ACSOFT SUPPLIES ADVANCED ACOUSTIC CAMERA TO CARDIFF UNIVERSITY'S STRUCTURAL PERFORMANCE LABORATORY

Latest Gfai GmbH system to be used for the development of non-contact damage detection using Audible Acoustics (AA) for composite materials in aerospace industry

AcSoft Sound & Vibration (01234 639550; www.acsoft.co.uk) has recently supplied a state-of-the-art Fibonacci Array Acoustic Camera from Gfai GmbH for Cardiff University's Structural Performance (CUSP) Laboratory in the School of Engineering, helping establishing it as internationally recognised facility for audible acoustic and damage detection research.

The advanced Gfai GmbH Fibonacci 96-channel Acoustic Camera system with associated NoiseImage software will be primarily used for the research and development of non-contact damage detection techniques using Audible Acoustics (AA) for composite materials within the aerospace industry.

Available in 72, 96 and 120 channel versions, the highly flexible Fibonacci Acoustic Camera utilises an array of microphones and optical camera to identify and locate sound in 2D and 3D spaces in a remote and non-contact manner by overlaying the audible source location on still or video images of the object.

Easy to use and portable, the Acoustic Camera is suitable for a variety of sound analysis and source localisation applications across a range of industrial sectors including aerospace, automotive, consumer products, psychoacoustics, environmental, musical instrument design, railway and zoological industries.

The Cardiff University Acoustic Camera system offers dual functionality and is capable of locating audible sources at low and high frequencies using holography and beamforming respectively.

The accompanying NoiseImage software enables the acquisition, evaluation and storage of data, acoustic images and movies.

The funding for the Acoustic Camera was secured by Dr Matthew Pearson, a newly appointed lecturer within the CUSP research group at the School of Engineering, whose research helps develops new and enhanced Structural Health Monitoring (SHM) techniques for a range of aerospace applications.

Dr Pearson has worked as the lead researcher on several industrial focussed research projects. These include two successfully completed Innovate UK projects (SHeMS and SANDWICH), one on-going Innovate UK project (Sentient) and an industrially funded project with Baosteel looking into electrical transformer noise.

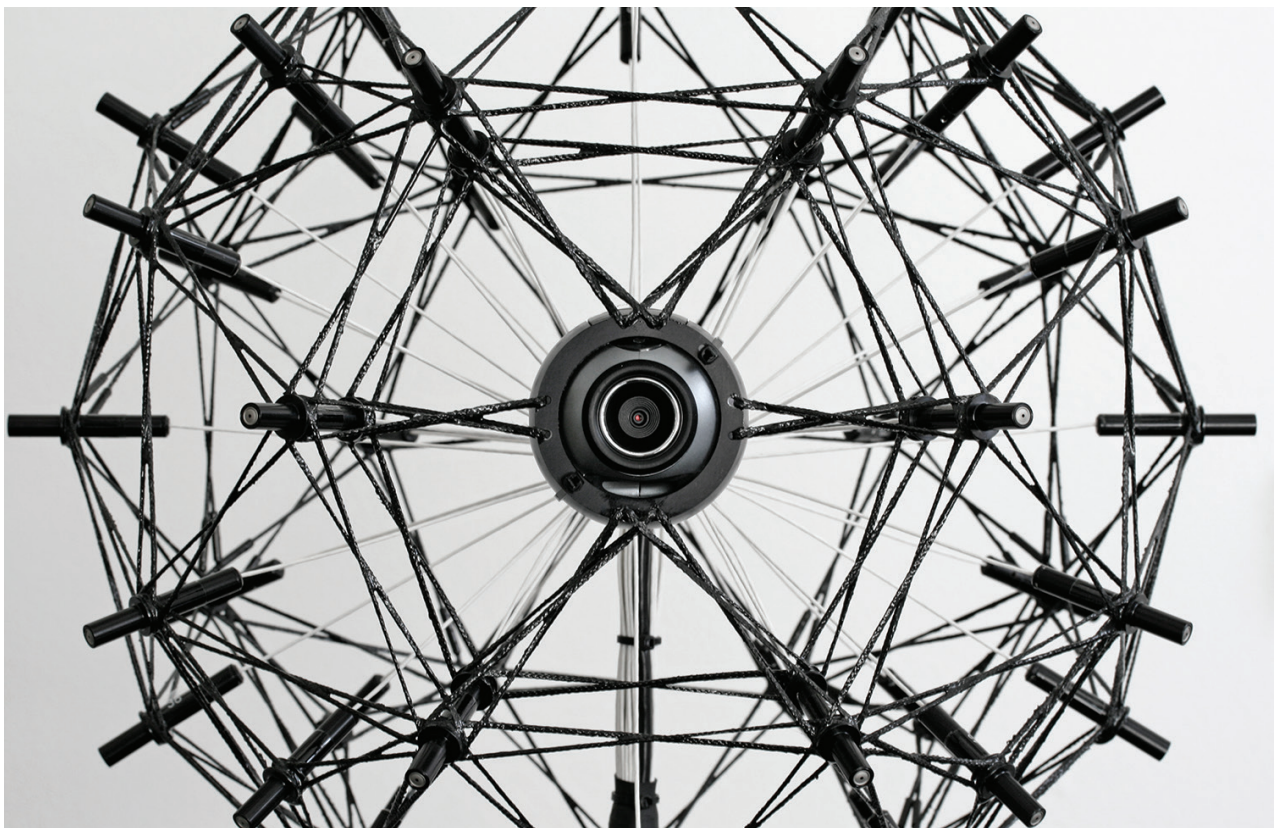
This has resulted in him developing strong links with companies including Airbus, BAE Systems, Boeing, Dstl, Marshall Aerospace, MBDA, Microsemi, Mistras Group and the MOD.

