



ACCESS CONTROL WITH **NFC AND ARDUINO**

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Enero 2017

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I. OBJECTIVES



OBJECTIVES (I)

- Create an access control point in a chain of stores
- **NFC** will be the technology to use
- An **Arduino** system will be the framework
- **Cheaper** than actual commercial solutions
- **Easy** to install and **maintain**

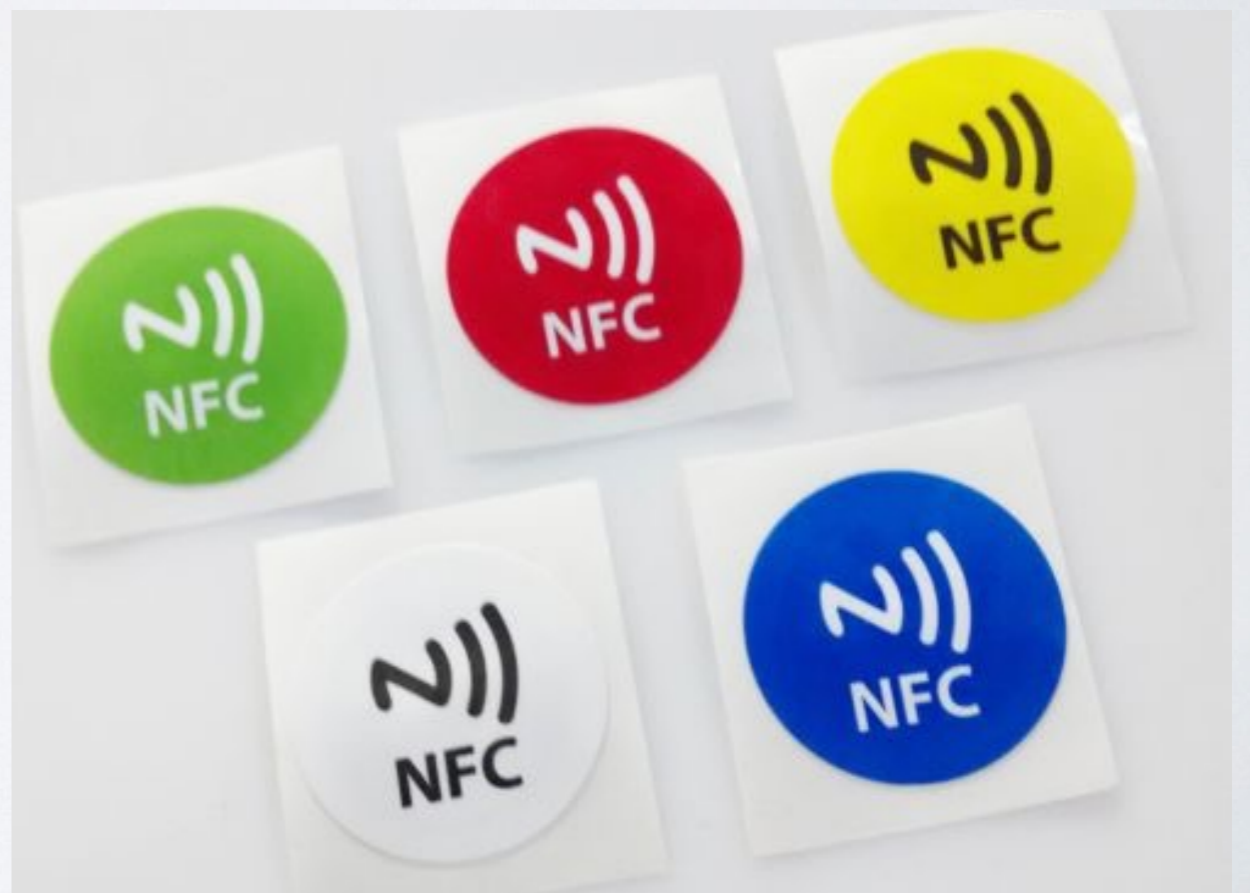
OBJECTIVES (II)

- User visual and sound warnings for each access using **LED's** and passive **buzzer**
- Secondary access with 4x4 membrane **keypad**
- **Database** (DB) backup of the accesses via **Ethernet**
- Upgrade to **wifi** connection
- **Web app** to view and manage the data in the DB

2. NFC

Near Field Communication





NFC (I)

- Enable two electronic devices, to establish communication by bringing them within **4 cm**
- It employs electromagnetic induction between two loop antennas of two devices
- It uses globally available unlicensed radio frequency ISM band of **13.56 MHz**
- Data rates ranging from 106 to **424 kbit/s**

