

## PATENT ASSIGNMENT COVER SHEET

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<b>NATURE OF CONVEYANCE:</b>	ASSIGNMENT	
<b>CONVEYING PARTY DATA</b>		
	<b>Name</b>	<b>Execution Date</b>
	THE UNIVERSITY OF BRISTOL	11/06/2020
<b>RECEIVING PARTY DATA</b>		
<b>Name:</b>	THE UNIVERSITY OF SUSSEX	
<b>Street Address:</b>	SUSSEX HOUSE, FALMER	
<b>City:</b>	BRIGHTON	
<b>State/Country:</b>	UNITED KINGDOM	
<b>Postal Code:</b>	BN1 9RH	
<b>PROPERTY NUMBERS Total: 1</b>		
	<b>Property Type</b>	<b>Number</b>
	Application Number:	16483907
<b>CORRESPONDENCE DATA</b>		
<b>Fax Number:</b>	(877)812-1249	
<i>Correspondence will be sent to the e-mail address first; if that is unsuccessful, it will be sent using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.</i>		
<b>Phone:</b>	9192382300	
<b>Email:</b>	vnguyen@wt-ip.com	
<b>Correspondent Name:</b>	WITHROW & TERRANOVA PLLC	
<b>Address Line 1:</b>	106 PINEDALE SPRINGS WAY	
<b>Address Line 4:</b>	CARY, NORTH CAROLINA 27511	
<b>ATTORNEY DOCKET NUMBER:</b>	2066-072	
<b>NAME OF SUBMITTER:</b>	VINCENT K. GUSTAFSON	
<b>SIGNATURE:</b>	/vincent k. gustafson/	
<b>DATE SIGNED:</b>	11/09/2020	
<b>Total Attachments: 8</b>		
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## **Assignment Agreement**

**Between**

**The University of Sussex**

**And**

**The University of Bristol**

**Dated** 6th November **2020**

**THIS ASSIGNMENT** dated 6th November 2020 is between:

- (1) **THE UNIVERSITY OF SUSSEX**, incorporated by Royal Charter in the United Kingdom, whose address is at Sussex House, Falmer, Brighton, BN1 9RH, United Kingdom ("**Sussex**"); and
- (2) **THE UNIVERSITY OF BRISTOL**, incorporated by Royal Charter in the United Kingdom, whose address is at Beacon House, Queens Road, Bristol, BS8 1QU, United Kingdom ("**Bristol**").

## **RECITALS:**

- A. Professor Bruce Drinkwater is a full-time employee of Bristol and is engaged by Bristol to carry out research, and Dr Mihai Caleap was a full-time employee of Bristol and was engaged by Bristol to carry out research, until 15 May 2020 (the "Inventors").
- B. The Inventors have made a contribution to certain inventions, and developed know-how relating to a Spatial Sound Modulator, as described further in Schedule 1 Part A (the "Know-How"), including the specific items of intellectual property described in Schedule 1 Part B (the "Patents").
- C. The Inventors have assigned all of their rights, title and interest in the Patents and associated Know-How, to Bristol.
- D. Sussex and Bristol have established a spin-out company, Metasonixx Limited (company number 12167825), to commercially exploit the inventions described in the Know-How and Patents and each party will be allocated an initial share-holding in the company on or after establishment in proportions of 19.95% to Sussex and 23.13% to Bristol.
- E. Bristol now wishes to assign to Sussex all of its rights, title and interest in the Know-How and Patents and Sussex wishes to take an assignment of the Know-How and Patents, subject to and in accordance with the provisions of this Assignment.

## **THIS ASSIGNMENT WITNESSES** as follows:

### **1 Assignment**

- 1.1 In consideration of the sum of £1 (one pound sterling) now paid by Sussex to Bristol (receipt of which is acknowledged), Bristol hereby assigns and transfers to Sussex absolutely all of its right, title and interest in and to the Know-How and Patents.
- 1.2 The assignment effected by this clause 1 shall include, without limitation, the assignment and transfer of:-
  - (a) all patents and any other intellectual property rights that may be granted pursuant to any applications listed in Schedule 1, as well as all patents that may derive priority from or have equivalent claims to or be based upon the Patents in any country of the world (and including supplementary protection certificates, divisions, continuations, continuations in part, reissues and extensions), and the Patents shall be deemed to include all such items of property; and

