

# Security Access Control (SAC) Systems Multi-Factor Authentication (MFA)

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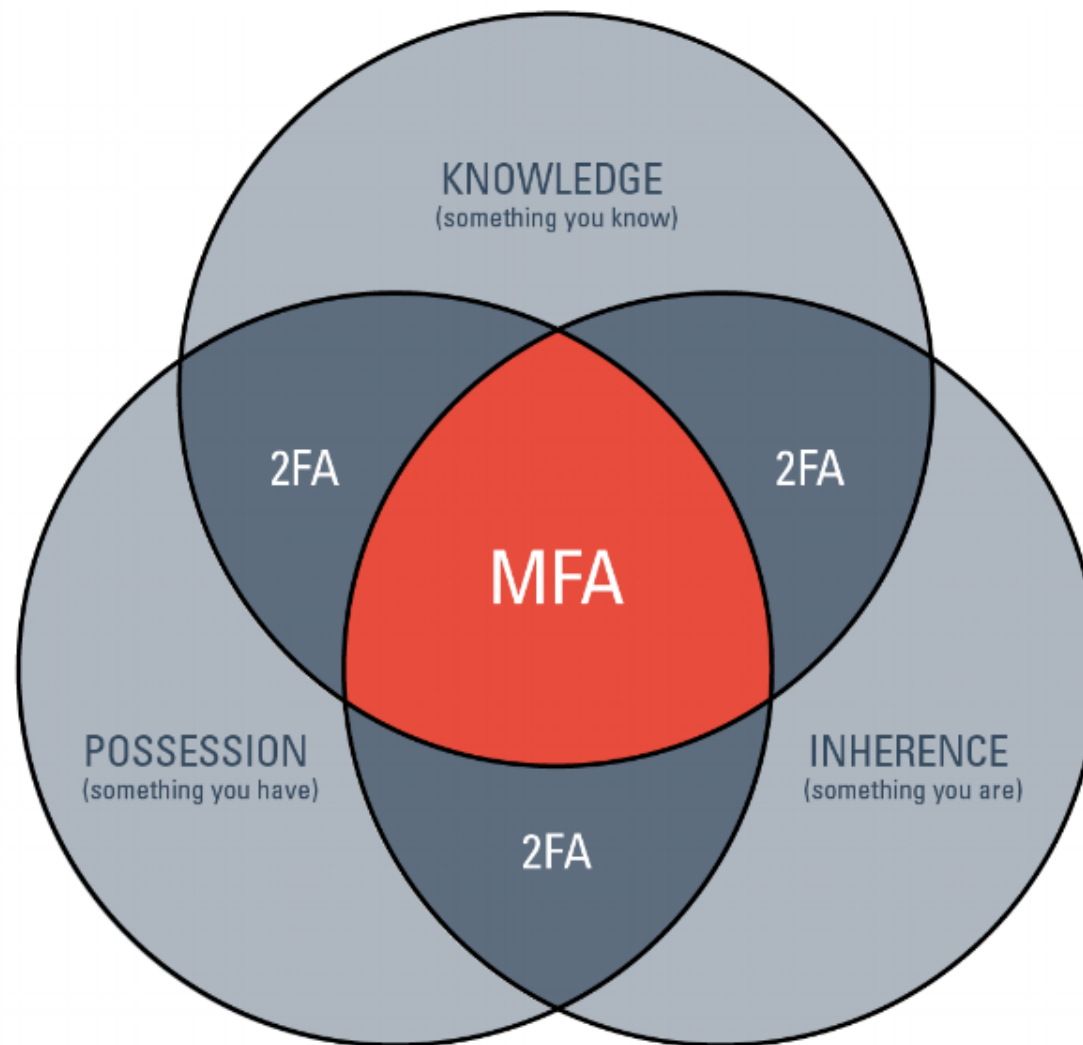
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Website : [www.efxa.org](http://www.efxa.org)

# What is Multi-Factor Authentication (MFA) ?

Multi-Factor Authentication (MFA) is a method of confirming a user's claimed identity in which a computer user is granted access only after successfully presenting 2 or more pieces of evidence (or factors) to an authentication mechanism.



