POSITION STATEMENT ACADEMIC STAFF

UTS:HUMAN RESOURCES

POSITION: **Postdoctoral Research Associate (Level A)/ Research Fellow (Level B)**

FACULTY: **Faculty of Engineering and Information Technology (FEIT)**
School of Mechanical and Mechatronic Engineering (MME)

Position Purpose:

Postdoctoral Research Associate (RA)/ Research Fellow (RF) will work on academic activities related to different projects including ARC funded research and industry research as well as general activities associated with the Biogenic dynamics group at UTS within the *Centre for Audio, Acoustics and Vibration* (CAAV), such assisting group activities, support in teaching and research training into Mechatronics and Vibroacoustics (sensing, actuation). of Undergraduate (UG) and Postgraduate (PG) students.

Supervisor: A/Prof Sebastian Oberst

Summary of group and project

The RA will work further closely together with the group leader of the "Biogenic dynamics" group and the other postdoctoral researchers focussing on applied mathematics (signal processing, computational intelligence, time series analysis, mathematical physics and nonlinear dynamics). Other more general activities include supporting activities within the School of MME and the CAAV.

The RA/RF will work on vibration signals and data recorded from various sources (technical and natural) with strong to weak signal-to-noise ratio using single and multiple sensors. Key research question is whether it is possible to extract dynamic information from coupled signal/noise and to which degree nonlinear filtering can be utilised. Nonlinear filtering methods based on the geometry of the dynamics in phase space and more conventional time-domain methods are compared and quantified using nonlinear dynamics theory. Using machine learning (computing reservoirs) a sufficient signal segregation into source terms is anticipated; as is the dynamics-preserving synthesis of micro-vibrational signals. Newly developed algorithms will be implemented into hardware (CorelDev, FPGA) to enable real-time actuation, measurement, and signal analysis. Algorithms will be improved and accelerated using appropriate heuristics and time-efficient uncertaintly calculations, especially for neighbourhood searches. The developed software should be tested in the laboratory and potentially in the field. Signals can be natural signal as emitted from insects or from certain technical devices.

DUTIES OF THE POSITION:

Research and Research training

- To independently conduct research into nonlinear time series analysis, and computational intelligence, especially feature extraction from noise and signal synthesis
- To push the boundaries of this work to detect and analyse signals of smallest amplitude
- To develop a data analysis framework based on machine learning and data fusion, analysing the signals for their quality and segregation
- Implementing the algorithms into hardware and testing their real-time capability (analysis in the stream)
- To publish in high-impact research journals and reputable conferences, to drive the research indepently and
- To liaise with internal partners (other CIs, other Postdoctoral Researchers) and external stakeholders (companies involved) and to interface the areas "Complex Dynamics/ Bioacoustics"
- Building up and managing the group from within, including assistance in supervision of PhD students, and interfacing the Vibration group at TechLab
- To assist in trials in the laboratory as appropriate and to test the algorithm on real-life data

ADMINISTRATION AND MANAGEMENT

- To assist in administration related to the activities of the group and the general organisation of the lab including risk assessements, development of standard operating procedures
- Documentation of procedures associated with the lab, including the write up of technical protocols during and after field trips, laboratory activities
- Work on laboratory reports for key stake holders

RESEARCH AND EXTERNAL ACTIVITIES
- Contribute as a researcher to project proposal preparation, conduct of the research, report preparation, paper writing, etc.
- Contribute as a presenter to the activities that can demonstrate the research achievements/goals of CAAV to the public, potential collaborators, or visitors.
- Collaborate with the team leaders and other team members for project progress control, meeting, and related experiment design or platform design.

OTHER RESPONSIBILITIES
- To comply with the requirements of University's Environment Health and Safety (OH&S) policies. They can be accessed via the following UTS website at: http://www.gsu.uts.edu.au/policies/health-safety-policy.html
- Supervisors and managers of staff and facilities must do whatever is reasonably practical to ensure that both the workplace and work itself are safe, in consultation with staff affected.
- Contribute to the project and provide assistance to lab research group related

KEY SELECTION CRITERIA ACADEMIC STAFF Level A

POSITION: **Postdoctoral Research Associate (Level A) for 3 years (1.0 FTE)/**
Faculty: **Faculty of Engineering and Information Technology (FEIT)**
School of Mechanical and Mechatronic Engineering

