Komponentovo orientované a udalosťami riadené programovanie Arduino zariadení

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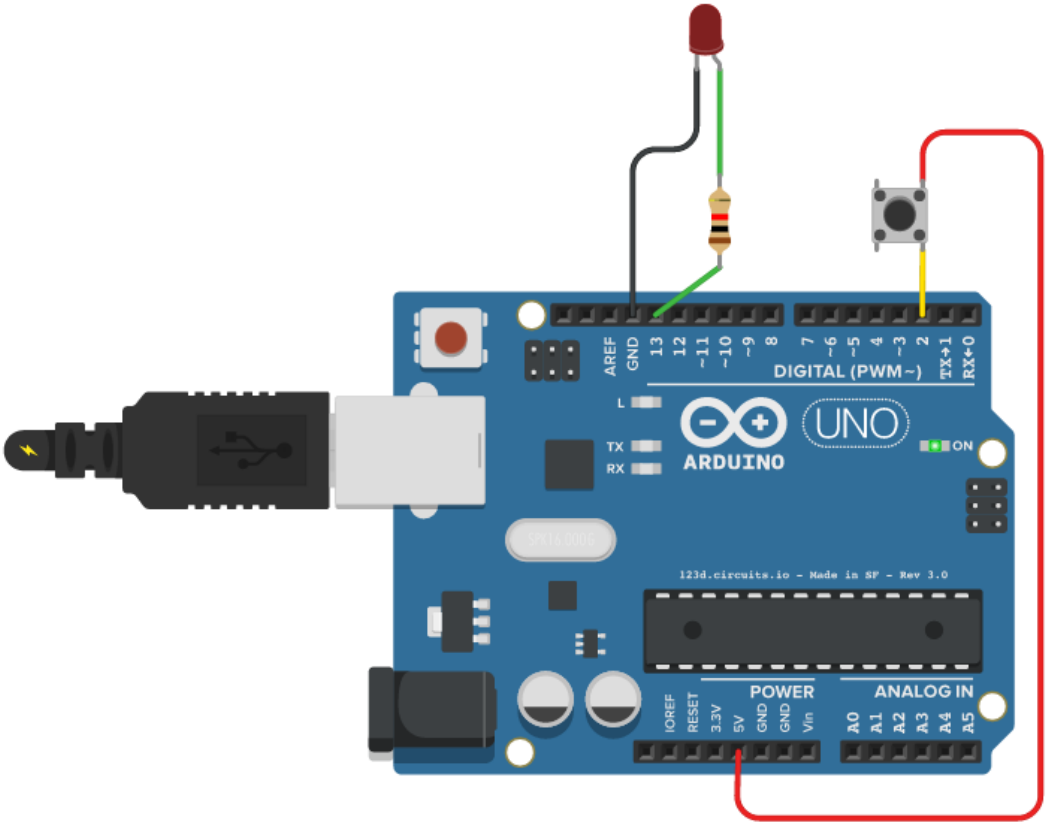
Motivácia

Parametre	Arduino UNO	Arduino Nano
Microcontroller	ATmega328P	Atmel ATmega168 or ATmega328
Operating Voltage	5V	5 V
Input Voltage (limit)	6-20V	6-20 V
Digital I/O Pins	14 (of which 6 provide PWM output)	14 (of which 6 provide PWM output)
Analog Input Pins	6	8
Flash Memory	**32 KB** (ATmega328P) of which 0.5 KB used by bootloader	**16 KB** (ATmega168) or 32 KB (ATmega328) of which 2 KB used by bootloader
SRAM	2 KB (ATmega328P)	1 KB (ATmega168) or 2 KB (ATmega328)
EEPROM	1 KB (ATmega328P)	512 bytes (ATmega168) or 1 KB (ATmega328)
Clock Speed	16 MHz	16 MHz
Size	68.6 mm * 53.4 mm	45 mm * 18 mm
Weight	25 g	5 g
Price	**$ 2.00**	**$ 2.00**

Demo projekt



Demo projekt

```
const int buttonPin = 2;
const int ledPin = 13;
int buttonState = 0;
void setup () {
    pinMode(ledPin, OUTPUT);
    pinMode(buttonPin, INPUT);
}
void loop () {
    if (buttonState == 0) {
        digitalWrite(ledPin, HIGH);
    }
    delay(1000);
    digitalWrite(ledPin, LOW);
    delay(1000);
    if (digitalRead(buttonPin) == HIGH) {
        buttonState = buttonState == 0 ? 1 : 0;
    }
}
```

Problém?

