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Authentication Using Pulse-Response Biometrics

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- 1 Background on Biometrics
- 2 Pulse-Response
- 3 Security Application
- 4 Experimental Results

Biometrics

Mechanism to identify people by characteristics or traits.



Behavioral

Includes: keystroke timings, speech pattern analysis, gait recognition, and analysis of stylus pressure, acceleration and shape in hand-writing

Physiological

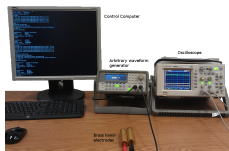
Includes: fingerprints, hand geometry, facial recognition, speech analysis, and iris/retina scans

Pulse-Response Biometric



- Pulse signal applied to the palm of one hand.
- The biometric is captured by measuring the response in the user's hand.





Voltage (V)	1	1.5
Max Current (mA)	0.1	500+
Exposure	100ns	~500ms

- **Universal**: Usable by everyone that needs to use it.
- **Unique**: within the target population.
- **Permanent**: Consistent over the time (stable).
- **Unobtrusive**: Does not disrupt the user's work flow.
- **Difficult to circumvent**: Unable to modify the biometric or impersonate others.

Identification

Obtain the identity of a user.

vs.

Authentication

Confirm the identity of a user.

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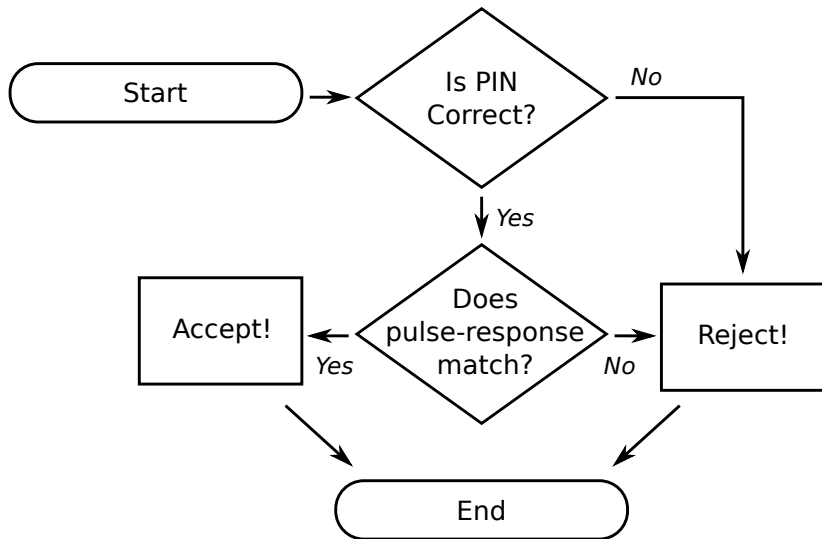
Continuous Authentication

Continuously confirm the identity of a user.