Dr Pearson was supported in his funding application by Dr Rhys Pullin and Prof. Carol Featherston (both CUSP) who investigate damage detection techniques, a major area of national importance as identified by the Engineering and Physical Sciences Research Council (EPSRC) and Innovate UK. The damage detection work focuses on techniques such as Acoustic Emission and Acousto-Ultrasonics. These both rely on high-frequency, structure-borne surface waves to detect and classify damage in structures including composite and metallic engineering components.

Dr Phil Anderson (Wolfson Centre for Magnetics) also supported the application and his research interests include the characterisation of magnetic materials, the properties, processing and application of soft magnetic materials, magnetostriction and transformer noise.

Dr Pearson comments: "The CUSP group research includes detection and classification of damage using high frequency structural borne waves. I am currently developing a highly novel and independent area of research within the group aimed at non-contact damage detection techniques using Audible Acoustics (AA) for composite materials. The Acoustic Camera will be fundamental to the development of this independent research theme and crucial in realising the greatest impact from this work."

The development of a non-contact AA damage detection system is aimed at certification testing of large scale composites structures. The AA technique utilises an array of microphones to detect and locate sound waves emitted from a variety of source mechanisms. The AA damage detection technique has considerable benefits as it



Gfai's acoustic camera array

is completely non-contact and can potentially monitor large areas with relatively short set-up times, significantly reducing down time and associated costs for testing programmes. This is especially relevant in the aerospace sector.

Dr Pearson continues: "The Acoustic Camera will allow on-line guiding of testing programmes to increase confidence of success, avoid any unexpected failures (which can be very costly), reduce test downtime and monitor hard to access locations."

