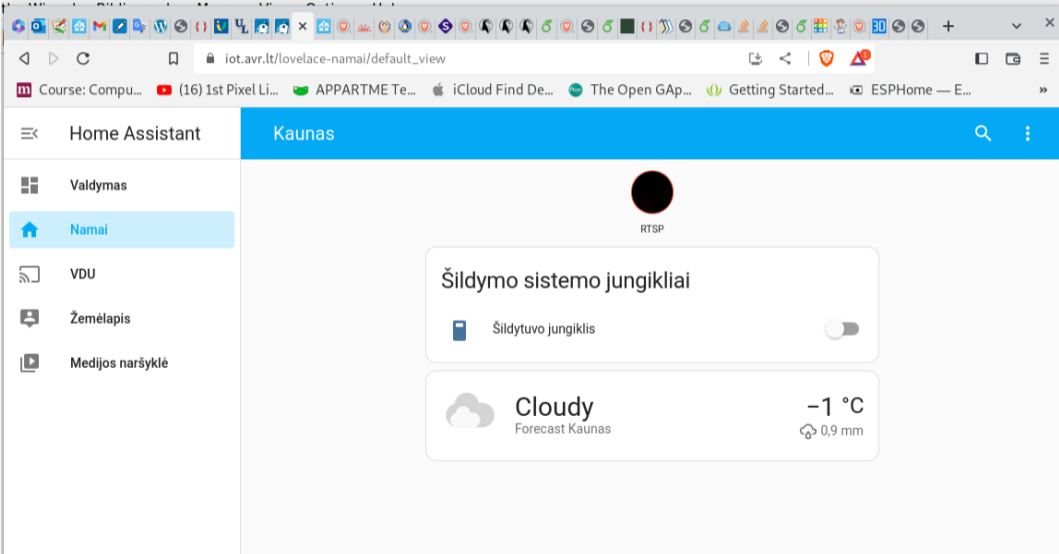
- Light:** Shows a "Stalo lempa" (Table lamp) with a power icon.
- II aukštas (2nd floor):** Displays "Paros suvartojimas, kWh" (16,000 kWh) and "Energijos skaitiklis" (0,00 kW). It also includes a "Siurbio Rėle" (Pump relay) toggle switch.
- Home Assistant Version:** Shows "Home Assistant Versions" as 2023.1.7.
- LED1 Tuya:** Features a "LED1 Tuya" toggle switch.
- TV Drėgmė (TV Humidity):** Shows a value of 43,1% with a line graph.
- TV temperatūra (TV Temperature):** Shows a value of 21,2 °C with a line graph.
- II aukštas stalo jutikliai (2nd floor table sensors):** Displays "Temperatūra" (23,5 °C) and "Drėgmė" (27%).
- Deluge sausas (Deluge dry):** Shows "Deluge Status" as idle, "Deluge Up speed" as 0,0 kB/s, and "Deluge Down speed" as -0,03 kB/s.
- Katilo valdymas (Boiler control):** Shows "Katilas" (Boiler) as Home and "Katilo jungiklis" (Boiler switch) as a toggle switch.
- Cloudy:** Shows a forecast of "Nemuno g. 5" with a temperature of -0,9 °C and 0,9 mm precipitation. A 5-day forecast table is provided:

sk	pr	an	tr	kt
0,6*	1,6*	2,5*	2,1*	1*
-3,2*	0,4*	-0,3*	0,6*	-0,4*

- Jungiklis (Switch):** Shows a "SonOFF\_Switch" toggle switch.
- esp-01-dht11-01:** Displays "Humidity" (Nepasiekiamas) and "Temperature" (Nepasiekiamas).
- Tasmota:** Shows "DHT11 DewPoint" (Nežinoma) and "DHT11 Humidity" (Nežinoma).
- Robotor S5 Max Robot Cleaner:** Shows "Priparkuotas" (Charged).
- TSM-R1 switch.tsm\_r1:** A toggle switch.
- TSM-R2 switch.tasmota\_5:** A toggle switch.
- Lightbulb icon:** A large orange lightbulb icon with a blue circular arrow around it, labeled "a2".

# Daiktų interneto (IoT) galimybės: URL nuoroda

Nuoroda: <https://iot.avr.lt/>



The screenshot displays a web browser window with the URL [https://iot.avr.lt/lovelace-namai/default\\_view](https://iot.avr.lt/lovelace-namai/default_view). The browser's address bar and tabs are visible at the top. The main content area shows the Home Assistant Lovelace interface for a device named "Kaunas".

The interface includes a sidebar on the left with the following menu items:

- Home Assistant
- Valdymas
- Namai (highlighted)
- VDU
- Žemėlapis
- Medijos naršyklė

The main content area features a blue header with the name "Kaunas" and a search icon. Below the header, there is a black circle representing the device's status, labeled "RTSP".

The interface displays two cards:

- Šildymo sistemo jungikliai**: A card showing a toggle switch for "Šildytuvo jungiklis", which is currently turned off.
- Cloudy**: A weather forecast card for "Forecast Kaunas" showing a temperature of  $-1\text{ }^{\circ}\text{C}$  and a forecast of  $0,9\text{ mm}$  of precipitation.

KLAUSIMAI?