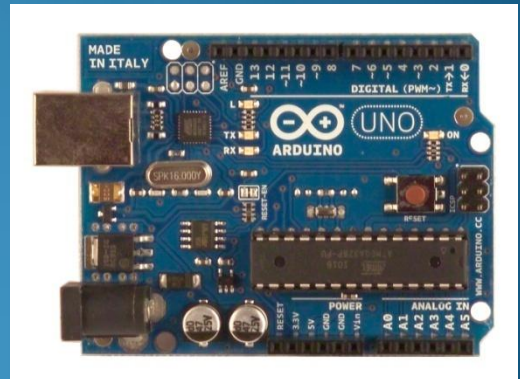


**TheHackerSpace**  
Thessaloniki's Hackerspace

# Multi-factor authentication system w/ Arduino



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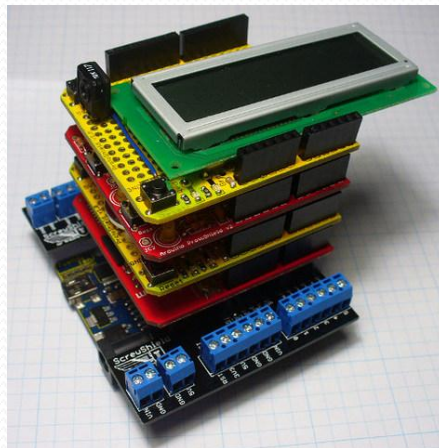
# What is Multi-factor Authentication

- > 2 authentication methodologies (2-factor)
- Something the user **knows** (password, PIN)
- Something the user **has** (smart card, RFID)
- Something the user **is** (biometric, voice, fingerprint)



# Why Arduino

- We have plenty in TheHacker's Lab ;)
- OSH & OSS.
- Cheap, easily available.
- Very widespread, many projects.
- Extra HW modules (shields) available.



# MFA system Design Concept

- Pick 3 methods (Password, RFID, Voice)
- Pick 3 modules/shields for Arduino  
(Keypad, RFID sensor, VRBot)
- Code
- Build/Test
- Done!
- Future upgrade ideas ;)

# HW Considerations

- Arduino's available digital i/o pin
- Keypad matrix (input only pins)
- RFID shield (pwr, io, tags)
- VRBot voice module  
(pwr, io, mic, recording, listening)

# SW Considerations

- Arduino IDE
- FSM Modeling (include library)
- Keypad valid passwords declaration
- VRBot voice programming
- RFID valid tags declaration
- Speaker out tone libs (for PWM pins)



# Parts

- Keypad
- VRBot module
- RFID sensor shield



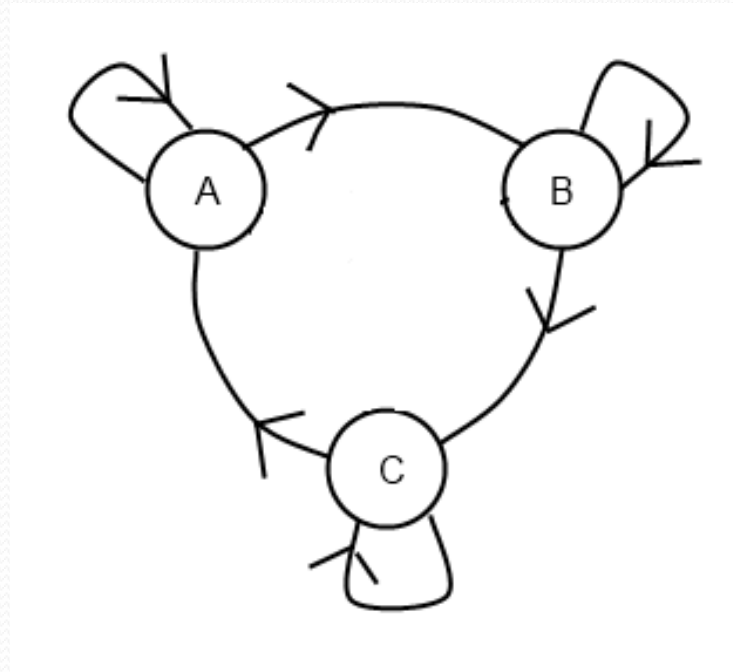
# Modeling

- Finite State Machine with 3 states :