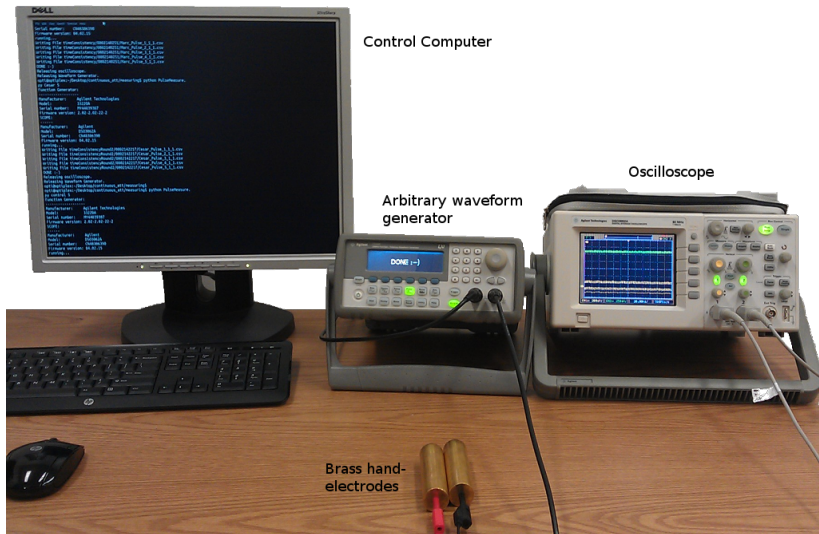
Hardening PIN Entry Systems



ATM Decision Flowchart



Experimental Setup

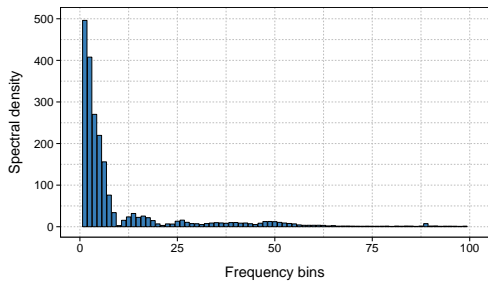
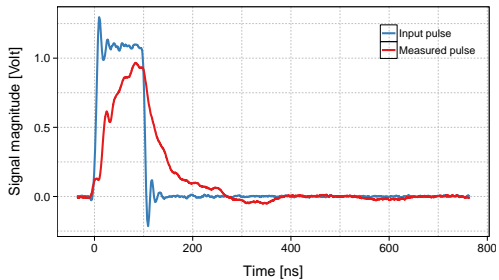


Control Computer

Oscilloscope

Arbitrary waveform
generator

Brass hand-
electrodes



FFT:



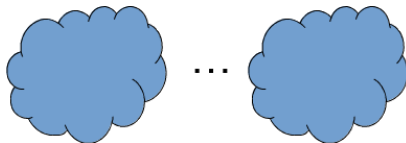
LDA

Feature vector:

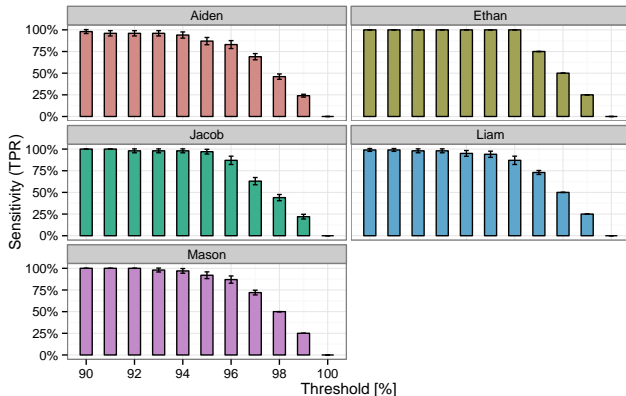


SVM

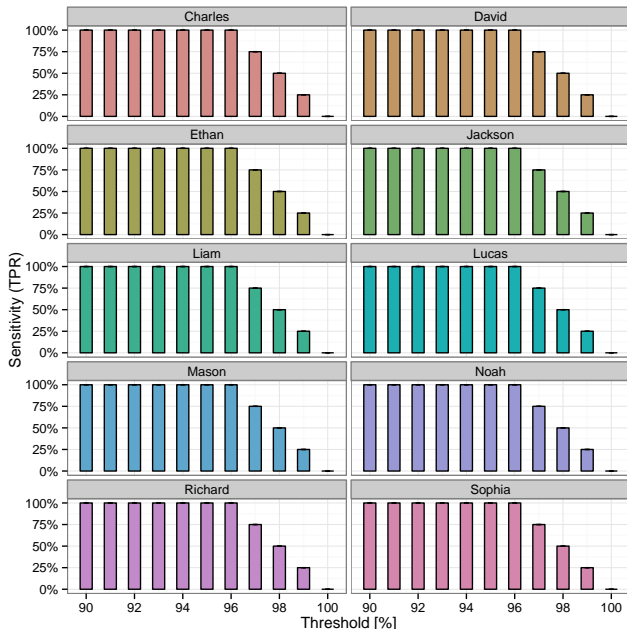
Classification:



