

# Ali Khodabakhsh

Ph.D. candidate

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## Summary

Ali Khodabakhsh obtained his B.Sc. degree in Electrical Engineering from University of Tehran, Tehran, Iran, in 2011, and his M.Sc. degree in Computer Science under the supervision of Dr. Cenk Demiroğlu from Özyeğin University, Istanbul, Turkey, in 2015. During his M.Sc. studies, he worked on Automatic Speech Recognition, Automatic Speaker Verification, Spoofing Automatic Speaker Verification Systems, and Speech-Based Assessment of Alzheimers' Disease. He co-authored a book chapter, 4 journal papers, and many conference and workshop papers during this time. He also contributed to the Spoofing and Anti-Spoofing (SAS) corpus, and consequently the Automatic Speaker Verification Spoofing and Countermeasures Challenge Special Session at Interspeech 2015 conference. He was an intern researcher under the supervision of Prof. Laurent Besacier in Laboratory of Informatics of Grenoble (LIG), Grenoble, France, during summer 2015. He is currently pursuing his Ph.D. studies in Norwegian Biometrics Laboratory under the supervision of Prof. Christoph Busch. His Ph.D. research is focused on the detection of fake and manipulated multimedia using biometric technologies.

## Education

### Ph.D. Candidate in Information Security

Sep 2017 - Present

Norwegian University of Science and Technology (NTNU), Gjovik, Norway

Thesis Title: Automated Authentication of Audiovisual Contents: A Biometric Approach

Thesis Advisor : Prof. Christoph Busch

### M.Sc. in Computer Science (GPA: 3.6)

Feb 2013 - Oct 2015

Özyeğin University, Istanbul, Turkey

Courses : Introduction to Machine Learning and Artificial Neural Networks, Machine Learning, Statistical Signal Processing, Digital Signal Processing, Digital Speech Processing, Digital Image Processing, Biometric Systems, ...

Thesis Title : Spoofing and Anti-spoofing Techniques for Text-independent Speaker Verification Systems

Thesis Advisor : Dr. Cenk Demiroğlu

### B.Sc. in Electrical Engineering, Bioelectric (GPA: 2.7)

Sep 2006 - Sep 2011

University of Tehran, Tehran, Iran

Courses : Numerical Computation, Signal and Systems, Logic Circuits, Microprocessor, Computer Architecture, Basics of Computer and Programming, Operations Research, Physiology and Anatomy, ...

Thesis Title : A Survey on Online Eye Tracking Techniques, and Implementation of Remote Gaze Tracking Using Near Infrared Illuminators

Thesis Advisor : Prof. Reza Aghaeizadeh Zoroofi

### Middle School, High School, and Pre-university Diploma

Sep 1999 - Sep 2006

National Organization for Development of Exceptional Talents (NODET), Zanjan, Iran

### Book Chapters

1. *Khodabakhsh, A., Demiroglu, C., Analysis of Speech-Based Measures for Detecting and Monitoring Alzheimer's Disease*, Data Mining in Clinical Medicine, 2015.

### Journal Articles

1. Demiroglu, C., Buyuk, O., *Khodabakhsh, A., Maia, R., Postprocessing Synthetic Speech with a Complex Cepstrum Vocoder for Spoofing Phase-based Synthetic Speech Detectors*, IEEE Journal of Selected Topics in Signal Processing, 2017.
2. *Khodabakhsh, A., Mohammadi, A., Demiroglu, C., Spoofing Voice Verification Systems with Statistical Speech Synthesis Using Limited Adaptation Data*, Computer Speech & Language, 2017.
3. Wu, Z., DeLeon, P., Demiroglu, C., *Khodabakhsh, A., King, S., Ling, Z.H., Saito, D., Stewart, B., Toda, T., Wester, M., Yamagishi, J., Anti-Spoofing for Text-Independent Speaker Verification: An Initial Database, Comparison of Countermeasures, and Human Performance*, IEEE/ACM Transactions on Audio, Speech, and Language Processing, 2016.
4. *Khodabakhsh, A., Yesil, F., Guner, E., Demiroglu, C., Evaluation of Linguistic and Prosodic Features for Detection of Alzheimer's Disease in Turkish Conversational Speech*, EURASIP Journal on Audio, Speech, and Music Processing, 2015.
5. Heydarpour, P., Hafezi-Nejad, N., *Khodabakhsh, A., Khosravi, M., Khoshkish, S., Sadeghian, M., Samavat, B., Faturechi, A., Pasalar, P., Dehpour, A. R., Medical Podcasting in Iran; Pilot, Implementation and Attitude Evaluation*, Acta Medica Iranica, 2013.

