Volume 31 Issue 2: 2022 Summer 2022

Vibrations

Powering Sound Ideas

UIA50 - A Multi-Access Success!

Hosted by the University of Warwick, the 50th UIA symposium was our first in person meeting since 2019, as well as our inaugural multi-access meeting which facilitated attendance via a virtual platform.

Dr Andrew Feeney, UIA50 Chair

Day 1 kicked off with UIA's president, Dr. Dominick DeAngelis, warmly welcoming everyone to the University of Warwick before introducing our Symposium Chair, Dr Andrew Feeney (University of Glasgow) who promptly commenced the Industrial Session of the symposium.

Our keynote speaker, Dr Rachel Edwards (University of Warwick)

Continued on page 3

Special Points of Interest

Virtual Collaborations: 15 September

End Uses of Ultrasound

This session of Virtual Collaborations is designed to present four different end uses of ultrasonics by individuals currently ultrasound in these applications.

Each presentation will be approximately 20 minutes long and there will be a general discussion after all the presentations.

Dominick DeAngelis, Kulicke & Soffa, will present **Semiconductor Wire Bonding.**

David Grewell, State University of North Dakota, will discuss **Biofuel Uses.**

Leo Klinstein, Dukane, will present **Plastic Welding.**

Kevin Houser, Johnson & Johnson Medical Devices Companies,, will present on **Ultrasonic Surgical Instruments.**

Register Now

Group Registrations are available

Small group discussions will give participants the opportunity to share ideas with their colleagues and peers about the information presented and specific applications.

MARK YOUR CALENDAR

UIA51

Utrecht, The Netherlands

24 - 26 April 2023

UIA Introduces Fellow Program

The UIA Board of Directors has approved this new recognition program for individuals who have been members of UIA for at least 10 years. ***Nominations are due for the first Fellow class by 1 November 2022.***

QUALIFICATIONS

To be elected Fellow of the Ultrasonic Industry Association, a candidate shall have demonstrated outstanding achievements in the field of ultrasonics, or in the management of such activities. The fellow shall be sponsored, in writing, by at least one Board Member of the Board of Directors.

Criteria for Eligibility

Criteria for eligibility for the Fellow of the Ultrasonic Industry Association member grade are taken to mean: having accomplished a step change in the state of the art of ultrasonics engineering and/or science and made significant advancements in either the technology or its commercial practice, bringing significant benefit to society. The individual must have contributed substantially, however not necessarily exclusively, to any achievement(s) being considered in evaluating her/his value to the profession. The nominee must be a current member of the UIA, with at least 10 years of culmulative membership and have made a significant contribution to the Society.

Substantial contributions include being an inventor, proprietor, creator or developer of a new concept or a driving force in reducing such to practice, or a recognized leader of such an effort with responsibilities that go beyond the administrative, such that the accomplishment could not have been made without that individual's dedicated leadership.

Documents indicating such recognition would include patents, publications, awards, promotions, letters of acknowledgment, elections to prestigious organizations and leadership positions in professional bodies that promote the utilization of the accomplishment for the common good. It is important that a clear documentation of these contributions be provided to enable even those personally unacquainted with the candidate to arrive at a valid judgment of his/her credentials.

Nominating Process

A current and/or past UIA member [either sustaining or individual] that has been a member of the UIA for a cumulative of 10 years, may be nominated by a current UIA member. The nomination must include:

- 1-2 page nomination letter from UIA member, detailing the nominee's contributions, outcomes and impacts in the area of ultrasonics as well as contribution to the UIA.
- Full resume of nominee
- 3 letters of recommendation (not required to be UIA member)

Applications must be submitted by November 1 and must be submitted to uia@ultrasonics.org as a single PDF file. The decision on the application will be shared with the nominee in February and any awardee by the end of February. The award will be formally announced at the UIA Symposium. While not required, it is expected the awardee to attend the conference (waived registration fee).