NFC (II) - 3 MODES

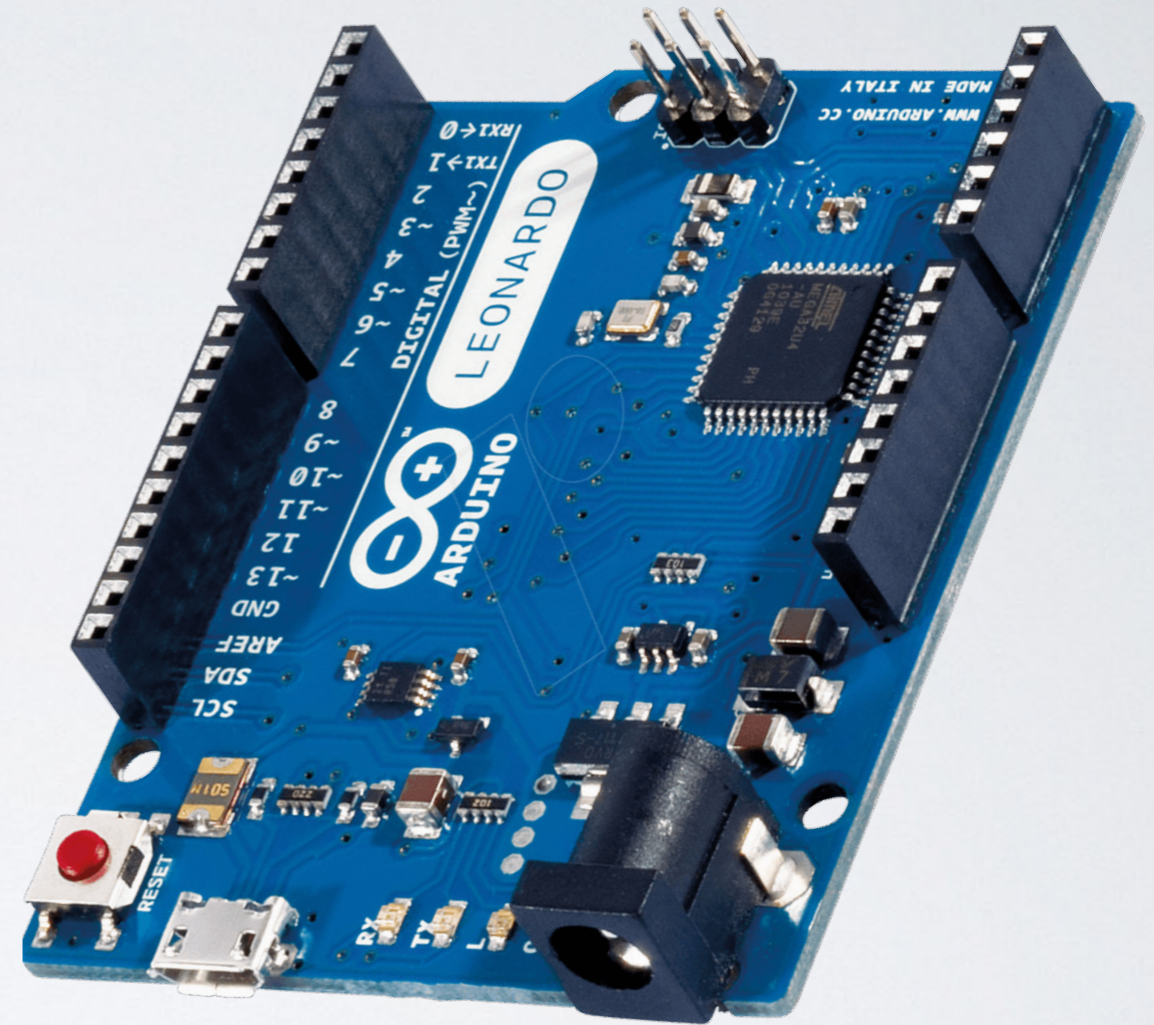
- **NFC card emulation** - enables devices such as smartphones to act like smart cards
- **NFC reader/writer** - enables devices to read information stored on inexpensive NFC tags
- **NFC peer-to-peer** - enables two NFC devices to communicate with each other, exchange information

NFC (III) - CARD, KEYRING



3. ARDUINO

Open-source microcontroller



ARDUINO (I)

- **Atmel** 8-, 16- or 32-bit AVR microcontroller
- Single-row pins or female headers that facilitate connections for programming and incorporation into other circuits
- Multiple add-on and stackable modules named **shields**

ARDUINO (II)

- Programmed via Universal Serial Bus (**USB**)
- Cheap, less than **15€**
- **Many sizes** and connection pins: Uno, Leonardo, Micro, Nano, Mega, etc