# What is Multi-Factor Authentication (MFA) ?



# 1-Factor Authentication (1FA)

Knowledge (something the user knows)

Password, Image, Pattern

## 2-Factor Authentication (2FA)

- Knowledge (something the user knows)

Password, Image, Pattern

- Possession (something the user has)

Fob that generates a pre-determined code

Signed Digital Certificate

Smartphone

RFID Tag

# 3-Factor Authentication (3FA)

- Knowledge (something the user knows)

Password, Image, Pattern

- Possession (something the user has)

Fob that generates a pre-determined code

Signed Digital Certificate

Smartphone

RFID Tag

- Inherence (something the user is)

Voice, Fingerprint, Palm Veins, Face, DNA, Hand Geometry, Iris, Retina

# 3FA Prototype with Arduino Platform

- Something the user knows : Password
- Something the user has : RFID Tag
- Something the user is : Voice

# Why Arduino Platform?

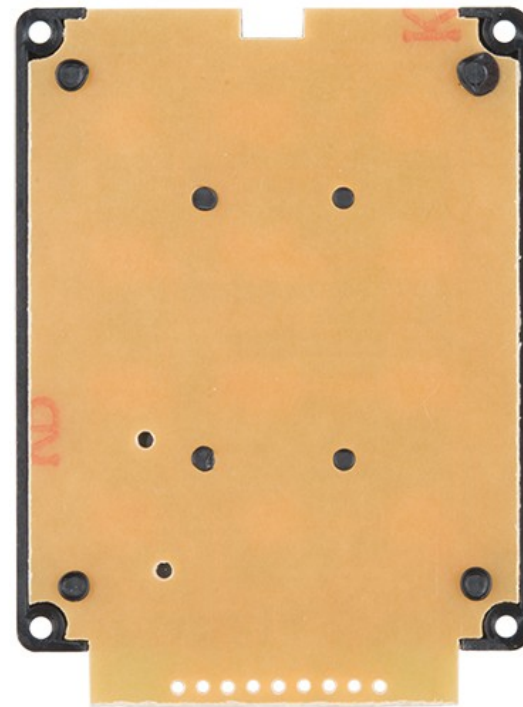
- Open Source Hardware / Open Source Software
- Cheap
- Easily available
- Easy to use
- Easy to program
- Very widespread
- Various hardware modules available



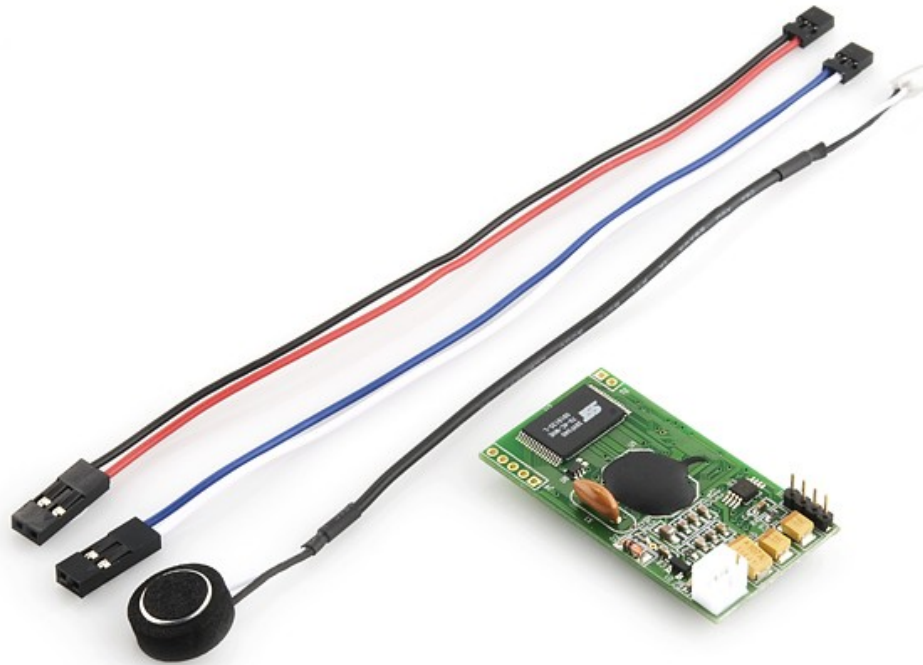
# Hardware Parts

- Keypad Module (12 Button)
- VRBot Module
- RFID USB Reader
- RFID Reader ID-12LA (125kHz)
- RFID Tags (125kHz)

