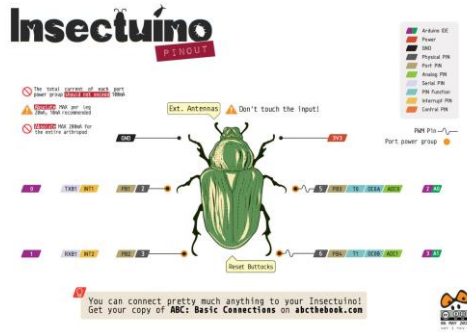
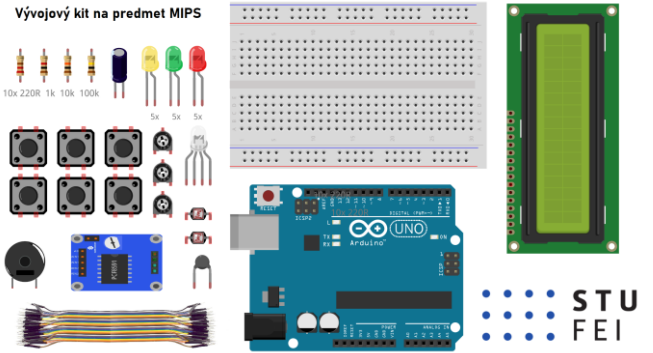


Mikropočítačové systémy

1. cvičenie



MIPS Kit



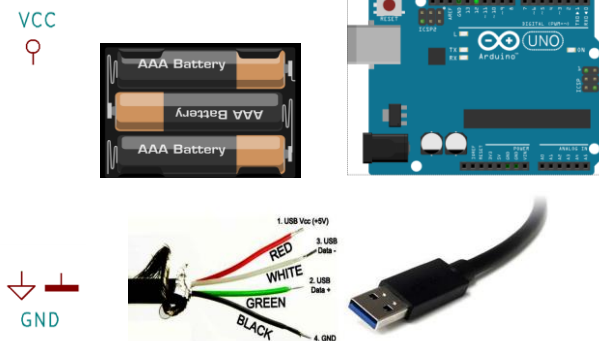
Arduino UNO



Arduino Nano



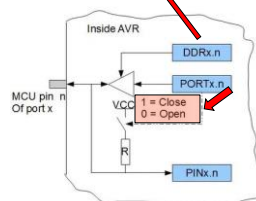
Schematické značky



I/O Port Operations



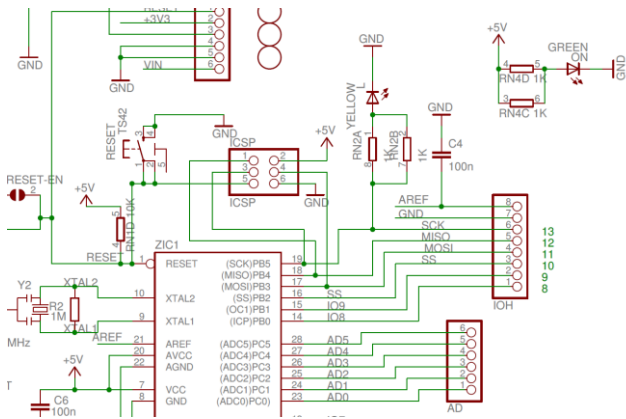
I (Input) → naopak 0
 0 (Output) → naopak 1



V jazyku C máme vďaka avr/io.h k dispozícii všetky registre

```
DDRB = 0x23;
PORTB = 0b00100011;
X = PINB;
```

Arduino UNO schematic



ATmega328P datasheet

13.4.2 PORTB – The Port B Data Register

Bit	7	6	5	4	3	2	1	0	PORTB
0x05 (0x25)	PORTB7	PORTB6	PORTB5	PORTB4	PORTB3	PORTB2	PORTB1	PORTB0	PORTB
Read/Write	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W	
Initial Value	0	0	0	0	0	0	0	0	

13.4.3 DDRB – The Port B Data Direction Register

Bit	7	6	5	4	3	2	1	0	DDRB
0x04 (0x24)	DDRB7	DDRB6	DDRB5	DDRB4	DDRB3	DDRB2	DDRB1	DDRB0	DDRB
Read/Write	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W	
Initial Value	0	0	0	0	0	0	0	0	

13.4.4 PINB – The Port B Input Pins Address

Bit	7	6	5	4	3	2	1	0	PINB
0x03 (0x23)	PINB7	PINB6	PINB5	PINB4	PINB3	PINB2	PINB1	PINB0	PINB
Read/Write	R	R	R	R	R	R	R	R	
Initial Value	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	

AVR Assembler

99. SBI – Set Bit in I/O Register

99.1. Description

Sets a specified bit in an I/O Register. This instruction operates on the lower 32 I/O Registers – addresses 0-31.

Operation:

(i) I/O(A,b) ← 1

Syntax: Operands: Program Counter:
 (i) SBI A,b 0 ≤ A ≤ 31, 0 ≤ b ≤ 7 PC ← PC + 1

16-bit Opcode:

1001	1010	AAAA	Abbb
------	------	------	------

99.2. Status Register (SREG) and Boolean Formula

I	T	H	S	V	N	Z	C
-	-	-	-	-	-	-	-

Example:

```
out r18,r0 ; Write EEPROM address
sbi r10,0 ; Set read bit in EEPROM
in r1,r10 ; Read EEPROM data
```

Words: 1 (2 bytes)
 Cycles: 2

AVR Assembler

37. CBI – Clear Bit in I/O Register

37.1. Description

Clears a specified bit in an I/O register. This instruction operates on the lower 32 I/O registers – addresses 0-31.

Operation:

(i) I/O(A,b) ← 0

Syntax: Operands: Program Counter:
 (i) CBI A,b 0 ≤ A ≤ 31, 0 ≤ b ≤ 7 PC ← PC + 1

16-bit Opcode:

1001	1000	AAAA	Abbb
------	------	------	------

37.2. Status Register (SREG) and Boolean Formula

I	T	H	S	V	N	Z	C
-	-	-	-	-	-	-	-

Example:

```
cbi r10,7 ; Clear bit 7 in Port D
```

Words: 1 (2 bytes)
 Cycles: 2
 Cycles XMEGA: 1
 Cycles Reduced Core tinyAVR: 1