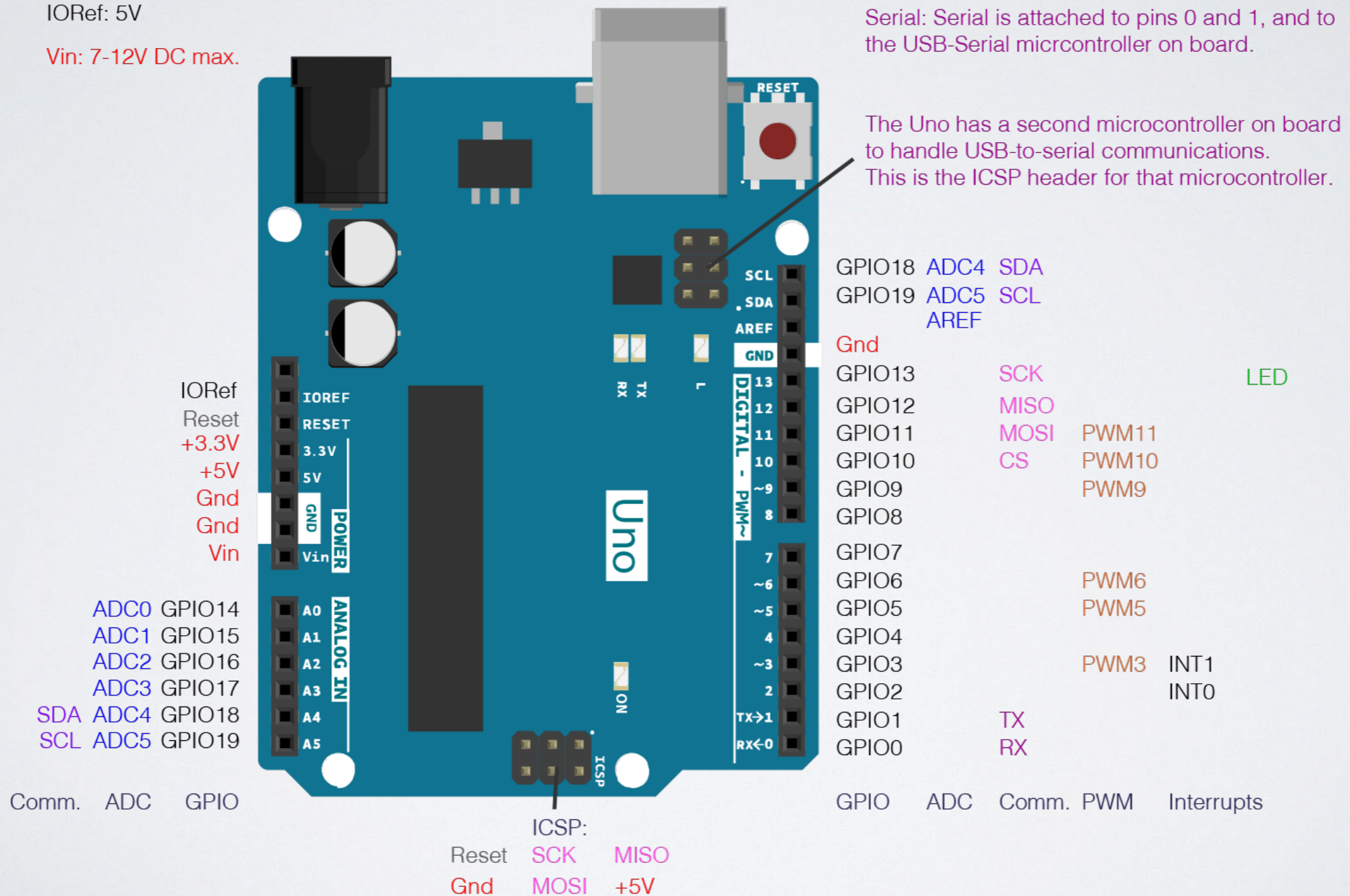
ARDUINO (III) - PINOUT

IOLRef: 5V

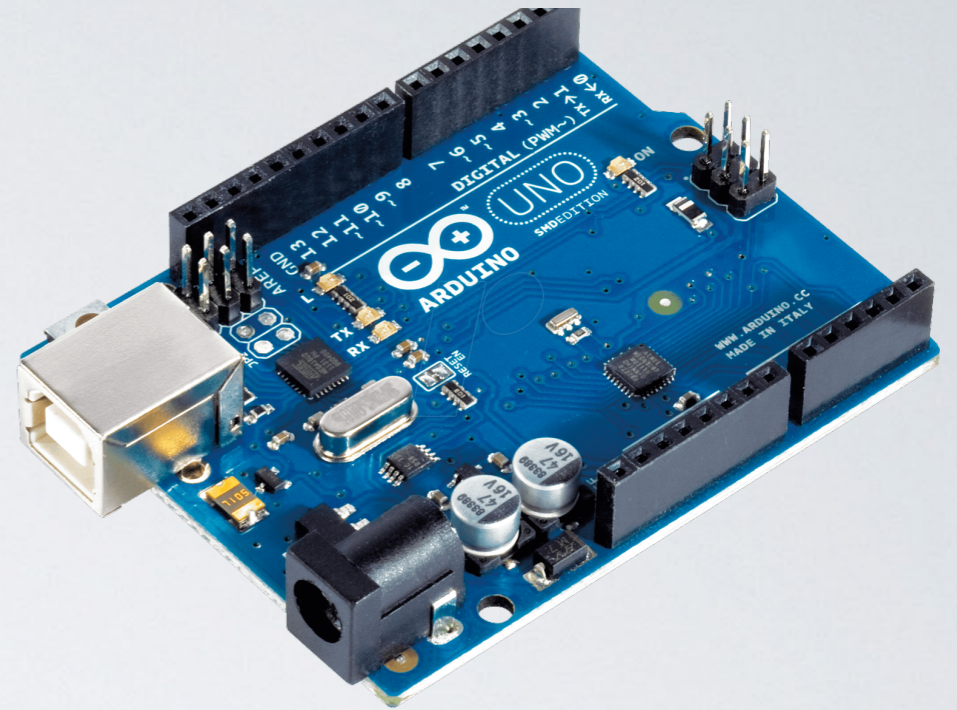
Vin: 7-12V DC max.