Po stlačení tlačidla sa nič nedeje!

```
if (buttonState == 0) {
    digitalWrite(ledPin, HIGH);
}
delay(1000);
digitalWrite(ledPin, LOW);
delay(1000);
if (digitalRead(buttonPin) == HIGH) {
    buttonState = buttonState == 0 ? 1 : 0;
}
```

Problém?

Po stlačení tlačidla sa nič nedeje!

```
if (buttonState == 0) {
    digitalWrite(ledPin, HIGH);
}
delay(1000);
digitalWrite(ledPin, LOW);
delay(1000);
if (digitalRead(buttonPin) == HIGH) {
    buttonState = buttonState == 0 ? 1 : 0;
}
```

delay(1000)
program je uspatý na 1 sekundu a neprijíma žiadne stlačenia.

Problém?

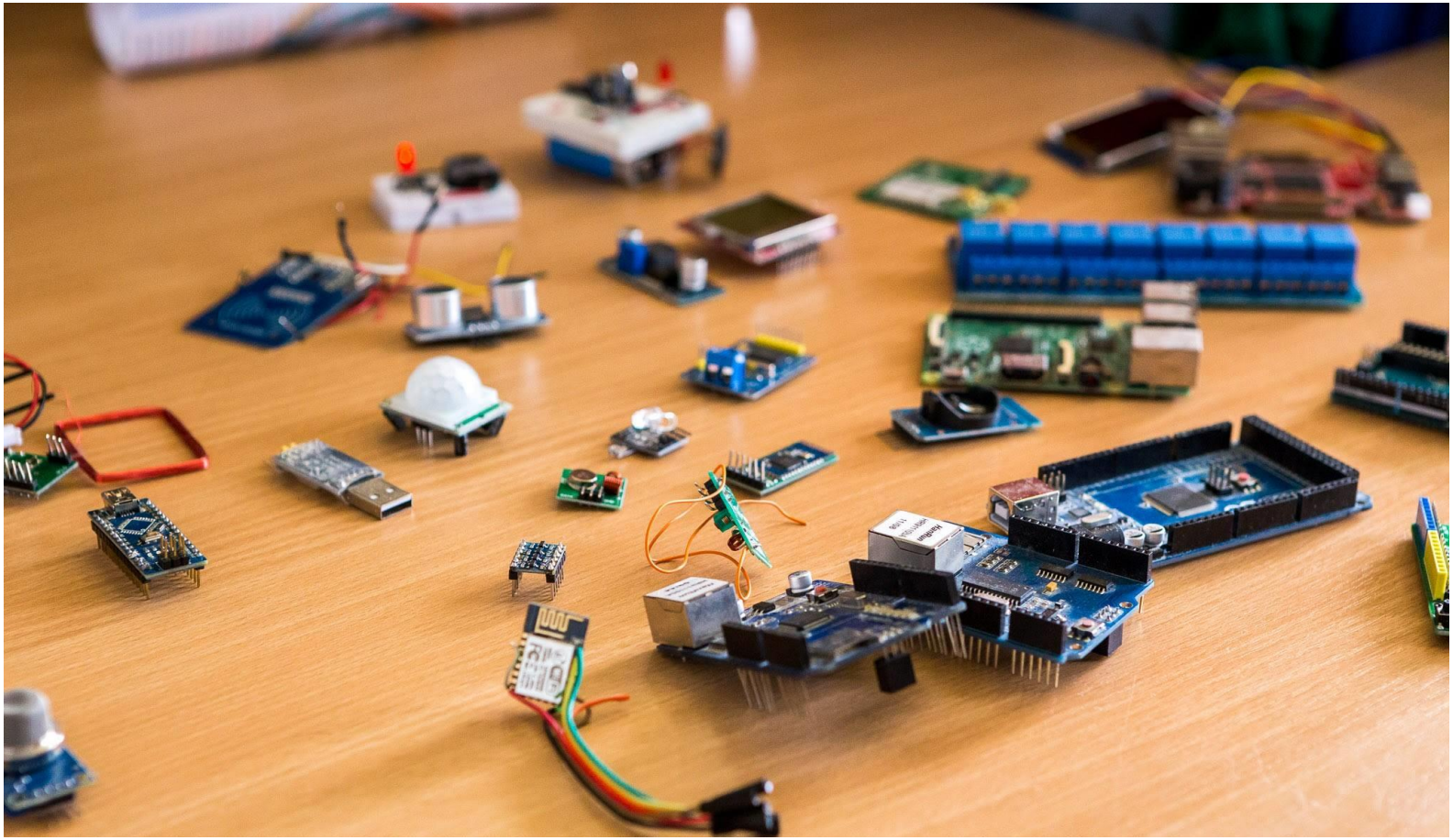
Po stlač

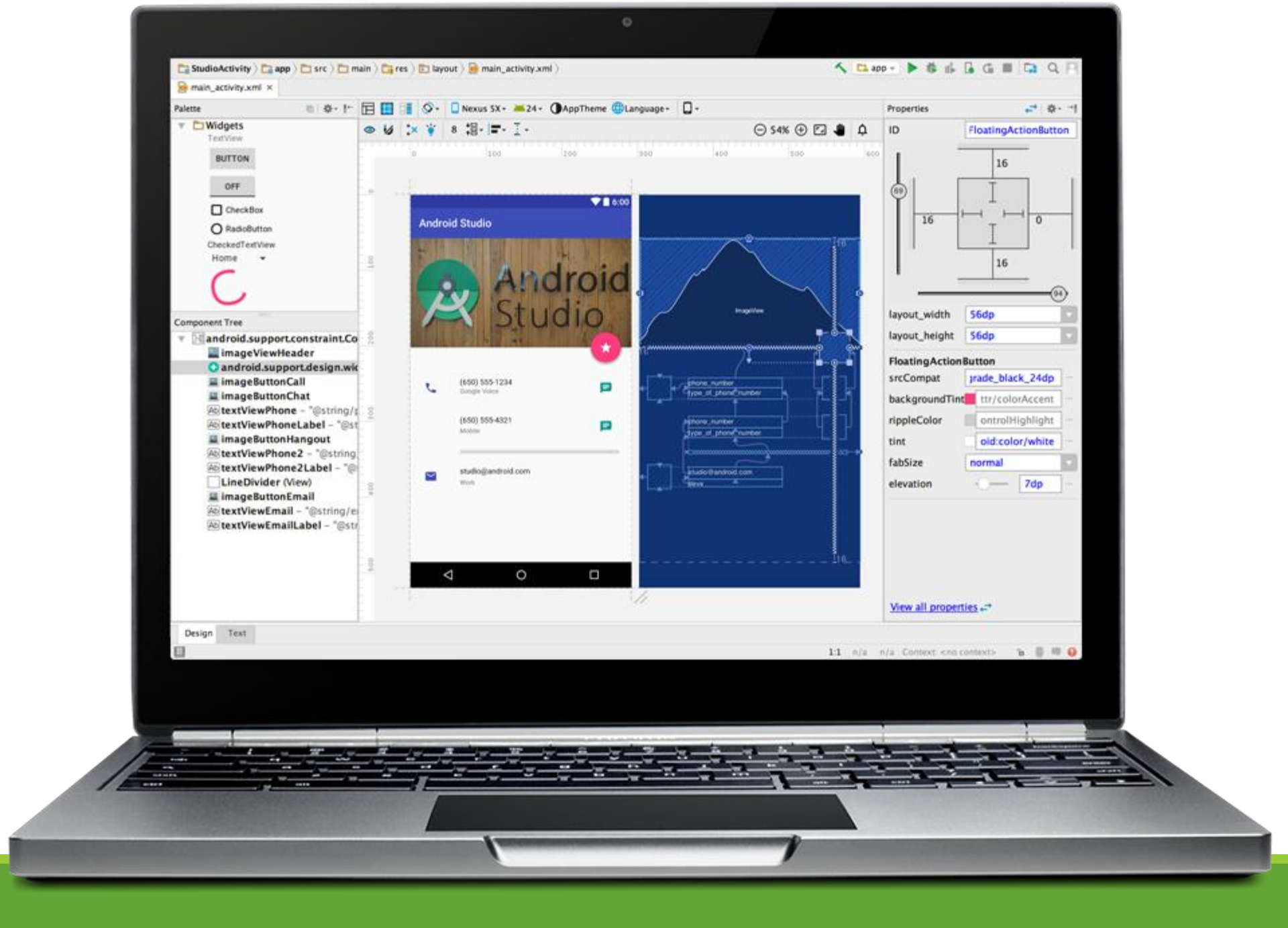
Máme riešenie (millis)