All fully completed applications will be reviewed by a sub-group of the UIA Board of Directors, consisting of three individuals. There is no term limit for the sub-committee and the positions are nominated and approved by the UIA Board of Directors.

Fellow Application Timeframe

Application process timing is subject to the final date of UIA Symposium each year

UIA50 Review, continued

provided a broad ranging and enjoyable talk on the use of electromagnetic acoustic transducers (EMATS) in non-destructive testing. After giving us a crash course in magneto-strictive transduction, as most delegates are more familiar with piezoelectric transduction, she explored advantages of using EMATS before moving on to discuss challenges and possible solutions to miniaturising this non-contact technology for incorporation onto robotic and autonomous inspection vehicles. The final section of Rachal's presentation focussed on the novel application of liquid crystal technology to rapidly visualise the acoustic field or vibration characteristics of transducers. This research, still in its infancy, clearly sparked the imagination of our delegates on how it could be used in ultrasonic applications.

The main session commenced with a presentation from **Kulicke and Soffa** by UIA President, Dr Dominick DeAngelis. In typical fashion Dominick approached a fundamental ultrasonic transducer problem head on, disseminating his findings and understanding to us. This year he discussed the problems arising from electrically and acoustically matching a piezoelectric transducer to the wider system. Dominick was followed by **Dr Hans-Jürgen Schreiner** from

CeramTec, UIA Bronze Sponsor, who provided an update on EU RoHS regulation and its potential impact on products containing piezoelectric materials before discussing CeramTec's recent advances in the development of a commercially available lead-free piezoceramic.

Dr Jie Zhang (University of Bristol) then presented research in which he discussed the basic configuration and inspection protocol approaches of performing NDT using EMAT technology. Presenting a simplified setup followed by a case study, Jie demonstrated that flaws in both aluminium plate and pipes could be identified and localised. Returning to power ultrasonics, Dr Amin Moghaddas provided, via the virtual platform, an update on EWI's development of a novel sonotrode which aims to increase the efficiency of electric vehicle battery pack manufacture by reducing the wear and hence maintenance downtime of ultrasonic metal welding kit used to seal packs.

North Dakota State University's Dr David Grewell provided two presentations stemming from his group's research into processing and subsequent utilisation of natural fibres in engineering applications. His first presentation discussed the use of power ultrasonics to enhance sugar release from the agave fibres during their post-processing, while his second talk continued to discuss employment and advantages of incorporating these natural fibres into composite polymers used in engineering applications in place of alternative fibres, such as glass fibre. Both presentations generated a detailed discussion regarding if tequila was the by product or not of this process.

Finally, recent technological updates from UIA's Gold Sponsor, Dukane were provided by Leo Klinstein. Leo discussed the use Dukane's welding systems during the manufacture of products, such as disposable personal protective equipment (PPE) or nappies (diapers). Also included in Leo's presentation was the development of a new 5000W

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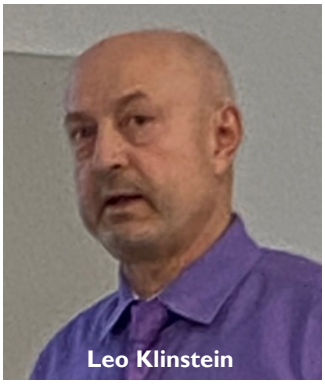
UIA50 Review, continued



Leo Klinstein

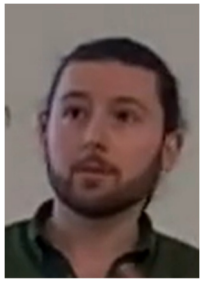
transducer and novel "push-pull" ultrasonic "scrubbing" horn.

Day one concluded with the customary cheese and wine networking reception during which both discussions regarding ultrasonics continued as well as the needed renewing of old acquaintances.