Serial: Serial is attached to pins 0 and 1, and to the USB-Serial microcontroller on board.

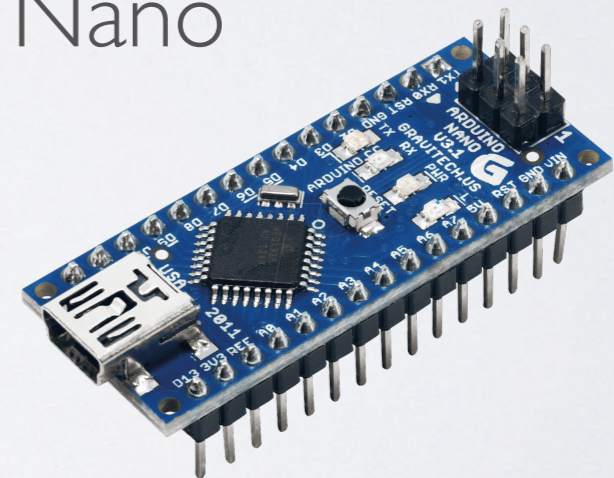
The Uno has a second microcontroller on board to handle USB-to-serial communications. This is the ICSP header for that microcontroller.



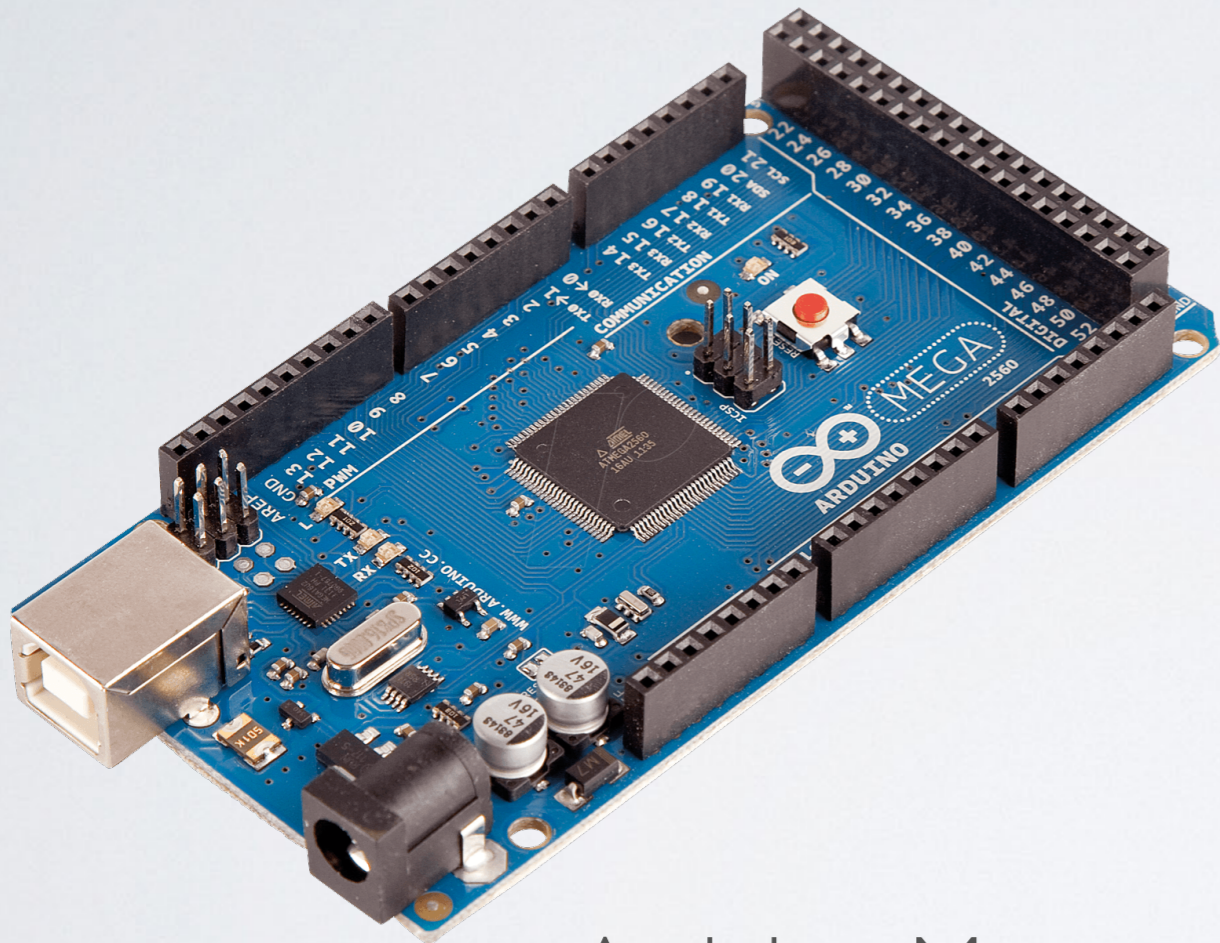
Arduino Uno



