

Ali Khodabakhsh, ML Research Scientist

Machine Learning/Deep Learning, Video Processing, Biometrics, Research and Innovation

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Ali Khodabakhsh has more than seven years of experience as a researcher in information technology. Ali's fields of expertise are artificial intelligence, speech and video processing, biometrics, and multimedia forensics. In his previous roles, Ali has worked on designing and development of machine learning solutions, dataset development, subjective evaluation, and result dissemination, as well as supervision and teaching assistance. Thanks to his interdisciplinary background and strong theoretical foundation, he has a successful record of accomplishments.

Ali is a Ph.D. candidate in information security at the Norwegian University of Science and Technology (NTNU). He has more than 20 peer-reviewed scientific publications with more than 200 citations to date. He lived in three countries and speaks English, Norwegian, and Persian. His colleagues describe him as analytical, creative, flexible, and goal-oriented.

Experience

Research Fellow, Norwegian Biometrics Laboratory, NTNU, Gjøvik, Norway 2017–2020

Research on biometric presentation attack detection and multimedia forensics on video modality. Subjective assessment of viewer vulnerability on categories of fake videos on the web. Development of large-scale datasets of fake videos collected from the wild. Design and implementation of novel deep-learning based fake video detection systems. Supervision of students in the context of Master thesis and internship (see [Supervision](#) below).

Achievements: Evaluated subjective vulnerability to fake video generation techniques in realistic scenarios and discovered two previously unknown vulnerabilities. Proposed the first general-purpose behavioral face recognition system on videos collected from the wild with 92% verification accuracy. Proposed the first video editing detection system on facial videos with 95% frame-level detection accuracy. Collected and organized three large-scale datasets of fake videos and made them publicly available ([FFW](#), [Morph-cut](#), [1000LP](#)).

Contact: [Christoph Busch](mailto:Christoph.Busch@ntnu.no) - Christoph.Busch@ntnu.no

Intern, Study Group for Machine Translation and Automated Processing of Languages and Speech (GETALP), Grenoble Informatics Laboratory (LIG), Grenoble, France 2015

Research on deep-learning based speaker recognition systems. Development of speaker recognition systems for person discovery in TV broadcast data. Person annotation on TV broadcast data using active learning.

Achievements: Developed one of the first deep learning based speaker identification systems.

Contact: [Laurent Besacier](mailto:Laurent.Besacier@imag.fr) - Laurent.Besacier@imag.fr

Research Assistant, Speech and Natural Language Processing Laboratory, Özyeğin University, Istanbul, Turkey 2012–2015

Development of back-end speech recognition engine for web-based language teaching. Development of short-utterance speaker adaptation method for speech synthesis. Development of text-independent speaker recognition systems and vulnerability assessment against statistical speech synthesis methods. Design and implementation of spoofing detection methods for speaker verification systems. Development of dementia detection and monitoring methods using speech and natural language processing on conversational speech.

Achievements: Development of a fully functional back-end engine for web-based language teaching and pronunciation correction. Achieved an Alzheimer's disease detection rate of 80% in conversational speech using speech and natural language processing. Contributed to the [spoofing and anti-spoofing \(SAS\)](#) corpus and subsequently to the [first ASVspoof challenge](#) in collaboration with the top research groups in the field.

Contact: [Cenk Demiroglu](mailto:Cenk.Demiroglu@ozyegin.edu.tr) - Cenk.Demiroglu@ozyegin.edu.tr

Teaching Assistant, Department of Computer Science, Özyeğin University, Istanbul, Turkey 2012–2015

Teaching assistant for two Bachelor's courses per semester in English. Running laboratory sessions, laboratory assistance, proctoring, preparing exam solutions, and grading.

Intern, Biomedical Engineering Laboratory, University of Tehran, Tehran, Iran 2009

Segmentation and registration of brain tumors in brain MRI scans using image processing.

Intern Researcher, Pars Khodro, Tehran, Iran 2009

Research on the automated face and eye tracking and driver fatigue assessment systems for highway safety and implementation of a prototype.

Achievements: Full implementation and demonstration of a low-cost working prototype.

Education

Philosophiae Doctor (Ph.D.), Dep. of Information Security and Communication Technology, Norwegian University of Science and Technology, Norway 2020

Subject of the dissertation: Automated Authentication of Audiovisual Contents: A Biometric Approach (Supervisors: **Christoph Busch** and **Raghavendra Ramachandra**).

Relevant Courses: Behavioral Biometrics, Biometrics, Introduction to Information Security, Image Quality, Ethics and Legal Aspects of Scientific Research

Master of Science (M.Sc.), Dep. of Computer Science, Özyeğin University, Turkey 2015
Final grade: 3.6/4.0. Specialized curriculum in machine learning and signal processing.

