

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SUZHOU MOJAWA INTELLIGENT ELECTRONIC CO., LTD.,
Petitioner,

v.

SHENZHEN SHOKZ CO., LTD.,
Patent Owner.

Case IPR2025-00843

Patent No. 11,310,582

DECLARATION OF DR. MICHAEL S. SCORDILIS

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I, Dr. Michael S. Scordilis, Ph.D., hereby declare as follows:

I. INTRODUCTION

1. My name is Dr. Michael S. Scordilis. I have been retained by counsel for Patent Owner SHENZHEN SHOKZ CO., LTD., (“Patent Owner”) to provide my independent analysis regarding the validity of Claims 1-12, 14, and 16-20 (“Challenged Claims”) of U.S. Patent No. 11,310,582 (“the ‘582 patent”).

A. My Background, Qualifications, Publications, and Testimony

2. My background, qualifications, and educational and employment history are set forth in my curriculum vitae, which is attached hereto as Appx. A.

3. I have over 40 years of experience in the areas of acoustics, electronics, and signal processing. I started building electronic radio circuits in 1977. That hands-on activity continued during my undergraduate studies at the Royal Melbourne Institute of Technology, where I built voice scrambling radio transmitters and other circuits, and during my summer work experience where I programmed and built control circuits for farming applications. My practical experience continued during my work as Technical Officer at LM Ericsson where I evaluated, repaired, and modified telephone exchange electronic systems for voice communications.

4. I have over 30 years of academic experience. First at the University of Melbourne (1990-1995) where, as tenured lecturer, I developed and taught courses

in digital signal processing and digital speech processing, and supervised several masters theses and doctoral dissertations in the areas of communications and audio and speech processing. I have had visiting scientist positions at Bell Communication Research (Bellcore) (1994) working on speech analysis and synthesis, at Sun Microsystems (1994) working on microphone arrays for speech recognition, and at the University of Patras, Greece (1995-96) working on acoustics and audio processing research. My academic career continued at the University of Miami (1997-2021) where, as associate professor, I developed and taught several undergraduate and graduate courses in electrical circuits, electronics, digital signal processing, speech and audio processing, and engineering acoustics. I also supervised many senior projects, master's theses, and doctoral dissertations in the areas of signals and systems, electronics, communications, acoustics, digital signal processing, audio and speech signal processing.

5. I am also the author of numerous academic research publications that focus on various aspects of electronic devices, machine learning, speech recognition, affective speech processing, speech enhancement, audio watermarking, acoustic filtering for echo cancellation, and numerous other audio and acoustics-related scientific studies. In addition, I am the named inventor on at least one United States patent focused on audio watermarking.

6. I have experience with several aspects of the technology related to airborne and structure-borne sound propagation. That experience includes teaching a graduate course in physical acoustics that included the design of apparatus and methods for hearing evaluation, sound measurement, the acoustic properties of materials, sound dampening techniques, acoustic antennas and acoustic filters. My research also includes loudness estimation and acoustic analysis of speech and audio signals, audio enhancement in real-world acoustic noise conditions, signal processing for electroglottography (acquisition of the glottal signal through human tissue) and acoustic compensation in hearing diagnosis and hearing aids applications.

B. Compensation

7. My compensation in this case is \$450 per hour without regard to the outcome of this proceeding.

8. I am not, and never have been, an employee of Shenzhen Shokz Co., Ltd. I am not receiving compensation for this declaration beyond my normal hourly fees based on my time actually spent analyzing and documenting my opinions herein on the '582 patent. My compensation is not related to the outcome of this proceeding, and I will not receive any additional compensation based on the outcome of any IPR or other proceeding involving the '582 patent.

II. SUMMARY OF MY OPINIONS

9. In summary, it is my opinion that each of the Challenged Claims of the '582 patent is valid and patentable.

10. I have been asked to review the Petition for *Inter Partes* Review of Claims 1-12, 14, and 16-20 ("Challenged Claims") of the '582 Patent along with the associated patent (Ex. 1001), the prosecution history of the '582 Patent (Ex. 1002), the alleged prior art relied on in Petitioner's invalidity grounds, the declaration of Petitioner's expert, Chris Kyriakakis (Ex. 1003), and other associated exhibits and provide my opinions regarding the Petition and corresponding documents. In forming my opinions, I have reviewed the materials cited in the List of Exhibits Reviewed (**Section III**, below) and the materials cited throughout my declaration.

11. I reserve the right to respond to anything that may be made available to me in the form of (1) information that may be provided in the expert report(s) of Petitioner's expert witness(s); (2) additional discovery information, such as Petitioner's expert(s)'s report(s) and declaration(s), deposition testimony, document production, etc.; and (3) information obtained through my own investigation. Further, should I not include analysis for certain claim limitations or elements in the sections below, this does not imply that I agree with Petitioner's claim that the limitation or element is anticipated by or obvious over the prior art, nor does it imply that I agree with Dr. Kyriakakis's analysis of the claim limitation or element. I

further reserve the right to offer additional analysis, including analysis of claim limitations or elements not discussed in this declaration, if *inter partes* review of the '582 Patent is instituted.

