ACCESS CONTROL WITH NFC AND ARDUINO

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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

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.
4. MODULES
MODULES (I) - RFID

- Reads NFC Cards an 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 (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