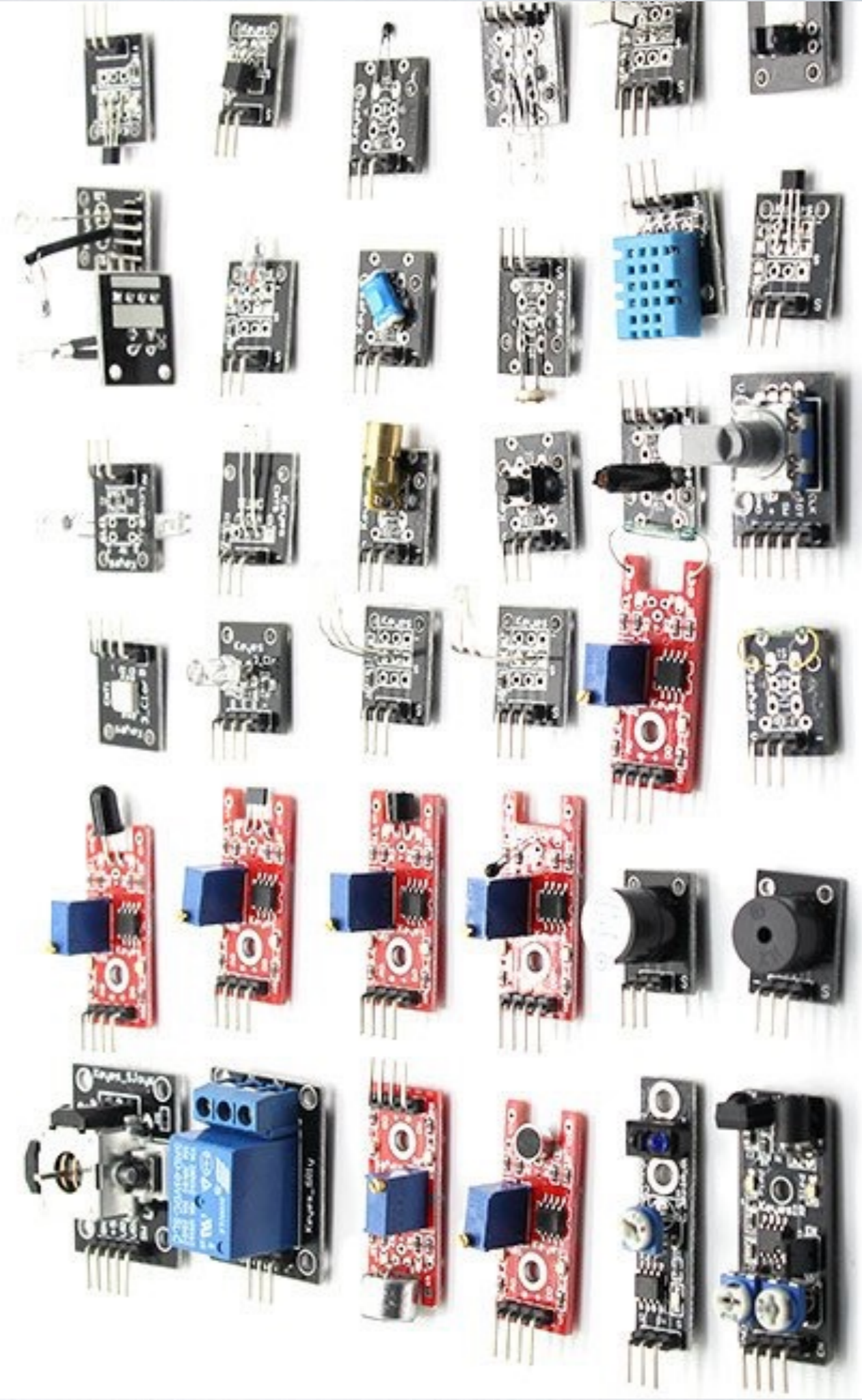
Arduino Nano



Arduino Mega

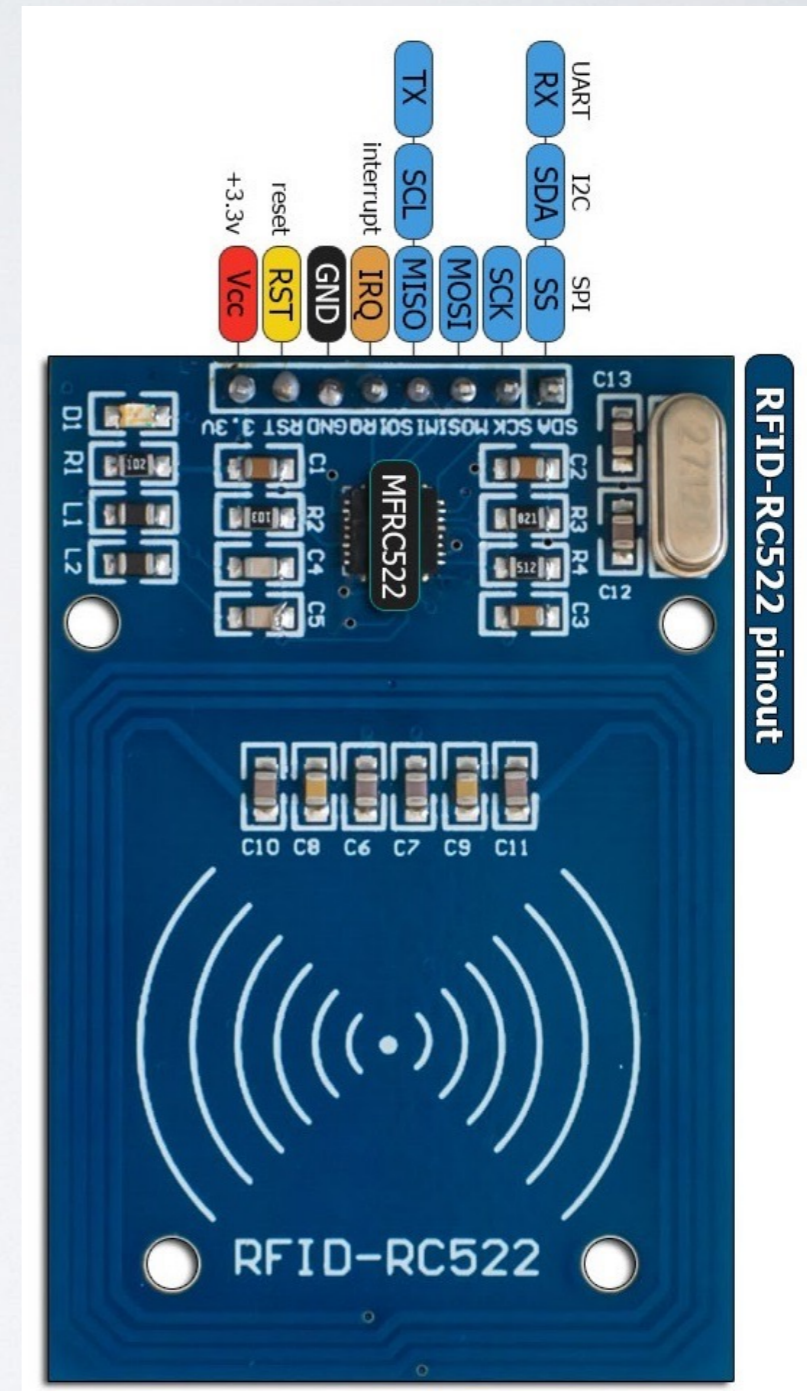


4. MODULES



MODULES (I) - RFID

- Reads NFC Cards and Keyrings
- 3.3V input voltage
- MFRC522 Chip



MODULES (II) - KEYPAD

- 4x4 keyboard
- Membrane keys
- 8 pin connection (4 rows and 4 columns)



