Arduino et al.

Microcontrollers for absolute beginners

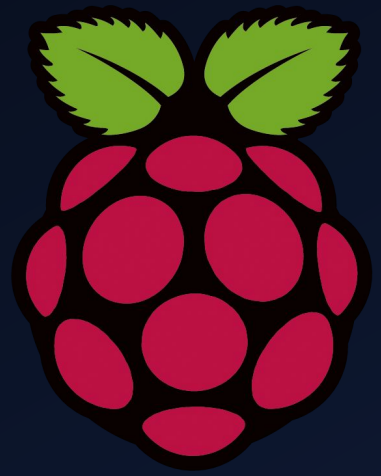
What we will discuss

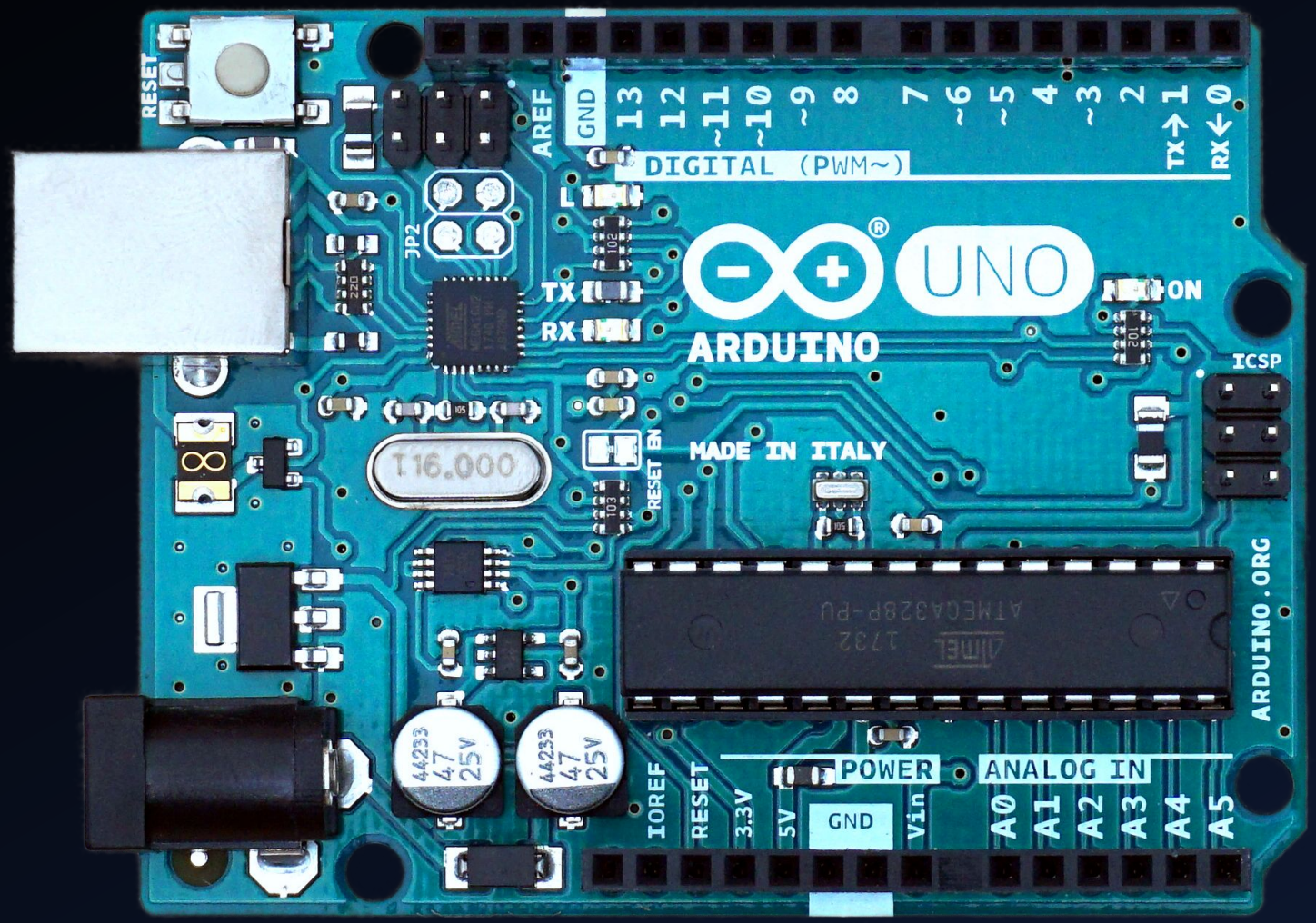
- What's a microcontroller?
- The Arduino
- Practical examples

Microcontroller ≠ Single-Board-Computer

Need a device for “simple” and repetitive tasks?