Tours and Workshops

Prior to the Day 2 workshop and poster sessions, the Centre of Industrial Ultrasonics showcased their research through a guided tour of their research facilities, showcasing their research activities. Much of this focused on the extensive research activities into EMAT technologies.

Joe Cregeen demonstrated EMATs generating a focused



acoustic field as well as their progress in the miniaturization and reduced complexity of these devices.

Gala Dalgety and Mark Potter presented two different autonomous applications of EMAT technologies; Gala providing an overview of their proposed integration on robots which could formed into a cluster for inspecting large metallic structures and Mark (Sonemat Ltd) describing EMAT devices which could be fitted to passenger or cargo railroad cars to continuously monitor rail condition without the need for specialized rail services.

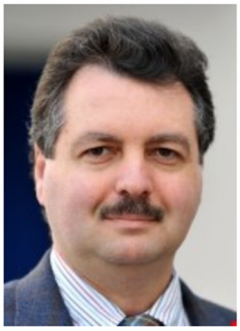
Proposed solutions, using EMAT technologies, for difficult to measure applications were also shown. Elizabeth Sharp demonstrated their use to detect leaks in pressurized cans used for the storage of nuclear waste. Exploiting their non-contact capability to engender a modal response in the container, it is possible to monitor this response and hence determine the pressurization of the container and subsequently identify if a leak is present. A "clamp-on" EMAT device, developed for measuring fluid flow rates in thin wall pipes (a challenge for current technologies) was also demonstrated, while Chris Peyton presented an approach to inspect non-conductive structures, for instance plastics, via magneto-strictive patches and his research into using a novel technique using shear-horizontal for inspecting titanium, which is problematic for EMATs due to titanium being a non-ferrous alloy.

Showcasing research activities outside of EMATs, Martha Turvey demonstrated a novel and low-cost method for visualizing acoustic waves generated by ultrasonic transducers through sheets of liquid crystal, while Will Somerset provided an overview of a project which used low-cost and mass produced flexural ultrasonic transducers (also known as FUTs) which are predominantly employed in automotive parking systems to

Will Somerset

develop an anemometer sensor to measure flow speed in air and techniques to perform "active damping" of receiving transducers for better signal to noise response.

The afternoon session started with our Day 2 keynote speaker, Brunel



University's **Professor Dmitry Eskin**, providing a detailed overview of the fundamentals and practice of the Ultrasonic melt process. First reported on during the 1960s, power ultrasonics has been used in metal casting and processing of molten metal alloys to refine grain structure. Exploiting acoustic phenomena, such as cavitation and acoustic streaming, Professor Eskin, suggested that power ultrasonics has the potential to provide benefit during the manufacture of new master alloys, composites and in the manufacture of 2D materials, such as graphene.

Continued on next page

Industrial Session Keynote Speaker / Registration

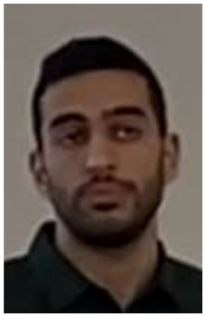
Our second, and final presentation on Day 2, was provided by **Louise Bierregaard** from Meggitt, UIA

Platinum Sponsor in collaboration with Thomas Kelley from Precision Acoustics. She also provided a detailed overview of the EU's RoHS regulation as well as providing an update on lead-free piezoceramics and Meggitt's latest developments in this research area. She finished her presentation by briefly discussing a recent collaboration with Precision Acoustics with whom they benchmarked an ultrasonic transducer based on lead-free piezoceramic against a conventional device manufactured by Precision Acoustics.

The afternoon session on Day 2 concluded with a poster showcase, during which presenters were provided a few minutes to give a brief description of their research before the day wrapped up at Warwick Castle for a medieval feast.