**A** - RFID auth. process

**B** - Voice auth. Process

**C** - Keypad auth. process

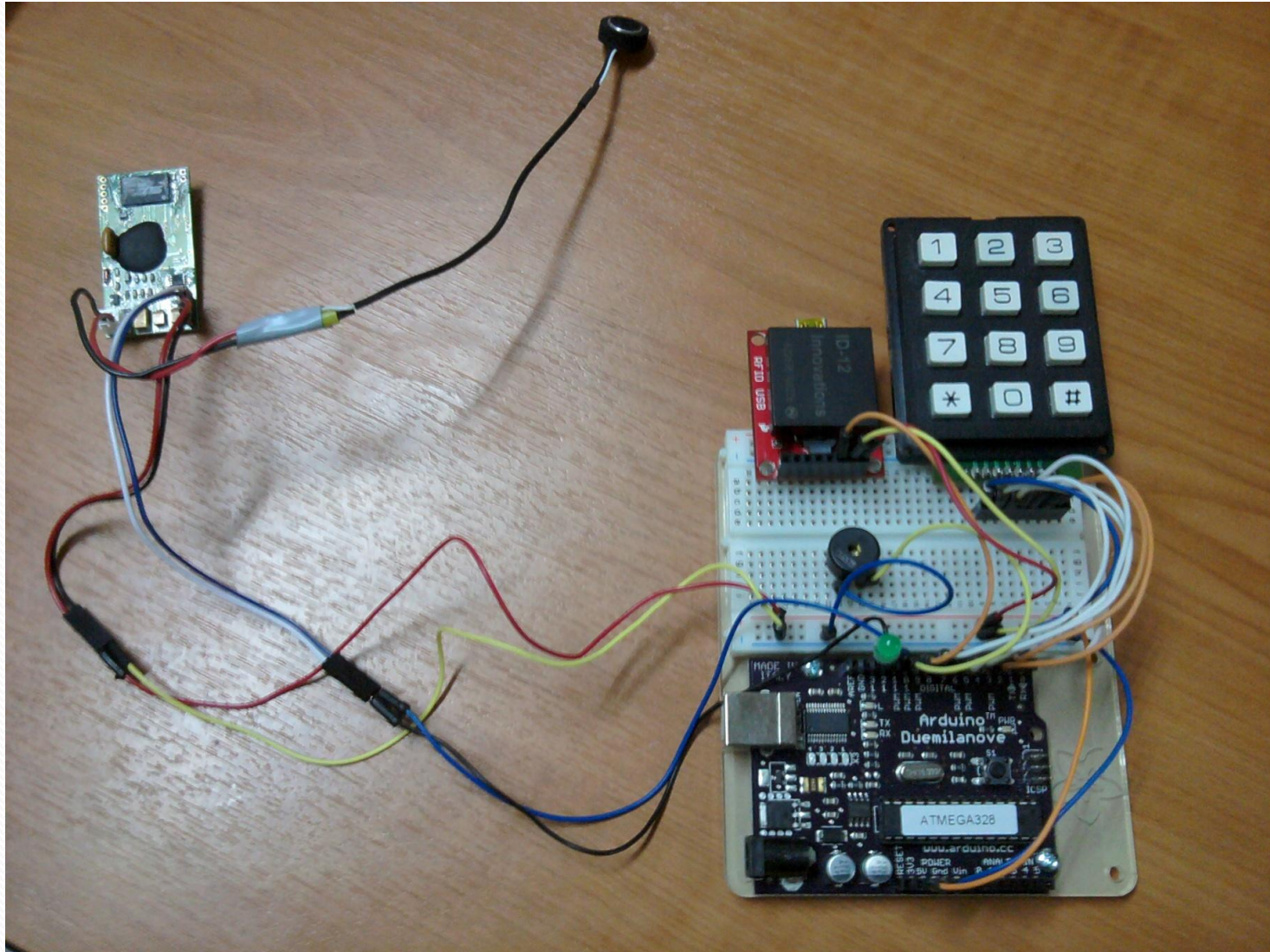




# External Libraries

- **FiniteStateMachine** – states, transitionTo, update
- **keypad** – voltage levels -> keys mapping
- **vrbot\_protocol** – voice module
- **NewSoftSerial** – RFID rx/tx
- **pitches** – pwm levels -> notes mapping

# Prototype photo



# BOM (approximate pricing)

• Arduino	€25
• VRBot module	€39
• RFID sensor	€37
• Keypad module	€3
• Piezo buzzer	€1

# Resources

- [the-hackerspace.org](http://the-hackerspace.org)
- [www.arduino.cc](http://www.arduino.cc)
- [www.veear.eu](http://www.veear.eu)
- [www.sparkfun.com](http://www.sparkfun.com)

Happy Hacking!