Need a small but full fledged computer?

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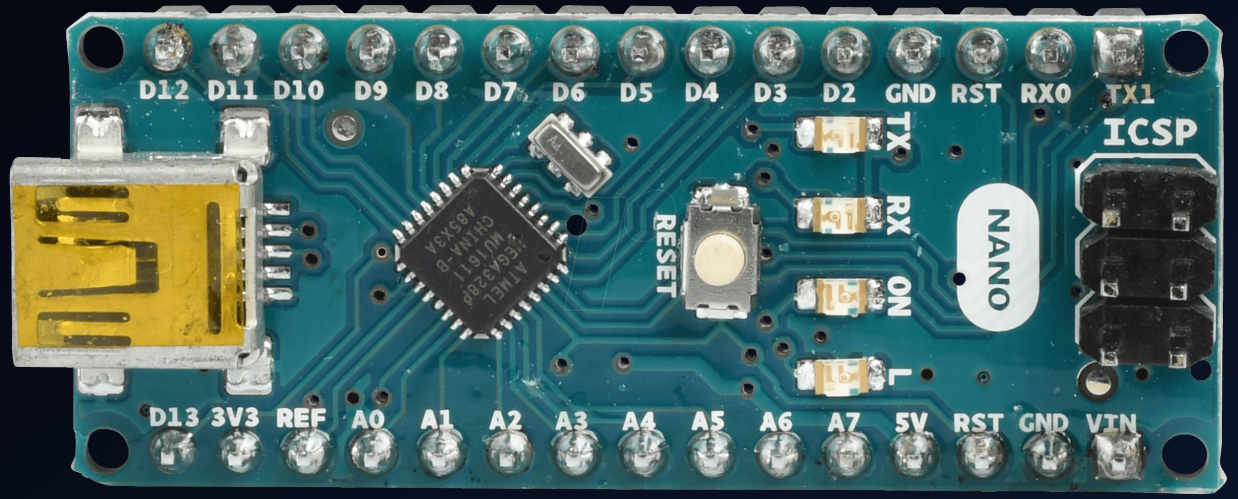
AREF
GND
13
12
~11
~10
~9
8
7
~6
~5
4
~3
2
TX→1
RX←0
DIGITAL (PWM~)
L
TX
RX
ON
ARDUINO
UNO
ICSP
MADE IN ITALY
16.000
ARDUINO.ORG
POWER
ANALOG IN
IOREF
RESET
3.3V
5V
GND
Vin
A0
A1
A2
A3
A4
A5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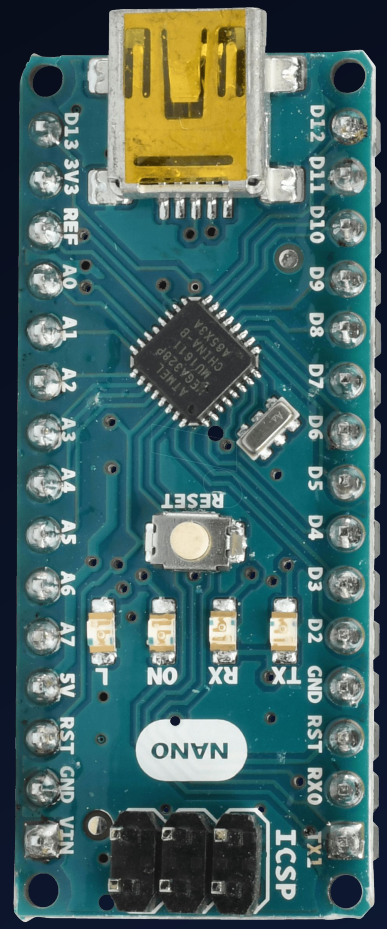
ICSP
TX
RX
ON
L
RESET
NANO
D13 3V3 REF A0 A1 A2 A3 A4 A5 A6 A7 5V RST GND VIN