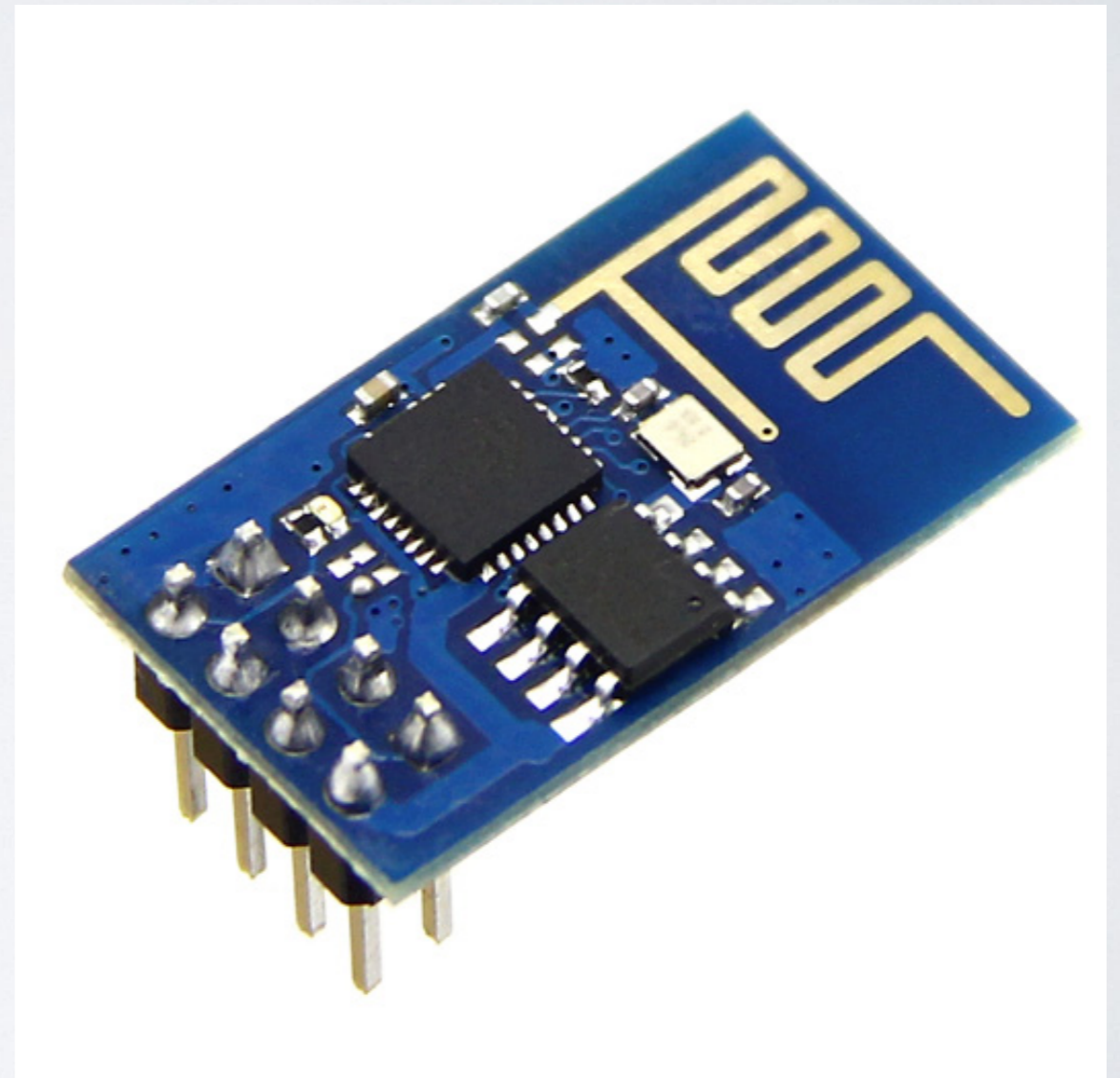
MODULES (III) - ETHERNET

- Mounts on top of Arduino
- Connection speed: 10/100Mb
- Connection with Arduino on SPI port
- microSD port included

