# SECURING BIOMETRIC TEMPLATES ON SMART CARDS

JONATHAN CHESEAUX

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Supervisers

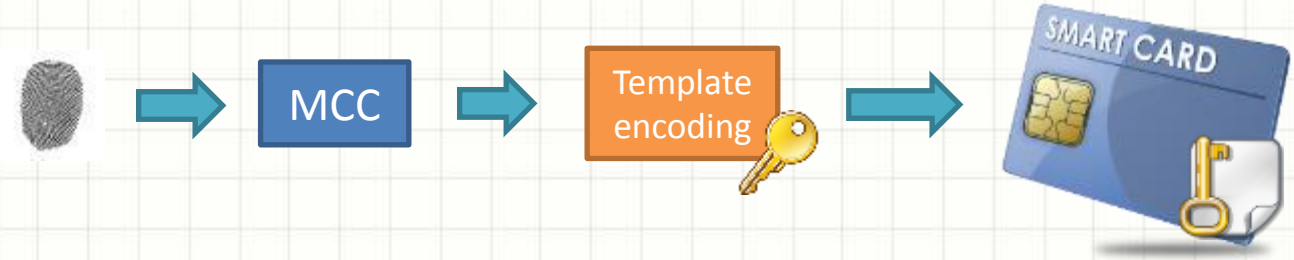
**Andrzej Drygajlo - Leila Mirmohamadsadeghi**

# Presentation plan

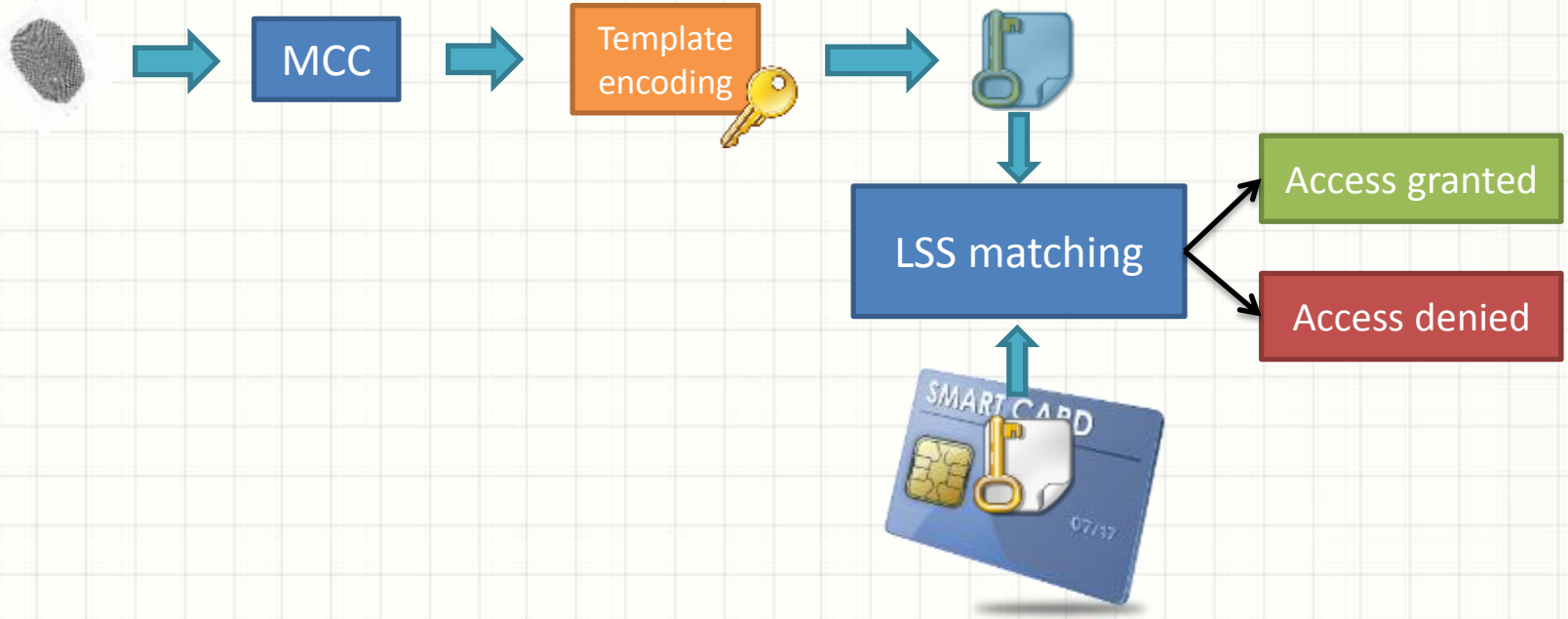
1. Introduction
   - Reminder about the project
   - Reminder about API limitations
2. Implementation of on-card matching
   - Software architecture
   - How to debug a JavaCard application
   - API limitations workaround
   - Results
   - Demonstration
3. Future goals

