uC101: Introduction to Microcontrollers / Interfacing with the real world

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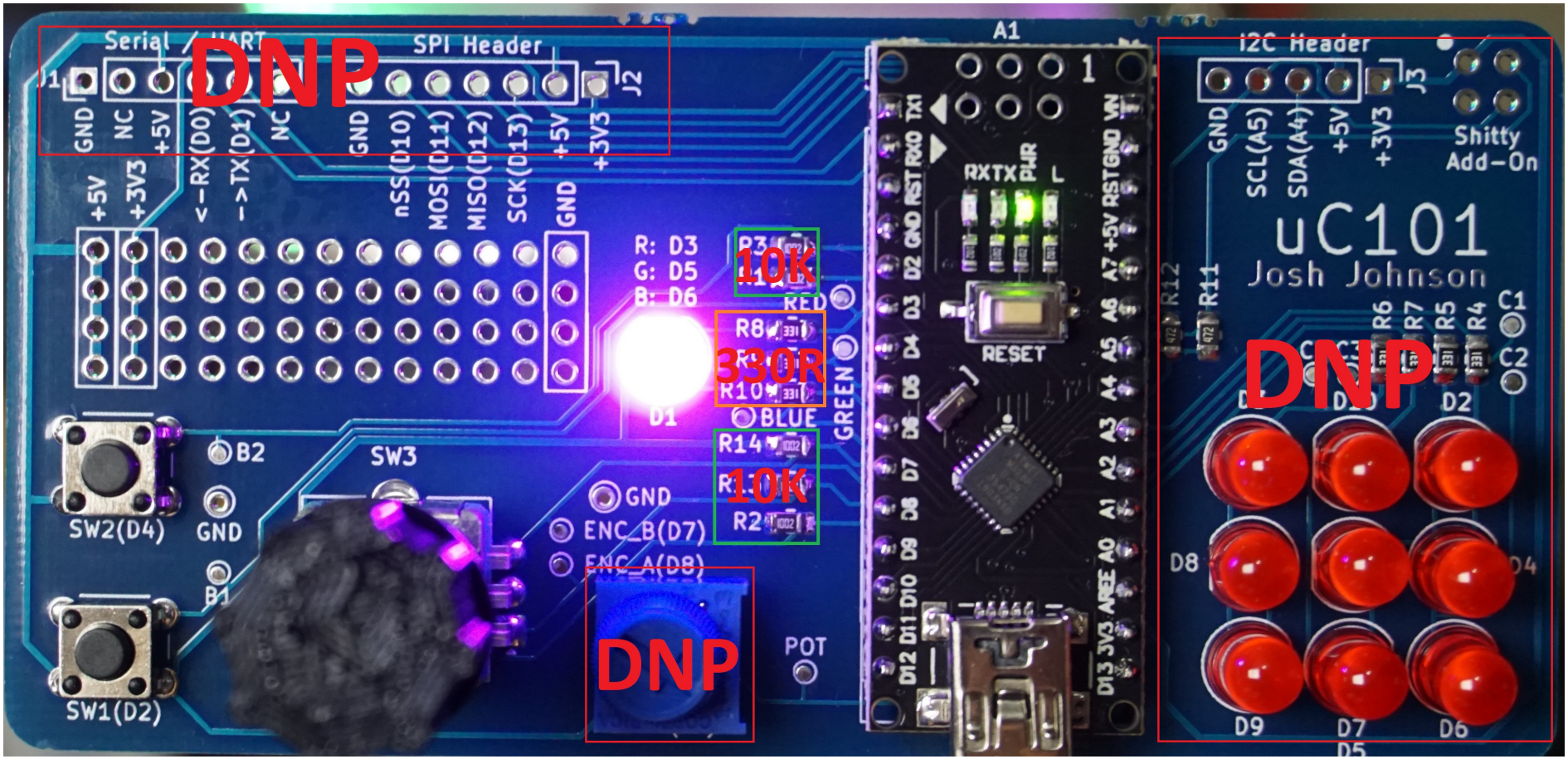
Overview