### Conference/Workshop Publications

1. *Khodabakhsh, A., Raghavendra, R., Busch, C., Subjective Evaluation of Media Consumer Vulnerability to Fake Audiovisual Content*, International Workshop on Quality of Multimedia Experience (QoMEX), 2019.
2. *Khodabakhsh, A., Pedersen, M., Busch, C., Subjective Versus Objective Face Image Quality Evaluation For Face Recognition*, International Conference on Biomedical Engineering and Applications (ICBEA), 2019.
3. *Khodabakhsh, A., Ramachandra, R., Raja, K., Wasnik, P., Busch, C., Fake Face Detection Methods: Can They Be Generalized?*, International Conference of the Biometrics Special Interest Group (BIOSIG), 2018.
4. *Khodabakhsh, A., Haasnoot, E., Bours, P., Predicted Templates: Learning-curve Based Template Projection for Keystroke Dynamics*, International Conference of the Biometrics Special Interest Group (BIOSIG), 2018.
5. Haasnoot, E., *Khodabakhsh, A., Zeinstra, C., Spreeuwens, L., Veldhuis, R., FEERCI: A Package for Fast Non-Parametric Confidence Intervals for Equal Error Rates in Amortized  $O(m \log n)$* , International Conference of the Biometrics Special Interest Group (BIOSIG), 2018.
6. *Khodabakhsh, A., Raghavendra, R., Busch, C., A Taxonomy of Audiovisual Fake Multimedia Content Creation Technology*, Proceedings of the 1st IEEE International Workshop on Fake MultiMedia (FakeMM'18), 2018.
7. Ozbay, M., *Khodabakhsh, A., Mohammadi, A., Demiroglu, C., Spoofing Attacks to I-vector Based Voice Verification Systems Using Statistical Speech Synthesis with Additive Noise and Countermeasure*, European Signal Processing Conference (EUSIPCO), 2016.
8. Budnik, M., Becasier, L., *Khodabakhsh, A., Demiroglu, C., Deep complementary features for speaker identification in TV broadcast data*, Odyssey: The Speaker and Language Recognition Workshop, 2016.
9. Budnik, M., Becasier, L., *Khodabakhsh, A., Demiroglu, C., OCR-Aided Person Annotation and Label Propagation for Speaker Modeling in TV Shows*, Acoustics, Speech and Signal Processing (ICASSP), IEEE International Conference on, 2016.
10. Budnik, M., Safadi, B., Besacier, L., Quénot, G., *Khodabakhsh, A., Demiroglu, C., LIG at MediaEval 2015 Multimodal Person Discovery in Broadcast TV Task*, Mediaeval Workshop, 2015.
11. Wu, Z., *Khodabakhsh, A., Demiroglu, C., Yamagishi, J., Saito, D., Toda, T., King, S., SAS: A Speaker Verification Spoofing Database Containing Diverse Attacks*, Acoustics, Speech and Signal Processing (ICASSP), IEEE International Conference on, 2015.
12. *Khodabakhsh, A., Kuscuoglu, S., Demiroglu, C., Natural Language Features for Detection of Alzheimer's Disease in Conversational Speech*, Biomedical and Health Informatics (BHI), IEEE-EMBS International Conference on, 2014.
13. *Khodabakhsh, A., Kuscuoglu, S., Demiroglu, C., Detection of Alzheimer's Disease Using Prosodic Cues in Conversational Speech*, Signal Processing and Communications Applications Conference (SIU), 2014.

14. Eghbalzadeh, H., Hosseini, B., Khadivi, S., *Khodabakhsh, A.*, **Persica: A Persian Corpus for Multi-purpose Text Mining and Natural Language Processing**, Telecommunications (IST), Sixth International Symposium on, 2012.

### Non-peer reviewed

1. *Khodabakhsh, A.*, Demiroglu, C., **Investigation of Synthetic Speech Detection Using Frame- and Segment-Specific Importance Weighting**, [arXiv:1610.03009](https://arxiv.org/abs/1610.03009), 2016.
2. *Khodabakhsh, A.*, Sarfjoo, S.S., Uludag, U., Soyigit, O., Demiroglu, C., **Incorporation of Speech Duration Information in Score Fusion of Speaker Recognition Systems**, [arXiv:1608.02272](https://arxiv.org/abs/1608.02272), 2016.