Technical data of the Uno/Nano

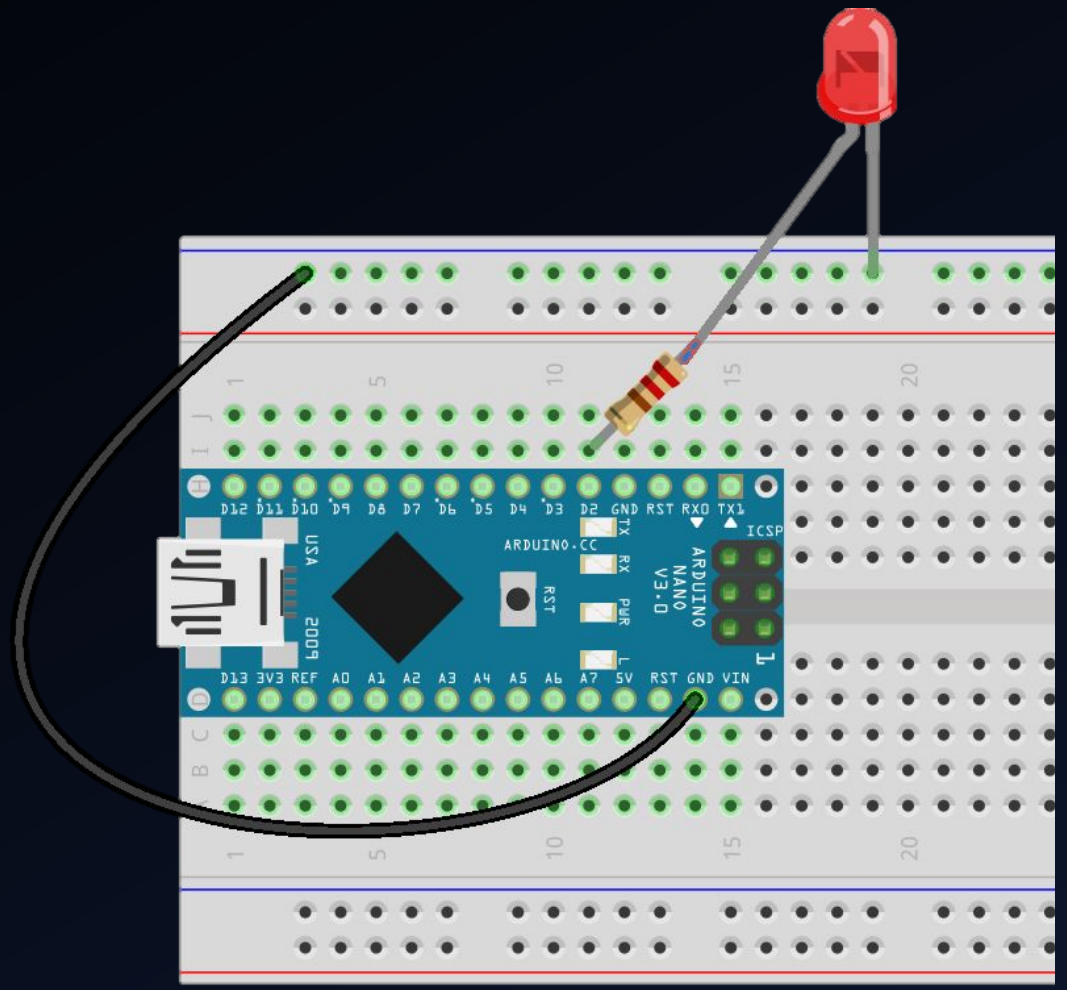
- 16 Mhz clock-speed
- 32 kB program storage
- 2 kB RAM (variable storage)
- 1 kB EEPROM (non volatile)

- 14 digital I/O pins
- 6 PWM pins
- 2 interrupt pins
- 8 analog I/O pins
- I2C / SPI capable