# Project presentation (reminder)

Fingerprint enrolment




Access control



# Programming environment setup (reminder)

## Java Card limitations

**Not supported by the API :**

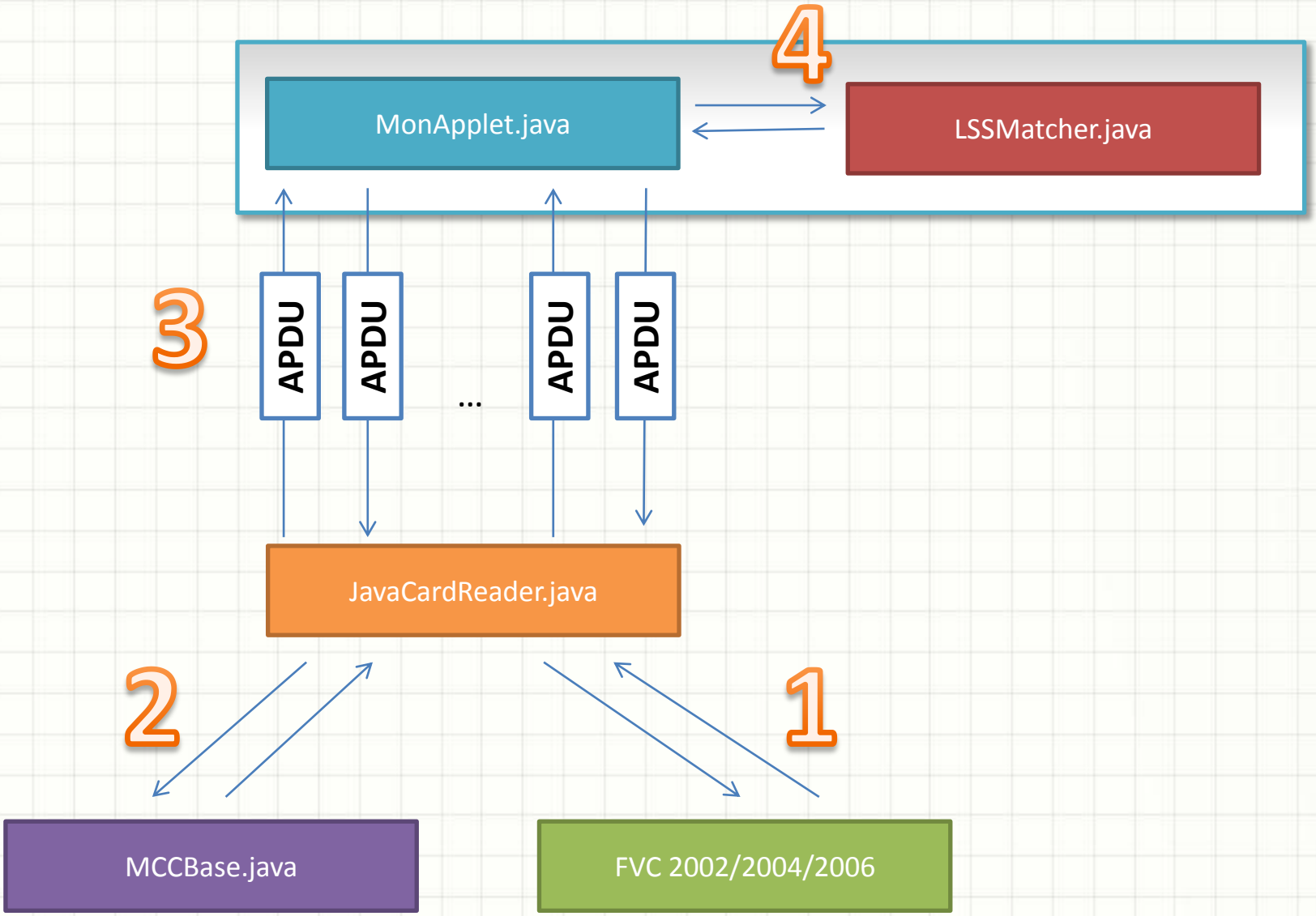
- Char, double, float, long
- Multidimensional arrays
- Garbage collection, threads