III. LIST OF EXHIBITS REVIEWED

Exhibit No.	Description
1001	U.S. Patent No. 11,310,582
1002	File History of U.S. Patent No. 11,310,582
1003	Expert Declaration of Dr. Chris Kyriakakis
1004	CN107454492A (“Li”) [Certified English Translation]
1005	CN106937222A (“Liao”) [Certified English Translation]
1006	CN202931524U (“Asaka”) [Certified English Translation]
1007	JP2008294872A (“Numata”) [Certified English Translation]
1008	CN205356672U (“Wang”) [Certified English Translation]
1009	CN205017577U (“Xu”) [Certified English Translation]
1010	WO 2009/086838 (“Nielsen”)
1011	US 2008/0279409 (“Hupkes”)
1012	US 7,672,469 (“Dryer”)
1013	US 8,515,103 (“Mei”)
1014	US 2016/0080853 (“Chen”)
1015	US 9,866,966 (“Lott”)
1016	US 2018/0316999 (“Bellas”)

1017	US 5,987,147 (“Nishimoto”)
1018	JP2007189269A (“Nakada”) [Certified English Translation]
1019	US 2014/0126742 (“Eggebraaten”)
1020	US 8,223,997 (“Wilson, II”)
1021	US 8,111,860 (“Retchin”)
1022	CN107454492A (“Li”) [Original]
1023	CN106937222A (“Liao”) [Original]
1024	CN202931524U (“Asaka”) [Original]
1025	JP2008294872A (“Numata”) [Original]
1026	CN205356672U (“Wang”) [Original]
1027	CN205017577U (“Xu”) [Original]
1028	JP2007189269A (“Nakada”) [Original]
2019	Möser, M., <i>Engineering Acoustics: An Introduction to Noise Control</i> , Second Edition, Chapters 1 and 4 (2009).

IV. LEGAL STANDARDS

A. Level of Ordinary Skill in the Art

12. When interpreting a patent, I understand that it is important to identify the relevant art pertaining to the patent-in-suit as well as the level of ordinary skill in that art at the time of the claimed invention. The “art” is the field of technology to which the patent is related.

13. I have been instructed by counsel that the person of ordinary skill in the art (“**POSITA**”) is a hypothetical person who is presumed to know the relevant prior art. I understand that the actual inventor’s skill is not determinative of the level of ordinary skill. I further understand that the factors that may be considered in determining the level of skill include the types of problems encountered in the art, prior art solutions to those problems, the rapidity with which innovations are made, the sophistication of the technology, and the educational level of active workers in the field. I understand that not all such factors may be present in every case, and one or more of them may predominate.

14. I am familiar with how a POSITA would have understood and used the terminology found in the ’582 Patent at the time and before the priority date of the ’582 Patent.

B. Legal Standard for Claim Construction

15. I understand that the first step in determining whether a patent claim would have been anticipated or obvious is to ascertain how a POSITA would have understood the claim terms.

16. I have been instructed by counsel on the law regarding claim construction and patent claims, and I understand that a patent may include two types of claims: independent claims and dependent claims. An independent claim stands alone and includes only the limitations it recites. A dependent claim can depend from

an independent claim, or it can further depend from another dependent claim. I understand that a dependent claim includes all the limitations that it recites, in addition to all the limitations recited in the claim(s) from which it depends.

17. It is my understanding that in proceedings before the USPTO, the claims of a patent are to be construed under what is referred to as the “*Phillips* standard.” I understand that this means that the claim terms of a patent are given the meaning the terms would have to a POSITA, in view of the description provided in the patent itself and the patent’s file history.

18. I understand that to determine how a person of ordinary skill would understand a claim term, one should look to those sources available that show what a person of skill in the art would have understood the disputed claim language to mean. I understand that, in construing a claim term, one looks primarily to the intrinsic patent evidence, including the words of the claims themselves, the remainder of the patent, and the patent’s prosecution history. I understand that extrinsic evidence, which is evidence external to the patent and the prosecution history, may also be useful in interpreting patent claims when the intrinsic evidence itself is insufficient.

19. I understand that words or terms should be given their ordinary and accepted meaning unless it appears that the inventors were using them to mean something else. In making this determination, the claims, the remainder of the patent,

and the prosecution history are of paramount importance. Additionally, the patent and its prosecution history must be consulted to confirm whether the patentee has acted as its own lexicographer (i.e., provided its own special meaning to any disputed terms), or intentionally disclaimed, disavowed, or surrendered any claim scope.

20. In comparing the claims of the '582 Patent to the prior art, I have considered the '582 Patent and its file history in light of the understanding of a person of skill at the time of the alleged invention.

C. Anticipation

21. It is my understanding that a prior art reference anticipates a claim of a patent if each and every element of the claim is found either explicitly or inherently in a single prior art reference or system. I understand that inherency requires a showing that the missing descriptive matter in the claim is necessarily or implicitly present in the allegedly anticipating reference, and that a POSITA would have so recognized it. In addition, I understand that an enabling disclosure is a disclosure that allows a POSITA to make the invention without undue experimentation.

D. Obviousness

22. I understand that the prior art may render a patent claim "obvious." I understand that two or more prior art references (e.g., prior art articles, patents, or publications) that each disclose fewer than all elements of a patent claim may be

combined to render a patent claim obvious if the combination of the prior art collectively discloses all elements of the claim and one of ordinary skill in the art at the time would have been motivated to combine the prior art in such a way. I understand that this motivation to combine need not be explicit in any of the prior art but may be inferred from the knowledge of one of ordinary skill in the art at the time the patent was filed. I also understand that one of ordinary skill in the art is not an automaton but is a person having ordinary creativity. I further understand that one or more prior art references, articles, patents or publications that disclose fewer than all of the elements of a patent claim may render a patent claim obvious if including the missing element would have been obvious to one of skill in the art (e.g., the missing element represents only an insubstantial difference over the prior art or a reconfiguration of a known system).

23. I understand that under the doctrine of obviousness, a claim may be invalid if the differences between the invention and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a POSITA to which the subject matter pertains.

24. To assess obviousness, I understand that I am to consider the scope and content of the prior art, the differences between the prior art and the claim, the level of ordinary skill in the art, and any secondary considerations to the extent they exist.

25. I understand that any evidence of secondary indicia of non-obviousness should be considered when evaluating whether a claimed invention would have been obvious to one of ordinary skill at the time of invention. These secondary indicia of non-obviousness may include, for example:

- a long-felt but unmet need in the prior art that was satisfied by the claimed invention;
- commercial success of processes claimed by the patent;
- unexpected results achieved by the invention;
- praise of the invention by others skilled in the art;
- the taking of licenses under the patent by others; and
- deliberate copying of the invention.