Subject of the dissertation: Spoofing and Anti-spoofing Techniques for Text-independent Speaker Verification Systems (Supervisor: **Cenk Demiroglu**).

Relevant Courses: Digital Speech Processing, Digital Signal Processing, Statistical Signal Processing, Machine learning, Introduction to Machine Learning and Artificial Neural Networks, Biometric Systems, Game Design and Development

Bachelor of Science (B.Sc.), Dep. of Bio-Electric, University of Tehran, Iran 2011
Final grade: 2.7/4.0. General curriculum in electrical engineering and computer science; specialization in bio-electrics.

Subject of the dissertation: A Survey on Online Eye Tracking Techniques, and Implementation of Remote Gaze Tracking Using Near-Infrared Illuminators. Supervisor: **Reza Aghaizadeh Zoroofi**.

Relevant Courses: Engineering Mathematics, Engineering Probability and Statistics, Numerical Computation, Calculus, Differential Equations, An Introduction to Biomedical Engineering, Physiology, Operations Research, Industrial Training, Principles of Entrepreneurship, Systems Analysis, Technical Language, Introduction to Computing Systems, Computer Architecture, Microprocessors, Communications

Soft Skills

Teamwork, Problem-Solving, Adaptability, Creativity, Organizational Skills, Resilience, Attention to Details, Willingness to learn

Technical Skills

Methodologies: Agile, Scrum
General: Git, GNU/Linux, Microsoft Windows, Bash, WordPress, LaTeX, Docker
Languages: Python, MATLAB, Java, Javascript
Data Processing: Tensorflow, Keras, Scikit-Learn, Pandas, Numpy, OpenCV
Deep Learning: CNN, LSTM, Autoencoders
Toolboxes: HTS, CMU Sphinx, LimeSurvey, Tesseract

Languages

Other languages¹

English²
Norwegian (Bokmål)³

Understanding				Speaking				Writing	
Listening		Reading		Interaction		Production			
C2	Fluent	C2	Fluent	C1	Fluent	C1	Fluent	B2	Independent
B2	Independent	B1	Independent	B1	Independent	B1	Independent	B1	Independent

¹Common European Framework of Reference for Languages (CEFR)

Mother tongue

Persian, Azerbaijani

²IELTS Academic Test

³Norskprøve på Kompetanse Norge

Teaching

Teaching assistant, Digital Signal Processing (in English) 1 semester
Bachelor course EE302, Özyeğin University

Teaching assistant, Object Oriented Programming (in English) 2 semesters
Bachelor course CS102, Özyeğin University

Teaching assistant, Computer Programming (in English) 2 semesters
Bachelor course CS101, Özyeğin University

Teaching assistant, Linear Algebra (in English) 1 semester
Bachelor course MATH211, Özyeğin University

Teaching assistant, Calculus for Engineering (in English) 2 semesters
Bachelor course MATH103 - MATH104, Özyeğin University

Teaching assistant, Physics (in English) 4 semesters
Bachelor course PHYS101L - PHYS102L, Özyeğin University

Supervision

Thomas Nielsen, Master student at the Technical University of Denmark (DTU). Internship at NTNU and Master's Thesis. 2020

Hugo Loisel, Master student at the Ecole Nationale Supérieure d'Ingénieurs de Caen (ENSICAEN). Internship at NTNU. 2019

Committees

Program Committee Member: BIOSIG

Reviewer: IEEE TIFS, IET Biometrics, Elsevier Information Sciences, Springer CSSP, Springer Multimedia Systems

Personal interests

Artificial Intelligence, Sociology, Psychology, Linguistics, Reading, Music, Hiking, Skiing, Board Games

Publications

Book Chapters

- [1] A. Khodabakhsh, C. Demiroglu, "Analysis of speech-based measures for detecting and monitoring Alzheimer's disease", In: *Data Mining in Clinical Medicine*, Springer, 2015, Pp. 159–173.

Peer-reviewed journals

- [1] Spoofing voice verification systems with statistical speech synthesis using limited adaptation data
A. Khodabakhsh, A. Mohammadi, C. Demiroglu
Computer Speech & Language 42 (2017), pp. 20–37
- [2] Postprocessing Synthetic Speech With a Complex Cepstrum Vocoder for Spoofing Phase-Based Synthetic Speech Detectors
C. Demiroglu, O. Buyuk, A. Khodabakhsh, R. Maia
IEEE Journal of Selected Topics in Signal Processing 11.4 (2017), pp. 671–683
- [3] Anti-Spoofing for Text-Independent Speaker Verification: An Initial Database, Comparison of Countermeasures, and Human Performance
Z. Wu, P. L. De Leon, C. Demiroglu, A. Khodabakhsh, S. King, Z. Ling, D. Saito, B. Stewart, T. Toda, M. Wester, J. Yamagishi
IEEE/ACM Transactions on Audio, Speech, and Language Processing 24.4 (2016), pp. 768–783
- [4] Evaluation of linguistic and prosodic features for detection of Alzheimer's disease in Turkish conversational speech
A. Khodabakhsh, F. Yesil, E. Guner, C. Demiroglu
EURASIP Journal on Audio, Speech, and Music Processing 2015.1 (2015), p. 9, Springer