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

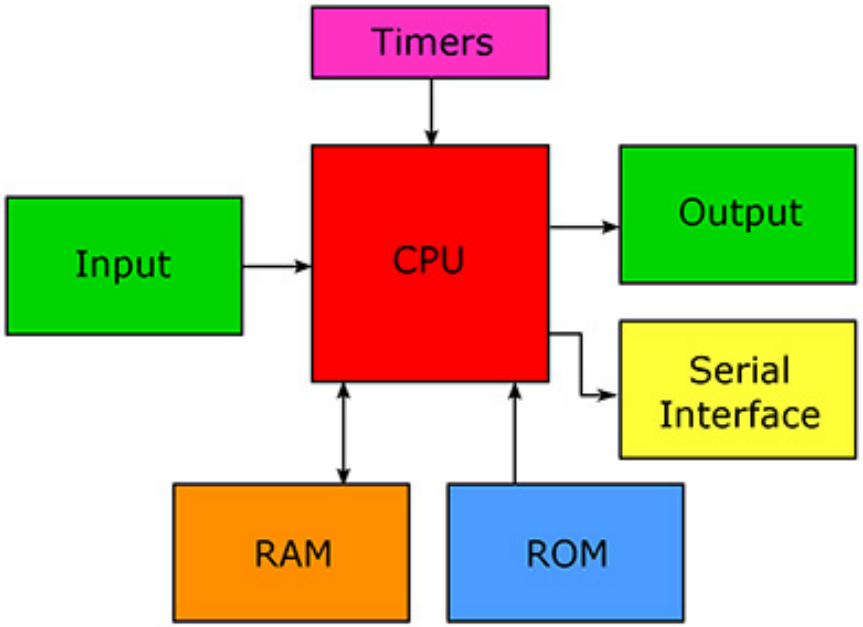
Project Files: `github.com/joshajohnson/CBRhardware`

Assembly of Hardware

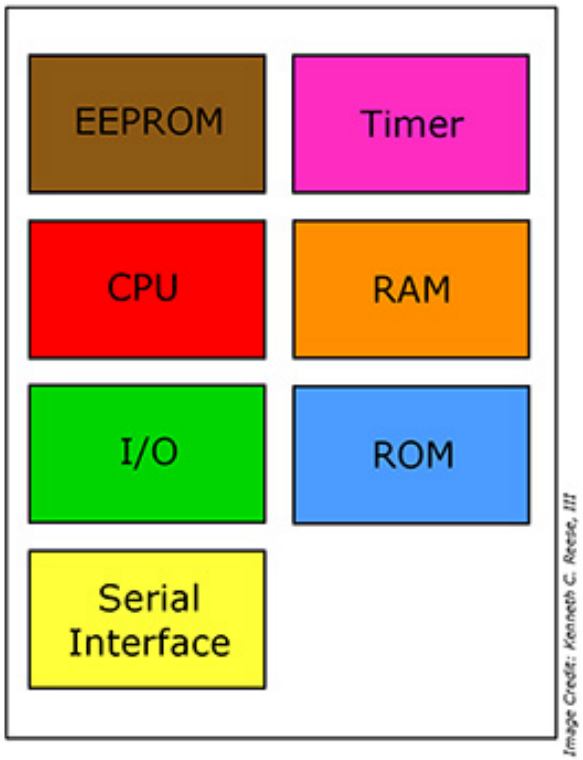


What is a microcontroller?

Microprocesser: CPU
and several supporting chips.



Microcontroller: CPU
on a single chip.