- (b) the right to apply for patents, utility models, registered designs and any other intellectual property rights in respect of any country of the world, including the right to claim priority therefrom under the Paris Convention for the Protection of Industrial Property or any other treaty, convention or arrangement, in respect of any application for intellectual property rights in respect of any country of the world; and
  - (c) all rights in respect of any Know-How that is described in the attached Schedule 1; and
  - (d) all rights of action, powers and benefits arising from ownership of the Know-How and Patents, including without limitation the right to sue for damages and other legal and equitable remedies in respect of all causes of action arising prior to, on or after the date of this Assignment.
- 1.3 Bristol shall, and shall ensure as far as is reasonably possible that the Inventors shall, execute such documents and give such assistance as Sussex may require, at the expense of Sussex:-
  - (a) to secure the vesting in Sussex of all rights in the Patents; and
  - (b) to uphold Sussex's rights in the Patents; and
  - (c) to defeat any challenge to the validity of, and resolve any questions concerning, the Patents.
- 1.4 Sussex shall assume responsibility for filing, prosecution, maintenance and defence/enforcement of the Patents, in co-operation and/or consultation with any licensee of the Patents if Sussex (in its sole discretion) considers this appropriate. On an annual basis, Sussex shall keep Bristol advised as to progress in respect of the Patents, including, provision to Bristol of all filing details and, where requested by Bristol to Sussex, copies of the Patents, office actions and other Patent Office correspondence, including copies of all issued patents.
- 1.5 Sussex shall be responsible for all costs in relation to filing, prosecution, maintenance and defence/enforcement of the Patents.
- 1.6 Subject to the terms of any licence of the Patents that may be entered into, Sussex shall not abandon the prosecution of any of the Patents (except in favour of a continuation or continuation-in-part application) without notifying Bristol in writing. Bristol will then have, if deadlines permit, 30 days to make a decision on whether or

not it wishes to take on the prosecution and commercialisation of the Patents and shall notify Sussex of its decision in writing.

- 1.7 Effective upon such assignment of the Patents from Bristol, Sussex shall immediately grant a non-exclusive, royalty-free licence back to Bristol for academic teaching and research purposes ("Academic Research Licence"). Bristol may work with third parties under the Academic Research Licence provided, at all times, it uses its best endeavours to ensure that no collaborating third party acquires commercial exploitation rights to the Patents, unless Sussex has given its prior written consent for such grant of rights to a third party.

## **2 Commercialisation**

- 2.1 Sussex shall have sole responsibility for licensing the Know-How and Patents. Sussex hereby agrees to use reasonable efforts to commercialise the Know-How and Patents. The mere failure of Sussex to consummate a licensing arrangement(s) shall not be deemed a breach of Sussex's obligations hereunder. In pursuance of this Agreement, Sussex shall aim to enter into a licensing agreement with Metasonixx Limited to commercialise the Know-How and Patents.
- 2.2 Sussex shall provide Bristol with copies of all signed license agreements, which Bristol shall hold in confidence.
- 2.3 Sussex shall be responsible for administering all license agreements and shall keep Bristol informed of licensee progress on an annual basis. Bristol agrees to keep confidential all information it receives from Sussex in relation to a licensee's activities.

## **3 Warranties, representations and undertakings**

Bristol warrants, represents and undertakes that:-

- (a) neither it, nor the Inventors, has been and is not currently a party to any agreement or understanding, whether oral or written, which would in any manner be inconsistent with the assignment of rights provided for in this Assignment;
- (b) it has obtained an assignment from the Inventors of all of the Inventors rights, title and interest in and to the Patents and associated rights which includes the Know-How;

- (c) neither it nor the Inventors shall enter into any agreement or understanding, oral or written, nor engage in any activity, which would in any manner be inconsistent with the provisions of this Assignment; and
- (d) it has disclosed to Sussex in writing the names of all persons of whom it or the Inventors are aware who might have rights in the Know-How and Patents, including any other persons who were involved in developing the Know-How and Patents, and any organisations that funded the development of the Know-How and Patents.