26. I understand that there must be a nexus between any such secondary indicia and the claimed invention.

27. It is also my understanding that there are additional considerations that may be used as further guidance as to when the above factors will result in a finding that a claim is obvious, including the following:

- the claimed subject matter is simply a combination of prior art elements according to known methods to yield predictable results;
- the claimed subject matter is a simple substitution of one known element for another to obtain predictable results;
- the claimed subject matter uses known techniques to improve similar devices or methods in the same way;

- the claimed subject matter applies a known technique to a known device or method that is ready for improvement to yield predictable results;
- the claimed subject matter would have been “obvious to try” choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success;
- there is known work in one field of endeavor that may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations would have been predictable to a POSITA;
- there existed at the time of the invention a known problem for which there was an obvious solution encompassed by the patent’s claims; and
- there is some teaching, suggestion, or motivation in the prior art that would have led a POSITA to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed subject matter.

28. Finally, I understand that a claim may be deemed invalid for obviousness in light of a single prior art reference, without the need to combine references, if the elements of the claim that are not found in the reference can be supplied by the knowledge or common sense of one of ordinary skill in the relevant art.

E. Priority Date

29. I understand that, subject to the next paragraph, the asserted “priority date” of a patent is the earlier of: (a) the date on which a patent application is filed; or (b) the date on which an earlier-filed patent application is filed if the patentee claims the benefit of priority to that earlier-filed patent application.

30. I understand that it is not enough for a patent to merely claim the benefit of an earlier-filed application, but that additional criteria must be met. In particular, the prior application itself must describe the claimed invention, and must do so in sufficient detail that one skilled in the art can clearly conclude that the inventor invented the claimed invention as of the filing date sought. First, I understand that a priority-date analysis is on a claim-by-claim basis. Second, I understand that, in order for a patent claim to be entitled to the filing date of an earlier patent application, a “Section 112 analysis” must be conducted. I am informed that a “Section 112” analysis encompasses looking to the earlier patent application, and ascertaining whether that earlier patent application meets both the written-description and enablement requirements as of the filing date of the earlier application. I understand that it is not enough that the claim would have been obvious from the earlier application, but that application itself must describe the claimed invention.

31. I understand that in order to satisfy the written description requirement, the earlier application must reasonably convey to those skilled in the art that the inventors had possession of the subject matter of the patent as of the filing date of the earlier application. I have been informed that it is the disclosures of the earlier patent application that count, and that while the meaning of terms, phrases, or diagrams in the earlier patent application must be interpreted from the vantage point of one skilled in the art, all of the claimed limitations must appear in the

specification. Further, I understand that this analysis is not a question of whether one skilled in the art might be able to construct the claimed invention from the teachings of the disclosure. The question is not whether a claimed invention is an obvious variant of that which is disclosed in the specification; rather, I understand that an earlier application must itself describe each of the claim limitations.

32. I also understand that in order to satisfy the enablement requirement, the earlier application must enable a person of ordinary skill in the art to practice the claimed invention without undue experimentation.