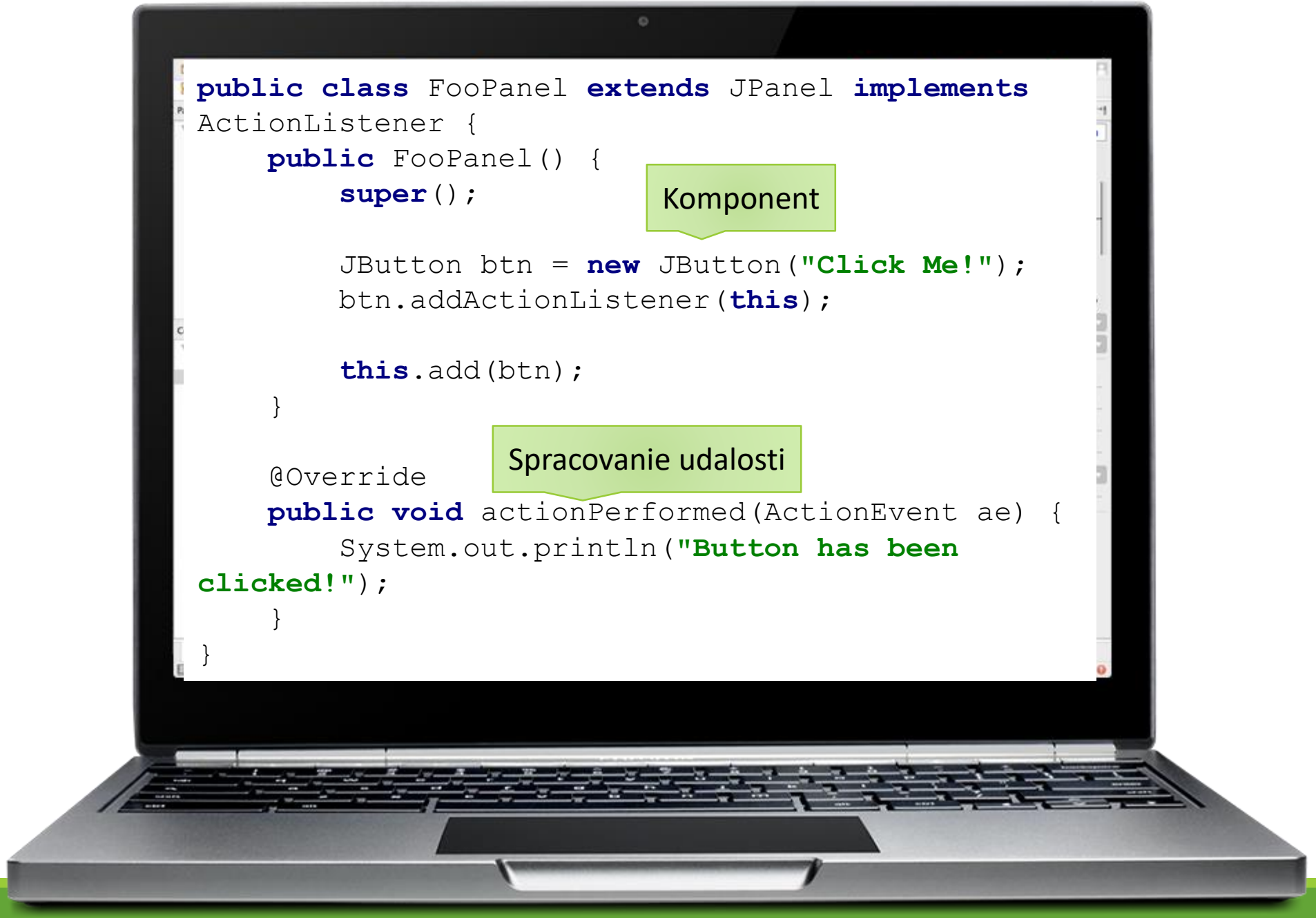
de

pro[illegible] je uspatý na 1 sekundu a neprijíma žiadne stlačenia.

