

Dr Peter Jančovič BSc, MSc, PhD

Lecturer

School of Electronic, Electrical and Computer Engineering

Contact details

Telephone [+44 \(0\) 121 414 4316](tel:+44(0)1214144316) (tel: [+44 121 414 4316](tel:+44(0)1214144316))

Fax +44 (0) 121 414 4291

Email p.jancovic@bham.ac.uk (mailto: p.jancovic@bham.ac.uk)

School of Electronic, Electrical and Computer Engineering
University of Birmingham
Edgbaston
Birmingham
B15 2TT
UK



About

Peter Jancovic is a lecturer at the School of Electronic, Electrical & Computer Engineering.

Peter specialises in signal processing and pattern recognition, in particular processing of audio, speech, biomedical and radar signals. He has published over 40 research papers in scientific journals and conferences and 3 book chapters in the above areas. Over the last few years, his research in speech pattern processing has been funded by two EPSRC grants and he has also worked with Prof. Cherniakov on target recognition using forward scatter radar funded by DTC.

He is regularly reviewing papers in scientific journals and conferences. He has recently been invited to give talks on his research at the Middle East Technical University (Turkey) and the University of New South Wales (Australia).

Qualifications

- PhD in Computer Science, Queens University Belfast, 2002
- MSc in Information Technology, Slovak University of Technology
- BSc in Information Technology, Slovak University of Technology

Biography

Peter Jancovic received BSc and MSc degrees in Information Technology from the Slovak University of Technology, Slovakia and a PhD degree from the School of Computer Science, Queens University Belfast. In conjunction with his PhD studies, he worked as a Research Assistant at the Queens University Belfast from July 2001 to May 2003. In June 2003, he joined the University of Birmingham as a lecturer in the School of Electronic, Electrical and Computer Engineering.

He was awarded over the last few years two grants from the Engineering and Physical Sciences Research Council (EPSRC) for research on speech pattern processing and speech enhancement in noisy environments (in total £470K). He has also worked with Prof. Cherniakov on target recognition using forward scatter radar funded by DTC (£900K).

He was an organising committee member of Interspeech 2009, a main annual world conference on speech science and technology with over 1000 delegates, and has served as an international program committee member for the IAENG "World Congress on Engineering", 2008-2009 and IASTED "Int. Conference on Signal Processing, Pattern Recognition, and Applications", 2007-2011.

He is regularly reviewing papers in scientific journals and conferences. He has recently been invited to give talks on his research at the Middle East Technical University (Turkey) and the University of New South Wales (Australia).

His current main research interests are in signal processing and pattern recognition, in particular, analysis of speech, audio, biomedical and radar signals.

He is currently teaching modules at both undergraduate and MSc levels: Speech and Audio Technology (Year 2), Multimodal Interaction (MSc), Embedded Digital Signal Processing (MSc). In past he was also teaching MSc modules C Programming and Spoken Language Processing.

Teaching

Teaching Programmes

- UG (Year 2): Speech and Audio Technology
- MEng (Year 4): Speech and Vision
- MSc: Multimodal Interaction
- MSc: Embedded Digital Signal Processing

Teaching in past years:

- MSc: C Programming
- MSc: Spoken Language Processing

Postgraduate supervision

PhD supervision

- Masoud Zakeri
- Shu-Nung Yao (jointly with Dr. T. Collins)
- Chunyang Xu (jointly with Prof. M. Cherniakov)
- Saeid Safavi (jointly with Prof. M. Russell)

- Nur Emileen Abd Rashid (jointly with Prof. M. Cherniakov)
- Xin Zou (awarded PhD, Dec 2008)

Research

HUMAN COMPUTER INTERACTION

He conducts research on various aspects of processing of acoustic speech signals as part of human interaction with computers, in particular in noisy environments. This includes: i) extraction of information from the acoustic speech signal that characterises its production; ii) acoustic modelling of speech signals; iii) dealing with noise; iv) paralinguistic signal processing, such as, recognition of speaker or an emotional state of a speaker based on the acoustic and brain neural signals; v) analysis of children speech. This research has over last few years been funded by two EPSRC projects. The main research topics are briefly outlined below.

□ Speech and Speaker Recognition in Noisy Environments

While current automatic speech and speaker recognition systems can achieve high performance in carefully controlled environments, their performance degrades rapidly when they are applied in real-world situations due to the presence of a background environmental noise. We conduct research on novel methods for noise-robust feature extraction and noise compensation. This includes methods for noise-robust combination of multiple features, which may be obtained by using different sources of information or different processing techniques applied on a specific source, and methods for improving acoustic modelling of speech, specifically, by employing the information about both the vocal tract and excitation.

□ Speech Signal Enhancement

The goal of speech enhancement is to estimate the original signal from a given noise-corrupted signal. Signal can be recorded using a single microphone (single-channel) or multiple microphones (multi-channel). The use of multiple microphones can enable to estimate the direction of arrival of the sound source and thus to further reduce the noise. We carry out research on development of richer techniques for single-channel and multi-channel speech enhancement which can better exploit the statistical properties of the signal and the intrinsic properties of speech signals.