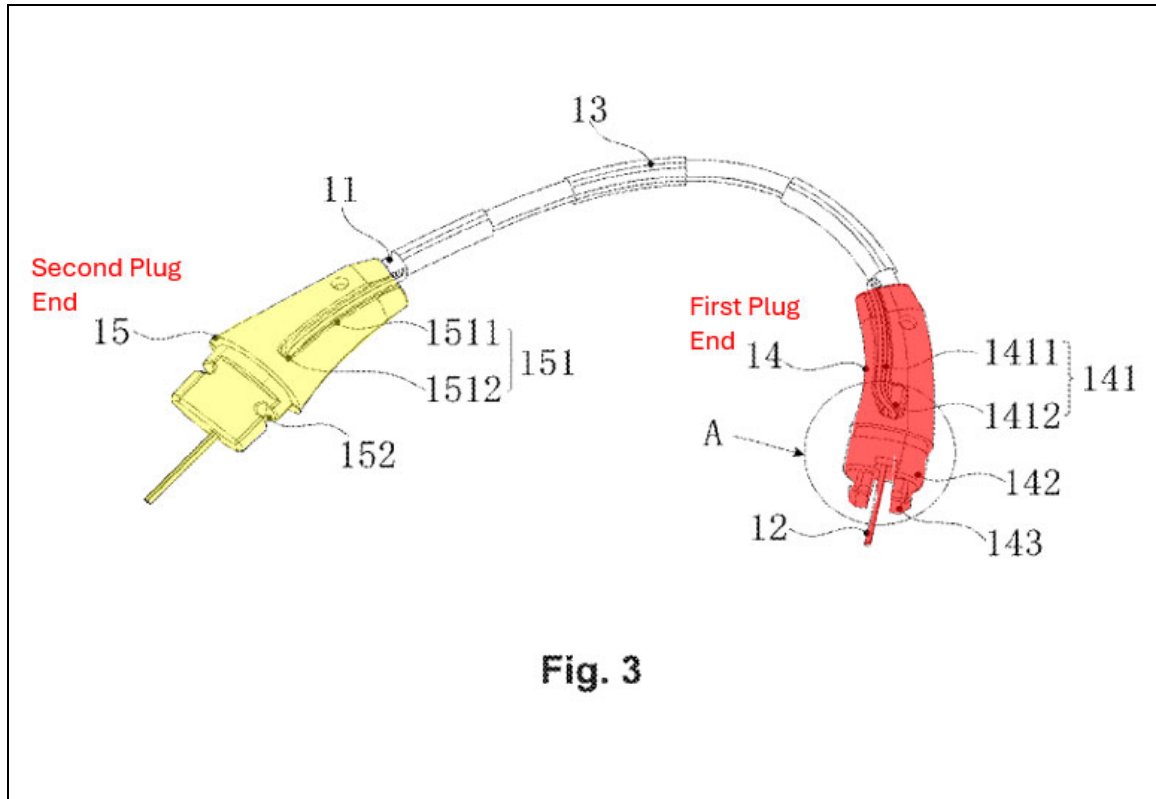
V. OVERVIEW OF THE '582 PATENT

A. Patent Specification

33. The '582 Patent teaches a loudspeaker apparatus, such as an earphone, which may use bone conduction technology. EX1001, Abstract, 5:57-59. The '582 Patent notes a desire to provide earphones with a waterproof function so that such headphones can be used in situations such as swimming and on rainy days, while also being easy to produce and assemble. *Id.*, 1:14-32.

34. In order to meet both goals, the '582 Patent teaches a structure that enables the components of such a headset to be easily manufactured and assembled so that the final assembled product is waterproof. That structure may include an ear

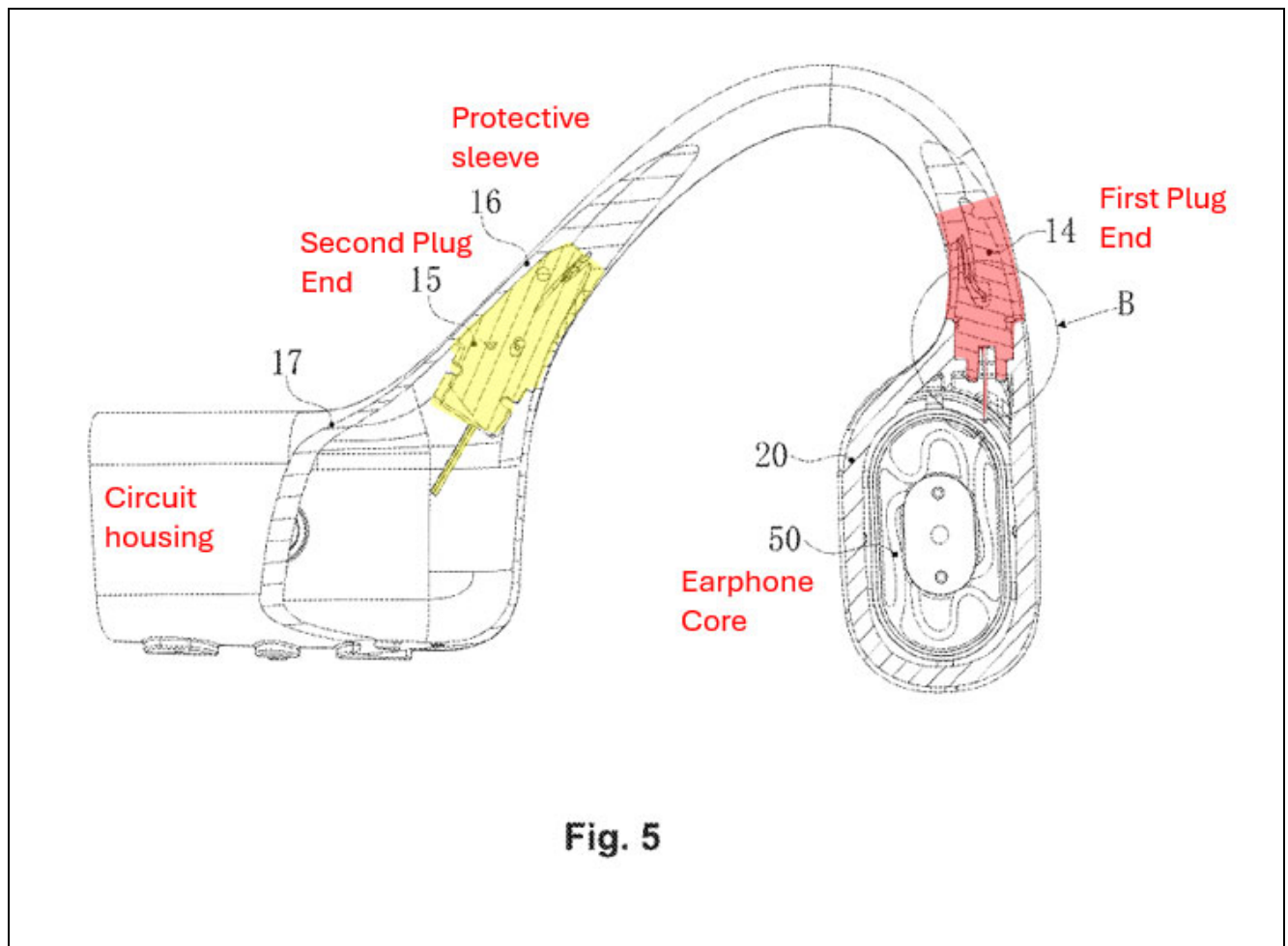
hook with plugs on both ends and a protective sleeve over the ear hook. EX1001, 8:63-67. Figure 3 illustrates the ear hook having first and second plug ends:



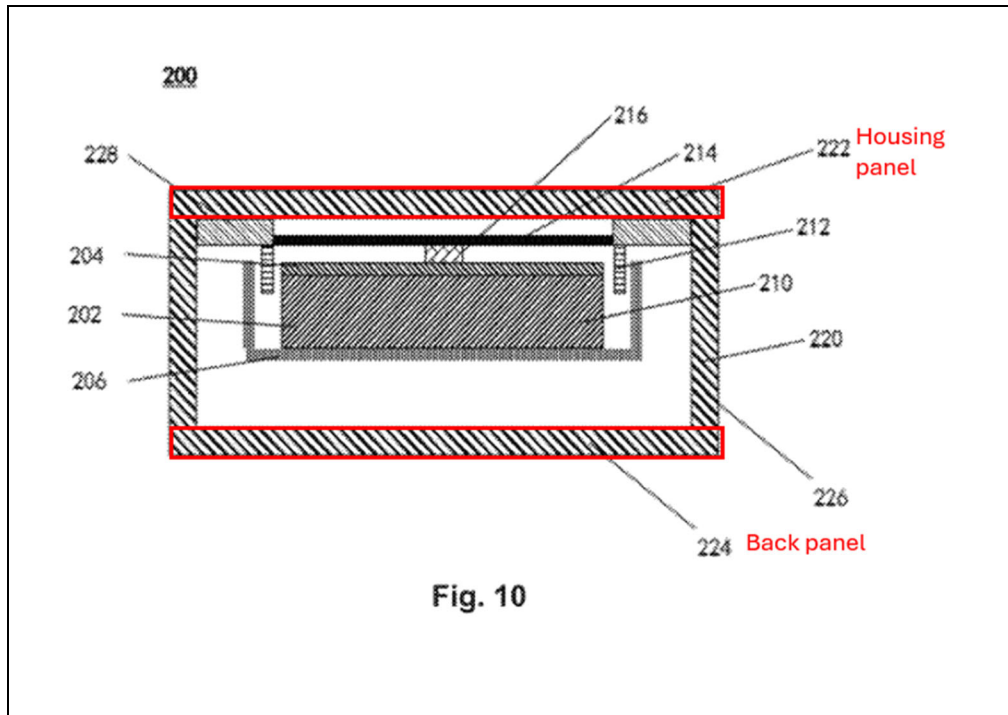
35. A first plug end may insert into a core housing 20 which may accommodate an earphone core, *i.e.* the part of the speaker apparatus that generates vibrations passed to the user. EX1001, 11:47-57. The plug is designed so that when inserted, the protective sleeve may elastically abut against the core housing, forming a waterproof seal protecting the earphone core inside the housing. EX1001, 13:4-11.

36. The second plug end 15 may be connected to a circuit housing 30. In some embodiments, the circuit housing 30 on one side of the headphones contains a circuit, while the circuit housing 30 on the other side contains a battery. EX1001, 16:5-8. The use of plugs in this manner also allows the ear hook to be formed separately from the circuit housing 30 and core housing 20, then assembled after the form is completed. EX1001, 11:52-57, 16:15-20.

37. Figure 5 illustrates the ear hook with the first and second plug ends inserted into the core housing 20 and the circuit housing 30, respectively:



38. The '582 Patent also addresses the problem of “sound leakage,” *i.e.* the audibility of headphone sound in the environment to others besides the user of the headphones. The housing of the earphone core may include a housing panel 222 facing the user and a back panel 224 facing away from the user, as shown in Fig. 10:



39. When the entire housing is very rigid, the vibration amplitudes and phases of the housing panel and back panel may be the same or substantially the same, so that the leaked sound waves from the housing panel and the back panel are superimposed on each other, thus reducing overall sound leakage. EX1001, 20:29-42.

B. Claims

40. Claim 1 is the sole independent claim of the '582 Patent, from which all of the other Challenged Claims depend. I have reproduced it below, using the same labelling of elements as the Petition:

A loudspeaker apparatus, comprising:

- [1a] an ear hook including a first plug end and a second plug end,
- [1b] the ear hook being surrounded by a protective sleeve, the protective sleeve being made of an elastic waterproof material;
- [1c] a core housing for accommodating an earphone core, the core housing being fixed to the first plug end and elastically abutted against the protective sleeve, wherein
- [1d] the core housing including a housing panel facing human body and a housing back panel opposite to the housing panel, and
- [1e] the vibration of the earphone core drives the housing panel and the housing back panel to vibrate, the vibration of the housing panel having a first phase, the vibration of the housing back panel having a second phase, wherein when the vibration frequencies of the housing panel and the housing back panel is within a range of 2000 Hz to 3000 Hz, an absolute value of a difference between the first phase and the second phase is less than 60 degrees; and
- [1f] a circuit housing for accommodating a control circuit or a battery, the circuit housing being fixed to the second plug end, the control circuit or the battery driving the earphone core to vibrate to generate a sound.

VI. LEVEL OF ORDINARY SKILL IN THE ART

41. I have reviewed the definition of a person of ordinary skill in the art proposed in the Petition. I understand that the Petition proposes that a POSITA at the time of the '582 Patent's priority date (January 5, 2019) would have had "a Bachelor's degree in electrical or computer engineering, or a comparable field of study, plus approximately two to three years of professional experience with acoustic technology. Additional graduate education could substitute for professional experience, and significant experience in the field could substitute for formal education." For the purposes of this declaration, I have applied Petitioner's proposed level of ordinary skill in the art, although I reserve the right to offer further opinions regarding the appropriate level of skill if *inter partes* review of the '582 Patent is instituted.

42. I possess both the education requirements and the field experience of a POSITA. Not only is my formal education in the same technical discipline (electrical engineering) as that of Petitioner's (and my) definition, but I also have additional education beyond a bachelor's degree. Furthermore, I have over 40 years of experience in the areas of acoustics, electronics, and signal processing, including practical and academic experience.

VII. CLAIM CONSTRUCTION

43. It is my opinion that a POSITA would understand all the claim terms to have their plain and ordinary meaning, and I have applied the plain and ordinary meaning, in the context of the '582 Patent, for all claim terms. The Petition does not propose any constructions for any terms in claim 1 of the '582 Patent.