ARDUINO DAY 2017




StudioActivity
app
src
main
res
layout
main_activity.xml
Palette
Widgets
TextView
BUTTON
OFF
CheckBox
RadioButton
CheckedTextView
Home
Component Tree
android.support.constraint.Co
imageViewHeader
android.support.design.wi
imageButtonCall
imageButtonChat
textViewPhone
textViewPhoneLabel
imageButtonHangout
textViewPhone2
textViewPhone2Label
LineDivider (View)
imageButtonEmail
textViewEmail
textViewEmailLabel
Nexus 5X
24
AppTheme
Language
54%
Android Studio
(650) 555-1234
(650) 555-4321
studio@android.com
Properties
ID
FloatingActionButton
layout_width
56dp
layout_height
56dp
FloatingActionButton
srcCompat
backgroundTint
rippleColor
tint
oid:color/white
fabSize
normal
elevation
7dp
View all properties
Design
Text


public class FooPanel extends JPanel implements
ActionListener {
public FooPanel() {
super();
JButton btn = new JButton("Click Me!");
btn.addActionListener(this);
this.add(btn);
}
@Override
public void actionPerformed(ActionEvent ae) {
System.out.println("Button has been
clicked!");
}
}
Komponent
Spracovanie udalosti

Naša vízia - komponenty

Časovač

Názov: **blinkTimer**

Interval: **1000**

OnTick: **changeLed()**

Tlačidlo

Názov: **button**

Pin: **2**

OnClick: **buttonClick()**

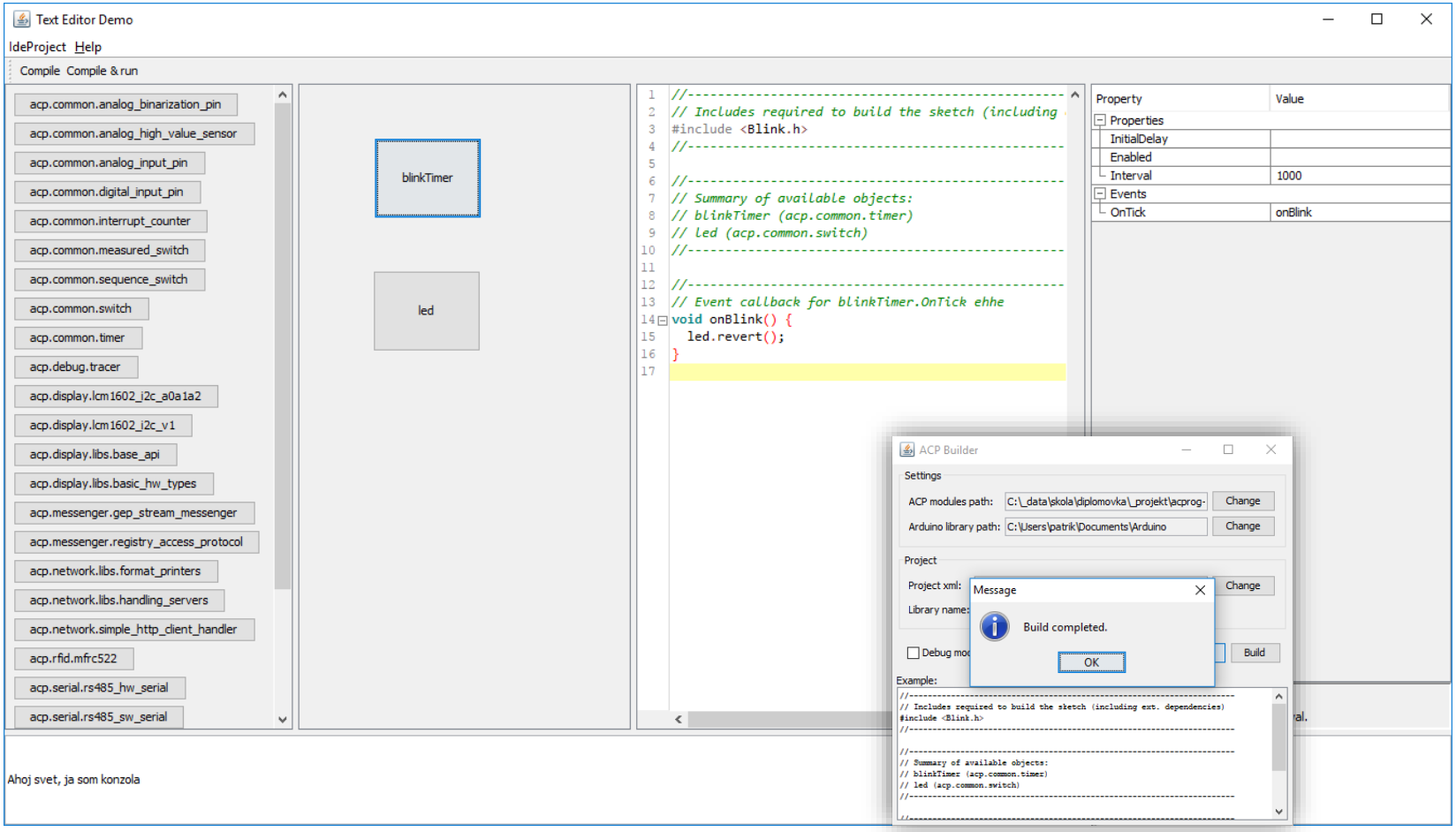
Prepínač

Názov: **led**

Pin: **13**

```
boolean blika = true;
void buttonClick() {
    blika = !blika;
}
void changeLed() {
    if(blika) {
        led.revert();
    }
}
```

Čo už máme


Text Editor Demo
IdeProject Help
Compile Compile & run
acp.common.analog_binarization_pin
acp.common.analog_high_value_sensor
acp.common.analog_input_pin
acp.common.digital_input_pin
acp.common.interrupt_counter
acp.common.measured_switch
acp.common.sequence_switch
acp.common.switch
acp.common.timer
acp.debug.tracer
acp.display.lcm1602_i2c_a0a1a2
acp.display.lcm1602_i2c_v1
acp.display.libs.base_api
acp.display.libs.basic_hw_types
acp.messenger.gep_stream_messenger
acp.messenger.registry_access_protocol
acp.network.libs.format_printers
acp.network.libs.handling_servers
acp.network.simple_http_client_handler
acp.rfid.mfrc522