Microcontroller 101

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

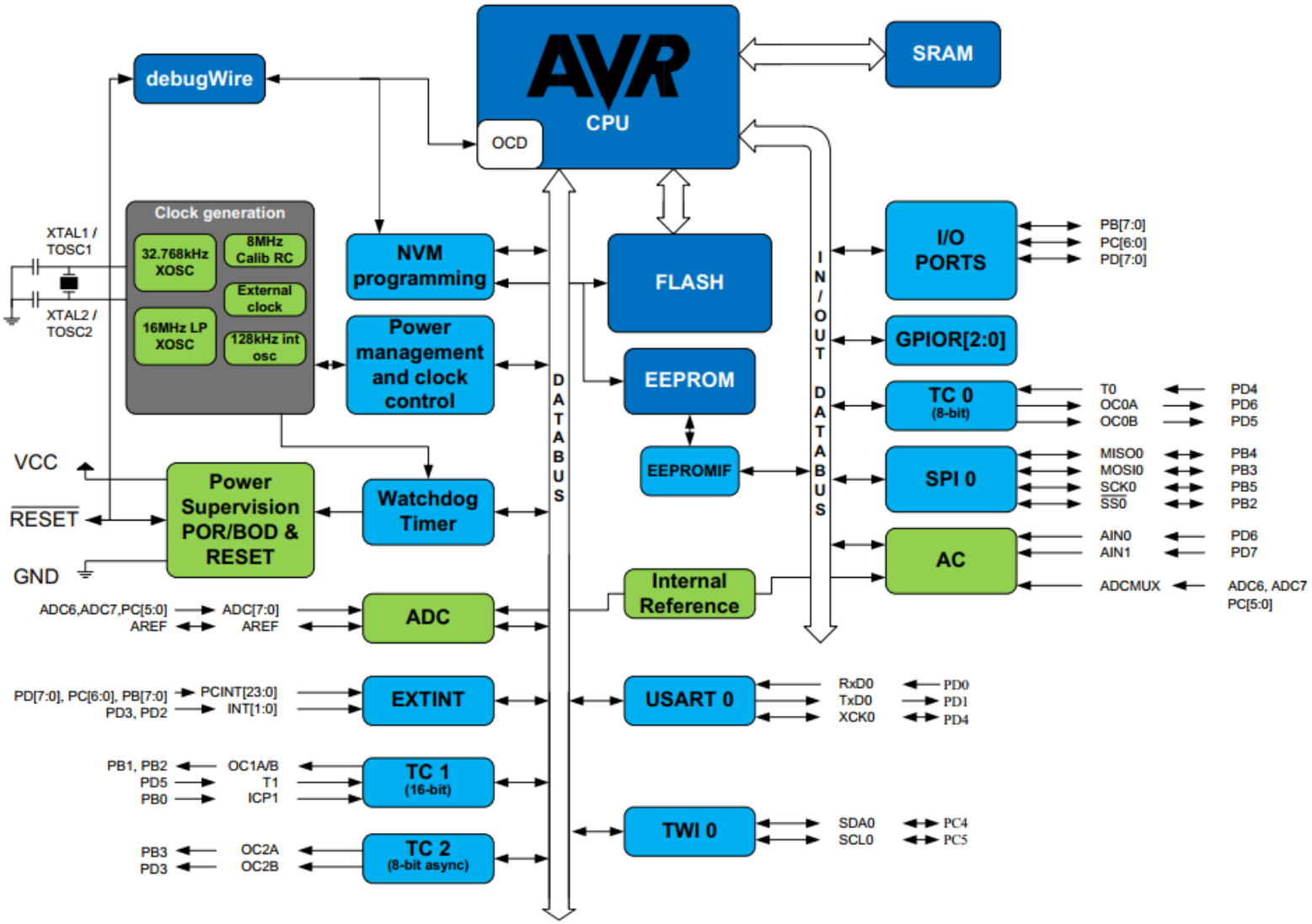
- Cortex-M0/M0+
- Cortex-M1 (FPGA only)
- Cortex-M3
- Cortex-M4 (M3 + DSP + FPU)
- ...

Microcontroller 101

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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Project Files: `github.com/joshajohnson/CBRhardware`