A few example projects

- Blinking internal LED
- Blinking external LED
- Traffic light
- Serial monitor
- OLED Display (I2C)
- Sensors
- Electromechanics (Stepper motor)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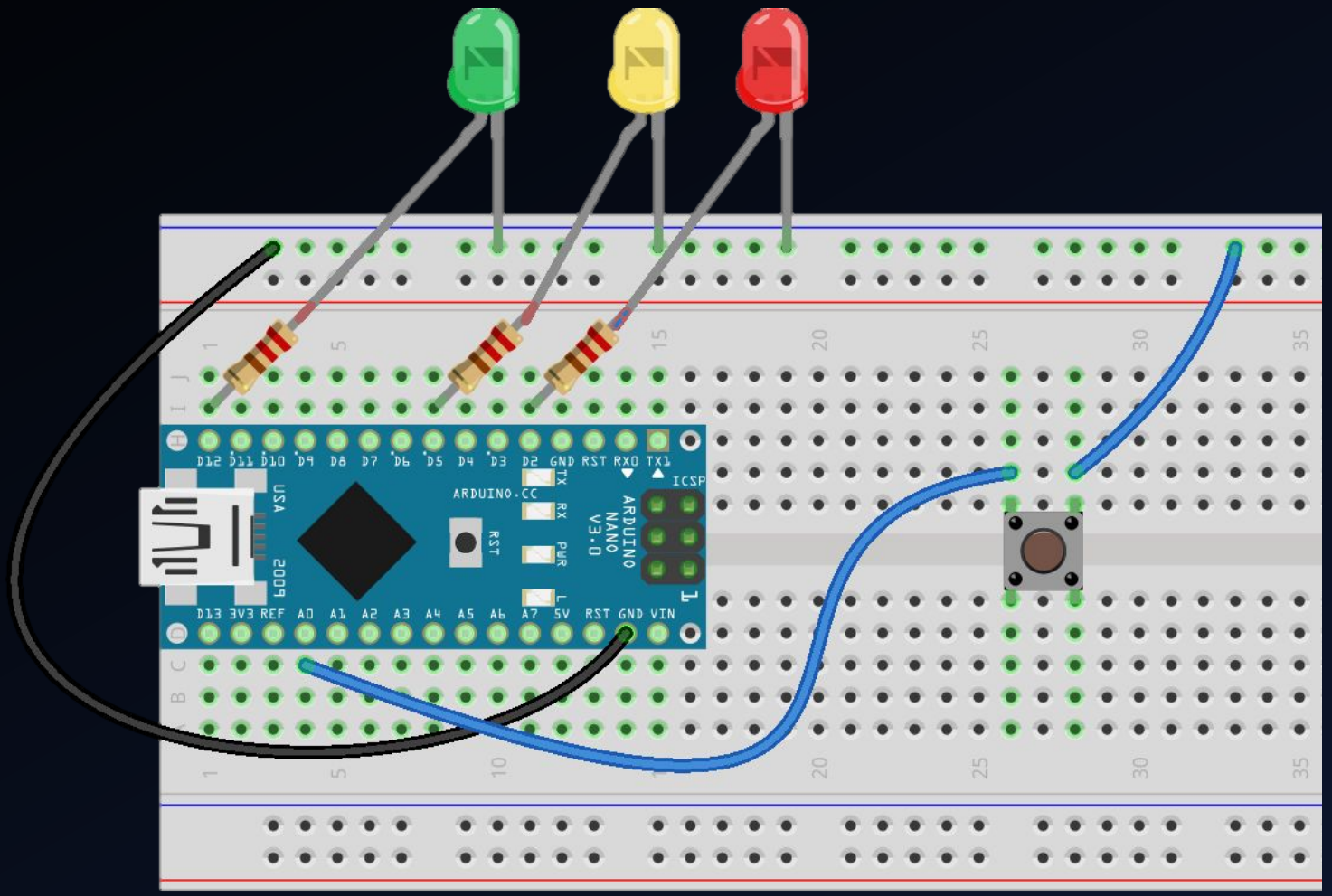
ICSP
ARDUINO.CC
TX
RX
PWR
L
RST
ARDUINO
NANO
V3.0
USA
2009
D13 3V3 REF A0 A1 A2 A3 A4 A5 A6 A7 5V RST GND VIN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