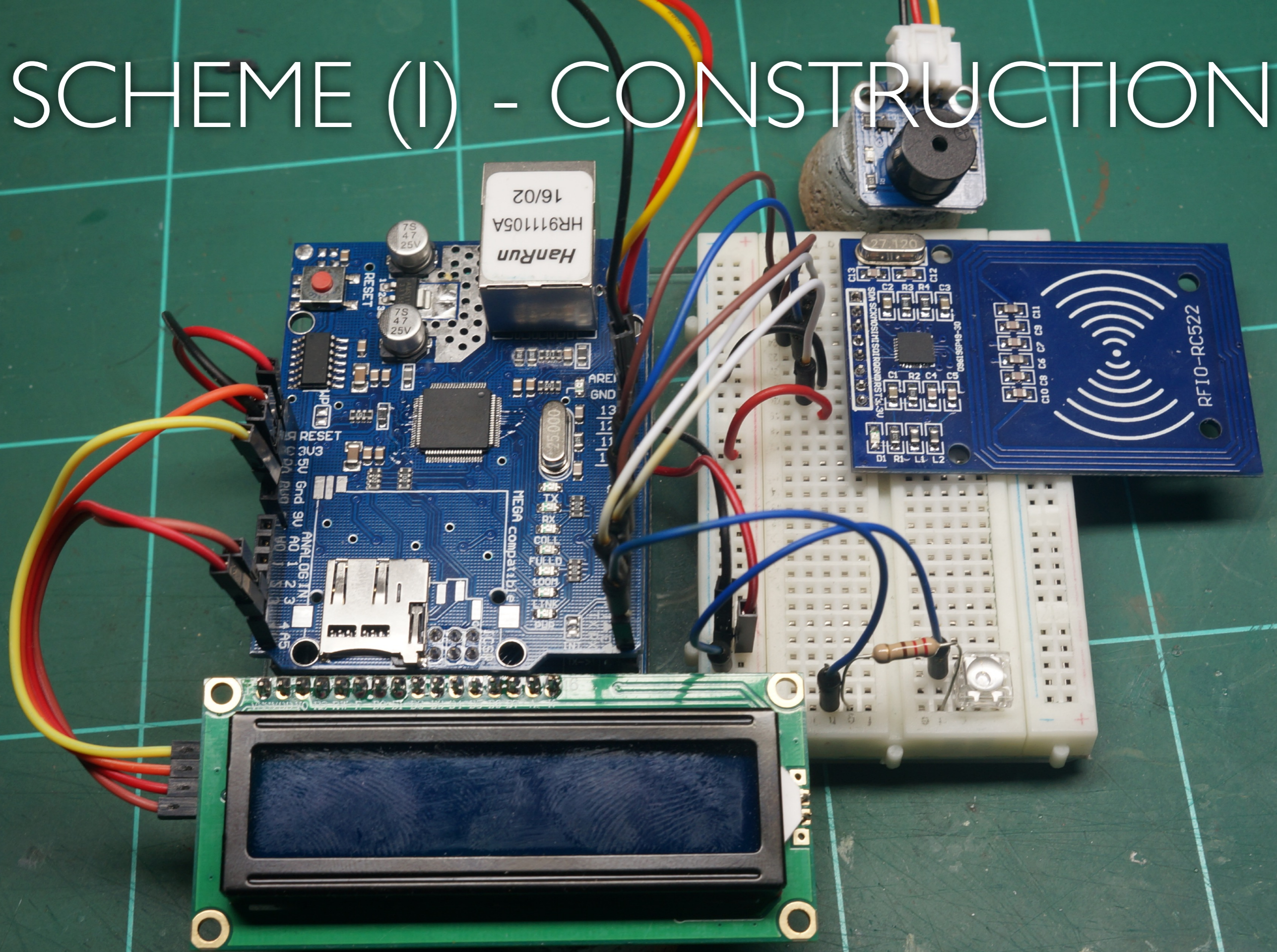


MODULES (IV) - ESP8266

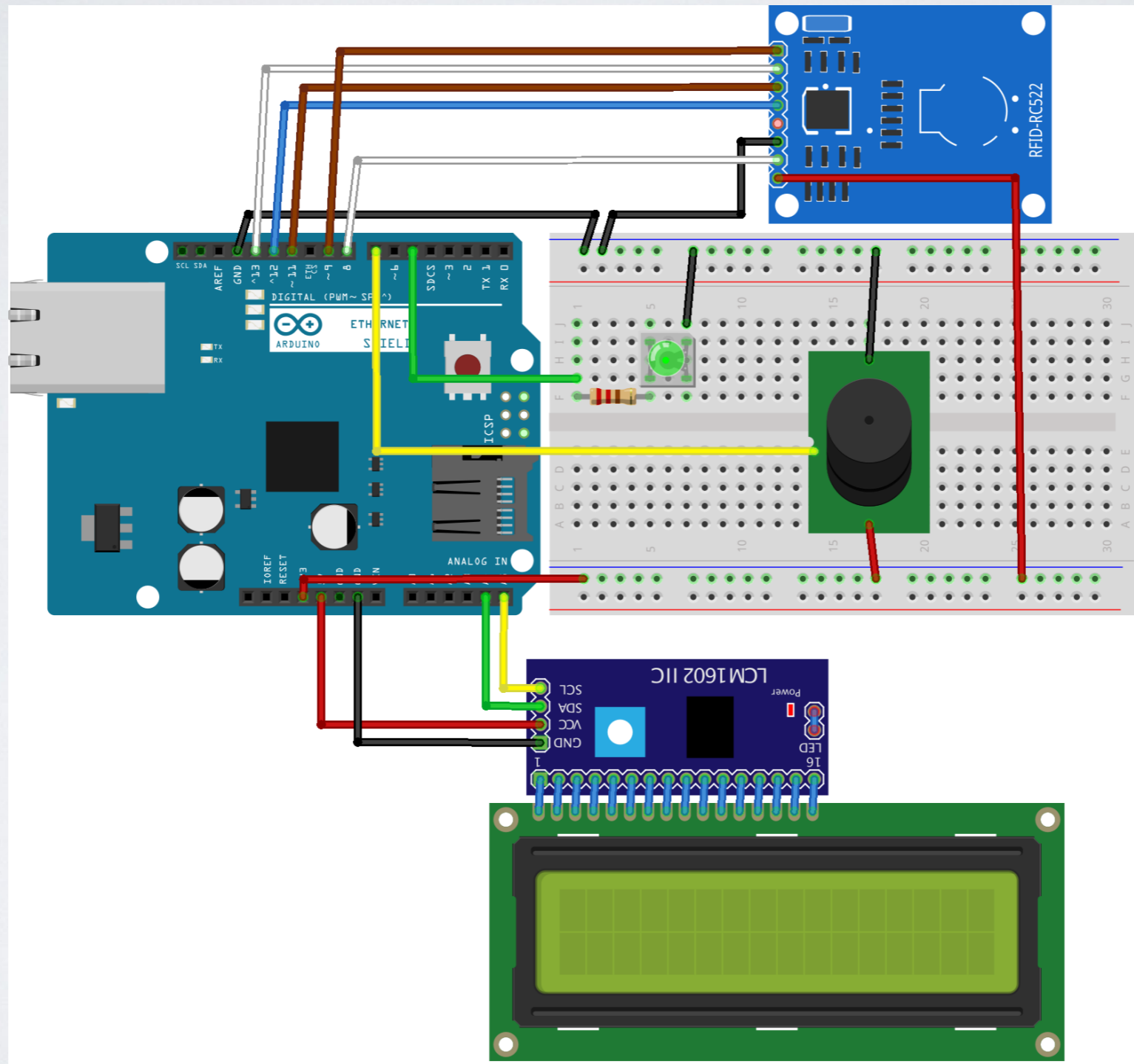
- Enables wifi connection on Arduino
- Minimum 450mA current input
- Needs hardware Serial Communication



SCHEME (I) - CONSTRUCTION



SCHEME (II) - ELECTRICAL



6. CONCLUSIONS

- Completed all objectives except two (box and email sending)
- Completed one secondary objective (web app showing results from the database)
- Tested 3 different Arduinos: Leonardo, Uno and Mega
- Less than 50€ per complete access control kit

Thanks for watching