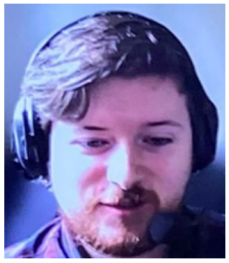
Medical Sessions

Day 3 of the UIA started with a brief welcome by the symposium chair, Andrew Feeney, who introduced the first speaker **Abdul Hadi Chibili** (University of Glasgow) who presented his work using a design of experiments for adapting and optimizing folded front masses transducers in ultrasonic scalpels for robotic surgery. His presentation led to a lively discussion including discussion on construction techniques and the impact of 3D printing.



Next, **Dhanak Gupta** (University of Birmingham) presented on the interaction of cells and tissues with the ultrasound as part of the EPSRC Ultrasurge project. This comprehensive talk started with an overview of bone structure and the development of a system to allow for in vivo experimentation using the hMSC amd Saos-2 cell lines. Results were presented on the effects of 45 kHz ultrasound at 10, 25, and 75 mW/cm^2 for endothelial osteoblast-like cells.

Following a short break, Jack Stevenson (University of Glasgow) joined us remotely to present his work on a miniaturized focused ultrasound transducer produced with additive manufacturing techniques. The goal of this miniaturized FUS transducer would be a device small enough for robotic delivery to be used for soft tissue ablation. First, an overview of the current FUS techniques were presented including extracorporeal and interstitial arrays. Next, he described his work on the design, construction, and evaluation of an acoustic planar lens using additive manufacturing.



Jack Stevenson

After lunch, president Dominick DeAngelis and Symposium Chair, Andrew Feeney, welcomed Xuan Li (University of Glasgow) who spoke on bone cutting performance of ultrasonic surgical tools incorporating PZT piezoceramics and Mn:PIN-PMN-PT piezocrystals. This included a quick introduction to the difference between hard tissue and soft tissue cutting. He then discussed the evaluation of transducers constructed of PIC-181 and Mn:PIN-PMN-PT. Finally a comparison of the thermal performance of both impedance matched and unmatched was presented.

Next, keynote speaker **Helen Mulvana** (University of Strathclyde) presented her work on using contrast enhanced magneto-motive ultrasound for colorectal cancer. This pre-clinical work focused on the aggregation of nanoparticles in tissues and lymph nodes to allow the use of ultrasonic imaging. Helen started with background information about colorectal cancer, which is the fourth most common cancer in the UK and how early detection increases survival rate.

UIA50 Review, continued

Current mouse models did not metastasize, so a new model had to be created for this work. Using the volume of lymph nodes, they were able to indicate metastatic disease. Further work was then presented on vascular flow dynamics and the creation and use of magnetic microbubbles to create tissue displacement in lymph nodes during ultrasonic imaging.

The final presentation of made by **Alex Darian** (Bioventus / Misonix) focusing on their latest developments in ultrasonic surgical probes. After a brief overview of Bioventus and a discussion on the clinical needs of ultrasound in wound care, Alex described how Bioventus' innovations overcame the challenges of efficiently

debriding a geometrically undulating wound bed while minimizing damage to healthy tissue as well as how they overcame the aerosolization of pathogens.

The symposium was concluded by Dominick DeAngelis and Andrew Feeney with information on next year's UIA symposium in Utrecht.

UIA51

24–26 April, 2023

Hotel Karol V

Utrecht, The Netherlands

Scenes from UIA50

Andy Mathieson, Andrew Feeney, George Puthenvilla

Warwick Castle

Andy Mathieson, Margaret Lucas, Thomas Kelley

Janet and Leo Klinstein

Meggitt - Platinum Sponsor

Rebecca Cleary, Helen Mulvana, Margaret Lucas, Damien Walmsley

Jennie Ramirez, Alex Darian, Margaret Lucas, Thom Wurlitzer, Hans-Juergen Schreiner, Lisa Shriane, Damien Walmsley, Mahshid Hafezi

Paul Barron, Maura Allen, George Puthenvilla

Ceramtec - Bronze Sponsor

Ultrasound Applications in the News

MIT engineers develop stickers that can see inside the body

New stamp-sized ultrasound adhesives produce clear images of heart, lungs, and other internal organs.