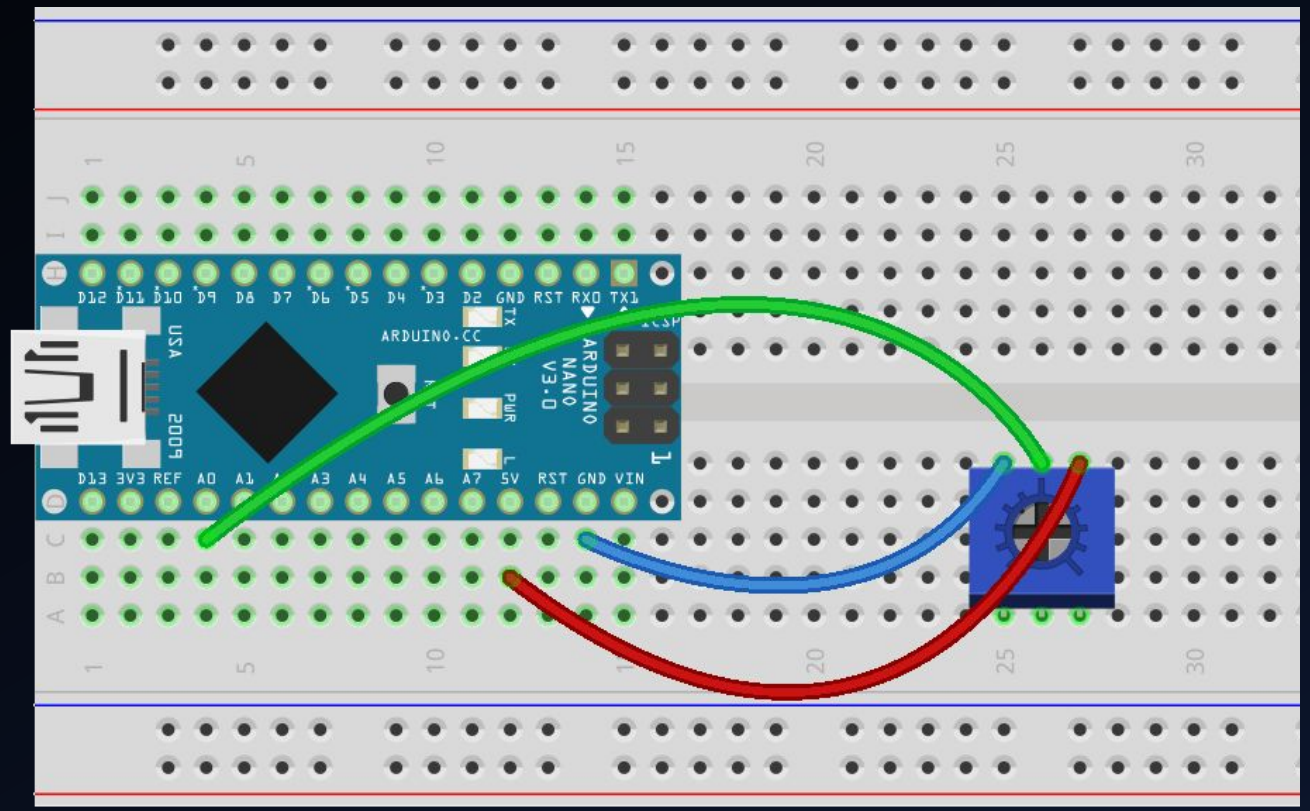
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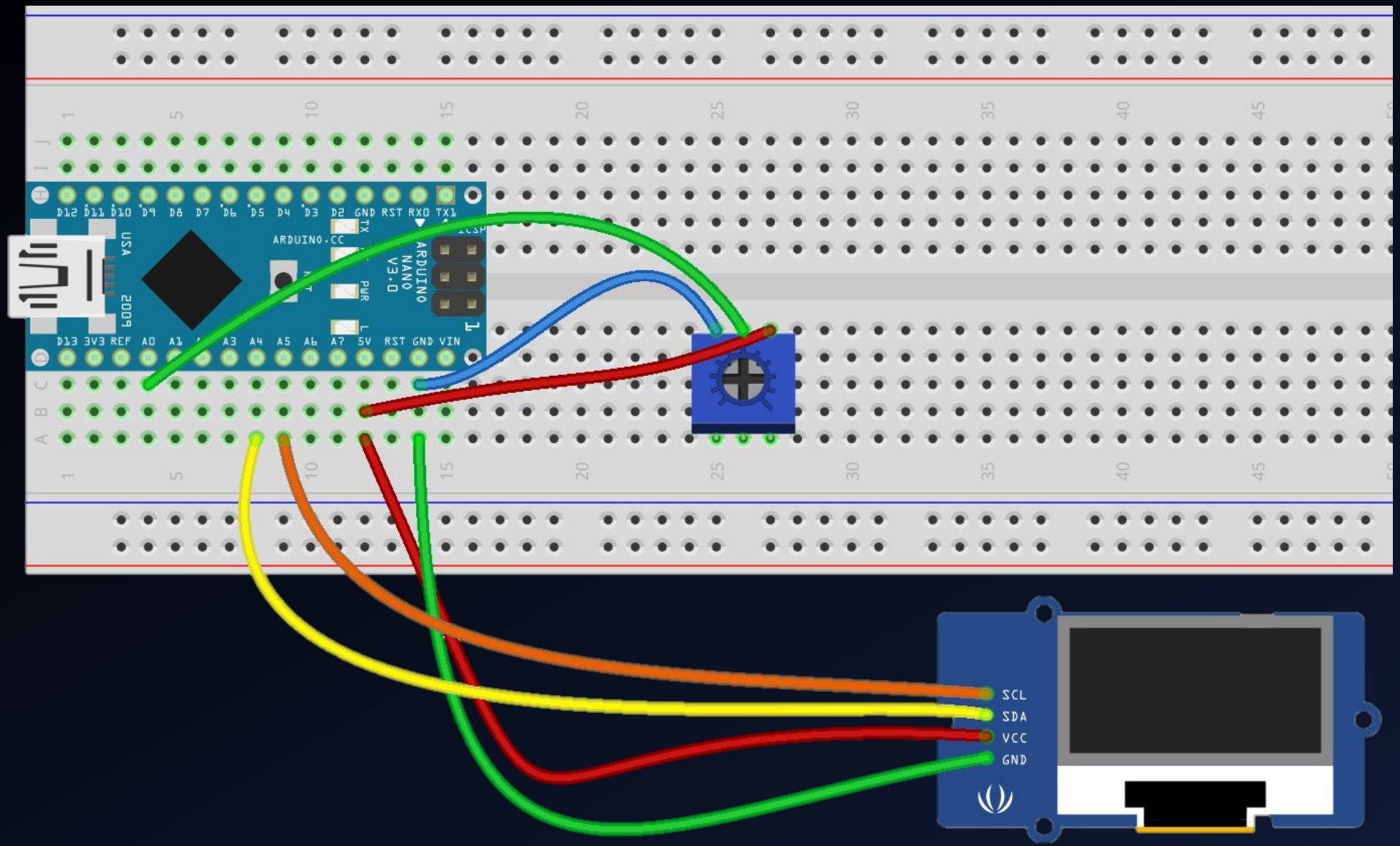
ARDUINO.CC
ARDUINO NANO V3.0
USA
2009
TX
PWR