### Datasets

1. *Khodabakhsh, A.*, Ramachandra, R., Busch, C., **Fake Faces in the Wild (FFW)**, Available at <http://ali.khodabakhsh.org/research/ffw/>.
2. Wu, Z., *Khodabakhsh, A.*, Demiroglu, C., Yamagishi, J., Saito, D., Toda, T., Ling, Z.H., King, S., **Spoofing and Anti-Spoofing (SAS) corpus v1.0**, University of Edinburgh. The Center for Speech Technology Research (CSTR), 2015.

## Experience

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### Research Assistant

Sept 2017 - Present

Norwegian University of Science and Technology (NTNU), Gjøvik, Norway

Working on Automated Detection of Fake Audiovisual Content in Fake News Detection context.

- Worked with Limesurvey and MATLAB.

### Intern

Apr 2015 - Jul 2015

GETALP, Laboratory of Informatics of Grenoble, Grenoble, France

Worked on developing Deep Convolutional Neural Networks and i-vector based Speaker Recognition Systems for Person Discovery in TV broadcast data under the supervision of Prof. Laurent Besacier. (Using MATLAB and Python)

- Worked with MSR Identity Toolkit, Caffe Framework, Alize Framework, LIA\_RAL toolkit.

### Research Assistant

Jan 2012 - Sep 2015

Speech Processing Laboratory, Özyeğin University, Istanbul, Turkey

Worked on several speech processing tasks under the supervision of Dr. Cenk Demiroğlu including:

- HMM-based speech recognition engine for web-based language teaching (Using Java)
  - Worked with CMU sphinx toolkit.
- HMM and unit-selection based speech synthesis for spoofing speaker verification systems (Using Python)
  - Worked with HTS and MaryTTS systems.
- Text-independent speaker recognition systems (Using MATLAB and Python)
  - Experienced with GMM-UBM, JFA, TVS, and PLDA technologies.
  - Developed local toolboxes, worked with MSR Identity Toolkit, Alize Framework, LIA\_RAL toolkit, etc.
  - Experienced with NIST Speaker Recognition Evaluation tasks, NIST i-vector challenge, REPERE broadcast data, and WSJ corpora.
- Spoofing detection for speaker verification systems (Using MATLAB)
  - Experienced with various Spoofing Detection techniques (e.g. MGD, LBP, i-vector).
- Detection of Alzheimer's disease in conversational speech (Using MATLAB)
  - Organized locally recorded database.
  - Used a wide range of speech- and text-based features and various machine learning algorithms. (e.g. SVM, Decision Trees, kNN, Naive Bayes)

## Teaching Assistant

Jan 2012 - Sep 2015

Özyeğin University, Istanbul, Turkey

Teaching Assistant of the following courses:

- Digital Signal Processing (1 semester) - Preparing solutions, Grading assignments, Proctoring.
- Computer Programming (2 semesters) - Laboratory assistant, Grading assignments, Proctoring. The programming language was Java.
- Object Oriented Programming (2 semesters) - Laboratory assistant, Grading assignments, Proctoring. The programming language was Java.
- Physics 101 and 102 (4 semesters) - Running laboratory sessions, Preparing solutions, Grading assignments and exams, Proctoring.
- Calculus for Engineering (2 semesters) - Proctoring, Preparing solutions, Grading exams.
- Linear Algebra (1 semester) - Proctoring, Grading exams.

## Intern

Jun 2009 - Sep 2009

Biomedical engineering laboratory, School of Electrical and Computer Engineering, University of Tehran, Tehran, Iran

Worked on segmentation and registration of brain tumors in brain MRI scans under the supervision of Prof. Hamid Soltanian-Zadeh. (Using C++)

- Worked with Insight Toolkit.

## Intern Researcher

Feb 2009 - May 2009

Pars Khodro, Tehran, Iran

Initial research on implementation of automated face and eye tracking and exhaust assessment systems for highway safety.