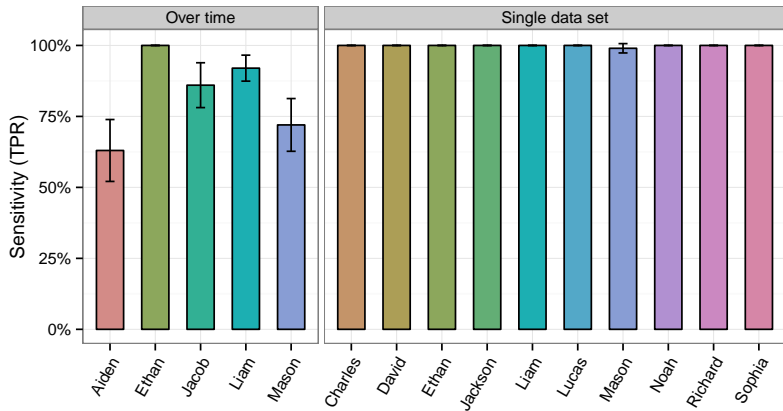
Over Time



Single Session



Identification Classifier



Prototype

- Build PIN entry prototype.
- Gather experience on acquisition time, etc.
- Gather data.

Acquisition Signal

- Higher bandwidth
- No signal
- Effects of stress, blood sugar levels, etc.
- Test impersonation strategies.

- A new biometric based on Pulse-Response.
- A scenario where Pulse-Response can be easily integrated.
- Fantastically promising results. Very high degree of uniqueness and remarkably stable over time.

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**WiSec 2014 & RFIDSec 2014
in Oxford, UK
July 21st - July 25th 2014**

ACM WiSec'14

Paper submission:
March 10th, 2014

Conference date:
July 23rd - 25th, 2014

RFIDSec'14

Paper submission:
March 1th, 2014

Workshop date:
July 21st - 23rd, 2014

ACM WiSec 2014
Oxford, United Kingdom
July 23rd - 25th 2014

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Important Dates

- Abstract Submission: March 21st, 2014
- Program Committee: March 24th, 2014
- Notification: March 24th, 2014
- Final Paper Submission: May 15th, 2014
- Published Program: May 15th, 2014
- Notification: May 15th, 2014
- Registration: May 15th, 2014
- Conference: July 23rd - 25th, 2014

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News

- Get a strong confirmation that ACM WiSec 2014 and RFIDSec 14 will be held in Oxford, UK.
- Get an early release on the selected address.
- Get the strong program dates confirmed.
- Get a strong release on the selected address.

About ACM WiSec 2014

ACM WiSec 2014 is an international academic conference on security, privacy and sensor systems. Security, privacy and sensor systems are the focus of the ACM Conference on Security and Privacy in Radio Frequency Identification (ACM WiSec) in the security and sensor systems of various communication, mobile networks and their applications. In addition to the traditional ACM WiSec topics of protocol, link, and network layer security, we also welcome papers focusing on the security and privacy of mobile software platforms and the surrounding diverse range of mobile or wireless applications. The conference welcomes both theoretical as well as system-oriented research.

ACM WiSec 2014 will run from July 23rd to July 25th, 2014. It will be co-located with RFIDSec 14 in Oxford, UK.

The proceedings will be published by the ACM.

RFIDSec14

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The 10th Workshop on RFID Security

July 21-23, 2014, Oxford, UK

RFIDSec is the earliest workshop devoted to security and privacy in Radio Frequency Identification (RFID). Starting in 2005, RFIDSec is today the reference workshop in the RFID field with participants from all over the world. RFIDSec aims to bridge the gap between cryptographic researchers and RFID developers through invited talks and contributed presentations. Two third of the attendees usually come from academia while the rest come from industry.

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<http://rfidsec2014.cis.uab.edu/>

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Thank you for your attention. Questions?

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