acp.serial.rs485_hw_serial
acp.serial.rs485_sw_serial
blinkTimer
led
1 //----------
2 // Includes required to build the sketch (including
3 #include <Blink.h>
4 //----------
5
6 //----------
7 // Summary of available objects:
8 // blinkTimer (acp.common.timer)
9 // led (acp.common.switch)
10 //----------
11
12 //----------
13 // Event callback for blinkTimer.OnTick ehhe
14 void onBlink() {
15 led.revert();
16 }
17
Property
Value
Properties
InitialDelay
Enabled
Interval
1000
Events
OnTick
onBlink
ACP Builder
Settings
ACP modules path:
C:_data\skola\diplomovka_projekt\acprog-
Change
Arduino library path:
C:\Users\patrik\Documents\Arduino
Change
Project
Project xml:
Change
Library name:
Debug mo
Build
Example:
Message
Build completed.
OK
// Includes required to build the sketch (including ext. dependencies)
#include <Blink.h>
// Summary of available objects:
// blinkTimer (acp.common.timer)
// led (acp.common.switch)
Ahoj svet, ja som konzola

Analýza alebo čomu sa budeme venovať

- Plánovač úloh procesora
- ~~Kompilátor~~
- Analyzátor logiky programu
- Implementovať komponenty
- ~~GUI~~
- Abstract syntax tree pre editor

Ciele práce

1. Preskúmať, analyzovať a porovnať existujúce prístupy, softvérové aplikácie a knižnice využívané pri programovaní Arduino zariadení
2. Preskúmať a analyzovať možnosti komponentového a udalosťami riadeného programovania s ohľadom na hardvérové obmedzenia Arduino zariadení

Ciele práce

3. Vychádzajúc z existujúcich open-source projektov a knižníc navrhnúť a implementovať uživateľsky prívetivé riešenie na jednoduché komponentovo-orientované a udalosťami riadené programovanie Arduino zariadení
4. Implementovať vzorové komponenty využiteľné pri návrhu a implementácii IoT riešení

Literatúra

1. Doukas, C. (2012) **Building Internet of Things with the Arduino**. CreateSpace Independent Publishing Platform, ISBN: 978-1470023430
2. Schwartz, M. (2016) **Internet of Things with Arduino Cookbook**. Packt Publishing, ISBN: 978-1785286582
3. Waher, P. (2015) **Learning Internet of Things**. Packt Publishing, ISBN 978-1783553532.

Ďakujem za pozornosť!