VIII. GROUND 1:

A. The Petition fails to show an “ear hook” having first and second “plug ends” in the configuration required by the claims

44. Claim 1 of the '582 Patent requires “an ear hook including a first plug end and a second plug end” (element [1a]), a “core housing being fixed to the first plug end and elastically abutted against the protective sleeve” (element [1c]), and a “circuit housing being fixed to the second plug end” (element [1f]). I have read the analysis of these claim elements in Patent Owner’s Preliminary Response to Mojawa’s Petition. I concur with the explanations in that Preliminary Response as to why the Petition has not shown that these claim elements are obvious. I do not intend to elaborate further regarding those claim elements in this declaration, but I reserve the right to do so if *inter partes* review is instituted.

B. The Petition fails to show that the combination of Li '492 and Liao teaches element [1e], “wherein when the vibration frequencies of the housing panel and the housing back panel is within a range of 2000 Hz to 3000 Hz, an absolute value of a difference between the first phase and the second phase is less than 60 degrees”

45. In my opinion, the Petition and Dr. Kyriakakis' declaration fail to show that the prior art cited in the Petition teaches this element.

46. As I noted in section V(A) above, the specification of the '582 Patent teaches that the configuration and selection of materials for the housing and back panel of an earphone core impacts the sound leakage properties of the earphone core. *See, e.g.* EX1001, 20:29-42. I will first provide some context regarding relevant principles of sound propagation in solid materials, then address how this material relates to the arguments raised in the Petition.

47. Vibration and sound existing in enclosed spaces as well as in open air is often the result of vibration propagating inside structures. Structure-borne sound can be generated either by mechanical disturbances generated by vibrating objects or from disturbances in the material attached to the structure. Such processes set solid structures into vibration, which in turn can excite the surrounding air resulting in air-borne sound disturbance. While air-borne sound is longitudinal waves, structure-borne sound in solid plates propagates in a combination of bending, longitudinal and transverse torsional waves, which cause the solid surfaces to vibrate

setting them to act as a distributed source that excites the surrounding air and can result in audible sound. Sound vibration in solids critically depends on the type of material and the geometry of the solid structure, which are factors that can facilitate or impede the propagation of the vibration and the degree to which a solid surface can excite the surrounding air thus generating undesirable audible sound in the form of sound leakage. Chapter 4 of Moser, *Engineering Acoustics: An Introduction to Noise Control* (EX2019), which is a textbook that I use regularly in my teaching, explains these general principles of sound propagation through solid materials.

48. There exist different approaches to minimizing sound leakage from enclosures. One approach is to elastically decouple the housing of the enclosure from the active, vibrating element. This can be achieved by selecting the material of the surrounding housing to exhibit stiffness properties (e.g., modulus of elasticity or Young's modulus) substantially different to those of the vibrating panel, or by including a connection between the two structures with elastic properties drastically different from the rest of the housing. This way, an abrupt discontinuity in elastic properties of the housing would exist inhibiting the propagation of vibration into the surrounding enclosure and preventing further vibration and sound leakage. A second approach is to select a highly stiff (i.e., high Young's modulus) material to form the housing which would be resistant to vibration and would diminish sound leakage in the audible frequency range of human hearing.

49. The specification of the '582 Patent follows the latter approach where a housing panel, housing back panel and housing side panel are selected so that the housing has "large rigidity" *See, e.g.* EX1001, 17:43-48 and 18:33-55, so that the disturbance of the air or water surrounding the housing is minimized. Furthermore, the specification of the '582 Patent describes that by selecting housing material of high rigidity the vibration amplitudes and phases of the housing panel and the housing back panel are maintained the same (i.e., amplitude ratio close to 1 and phase difference small or close to zero) *See, e.g.* EX1001, 21:56-59 and 22:39-41 or substantially the same (i.e., amplitude ratio close to 1 and phase difference less than 60 degrees) in much of the audible frequency range and the superposition of sound waves from opposite sides of the panel reduces sound leakage from the housing into the environment even further *See, e.g.* EX1001, 20:22-67. Overall, selecting housing components with large rigidity is key in this approach for minimizing leakage.

50. In contrast, Liao '222 [Par. 64-68] proposes a different approach for sound leakage mitigation by minimizing the housing vibration with respect to the panel vibration ($x_2/x_1 < 1$.) The described method for achieving this is by selecting a (housing) panel with stiffness, k_1 , much greater than the stiffness k_2 of the housing (back and side housing), with the stiffness ratio being the key mechanism ($k_1/k_2 \gg 1$.) This teaches away from '582, which is based on stiff overall housing materials with resistance to vibration. Another proposed embodiment in Liao '222 [69] is

reducing the rigidity, k_1 , of the panel itself by connecting it to the housing with an elastic connection member of lower rigidity, which also teaches away from '582.

51. Li '492 describes a different approach to reducing sound leakage based on the placement of holes which may guide sound component to interfere with the sound leakage and therefore reducing it. EX1004, [0049]-[0051]. Therefore, it also teaches away from the approach of the '582 Patent.

1. Liao does not teach a phase difference less than 60 degrees

52. The Petition and Dr. Kyriakakis both rely on the Liao reference to meet this claim element, although Dr. Kyriakakis also makes some additional arguments with respect to Li '492. The crux of the argument made by the Petition (and Dr. Kyriakakis) appears to largely center around the assumption that the housings in the Liao reference relied on by the Petition (that is, the panel facing the user and the opposite panel or back panel) would be made out of rigid materials and rigidly connected, and therefore would vibrate approximately in phase. For example, the Petition asserts (at page 35) that “if panel 220 is vibrating, housing 210 is also vibrating in phase (the absolute value of the phase difference is nearly zero) because panel 220 and housing 210 are rigidly connected without connection members 250, as taught by Liao.”