Ultrasound imaging is a safe and noninvasive window into the body's workings, providing clinicians with live images of a patient's internal organs. To capture these images, trained technicians manipulate ultrasound wands and probes to direct sound waves into the body. These waves reflect back out to produce high-resolution images of a patient's heart, lungs, and other deep organs.

Currently, ultrasound imaging requires bulky and specialized equipment available only in hospitals and doctor's offices. But a new design by MIT engineers might make the technology as wearable and accessible as buying Band-Aids at the pharmacy.

In a paper appearing today in Science, the engineers present the design for a new ultrasound sticker — a stamp-sized device that sticks to skin and can provide continuous ultrasound imaging of internal organs for 48 hours.

The researchers applied the stickers to volunteers and showed the devices produced live, high-resolution images of major blood vessels and deeper organs such as the heart, lungs, and stomach. The stickers maintained a strong adhesion and captured changes in underlying organs as volunteers performed various activities, including sitting, standing, jogging, and biking.

The current design requires connecting the stickers to instruments that translate the reflected sound waves into images. The researchers point out that even in their current form, the stickers could have immediate applications: For instance, the devices could be applied to patients in the hospital, similar to heart-monitoring EKG stickers, and could continuously image internal organs without requiring a technician to hold a probe in place for long periods of time.

If the devices can be made to operate wirelessly — a goal the team is currently working toward — the ultrasound stickers could be made into wearable imaging products that patients could take home from a doctor's office or even buy at a pharmacy.

MIT engineers designed an adhesive patch that produces ultrasound images of the body. The stamp-sized device sticks to skin and can provide continuous ultrasound imaging of internal organs for 48 hours

"We envision a few patches adhered to different locations on the body, and the patches would communicate with your cellphone, where AI algorithms would analyze the images on demand," says the study's senior author, Xuanhe Zhao, professor of mechanical engineering and civil and environmental engineering at MIT. "We believe we've opened a new era of wearable imaging: With a few patches on your body, you could see your internal organs."

The study also includes lead authors Chonghe Wang and Xiaoyu Chen, and co-authors Liu Wang, Mitsutoshi Makihata, and Tao Zhao at MIT, along with Hsiao-Chuan Liu of the Mayo Clinic in Rochester, Minnesota.

A sticky issue

To image with ultrasound, a technician first applies a liquid gel to a patient's skin, which acts to transmit ultrasound waves. A probe, or transducer, is then pressed against the gel, sending sound waves into the body that echo off internal structures and back to the probe, where the echoed signals are translated into visual images.

For patients who require long periods of imaging, some hospitals offer probes affixed to robotic arms that can hold a transducer in place without tiring, but the liquid ultrasound gel flows away and dries out over time, interrupting long-term imaging.

In recent years, researchers have explored designs for stretchable ultrasound probes that would provide portable, low-profile imaging of internal organs. These designs gave a flexible array of tiny ultrasound transducers, the idea being that such a device would stretch and conform with a patient's body.

But these experimental designs have produced low-resolution images, in part due to their stretch: In moving with the body, transducers shift location relative to each other, distorting the resulting image.

"Wearable ultrasound imaging tool would have huge potential in the future of clinical diagnosis. However, the resolution and im-

Continued on next page

Ultrasound Applications in the News *continued*

aging duration of existing ultrasound patches is relatively low, and they cannot image deep organs," says Chonghe Wang, who is an MIT graduate student.

An inside look

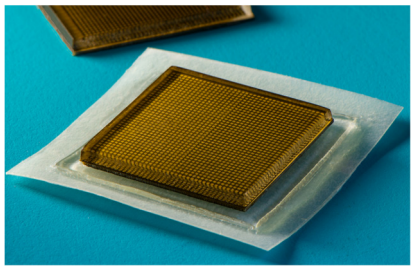
The MIT team's new ultrasound sticker produces higher resolution images over a longer duration by pairing a stretchy adhesive layer with a rigid array of transducers. "This combination enables the device to conform to the skin while maintaining the relative location of transducers to generate clearer and more precise images." Wang says.