## Editorial Activities

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### Peer Review Activities:

- IEEE Transactions on Information Forensics and Security
- Elsevier journal of Information Sciences
- Springer journal of Circuits, Systems, and Signal Processing

### Program committee member:

- IEEE International Conference of the Biometrics Special Interest Group

## Honors and Awards

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- Contributed to the first automatic speaker verification spoofing and countermeasures challenge (ASVspoof 2015)
- TUBITAK Research Grant, Sept 2012 - Sept 2015
- Full scholarship, Özyeğin University
- Full scholarship, University of Tehran
- Ranked 153th among approximately 15,000 participants in nationwide university entrance exam in Electrical Engineering field for M.Sc. degree in Iran.
- Ranked 180th among approximately 400,000 participants in nationwide university entrance exam in Mathematics and Physics field for B.Sc. degree in Iran.
- Ranked 1st among approximately 2,000 Participants in local entrance exam in computer engineering field for B.Sc. degree, Islamic Azad University, Zanjan, Iran.
- Ranked 6th in the Iran high school programming contest.

## Projects

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### **Masters Thesis - Dr. Cenk Demiroglu, Özyeğin University, 2014/15**

Worked on various spoofing and anti-spoofing techniques on speaker recognition systems.

- Experimented with i-vector based speaker recognition systems.
- Used techniques such as Hybrid Speech Synthesis and Linear Regression for increasing effectiveness of spoofing attacks.
- Used various features (such as LBPs, MGDs, MFCCs, i-vectors, etc.) and techniques (such as GMMs, SVMs, etc.) for detection of synthetic speech.
- Used HTS system, MSR Identity Toolbox, and MATLAB and Python programming languages.

### **Biometric Systems - Dr. Umut Uludag, Özyeğin University, Fall 2014/15**

Experimented on the use of speech duration information in score fusion of speaker recognition systems.

- Adapted and reorganized Voxforge open source database for Speaker Recognition task.
- Used GMM-UBM, TVS, and PLDA techniques. Used MSR Identity Toolbox, and MATLAB.

### **Introduction to Machine Learning and Artificial Neural Networks - Dr. Erhan Oztop, Özyeğin University, Spring 2013/14**

Several course projects including implementation of Q-Learning on simulated environment, and MLP training for handwritten digit recognition in MATLAB.

### **Game Design - Prof. Tanju Erdem, Özyeğin University, Spring 2013/14**

Step by step design and implementation of a puzzle game in Processing programming language.

### **Digital Image Processing - Prof. Tanju Erdem, Özyeğin University, Fall 2013/14**

Several course projects on Digital Image Processing including Image Enhancement, Resampling, Edge Detection, Fourier Transform, Image Warping, and etc. using MATLAB.

### **Digital Speech Processing - Dr. Cenk Demiroglu, Özyeğin University, Fall 2012/13**

Implementation of a speech vocoder for HMM based speech synthesis systems in MATLAB.

- Spectral and Prosodic feature extraction and synthesis based on a LPC based filter.

### **Bachelor Thesis - Prof. Reza Aghaeizadeh Zoroofi, University of Tehran, Summer 2010/11**

Implementation of an online NIR LED based remote eye and gaze tracking system.

- Implementation of remote gaze tracking hardware using near infrared illuminators.
- Implementation of image processing algorithms and user interface in MATLAB.

### **General Workshop - Dr. Sied Mehdi Fakhraie, University of Tehran, Fall 2010/11**

Implementation and assembly of path finder robot hardware and software.

- Implementation of software on 8051 microprocessor using C.

### **Logic Circuits - Prof. Zainalabedin Navabi, University of Tehran, Spring 2009/10**

Implementation of a simple submarine simulator game on a seven segment display on FPGA using VHDL.

## Languages

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- English (Advanced Professional Proficiency)
  - IELTS academic test: (Band score of 7.5, Listening: 8.5, Reading: 8.5, Writing: 6.5, Speaking: 7.0)
- Norwegian (Limited working proficiency)
  - Norskprøve: (Listening: B2, Reading: B1, Writing: B1, Speaking: B1)
- Azerbaijani (Mother tongue)
- Persian (Native)
- Turkish (Limited working proficiency)

## Skills

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- Languages : MATLAB, LaTeX, Python, Java, ...
- Toolboxes : MSR identity Toolbox, Caffe, CMU Sphinx, ALIZE, HTS, ...
- Platforms : GNU/Linux, Microsoft Windows, Eclipse

## Interests

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- Research interests : Speech Processing, Biometrics, Deep Learning, Fake News Detection
- Hobbies : Guitar Playing, Reading, Travelling

## References

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References available upon request.