#### **4 General**

- 4.1 The obligations on Bristol and the Inventors under Clauses 1.2, 1.3, 3 and 4 shall continue in force without limit of time.
- 4.2 The validity, construction and performance of this Agreement shall be governed by English law. Any dispute arising under or in connection with this Agreement shall be subject to the exclusive jurisdiction of the English courts to which the parties to this Agreement hereby submit.
- 4.3 Nothing in this Agreement shall be deemed to constitute or evidence any partnership or joint venture between the Parties to this Agreement, or make any of them agent of the other.

**AGREED** by the Parties through their authorised signatories:

For, and on behalf of

**THE UNIVERSITY OF SUSSEX**

Signature 

Dr Susan Baxter

Print name

Director of Innovation & Business Partnerships

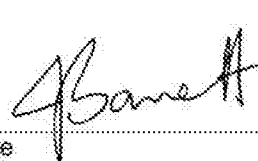
Job title

6th November 2020

Date

For, and on behalf of

**THE UNIVERSITY OF BRISTOL**

Signature 

Jacqueline Barnett

Print name

Head of Research Commercialisation and Investment

Job title

5 November 2020

Date



## Schedule 1

### Part A: Know-How

#### Spatial Sound Modulator

The ability to manipulate acoustic waves may be important in various fields including, but not limited to, loudspeaker design, position/motion sensing, ultrasound imaging and therapy, non-destructive testing of engineering structures, haptic control utilising focussed acoustic waves (i.e. haptic user interfaces) and acoustic particle manipulation e.g. acoustic levitation. These applications generally require more precise control of acoustic waves.

According to a first aspect of the present invention, there is provided a device for manipulating an incident acoustic wave to generate an acoustic output comprising: a plurality of unit cells arranged into an array, at least some of the unit cells being configured to introduce time delays to an incident acoustic wave at the respective positions of the unit cells within the array of unit cells, such that the plurality of unit cells define an array of time delays to thereby define a spatial delay distribution for manipulating an incident acoustic wave to generate an acoustic output, wherein the array of time delays defined by the plurality of unit cells is re-configurable to vary the spatial delay distribution in order to generate different acoustic outputs.

In a further aspect, there is provided a method of designing or configuring a device for manipulating acoustic waves comprising a plurality of unit cells arranged into one or more layers each layer comprising an array, at least some of the unit cells being configured to introduce time delays to an incident acoustic wave at the respective positions of the unit cells within the array(s) of unit cells, such that the plurality of unit cells define an array of time delays to thereby define a spatial delay distribution for manipulating an incident acoustic wave to generate an acoustic output, the method comprising: determining a quantised delay distribution of a desired analogue acoustic field containing a set of discrete pairs of time delay values and spatial positions representing the distribution of time delays required in the device for generating the desired analogue acoustic field; mapping the quantised delay distribution of the desired analogue acoustic field to the positions and time delay values of the unit cells for the device; and selecting the time delays of the unit cells for (or within) the device based on the mapping.

The unit cells may generally comprise of "acoustic metamaterials". Acoustic metamaterials are generally characterised by their effective mass density and bulk modulus. The structure of an acoustic metamaterial may be engineered to perform various manipulations, and may for instance be engineered to have negative effective parameters leading to interesting effects such as negative refraction and sub-diffraction focussing. In this context, the metamaterials effectively slow down or speed up the sound waves hence altering the effective speed of sound and/or path length within the material. Current studies of acoustic metamaterials are typically limited to audible frequencies up to 20 kHz, and are designed to illustrate a specific principle, or to fit a specific purpose e.g. a lens with a fixed focus. That is, acoustic metamaterials are typically currently only used to create relatively limited, static structures. By contrast, the present invention presents flexible solutions for manipulating potentially arbitrary acoustic waves.

**Part B: Patents - specific items of intellectual property or other property**

Any patents or patent applications based on or derived from:

- (i) Application number GB1702131.2, entitled Acoustic Wave Manipulation, filed on 9 February 2017;
- (ii) Application number GB1800286.5, entitled Acoustic Wave Manipulation, filed on 8 January 2018, and
- (iii) Application number PCT/GB2018/050373 (Publication number WO2018/146489), entitled Acoustic Wave Manipulation, filed on 9 February 2018, and
- (iv) European Patent Application number 18705482.0, entitled Acoustic Wave Manipulation with filing date of 9 February 2018 and entered into on 9 August 2019, and
- (v) United States Patent Application number 16/483907, entitled Acoustic Wave Manipulation, with filing date of 9 February 2018 and entered into on 9 August 2019