

Alexis Bernard, Ph.D.

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OBJECTIVE

Research & development or product management position in speech processing, communications, signal processing or security.

SUMMARY OF QUALIFICATIONS

- 8 years experience in speech/voice processing applications including speech recognition (noise robustness, model training, distributed recognition) and speech coding (GSM AMR, CELP, VoIP, perceptual coding, VQ)
- 6 years experience in communications including digital wireless communication (GSM, CDMA), DSL technology, coding theory (source coding, channel coding, unequal error coding, joint coding) and packet based communications
- 2 years experience in security: cryptography and image authentication (RSA, DES, GQ, Hash, Zemor)
- Resourceful, highly-motivated, and analytical team player with excellent interpersonal, communication and leadership skills

PROFESSIONAL EXPERIENCE

[AUDIENCE INC.](#), *Senior Speech Recognition Engineer* 2/2004 – Present, Mountain View, CA
- Supervised speech recognition activities, provided technical expertise and trained engineering team in speech recognition.

[TEXAS INSTRUMENTS](#), *DSP Solutions R&D Technical Researcher* 6/2002 – 2/2004, Dallas, TX
- Patented and developed speech recognition back-end compensation solutions outperforming world state-of-the art front-end noise robustness techniques (ETSI Advance Front-End standard) by more than 30% over a wide range of noise conditions.
- Patented and implemented robust speech endpoint detection algorithms for hands-free speech recognition applications in automobile environments. Algorithm reduced endpoint detection error from 26% to 0.5%.
- Patented and programmed in PERL/Shell innovative methods for performing automatic acoustic triphone modeling in any language without human intervention. Invention yielded 48% word error rate reduction in English.

[UCLA](#), *Research Assistant* 9/1997 – 6/2002, Los Angeles, CA
- Designed low-bitrate distributed speech recognition systems over IP and wireless communication networks using efficient feature coding, adaptive channel coding and soft-decision decoding. Invented the concepts of joint channel-decoding/speech-recognition and Weighted Viterbi Decoding (WVD) for improved robustness against acoustic and channel noise.
- Designed joint source-channel coding adaptive multi-rate digital speech communication systems using embedded perceptually-based speech coding and rate compatible channel coding. Invented the Rate-Compatible Punctured Trellis (RCPT) codes to provide unequal error protection (UEP) over large modulation constellation.
- Developed cryptographic solutions for authentication of video sequences (GQ, Hash and Zemor functions, RSA, DES).

[TEXAS INSTRUMENTS](#), *Intern* Summer 1999 & 2000, Dallas, TX
- Patented techniques for coding and searching fixed codebook excitations of algebraic and multi-pulse CELP coders. Invention was implemented in fixed point C code, optimized for DSP assembly coding, and improved quality of the TI GSM AMR wideband speech coder, which placed second in the worldwide ETSI 3GPP speech coding standard competition.

[ALCATEL TELECOM](#), *Intern* 7/1997 – 9/1997 Antwerp, Belgium
- Implemented different trellis coding modulation (TCM) techniques for Discrete Multi-Tone DSL modems

EDUCATION

[UNIVERSITY OF CALIFORNIA, LOS ANGELES \(UCLA\)](#) Los Angeles, CA
- **Ph.D.** and **M.S.** in **Electrical Engineering** (Majors: Communications and Signal Processing, 3.8/4.0)

[UNIVERSITE CATHOLIQUE DE LOUVAIN / KATHOLIEK UNIVERSITEIT LEUVEN](#) Louvain, Belgium
- **Master Diploma in Electrical Engineering** (*Summa Cum Laude*) **B.A. in Philosophy** (*Summa Cum Laude*)

AWARDS

- [University of California](#) Scholarship (tuition waiver award) for outstanding research and teaching (1998-2002, \$80k)
- Fellow of the [Belgian-American Educational Foundation \(BAEF\)](#), based on academic excellence (1996-1997, \$25k)
- [IEEE](#) Belgium bronze medal for outstanding undergraduate thesis on security and cryptography (1996)

ADDITIONAL INFORMATION

Computer proficiency: C/C++, Pascal, Fortran, SHELL, PERL, HTK, MATLAB, Spice, VHDL, Verilog, Visual C++, Unix
Activities: Choir singing, arts, architecture, mountain biking, mountaineering, squash, soccer, traveling, symphony, theatre
Four Languages: Fluent in [French](#), [Dutch](#), and [English](#). Conversational [Spanish](#)

PUBLICATIONS, INVITED TALKS , REVIEWER, AFFILIATIONS

DISSERTATION AND THESES

1. Ph.D. Dissertation: "[Source and channel coding techniques for speech transmission and recognition](#)", March 2002
2. M.S. Thesis: "[Source - channel coding of speech](#)", December 1998
3. Master Diploma Thesis: "[Image authentication using a secure camera](#)", June 1996