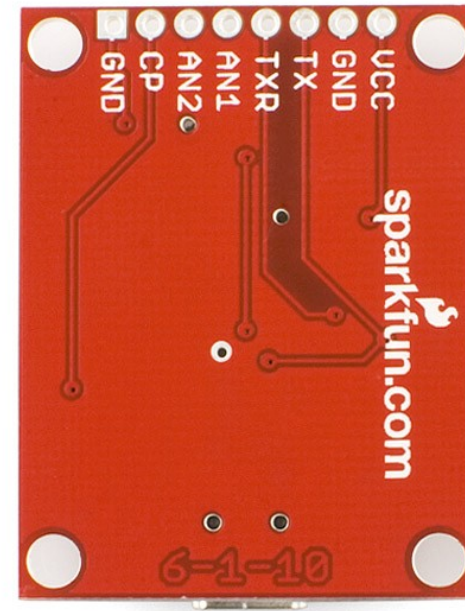
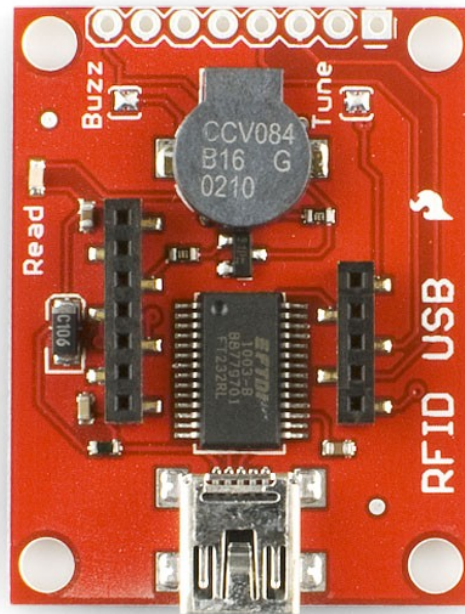
## Keypad Module (12 Button)