53. However, in my opinion, the portions of Liao cited by Petitioner do not provide support for Petitioner's assertion. Petitioner's citations to Liao in order to

support the assertion above are paragraphs [0057] and [0058]. I have reproduced these paragraphs in their entirety below:

[0057] It shall be noted that the method of fixing the energy conversion device and the panel in the housing is not limited to the connection method described in figure 2-B. Obviously, for those skilled in the art, whether to use the connection member 240, or to use the connection member 240 made of different materials, adjust the energy conversion device 230, or connect the panel 220 to the housing 210, will all exhibit different mechanical impedance characteristics, produce different vibration transmission effects, thereby affecting the overall vibration efficiency of the vibration system and producing different sound quality.

[0058] For example, if connection members are not used, the panel can be directly attached to the housing, or connected to the housing by clamping or welding. If connection members are used, connection members with moderate elastic force have a shock-absorbing effect during the transmission of vibration, which can reduce the vibration energy transmitted to the housing and effectively suppress the bone conduction speaker from leaking sound to the outside caused by housing vibration. It can also help avoid the occurrence of abnormal sound caused by possible abnormal resonance, achieving the effect of improving sound quality. The connecting pieces located at different positions inside/on the housing will also have varying degrees of impact on the transmission efficiency of vibration. Preferably, the connection

members can keep the energy conversion device in different status such as a suspended or supported status.

54. Neither of these paragraphs support the assertion made by Petitioner. For example, neither paragraph mentions phase differences, particularly between the vibration panel 220 and the back side of the housing 210. In my opinion, a POSITA would not draw the conclusion suggested by the Petition from these paragraphs. Rather, what a POSITA would take away from these two paragraphs is simply that the selection of materials and design of the housing characteristics can have a wide range of impacts on the vibration characteristics of the design. These paragraphs in Liao correctly identify a number of factors with its design that might effect vibration characteristics of the housing. None of this discussion indicates that that the panel 220 and housing 210 would vibrate in phase with each other.

55. Both the Petition and Dr. Kyriakakis appear to rely most heavily on the first sentence of paragraph [0058], particularly that “the panel can be directly attached to the housing, or connected to the housing by clamping or welding.” In my opinion, that sentence does not imply that the housing 210 would be “also vibrating in phase” with the panel 220. The phase of vibration of the housing 210 would also depend on how it is attached to the panel 220 and the acoustic properties of the material of the housing, such as its density, rigidity, thickness, size, and shape.

Additional effects can occur when two components are joined together. For example, sound waves or a portion of them may reflect when they encounter a junction between different components or different materials. The acoustic properties of the clamping or welding material and processes and the degree to which acoustic discontinuities are formed with the panel 220 would determine the phase relationship of the different sides and the degree of vibration attenuation. These effects are complex, and a POSITA could not simply infer that two components would necessarily vibrate in phase simply because they are connected to one another.

2. Liao teaches a different approach to sound leakage than the claimed invention

56. Curiously, while the Petition relies on paragraphs in Liao that do not discuss phase differences in order to support its assertions, it does not discuss the paragraphs in Liao that do address the issue of sound leakage, which is related to the various acoustic properties of the housings involved. For example, Liao's paragraph [0087] teaches that one way of addressing the issue of sound leakage is to provide sound holes in the housing, and to configure those holes in such a way that air vibrations coming from those holes will offset the air vibrations caused by the vibration of the housing itself. In other words, if the air vibrations emitted from the holes are significantly out of phase with the vibrations from other portions of the housing, those vibrations will cause destructive interference and attenuate the sound

leakage. Liao also describes in detail a series of equations for calculating the sound pressure from various sources of vibration and summing those sources together, including the phase difference between them. EX1005, [0088]-[0095].

57. Liao also discusses controlling sound leakage by using phase adjusting materials, which are materials that would change the phase of vibrations passing through them:

For example, using **phase adjusting materials (such as but not limited to sound absorbing materials) as portion of the housing material**, so that the phase of the air vibration transmitted is **within the range of 90° to 270°** with the vibration phase of other portions of the housing, thereby achieving the purpose of sound offsetting... Furthermore, **by adjusting the connection method between the energy conversion device and the housing, the phase of vibration in other portions of the housing can be changed**, and the phase difference between it and the sound transmitted from the sound hole can be **within the range of 90° to 270°**, thus achieving the purpose of sound offsetting.

Liao (EX1005), [0096].

58. In my opinion, using phase adjusting materials in the housing is a very different approach from that taught by the '582 Patent. A POSITA would not infer any suggestion from Liao to design the entire housing so that the front and back

panels vibrate in phase. A POSITA reviewing Liao would be discouraged from such an approach because Liao encourages the desirability of using phase adjusting or sound absorbing materials.

3. Dr. Kyriakakis' additional arguments are incorrect

59. I note that there are several additional arguments made in Dr. Kyriakakis' declaration that do not appear in the corresponding sections of the Petition. I will address those arguments, but nothing in my response should be considered any sort of admission that these arguments are properly raised.

60. For example, unlike the Petition, which relies entirely on Liao, Dr. Kyriakakis also argues that the Li '492 reference alone teaches element [14]. EX1003, ¶¶134-137. I disagree. Li '492 actually says nothing about the phase difference between its second housing 112 and fourth housing 115. Dr. Kyriakakis states at his paragraph 135 that "the housings are constructed of rigid material such as plastic." The two paragraphs that he cites, Li '492's paragraphs [0029] and [0043], do not actually say anything about the rigidity of the housing material.