L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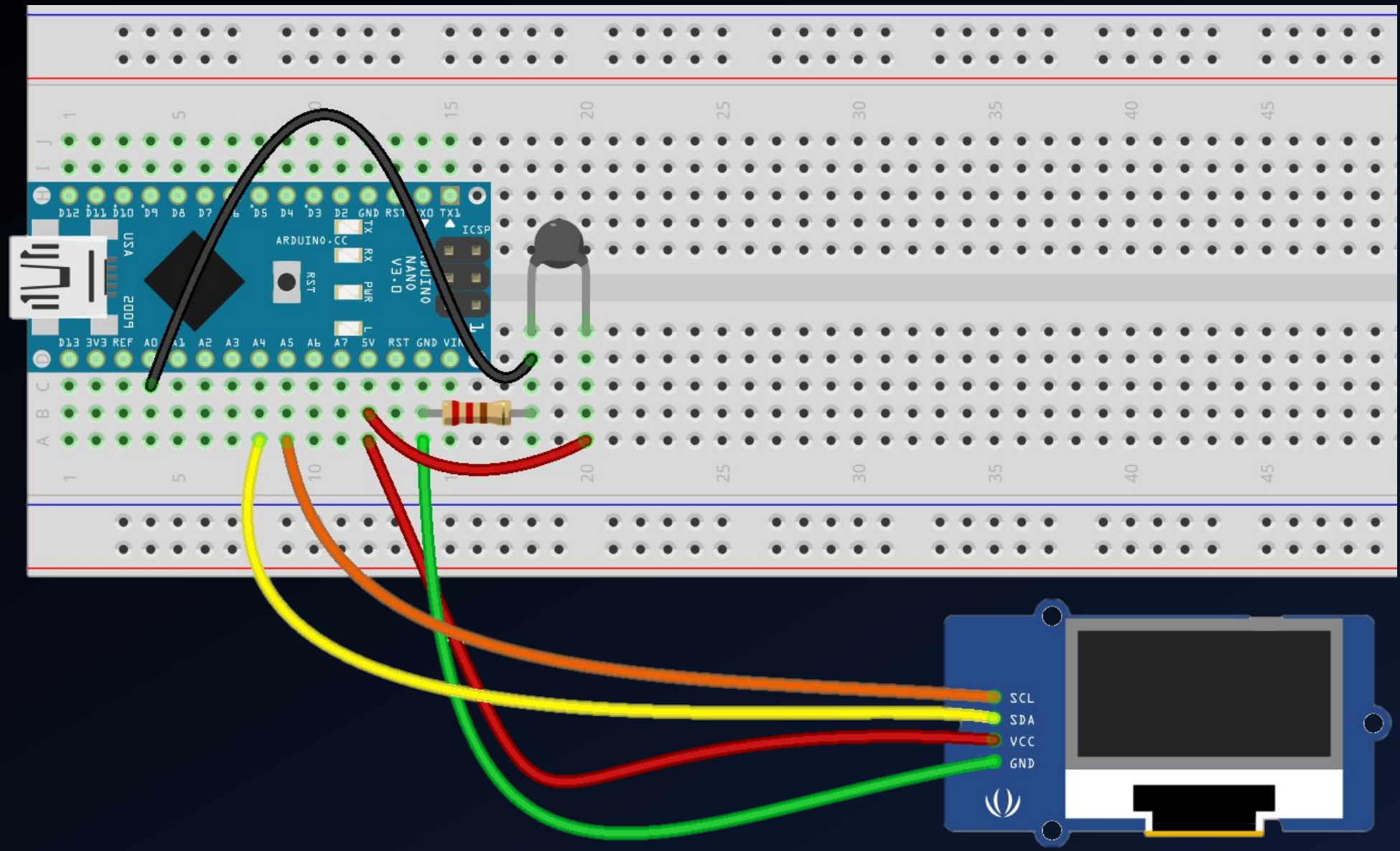
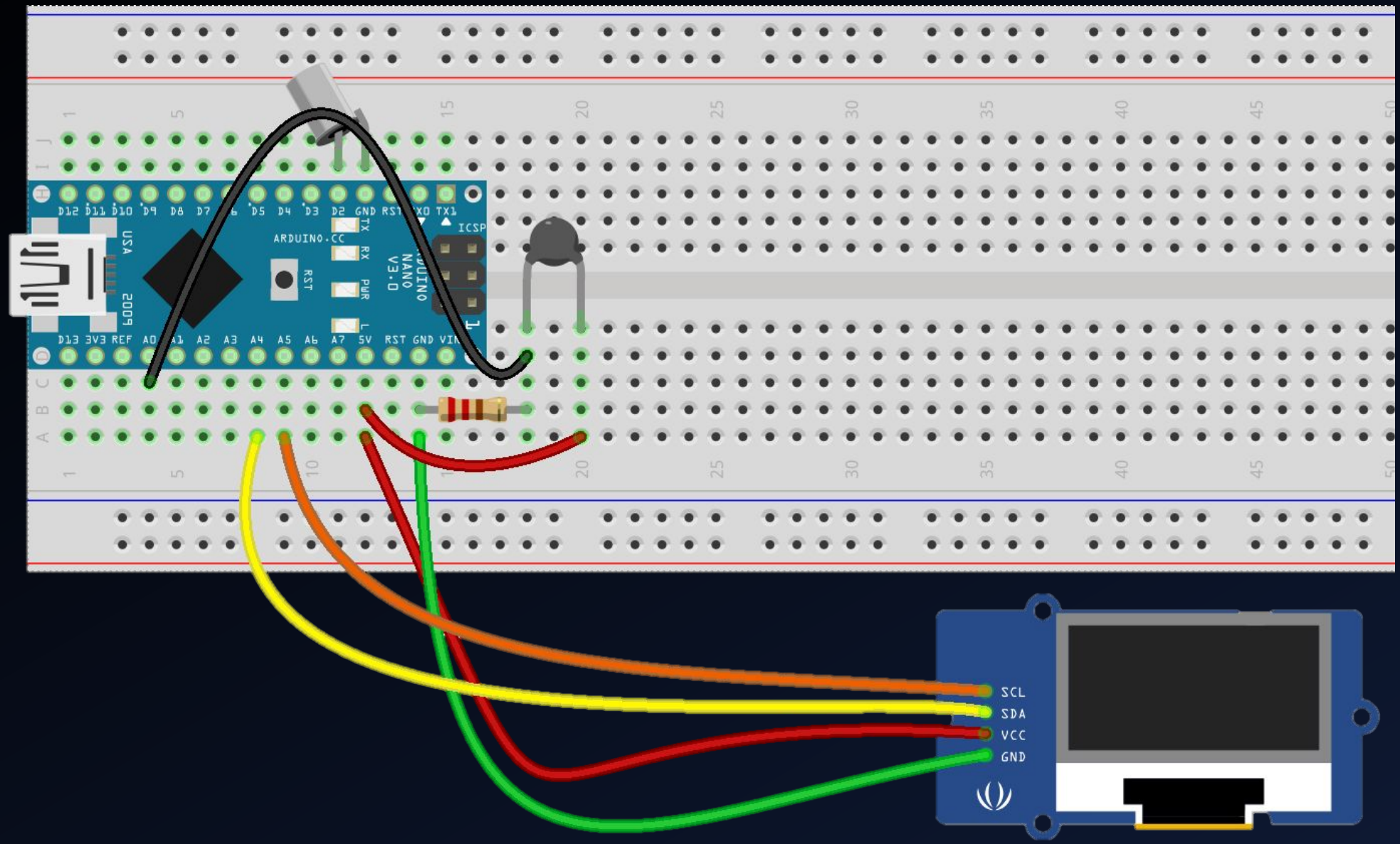
ARDUINO.CC
ARDUINO NANO V3.0
D13 3V3 REF A0 A1 A2 A3 A4 A5 A6 A7 5V RST GND VIN
SCL
SDA
VCC
GND