**Hardware limitations :**

- Limited storage capacity (<100KB)
- 8- or 16-bit CPU running at 3.7MHz
- Messages/responses size limited (<255 bytes)

# Implementation of on-card matching

## Software architecture



# Implementation of on-card matching

## How to debug a JavaCard application

**You can’t !**

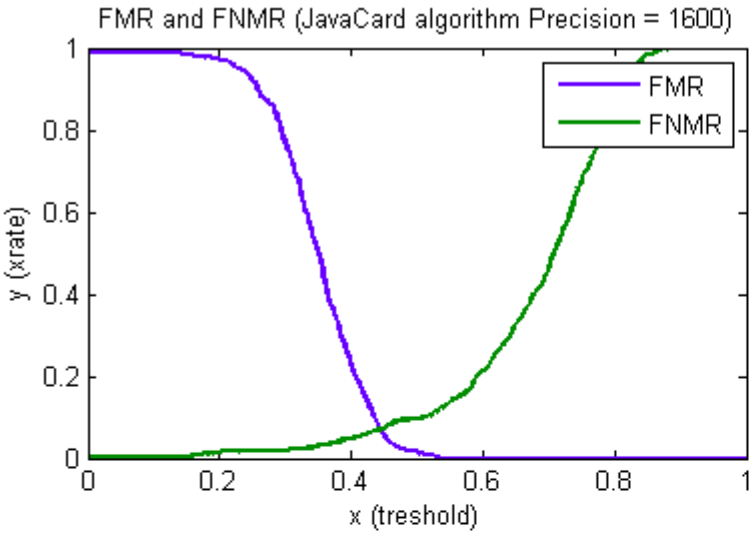
# Implementation of on-card matching

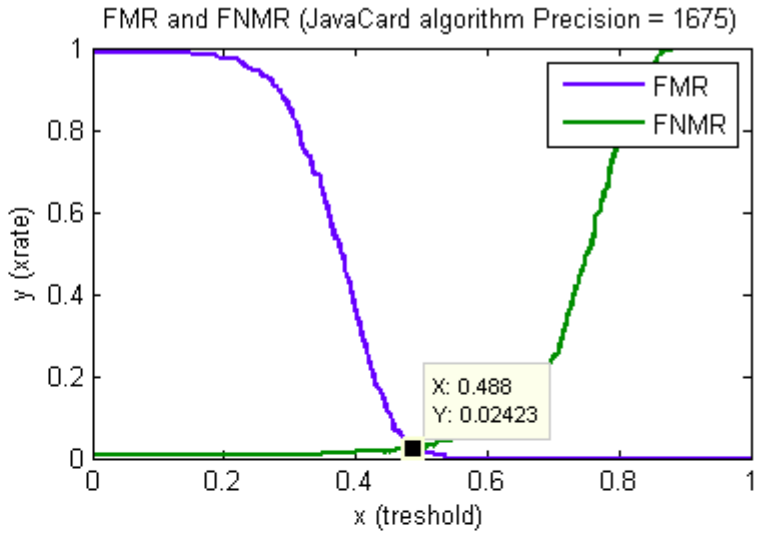
## API Limitations workaround

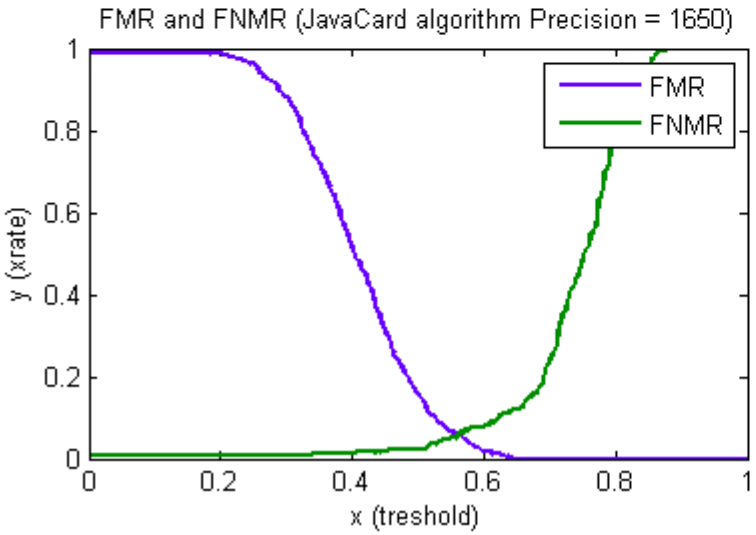
- **Floating-points** not implemented
  - Computations with **integer values** instead
  - How to represent 3.1415 ?
    - -> (short) (3.1415 * 1000) = 3141 (on the card)
    - -> 3141 / 1000.0 = 3.141 (on the host)
    - -> loss of precision
- 32-bit **int** type not implemented
  - Use 16-bit **short** type instead
  - Maximum value = **32'768**
    - impossible to create an array of more than 32'768 elements
  - A protected template contains 1024 * *number_of_minutiae* elements
    - Maximum number of minutiae = 30 per fingerprint
  - Possible **overflows**
    - Look-up table