The device's adhesive layer is made from two thin layers of elastomer that encapsulate a middle layer of solid hydrogel, a mostly water-based material that easily transmits sound waves. Unlike traditional ultrasound gels, the MIT team's hydrogel is elastic and stretchy.

"The elastomer prevents dehydration of hydrogel," says Chen, an MIT postdoc. "Only when hydrogel is highly hydrated can acoustic waves penetrate effectively and give high-resolution imaging of internal organs."

The bottom elastomer layer is designed to stick to skin, while the top layer adheres to a rigid array of transducers that the team also designed and fabricated. The entire ultrasound sticker measures about 2 square centimeters across, and 3 millimeters thick — about the area of a postage stamp.

The researchers ran the ultrasound sticker through a battery of tests with healthy volunteers, who wore the stickers on various parts of their bodies, including the neck, chest, abdomen, and arms. The stickers stayed attached to their skin, and produced clear images of underlying structures for up to 48 hours. During this time, volunteers performed a variety of activities in the lab, from sitting and standing, to jogging, biking, and lifting weights.



From the stickers' images, the team was able to observe the changing diameter of major blood vessels when seated versus standing. The stickers also captured details of deeper organs, such as how the heart changes shape as it exerts during exercise. The researchers were also able to watch the stomach distend, then shrink back as volunteers drank then later passed juice out of their system. And as some volunteers lifted weights, the team could detect bright patterns in underlying muscles, signaling temporary microdamage.

"With imaging, we might be able to capture the moment in a workout before overuse, and stop before muscles become sore," says Chen. "We do not know when that moment might be yet, but now we can provide imaging data that experts can interpret."

The team is working to make the stickers function wirelessly. They are also developing software algorithms based on artificial intelligence that can better interpret and diagnose the stickers' images. Then, Zhao envisions ultrasound stickers could be packaged and purchased by patients and consumers, and used not only to monitor various internal organs, but also the progression of tumors, as well as the development of fetuses in the womb.

"We imagine we could have a box of stickers, each designed to image a different location of the body," Zhao says. "We believe this represents a breakthrough in wearable devices and medical imaging."

This research was funded, in part, by MIT, the Defense Advanced Research Projects Agency, the National Science Foundation, the National Institutes of Health, and the U.S. Army Research Office through the Institute for Soldier Nanotechnologies at MIT.

Paper: Bioadhesive Ultrasound for Long-term Continuous Imahing of Diverse Organs

3D bimodal photoacoustic ultrasound imaging to diagnose peripheral vascular diseases

Our body is like a sophisticated network with a myriad of peripheral blood vessels connected from the heart to the extremities. If blood fails to pass through these peripheral blood vessels, a wound may not heal or even lead to necrosis. Peripheral vascular diseases require particular attention as it mostly appears in the foot, crucial to a person's well-being and livelihood. Recently, a Korean research team has developed a 3D foot imaging technique that vividly captures peripheral blood vessels, even thinner than 1 mm.

Continued on next page

Ultrasound Applications in the News *continued*

A POSTECH research team led by Professor Chulhong Kim (Belonging to the Departments of Convergence IT Engineering, Electrical Engineering, and Mechanical Engineering) has developed an imaging technique that combines the photoacoustic and ultrasound images. The findings from the study were recently published in the international journal *Radiology.*

Conventionally, the ankle-brachial index test was used to measure the blood pressure of the wrist, ankle, or toe to calculate the ratio to diagnose peripheral vascular diseases. As for imaging modalities, the Doppler ultrasonography, which measures the blood flow, angiography using computed tomography (CT), or magnetic resonance imaging (MRI) were widely used.

