

uC101: Introduction to Microcontrollers / Interfacing with the real world

Josh Johnson

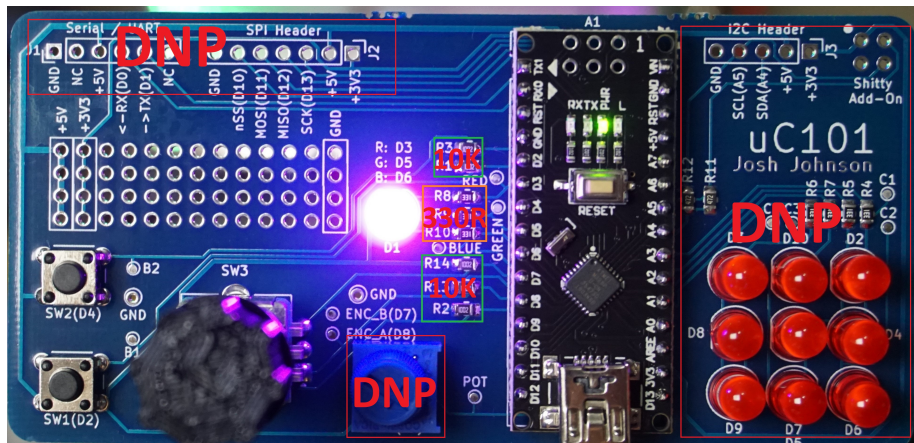
13/5/2019

Overview

- Assembly of Hardware
- Microcontroller 101
- Tools
- Bit shifting, logical operations
- Demos
 - Blink
 - Button
 - RGB LED (PWM)
 - Rotary Encoder
 - UART
 - Charlieplexing

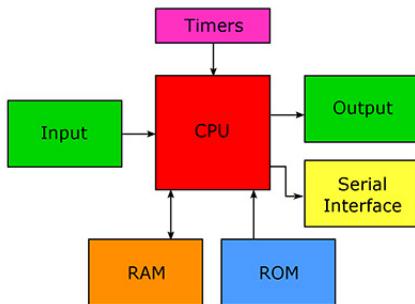
Project Files: github.com/joshajohnson/CBRhardware

Assembly of Hardware



What is a microcontroller?

Microprocessor: CPU
and several supporting chips.



Microcontroller: CPU
on a single chip.

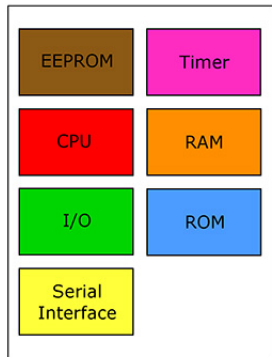


Image Credit: Kenneth C. Reitzel, III

Common Options

8 bit

- ATtiny
- ATmega (Atmel / Microchip)
- PIC (Microchip)

16 bit

- MSP430 (TI)

32 bit

- STM32 (ST)
- SAM (Atmel / Microchip)
- nRF5x (Nordic Semi)
- ESP8266/32 (Espressif)
- CCxxxx (TI)
- LPCxxxx (NXP)
- PIC32 (Microchip)

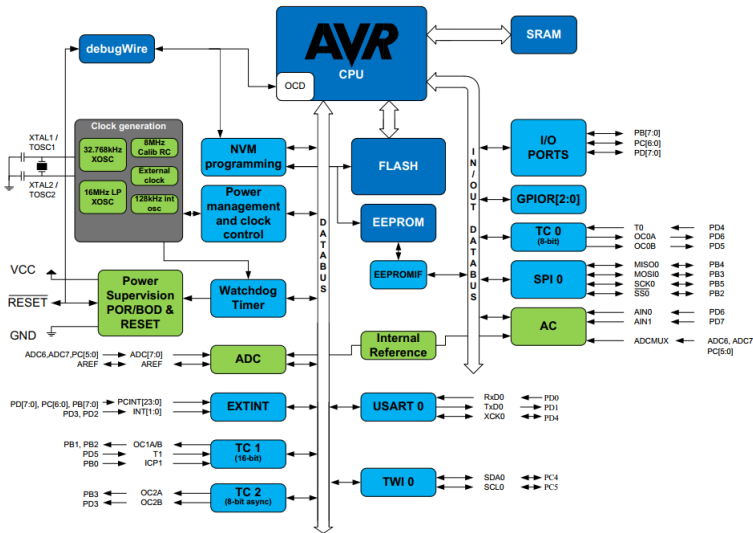
32 bit ARM cores

- Cortex-M0/M0+
- Cortex-M1 (FPGA only)
- Cortex-M3
- Cortex-M4 (M3 + DSP + FPU)
- ...

How to choose?

- Compute power
 - 8 bit vs 32 bit
 - DSP / FPU
- Peripherals
 - Wireless
 - WiFi
 - Bluetooth
 - LoRa
 - Cellular
 - USB
 - ADC
 - Ethernet
 - CAN
 - Number of SPI/UART/I2C/Timers

ATmega328p Architecture



The End

Links to resources: [uC101/README.md](#)

Next Month

- Breadboard to Printed Circuit Board
- Mechanical Design Considerations

Say Hello!

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