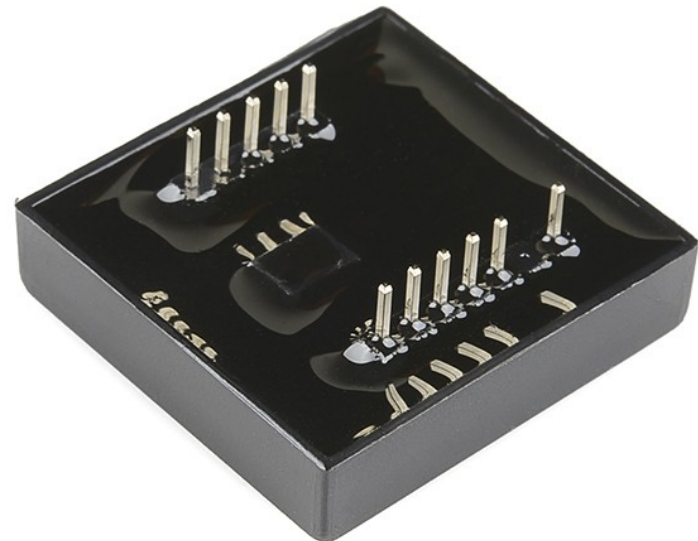
# VRBot Module



# RFID USB Reader



## RFID Reader ID-12LA (125kHz)



## RFID Tags (125kHz)

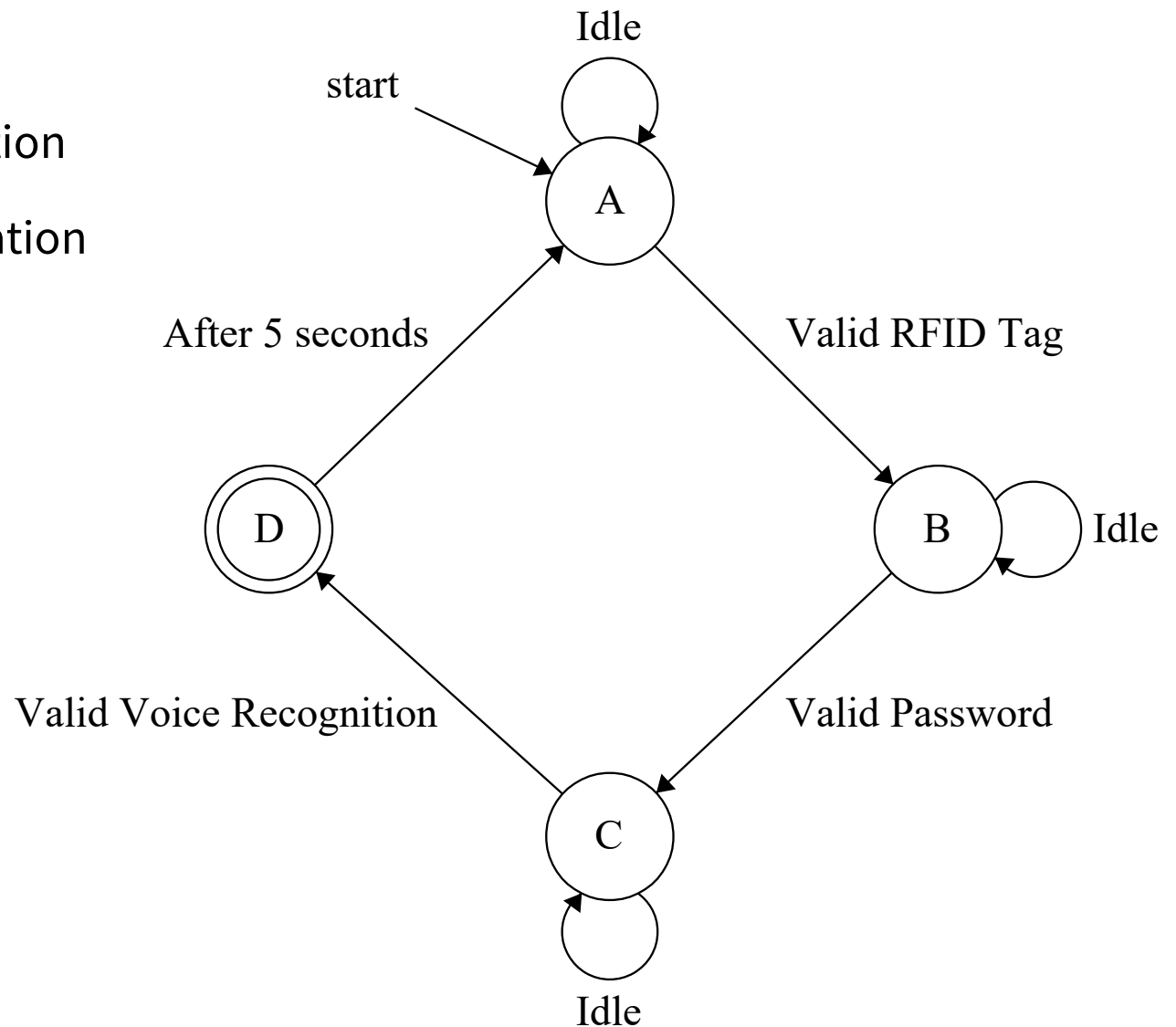


# External Software Libraries

- Finite State Machine
- Software Serial
- Keypad
- VRBot Module Communication Protocol
- Musical Notes Pitches

