

Pouring a Solid Foundation: *Addressing Common Questions about Speaker Verification*

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Terminology

Speaker Authentication

Question: Is this person who they say they are?

Speaker Authentication Solution

Uses one or more technologies
to answer that question.



BEWARE

Sometimes "speaker authentication"
is used as a synonym for "speaker
verification."

Speaker Authentication Solution

Authentication Technologies

Possession

Something
you have

Mobile phone
ID
token

Strength

Possession

Weakness

Lost
Stolen
Spoof

Knowledge

Something
you know

PIN
password
birth date

Strength

Secret

Weakness

Learned
Shared

Biometric

Who
you are

voice

face

Fingerprint

DNA

Iris

Nose

Hand bacteria

Biometric Errors

False Acceptance

(False Match)

let impostors in

False Rejection

(False Non-match)

Keep legitimate users out

Speaker Verification (SV)

- 1. Uses information about the vocal tract** Uses the physiology and anatomy (size & shape of throat, mouth, etc.) and speaking behavior.
- 2. Enrollment: Creates a voice model for each person** This **NOT** a recording. It is a digital map of features gathered and analyzed under point #1. (reference model)
- 3. Verification: One-to-one comparison** Compares the voice of an authorized user with the voice of a person claiming to be that user.
- 4. Vulnerabilities** DEVICE: device mis-match – also channel mismatch; ENVIRONMENT: Noise on channel or background USER: change in voice (ex. Fatigue, yelling), DNA similarities

Speaker Verification

Kinds of Spoken Input

- Free speech (text independent)
- Password (text dependent)
- Challenge-response (text prompted)

SV – How It Works

Enrollment

- **Validate enrollee's identity**
- **Collect samples**
- Create model (reference model)
- **Store securely**

SV – How It Works

Verification

- **Claim of identity**
- Collect samples
- Create Model
- Retrieve reference model
- Matching = One-to-one comparison
- Decision = Accept / Reject / Undecided

SV – How It Works

Verification

- Claim of identity
- Collect samples
- Create model
- Retrieve reference model
- Matching (One-to-one comparison)
- **Decision = Accept/Reject/Undecided**

Setting the Threshold

Errors and Thresholds



Beyond Authentication

Authentication focuses on the user

- Make sure your application complies with corporate and regulatory requirements
- Check to see that security holes don't allow bypassing of the authentication security

Resources

1. *Speaker Identification and Verification (SIV) Requirements for VoiceXML Applications*, Speaker Biometrics Committee -VoiceXML Forum, 2005
2. Mobio Project (biometrics on mobile devices)
www.mobioproject.org/
3. *E-Authentication Guidance for Federal Agencies* (OMB M-04-04) US Office of Management and Budget, 2004
4. *Study Report on Biometrics in E-Authentication* (INCITS M1/07-0185), ANSI/INCITS M1 2007
5. *Speaker Identification and Verification Applications* Speaker Biometrics Committee -VoiceXML Forum, 2006

Standards

1. *Media Resources Control Protocol (draft 20)*, Internet Engineering Task Force
2. *VoiceXML Version 3 SIV module (draft)*, W3C - Voice Browser Working Group, 2010
3. *Financial services—Biometrics—Security Framework (ISO 19092)*, International Standards Organization 2008
4. *Speaker Recognition Format for Raw Data Interchange (SIVR-1) (INCITS 456)*, ANSI/INCITS

Thank you

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