Although these methods can detect abnormalities in major arteries, they have limitations in clearly capturing the thin and numerous peripheral blood vessels. They can also cause pain or side effects because a contrast agent must be injected into the patient.

To overcome these issues, the researchers combined photoacoustic and ultrasound images to and visualize 3D images of blood vessels thinner than 1 mm without a contrast agent by. Using the photoacoustic effect -- in which sound waves are formed following light absorption in a material -- blood vessels in the body can be imaged using the light absorption of the blood without a contrast agent. Adding the ultrasound image to this can visualize the structural image of blood vessels with the image of the skin and bone structures simultaneously.

> It was verified that the blood vessels, skin, and bone structures of the foot could be clearly displayed simultaneously.

The new modality can provide the information to aid in diagnosing and treating peripheral vascular diseases since it provides functional diagnostic values for the blood supply to tissues, such as total hemoglobin concentration or blood oxygen saturation, using a wavelength-convertible laser. In order to improve the reliability and reproducibility of the image results, the researchers also developed a contour scan technology where the imaging probe detects various curves of the foot and moves it along the contour.

To present its applicability as a diagnostic technology, the researchers conducted an experiment on the feet of healthy participants. By acquiring photoacoustic and ultrasound images of the entire foot in vivo, it was verified that the blood vessels, skin, and bone structures of the foot could be clearly displayed simultaneously. In addition, the researchers used a pressure cuff on the healthy participants to artificially occlude the peripheral blood flow and observed significant changes in the hemoglobin concentration and vessel density before and after occlusion. Based on the results of this study, the researchers have confirmed the new imaging technology's applicability for diagnosing peripheral vascular diseases in the future.

This study was conducted with the support from the Ministry of Science and ICT, Ministry of Education, and the National Research Foundation of Korea.

www.sciencedaily.com/releases/2022/04/220427100511.htm

Sound of music: Ultrasound exposure improves depressive behavior in rodents

A new study reveals that ultrasound exposure improves depressive behavior in a rat model of depression

The effect of ultrasound waves on the function of the human brain has been the key focus of recent research, which has indicated its potential as an effective, non-invasive approach for the modulation of brain activity. While the effects of ultrasound exposure on consciousness and cognition have been extensively explored, little is known about its impact on emotional states such as depression. To add to it, there are

Ultrasound Applications in the News *continued*

limitations in our understanding of neural and molecular mechanisms that underpin emotions.

Fortunately, rats experience pleasant emotions in response to high-frequency ultrasound vocalizations (USVs), making them ideal model organisms to study mechanisms underlying depression.

To this end, a team of researchers led by Professor Akiyoshi Saitoh, including Professor Satoru Miyazaki, Assistant Professor Daisuke Yamada and Ms. Tsugumi Yamauchi from Tokyo University of Science, and Mr. Shoichi Nishino from FUJIMIC, Inc., delved deeper into understanding the effects of ultrasound exposure on depression, by conducting experiments on rats lacking olfactory lobes -- organs that regulate neurotransmission. These "olfactory bulbectomized (OB)" rats undergo changes in neurotransmitters, endocrine secretions, and behavior, which are similar to those observed in humans with depression.

Giving further insights into their study, Prof. Saitoh remarked, "*Since studies on ultrasound exposure have been primarily conducted on human subjects, we needed to establish robust animal models to elucidate underlying mechanisms using invasive techniques. In our current study, we have used OB rats to study the effects of ultrasound on neural activity and behavior*" Their study, published in Volume 33, Issue 10 of *NeuroReport* on July 6, 2022, is the first of its kind to demonstrate potential antidepressant effects of ultrasound exposure in rats.

Initially, the team exposed wild type and OB rats to USV for 24 hours, following which they scored them for "hyperemotionality" (agitation and anxiety-like behavior) by studying their responses to getting attacked, getting startled, facing a struggle, and initiating a fight.