JOURNAL PAPERS

4. **A. Bernard** and A. Alwan, "[Source and channel coding for low-bitrate distributed speech recognition systems](#)", *IEEE Transactions on Speech and Audio Processing*, Vol. 10, No. 8, pp 570—580, Nov. 2002
5. **A. Bernard**, X. Liu, R. Wesel and A. Alwan, "[Speech transmission using rate-compatible trellis codes \(RCPT\) and embedded source coding](#)", *IEEE Transactions on Communications*, Vol. 50, No. 2, pp. 309—320, Feb. 2002
6. Y. Gong and **A. Bernard**, "[Noise robust speech endpoint detection for hands-free automobile applications](#)", submitted to Speech Communications

PATENTS

7. **A. Bernard** and Y. Gong, "[Method to extend the operating range of joint additive and convolutive compensating algorithm using environment and statistics dependent channel estimation](#)", submitted to U.S. Patent Office in October 2003
8. **A. Bernard** and Y. Gong, "[A middle-end solution to robust speech recognition: SNR dependent decoding and weighted Viterbi recognition](#)", submitted to U.S. Patent Office in October 2003
9. **A. Bernard** and L. Netsch, "[Automatic language independent triphones training using a phonetic table](#)", submitted to U.S. Patent Office in February 2003
10. Y. Gong and **A. Bernard**, "[Data processing for noise-resistant utterance detection](#)", submitted to U.S. Patent Office in 2/2003
11. **A. Bernard**, "[Algebraic codebook coding system and method](#)", submitted to U.S. Patent Office in October 2001

PAPERS IN REFEREED INTERNATIONAL CONFERENCES

12. **A. Bernard**, and A. Alwan, "[Mathematical sensitivity analysis of LSF quantization on LP based cepstral coefficients coding](#)", submitted to INTERSPEECH 2004, to be held in Korea in October 2004
13. **A. Bernard** and A. Alwan, "[On weighted Viterbi decoding and multi-conditional acoustic model training](#)", submitted to INTERSPEECH 2004, to be held in Korea in October 2004
14. **A. Bernard**, Y. Gong and X. Cui, "[Can back-ends be more robust than front-ends? Investigation over the Aurora-2 database](#)", accepted and to be published at ICASSP in Montreal, Canada, in May 2004
15. L. Netsch and **A. Bernard**, "[Automatic and language independent triphone training using phonetic tables](#)", accepted and to be published at ICASSP in Montreal, Canada, in May 2004
16. X. Cui, **A. Bernard**, and A. Alwan, "[A Noise-Robust ASR Back-end Technique Based on Weighted Viterbi Recognition](#)," in Proc. EUROSPEECH, Switzerland, pp. 2169-2172, Sept. 2003
17. **A. Bernard** and A. Alwan, "[Channel decoding - Viterbi speech recognition for wireless applications](#)," in Proc. EUROSPEECH, Aalborg, Denmark, vol. 4, pp. 2703-2706, Sept. 2001.
18. **A. Bernard** and A. Alwan, "[Source and channel coding for remote speech recognition over error-prone channel](#)," in Proc. of ICASSP, Salt-Lake City, UT, vol. 4, pp. 2613-2616, May 2001.
19. A. McCree, T. Unno, A. Anandakumar, **A. Bernard**, and E. Paksoy, "[An embedded adaptive multi-rate wideband speech coder](#)", in Proc. of ICASSP, Salt-Lake City, UT, vol. 4, pp. 2613-2616, May 2001
20. **A. Bernard** and A. Alwan, "[Perceptually based and embedded wideband CELP coding of speech](#)", in Proc. of Eurospeech, Budapest, Hungary, vol. 4, pp. 1543-1546, Sept. 1999
21. **A. Bernard**, X. Liu, R. Wesel and A. Alwan "[Embedded joint source-channel coding of speech using symbol puncturing in trellis code](#)", in Proc. of ICASSP, vol. 5, pp. 2427-30, Phoenix, March 1999
22. **A. Bernard**, X. Liu, R. Wesel and A. Alwan, "[Channel adaptive joint source-channel coding of speech](#)", Proc. 32nd Asilomar Conf. Signals, Systems, Computers, Pacific Grove, CA, vol. 1, pp. 357-61, Nov. 1998
23. **A. Bernard**, J.J. Quisquater, B. Macq, M. Joye and N. Degand, "[Practical solution to authentication of images with a secure camera](#)", in Proc. of SPIE Int. Soc. for Optical Eng., vol. 3022, pp. 290-7, 1997

INVITED SPEAKING ENGAGEMENTS

Lucent Bell Labs, IBM Research, UC San Diego, Boston University, Imperial College, Conexant, Hughes Research Laboratory, Mindspeed, Sony Inc., Altra Broadband Communications, UCLA, Texas Instruments, Alcatel Telecom Research

REVIEWER FOR

IEEE Transactions on Communications, IEEE Transactions on Speech and Audio Processing, Speech Communications, IEEE Signal Processing Letters, EURASIP, ICASSP, ICC, GLOBECOM, EUROSPEECH, ICSLP, INFOCOM

PROFESSIONAL AFFILIATIONS

IEEE Communications Society, IEEE Signal Processing Society, International Community Speech Association