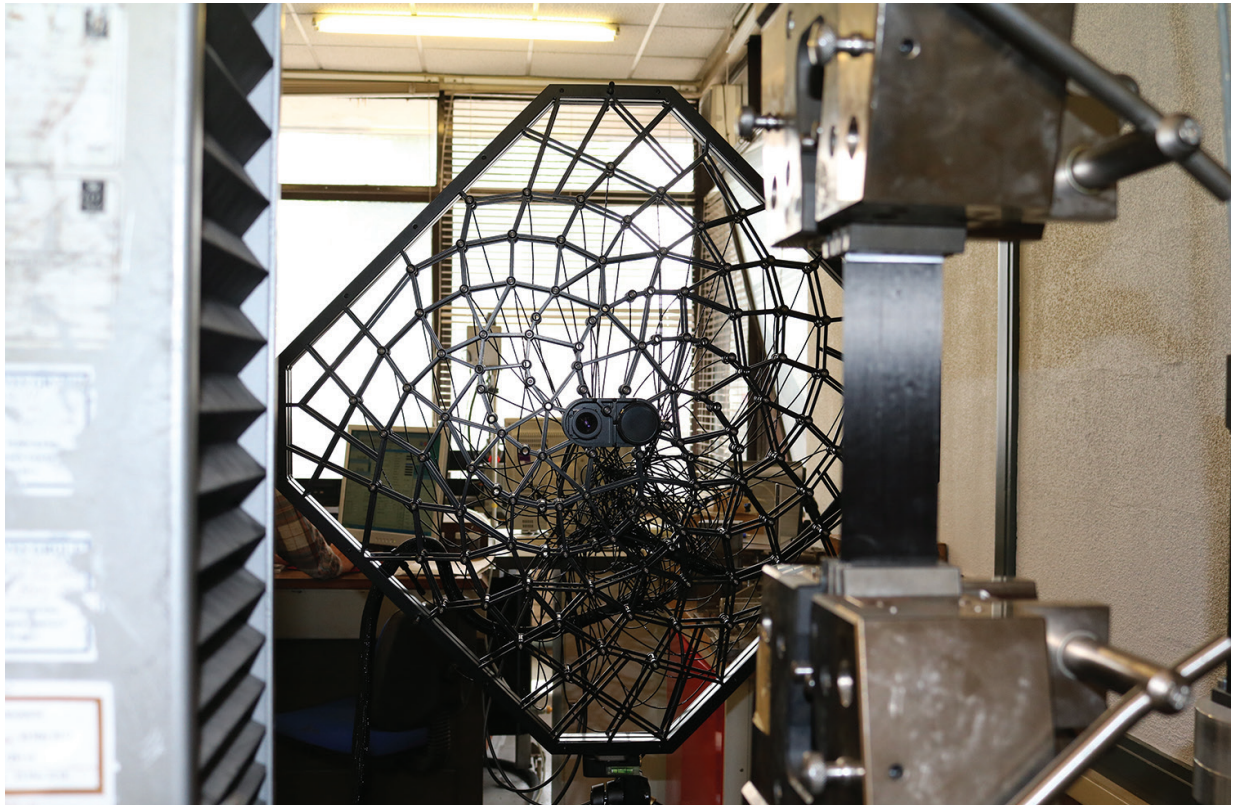
Airbus has expressed a strong desire for the development of AA for damage detection in structural and in-service testing, and sees definite benefit from using the equipment to facilitate this research. The Acoustic Camera will enable Cardiff to develop a new collaboration between the University and Materials / Processes & Structures Group at Airbus.

The Group has a global reputation for research with direct application in industry. This highly novel research combined with the unique test facility will enable laboratory results to be translated quickly into application of benefit to Airbus and others.

Acoustic detection has a number of clear links into everyday experience making it an accessible topic for a non-technical audience. It uses a number of basic scientific and mathematical principles which link into the national curriculum and are highly appealing to teachers.

Dr Pearson says: "On the basis of current research into factors affecting attitudes towards STEM careers we are keen to work more closely with parents and primary school children. Acoustic detection is a strong candidate for a family activity that can be tailored to different levels of skill and knowledge, providing ample opportunity to discuss current research at Cardiff University with a wider audience.

"We are thrilled to have secured the funding for the Acoustic Camera which will deliver a new area of research within the School of Engineering supporting an early career researcher and allow Cardiff University to become internationally recognised for audible acoustic research. It will also enable us to increase industrial partnerships and academic collaborations within the EU and USA and provide a greater learning experience for undergraduate students and impact the National Student Survey (NSS)."



The acoustic camera system supplied to Cardiff University

Cardiff University's Acoustic Camera package also comprises acoustic photo capability and sound mapping on 2D photo, data recorder, compactPCI, Windows XP embedded, seven

slots for gfai tech expansion cards, two additional slots including CPU, hard disk and powerarray. Plus a streaming capable card for microphone array connection, 24 differential microphone channels, 24-bit resolution and 32 bit recording.

All microphones in the arrays are calibrated for amplitude and phase, traceable to National Standards. The calibration factors for each set of microphones are stored in EPROM within the array itself.

"The technical help and overall service provided by Gfai tech and AcSoft has been excellent. Nothing has been too much trouble and we look forward to collaborating with both businesses as the Acoustic Camera becomes operational, and we start to feed back the results of our research."

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