Their findings revealed that OB rats exposed to USV had significantly lower hyperemotionality scores and lower plasma corticosterone levels than unexposed rats. Furthermore, in OB rats with a higher latency initially. i.e., higher inclination to reach the open areas of the maze, ultrasound exposure significantly decreased their latency.

Next, they monitored plasma corticosterone (a hormone that is released in response to stress) levels in the blood samples of these rats. In addition, the team assessed anxiety-like behavior of the rodents using the elevated plus maze (EPM) -- an approach which triggers behavioral anxiety in rats by exposing them to open spaces in a maze, and causes them to move to closed spaces.

Their findings revealed that OB rats exposed to USV had significantly lower hyperemotionality scores and lower plasma corticosterone levels than unexposed rats. Furthermore, in OB rats with a higher latency initially. i.e., higher inclination to reach the open areas of the maze, ultrasound exposure significantly decreased their latency. Similar effects were observed with a 50-kHz ultrasound frequency which was generated artificially.

This study provides novel evidence on the anti-depressant effects of ultrasound exposure in rodents. "*Our findings suggest that OB rats may be a useful animal model for investigating the effects of ultrasound exposure and mechanisms of influence*.," exclaims Prof. Saitoh about the implications of the study.

He further adds, "*Unlike drug therapy, ultrasound exposure is non-invasive and easy to use. An ultrasound based therapeutic device may therefore aid the treatment and prevention of mental disorders in patients while they go about their daily lives.*"

Let's hope that these results pave the way for developing ultrasound exposure therapy as a novel treatment to help patients cope with stress and psychiatric disorders.

www.sciencedaily.com/releases/2022/08/220801102947.htm

From the President

Dominick DeAngelis
UIA President

COVID be dammed, the long awaited in-person UIA symposium at Warwick University was a "brilliant" success; when you can impress a bunch of hard-core ultrasonics people with lots of stuff they never saw before, that is no easy feat! Well done Andrew Feenney, for your stewardship as chair.

It was great to finally see all the familiar faces again "off-camera," 😊 as well as meet lots of new ones too. We even ate dinner inside of a real castle that was built in AD1068, which was every bit as amazing as it was massive.

The engineering department at Warwick showcased their great ultrasonics work being done at the university, especially with their progress in miniaturizing EMATs (electro-magnetic acoustic transducers), and making them as simple and economical as possible: their research essentially puts an entirely new spin on the old bulky EMAT technology that has been around since the 1960's!

We hope to keep this good momentum going for the rest of the year with the continuation of our Virtual Collaboration Series, back by popu-lar demand, starting on September 22. Please show your support for our organization by registering for the next Virtual Collaborations event, or even better yet, consider participating by presenting a topic yourself.

UIA Board

Volume 31 Issue 2: Summer 2022

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ultrasonic industry association
UIA
powering sound ideas

VISIT US AT ULTRASONICS.ORG

How can ultrasonics enhance the value of your business?

UIA is the international business forum for users, manufacturers, and researchers of ultrasonics. Our members use acoustic vibrations to improve materials, industrial processes, and medical technology. We call this *powering sound ideas.*

Let's work together to power your sound ideas. Contact a member consultant or company through our online Referral Network, learn about ultrasonics with our online primer, or meet industry leaders at our next symposium.

Mark your calendar to join us in Utrecht, The Netherlands, for UIA51 - April 24—26 2023.

Our hotel is a 5 minute walk from the Central Station, just a 29 minute train ride from Schipol Airport - a major European air hub.

Utrecht canal soffers many restaurants and bars just minute from our hotel

Important Dates

September 15 2022: Virtual Collaborations Mini Symposium

November 2022: Virtual Collaborations

December 2022: Proposal Submission Deadline for UIA51

February 2023: Virtual Collaborations

April 24 - 26 2023: UIA51 Symposium in Utrecht, The Netherlands