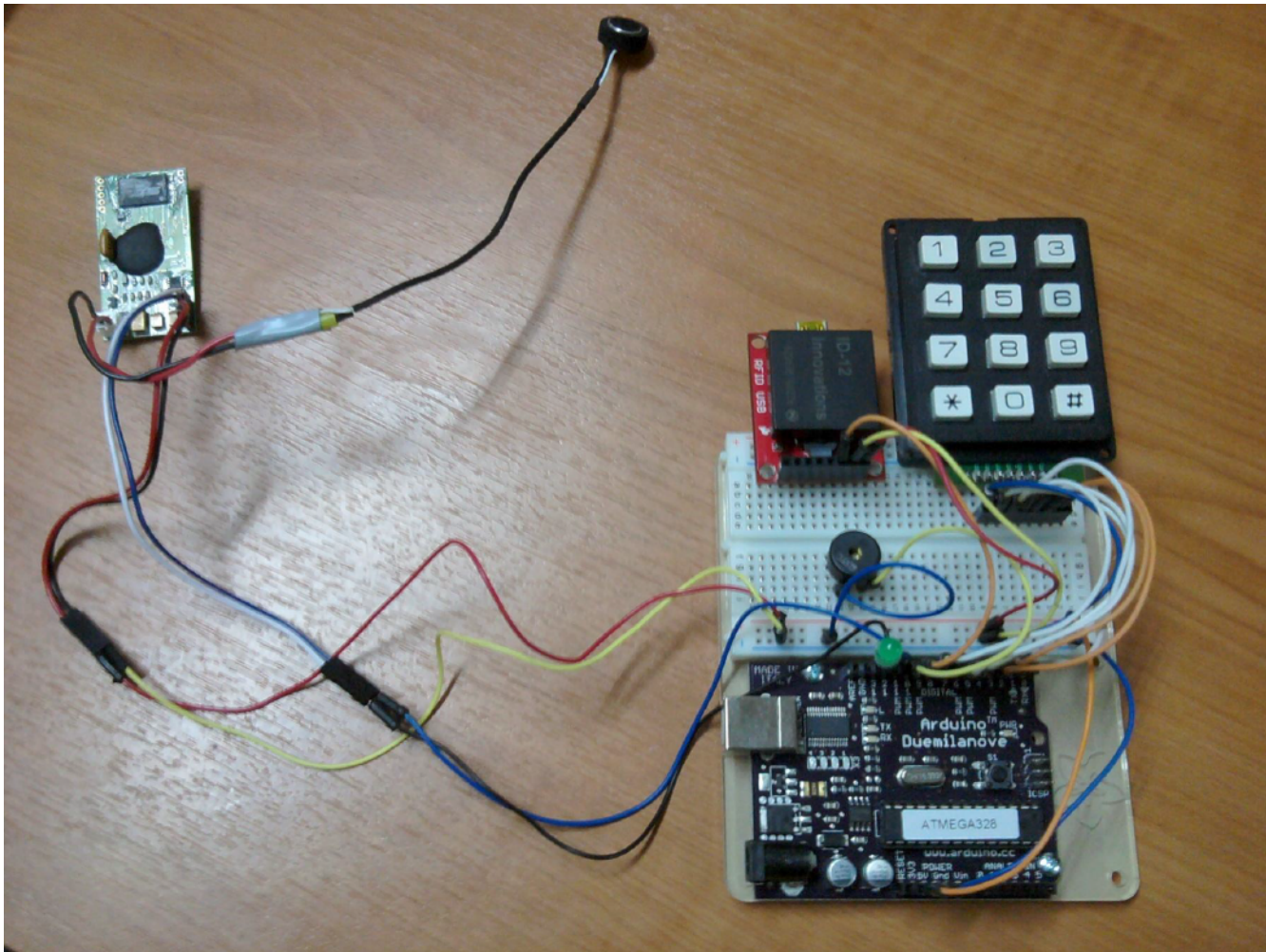
# Finite State Machine

- A - RFID Tag authentication
- B - Password authentication
- C - Voice authentication
- D - Successful Access





# Prototype Photograph



# Resources

- <http://www.arduino.cc>
- <http://www.sparkfun.com>
- <http://www.veear.eu>
- <http://www.id-innovations.com>
- [http://en.wikipedia.org/wiki/Multi-factor\\_authentication](http://en.wikipedia.org/wiki/Multi-factor_authentication)
- [http://efxa.org/arduino\\_security\\_control\\_multi\\_factor\\_authentication](http://efxa.org/arduino_security_control_multi_factor_authentication)
- <http://gitlab.com/efxa/security-access-control-multi-factor-authentication>



Every  
accomplishment  
starts with  
the decision  
to try - Gail Devers