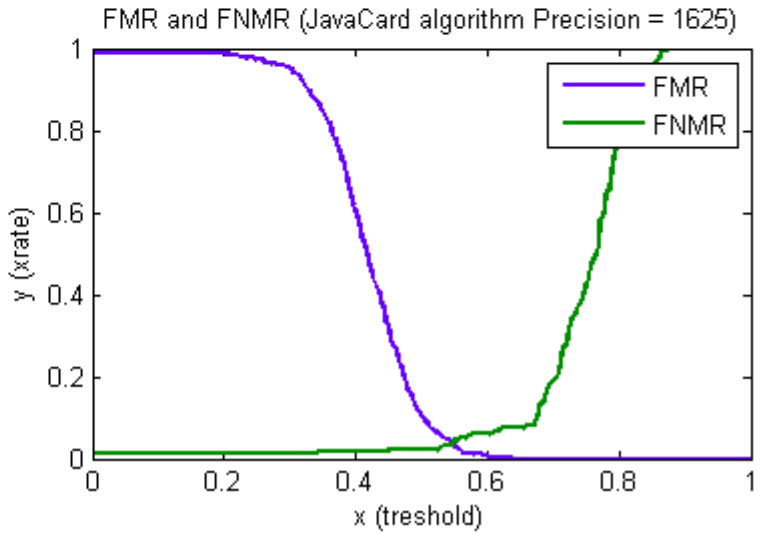
# Implementation of on-card matching

## Precision choice



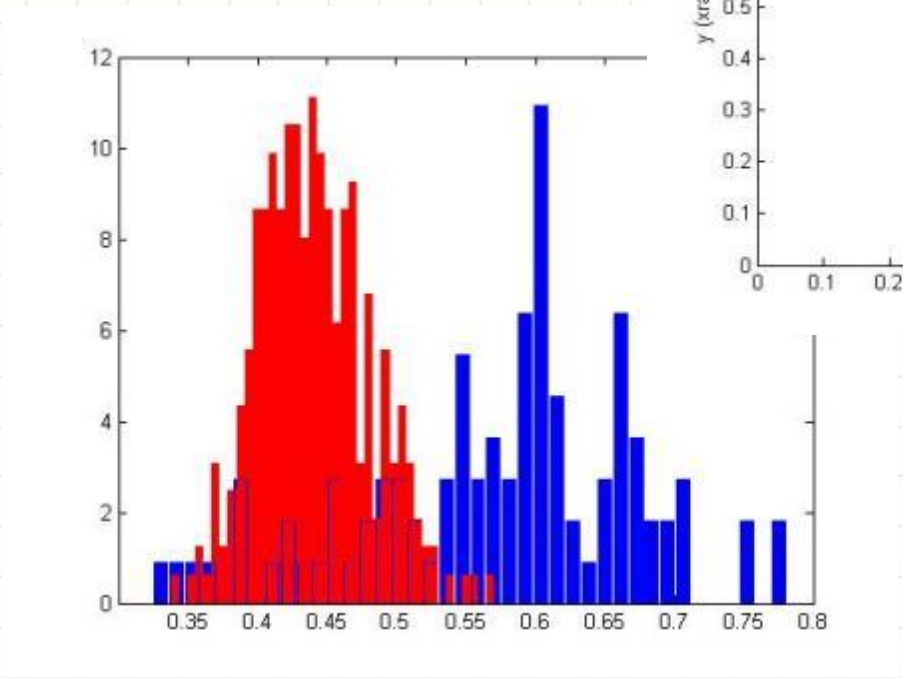



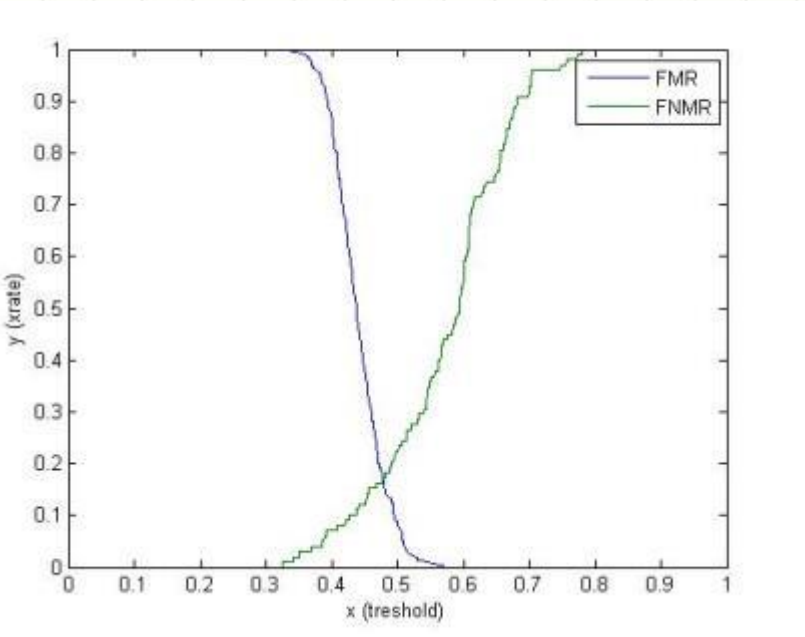



# Implementation of on-card matching

## Results



# Implementation of on-card matching

## Demonstration

# Future goals

- Enhance memory/CPU usage
- Encrypt the minutiae on the card
- Project Report
- Final presentation

# Questions

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