Peer-reviewed conference proceedings

- [1] Unit-Selection Based Facial Video Manipulation Detection
T. Nielsen, A. Khodabakhsh, C. Busch
2020 International Conference of the Biometrics Special Interest Group (BIOSIG), 2020
- [2] Action-Independent Generalized Behavioral Identity Descriptors for Look-alike Recognition in Videos
A. Khodabakhsh, H. Loisel
2020 International Conference of the Biometrics Special Interest Group (BIOSIG), 2020
- [3] A Generalizable Deepfake Detector based on Neural Conditional Distribution Modelling
A. Khodabakhsh, C. Busch
2020 International Conference of the Biometrics Special Interest Group (BIOSIG), 2020

- [4] Subjective Evaluation of Media Consumer Vulnerability to Fake Audiovisual Content
A. Khodabakhsh, R. Ramachandra, C. Busch
2019 Eleventh International Conference on Quality of Multimedia Experience (QoMEX), 2019
- [5] Subjective Versus Objective Face Image Quality Evaluation For Face Recognition
A. Khodabakhsh, M. Pedersen, C. Busch
Proceedings of the 2019 3rd International Conference on Biometric Engineering and Applications, 2019, Association for Computing Machinery
- [6] Fake Face Detection Methods: Can They Be Generalized?
A. Khodabakhsh, R. Ramachandra, K. Raja, P. Wasnik, C. Busch
2018 International Conference of the Biometrics Special Interest Group (BIOSIG), 2018
- [7] Predicted Templates: Learning-curve Based Template Projection for Keystroke Dynamics
A. Khodabakhsh, E. Haasnoot, P. Bours
2018 International Conference of the Biometrics Special Interest Group (BIOSIG), 2018
- [8] FEERCI: A Package for Fast Non-Parametric Confidence Intervals for Equal Error Rates in Amortized $O(m \log n)$
E. Haasnoot, A. Khodabakhsh, C. Zeinstra, L. Spreeuwiers, R. Veldhuis
2018 International Conference of the Biometrics Special Interest Group (BIOSIG), 2018
- [9] A Taxonomy of Audiovisual Fake Multimedia Content Creation Technology
A. Khodabakhsh, C. Busch, R. Ramachandra
2018 IEEE Conference on Multimedia Information Processing and Retrieval (MIPR), 2018
- [10] OCR-aided person annotation and label propagation for speaker modeling in TV shows
M. Budnik, L. Besacier, A. Khodabakhsh, C. Demiroglu
2016 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), 2016
- [11] Spoofing attacks to i-vector based voice verification systems using statistical speech synthesis with additive noise and countermeasure
M. C. Özbay, A. Khodabakhsh, A. Mohammadi, C. Demiroglu
2016 24th European Signal Processing Conference (EUSIPCO), 2016
- [12] Deep complementary features for speaker identification in TV broadcast data
M. Budnik, A. Khodabakhsh, L. Besacier, C. Demiroglu
Odyssey 2016, 2016
- [13] LIG at MediaEval 2015 Multimodal Person Discovery in Broadcast TV Task
M. Budnik, B. Safadi, L. Besacier, G. Quénot, A. Khodabakhsh, C. Demiroglu
MediaEval 2015 Workshop, 2015
- [14] SAS: A speaker verification spoofing database containing diverse attacks
Z. Wu, A. Khodabakhsh, C. Demiroglu, J. Yamagishi, D. Saito, T. Toda, S. King
2015 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), 2015
- [15] Natural language features for detection of Alzheimer's disease in conversational speech
A. Khodabakhsh, S. Kuşuoğlu, C. Demiroglu
IEEE-EMBS International Conference on Biomedical and Health Informatics (BHI), 2014
- [16] Detection of Alzheimer's disease using prosodic cues in conversational speech
A. Khodabakhsh, S. Kuscuoglu, C. Demiroglu
2014 22nd Signal Processing and Communications Applications Conference (SIU), 2014

Technical reports

- [1] Unknown Presentation Attack Detection against Rational Attackers
A. Khodabakhsh
2020
- [2] Incorporation of Speech Duration Information in Score Fusion of Speaker Recognition Systems
A. Khodabakhsh, S. S. Sarfjoo, U. Uludag, O. Soyyigit, C. Demiroglu
2016
- [3] Investigation of Synthetic Speech Detection Using Frame- and Segment-Specific Importance Weighting
A. Khodabakhsh, C. Demiroglu
2016