SCL
SDA
VCC
GND


SCL
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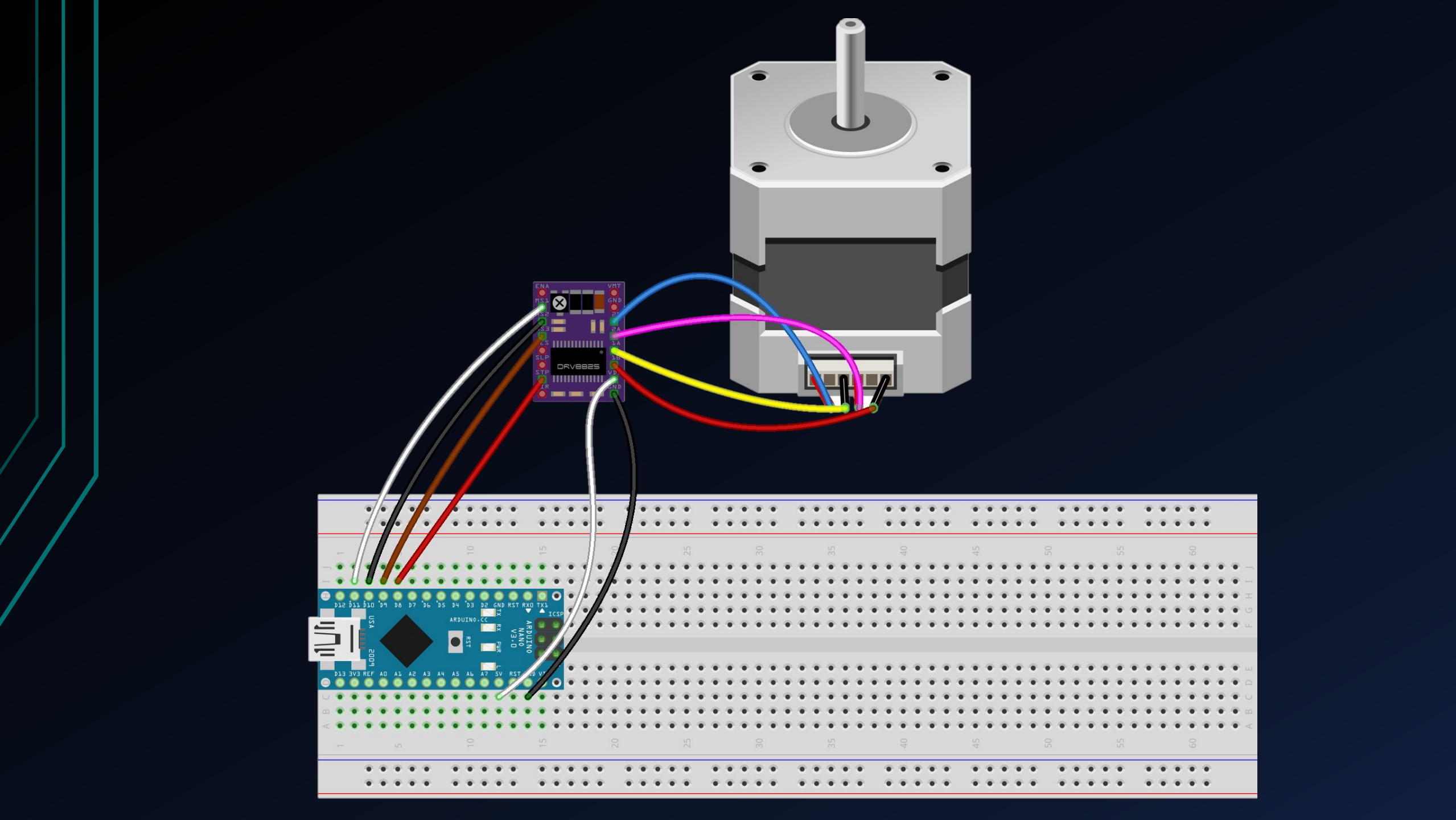
VCC
GND


ENA
VMT
GND
DRV8825
ARDUINO.CC
ARDUINO NANO V3.0

Now, why would you care?

- easy & cheap to get going
- steep learning curve
- “natural” problem/solution expressing

Useless
Box
ON
OFF