AUDIO / MUSIC PATTERN PROCESSING

□ Recognition of Bird Species from their Songs

In this work, we study the problem of automatic detection and recognition of bird species from their song. The objective is to create an automatic system which can detect individual occurrences of the song of a particular species of bird over a period of several days, in order to establish whether or not that species is resident in the locality. This research involves applying pattern recognition techniques which have been demonstrated to be effective for computer speech recognition and their modifications to birdsongs. The outcomes of our research so far showed that the proposed techniques can achieve high detection accuracy of bird vocalisations and high recognition accuracy of bird species based on their songs in real-world noisy conditions.

□ Analysis of Musical Signals

During recent years, there has been a huge increase of the amount of various types of multimedia data available in digital format on the internet. This has created a large demand for development of automatic intelligent tools that could organise and search through this data, or extract knowledge from this data. The objective of this research is to investigate novel techniques for automatic processing of musical data, for instance, recognition of instruments or note transcription in polyphonic music, analysis of song structure, genre classification. The research involves applying of signal processing and machine learning techniques.

RADAR TARGET CLASSIFICATION

In this work, we study the feasibility of forward scattering radar for automatic ground target classification. Our study provides important results in the area that currently contains only few theoretical works with very limited experimental confirmation. The obtained results indicate that the proposed signal processing has a wide range of potential applications in military and protection against terrorism, e.g., an early warning system to protection of airports and power stations. This work is in collaboration with Prof. M. Cherniakov at our school and with Bauman University, Moscow, Russia. This work has been funded by DTC.

BIOMEDICAL DATA ANALYSIS

In this interdisciplinary project, we worked on analysis of the risk of an individual having a colorectal cancer based on family history (pedigree consisting of 6,800 individuals covering four or more generations) in collaboration with Coventry University and the Newfoundland Memorial Hospital in Canada.

Other activities

Reviewer for Scientific Journals:

- IEEE Transactions on Audio, Speech and Language Processing
- IEEE Transactions on Signal Processing
- IEEE Transactions on Image Processing
- IEEE Transactions on Neural Networks
- IEEE Signal Processing Letters
- Computer Speech and Language (Elsevier)

Reviewer for Scientific Conferences:

- INTERSPEECH
- IEEE Int. Conf. on Acoustics, Speech and Signal Processing (ICASSP)
- European Signal Processing Conference (EUSIPCO)
- IASTED Int. Conf. on Signal Processing, Pattern Recognition, and Applications (SPPRA)
- International Symposium on Circuits and Systems (ISCAS)

Conference Organisation:

- Int. Program Committee Member of the IASTED "Int. Conf. on Signal Processing, Pattern Recognition, and Applications", Innsbruck, Austria, 2007-2011
- Organising Committee Member of "INTER-SPEECH" conference, Sept. 2009
- Int. Program Committee Member of the "World Congress on Engineering", London, UK, 2008-2009
- Organisation of a poster presentations as part of the research workshop "One-day Meeting on Unified Models for Speech Recognition and Synthesis", University of Birmingham, Jan 2007 and Jan 2009

Public Outreach:

- Interviewed by a journalist for contribution to 'The Engineer' magazine, Apr 2009.

Publications

Journal Articles:

Jančovič, P., Kökür, M. (2011), Automatic detection and recognition of tonal bird sounds in noisy environments, Eurasip Journal on Advances in Signal Processing, in press.

Jančovič, P., Kökür, M. (2009), Incorporating the voicing information into HMM-based automatic speech recognition in noisy environments, Speech Communication, Vol. 51, No. 5, pp. 438-451.

Zou, X., Jančovič, P., Liu, J., Kökür, M. (2008), Speech signal enhancement based on MAP algorithm in the ICA space, IEEE Transactions on Signal Processing, Vol.

Jančovič, P., Köküer, M. (2007), Estimation of voicing-character of speech spectra based on spectral shape, *IEEE Signal Processing Letters*, Vol. 14, No. 1, pp. 66-69.

Cherniakov, M., Abdullah, R.S.A.R., Jančovič, P., Salous, M., Chapursky, V. (2006), Automatic ground target classification using FSR, *IEE Proceedings – Radar, Sonar and Navigation*, Vol. 153, Issue 5, pp. 427-437.

Book Chapters:

Jančovič, P., Zou, X., Köküer, M. (2011) "Speech enhancement and representation employing the Independent Component Analysis", In: Ramirez, J., and Gorriz, J. (eds.) *Recent Advances in Robust Speech Recognition Technology*. Bentham Science Publishers, pp. 103-113.

Jančovič, P., Köküer, M. (2008) "Employment of spectral voicing information for speech and speaker recognition in noisy conditions", In: Mihelic, F., Zibert, J. (eds.) *Speech Recognition (Technologies and Applications)*. I-Tech, pp. 45-60.