Skills and Attributes

- Demonstrated capacity to work independently with a minimum of supervision and as part of a team, while self-driven and motivated,
- Demonstration of excellent time/project management skills
- Demonstrated ability to publish in high-quality journals of international repute.
- Excellent oral and written English language skills and ability to translate and demonstrate research results at different levels including researchers, media and general public.
- Interest in working with insects and studying their behavior and communication

Knowledge

- Demonstrated knowledge in conducting experimental work, using different vibration sensors (laser vibrometry, ultrasonic transducers/ NDT, accelerometers, strain/ stress and humidity sensing) including their data analysis.
- Demonstrated knowledge in Signal Processing or Machine Learning/ Feature extraction and the willingness/capability to learn in this area
- Desired knowledge and/or experience in one or all of the following areas: complex dynamics, Noise and filtering, Communication signals
- Demonstrated knowledge in C / VHDL, scripting, and data handling

Qualifications

PhD in applied mathematics, technical mathematics, or computer science or electrical engineering with an excellent understanding of experimental physics/ theory of waves OR PhD in mathematical physics with experience in experiments, experimental physics with a strong interest in machine learning and signal processing (candidates who are near completion of their PhD degree are also encouraged to apply).

Experience required

- Refereed publications in reputable international journals of the highest standard eg MSSP, JSV, JASA, … or in computer science conference publications of the highest standing
- Successful record of research achievements including Fellowships, Travel Awards, Competitive Stipends or top-ups;
- Emerging leadership qualities, demonstrated ability to supervise UG student projects

Experience desired

- Desired experience in working with industry and working on industry projects.
- Desired experience in studying biological systems using ultransonics and laser vibrometry and/or biological signals as evidenced by conference and journal publications
- Willingness to work with insects potentially required and enthusiasm about and experience in pattern recognition from time series.

KEY SELECTION CRITERIA ACADEMIC STAFF Level B

POSITION: **Postdoctoral Research Fellow (Level B) for 3 years (1.0 FTE)**

Faculty: **Faculty of Engineering and Information Technology (FEIT)**
School of Mechanical and Mechatronic Engineering

Skills and Attributes

- Demonstrated capacity to work independently with a minimum of supervision and as part of a team, while self-driven and motivated,
- Demonstration of excellent time/project management skills
- Demonstrated ability to publish in high-quality journals of international repute.
- Excellent oral and written English language skills and ability to translate and demonstrate research results at different levels including researchers, media and general public.
- Interest in working with insects and studying their behavior and communication

Knowledge

- Demonstrated knowledge in conducting experimental work, using different vibration sensors (laser vibrometry, ultrasonic transducers/ NDT, accelerometers, strain/ stress and humidity sensing) including their data analysis.
- High level of knowledge in Signal Processing or Machine Learning/ Feature extraction, and coding
- Demonstrated knowledge and/or experience in one or all of the following areas: complex dynamics, Noise and filtering, Communication signals
- Demonstrated experience working with natural structures and related wave propagaion, in particular timbers or soils
- High level programming skills in C / VHDL, scripting, and data handling

Qualifications

PhD in applied mathematics, technical mathematics, or computer science/electrical engineering with an excellent understanding of physics/ theory of waves OR PhD in mathematical physics, physics with a strong interest in machine learning and signal processing (candidates who are near completion of their PhD degree are also encouraged to apply).

Experience required

- Refereed publications in reputable international journals of the highest standard eg PNAS, Nature Communications,MSSP, JSV, JASA, … or in computer science conference publications of the highest standing
- Successful record of research achievements including Fellowships, Travel Awards, Competitive Stipends or top-ups;
- Demonstrated leadership qualities, demonstrated ability to supervise UG and PG student projects (PhD supervision required)
- Demonstrated track record of working with industry partners with evidence of excellent time management.
- Experience in studying biological systems using ultransonics and laser vibrometry and/or biological signals as evidenced by conference and journal publications
- Demonstrated experience in working in parallel on different projects, experimentally and theoretically

Experience desired

- Willingness to work with insects potentially required and enthusiasm about and experience in pattern recognition from time series.
- High level of communication skills, to deal with different stakeholders within the university

Application Process

Please submit a covering letter, your detailed CV (including the list of publications, awards and details of 3 referees) and a statement addressing the selection criteria through the UTS application website. The shortlisted applicants will be invited for an interview and they will be expected to present a seminar in conjunction with the selection interview process. For more information on the application process please contact:

School Manager: mme.admin@uts.edu.au

Written By: A/Prof Sebastian Oberst

Approved by: Prof Michael Blumenstein   Date: