AVR/GNU Assembler

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ARDUINO
WEEK2022

March 21st / 26th
week.arduino.cc
#ArduinoWeek22

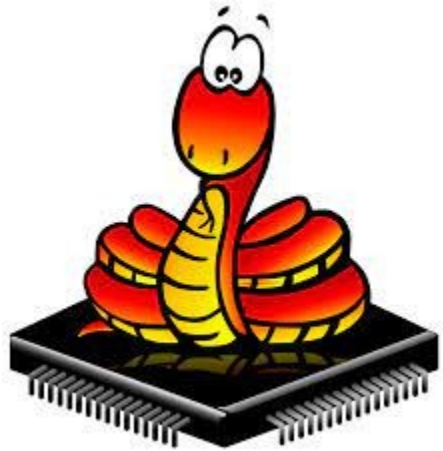
Agenda

- Traditional ways to program Arduino
- Assembler Supported Architectures
- Avra VS GNU Assembler
- Demo

Traditional ways to program Arduino

In General we have different ways to program Arduino based on Atmega328p microcontroller:

- To use official C++ based dialect
- To use C language
- MicroPython



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- Assembler Supported Architectures

- Today we are looking for another way, this way is to use Assembly language.
- There are different assembly languages for well-known these days Instruction Set Architectures. For example:
- X86_64 -> NASM, MASM
- ARM -> GNU Assembler and AVR Assembler (avra).
- We will use both assembly languages for ARM architecture

nasm the netwide assembler

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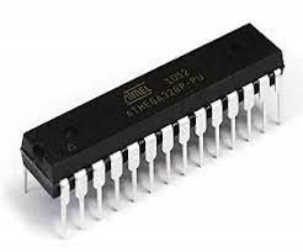
Atmega 328p Datasheet

If we look at Atmega 328p Datasheet we can see that the microcontroler is ARM RISC based

GNU Assembler VS AVRA



GNU Assembler is assembly language part of the GNU Project. This assembly language is part of binutils package

AVR Assembler is GNU GPL v3 licensed for cuple of AVR microcontrolers such as:

- Attiny 13
- Attiny 85
- Atmega 328p and others.

We can install them with command bellow:

sudo apt install binutils avra

Getting Started with GNU Assembler

- .s

```
.text
.global main
.func main
main:
mov r0,#3
mov r1,#4
add r2,r0,r1
bx lr
```

```
/* R0 ..r15*/
//R10
//Ro=3
//R1=4
//R2,r0 r1
```

```
.text
.global main
.func main
main:
mov r0, #6
mov r1, #5
cmp r0,r1
beq pass
bge grt
fail:
mov r0,#2
b end
grt:
mov r0,#6
b end
pass:
mov r0,#1
b end
end:
bx lr
```

AVRA Blink

```
.include "m328pdef.inc"
.cseg
.org 0x00
ldi r16,(1<<PINB0)
out DDRB,r16
out PORTB,r16
loop: rjmp loop
```

Some Tips

- We can use microcontrolers on breadboad standalone. Atmega 328p is mounted on the Arduino board just for our comfortable.

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GNU/AVR

Asm Demo

Sources

- Examples in this presentation are modificated from
- RASPBERRY PI ASSEMBLER
- Roger Ferrer Ibáñez
- Cambridge, Cambridgeshire, U.K.

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Thank you!

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