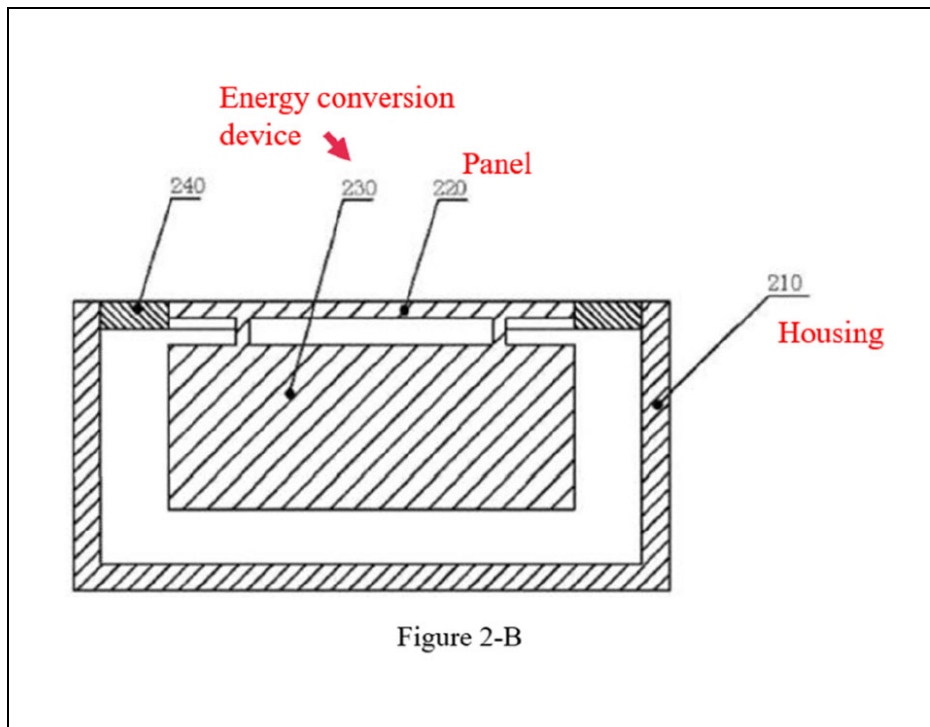
61. I also disagree that the mere reference to some of the housing materials being "plastic" necessarily implies any particular rigidity. The term "plastic" can encompass a wide range of solid polymer materials having a wide range of rigidities, densities, and associated acoustical properties. For example, polyvinyl chloride (PVC) and synthetic rubber bands are both examples of "plastics." In fact, Li '492

refers in some cases to using “elastic plastic” in its construction, such as at paragraph [0028]. As with other materials, the acoustic properties of plastic objects can also vary widely for reasons in addition to the material used, such as the thickness and shape of the plastic material and interfaces between components and materials. As a result of these variations in the material itself and the construction of a housing using such material, the mere use of the word “plastic” is not sufficient for a POSITA to reach the definitive conclusions that Dr. Kyriakakis does about the degree of phase shift that would occur when vibrations passed through such plastic structures.

62. Dr. Kyriakakis repeats similar assertions in this section of his declaration. For example, he argues at paragraph 136 of his declaration that “the housings vibrate nearly in phase (*i.e.*, the absolute value of the phase difference is nearly zero) because Li’s housing is rigid.” It is not clear the source of this assertion, because neither of the paragraphs of Li ’492 that he cites ([0029], [0043]) discusses the rigidity or elasticity of the housing materials. Later in the same paragraph he also cites paragraph [0044] of Li ’492 to make another similar assertion. However, Li ’492’s paragraph [0044] only talks about how the second housing 112 and fourth housing 115 are connected, not the type of material used, the acoustic properties of that material, or anything about how sound waves would interact with those materials. I do not believe that this paragraph supports Dr. Kyriakakis’s assertion that “the housings are rigidly connected to each other and made of rigid materials,

indicating that their vibrations would be nearly in phase and approximately the same amplitude.”

63. Dr. Kyriakakis also asserts in his paragraph 140 that Liao suggests using rigid housing materials. Specifically, he states that “Liao teaches that panel 220 is made of a rigid material and lists materials that are explicitly named in the ’582 Patent as housing panel materials, further adding to the POSITA’s understanding that the Liao housing would vibrate similarly to the ’582 Patent’s housing.” EX1003, ¶140, citing EX1005, [0075] and EX1001, 18:16-19:16. However, the reference to housing panel materials in the paragraph of Liao that he cites has to do with the “panel of a bone conduction speaker” referenced in the preceding paragraph of Liao ([0074]) which “transmits vibrations via human tissues to the human hearing system.” This panel corresponds to panel 220 in Liao’s Fig. 2-B (annotated by Petitioner below), not the housing 210:



64. In my opinion, neither this paragraph of Liao, nor anything else in Liao, teaches using such materials for the housing 210, nor suggests any rationale for a POSITA to use such materials in the housing 210. The purpose of the panel 220 is to transmit vibrations to the user's body, which is why rigid materials are described for that panel. That purpose does not apply to the remainder of the housing 210 which is not in contact with the user's body.

65. I also disagree with Dr. Kyriakakis' comparison of Liao to the teachings of the '582 Patent in this paragraph of this declaration, particularly between paragraph [0075] of Liao and the list of materials in the '582 Patent at 18:16-19:16. As I noted above, when Liao lists such materials, it is only to suggest using them for the panel 220 which transmits vibrations to the user's body, whereas the '582 Patent

suggests the use of these materials to make the entire housing rigid. Therefore, in my opinion, Dr. Kyriakakis' comparison between the '582 Patent and Liao is incorrect, and appears to rely on the guidance of the '582 Patent itself in hindsight to suggest a modification to Liao that Liao itself does not.

IX. GROUND 2-4:

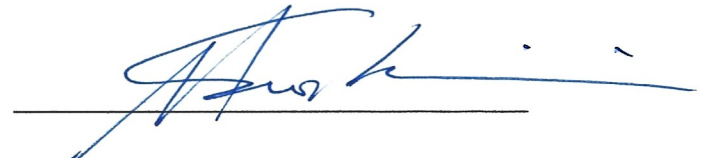
66. Grounds 2-4 all address claims which depend from claim 1, and these grounds just refer back to Ground 1 for their discussion of claim 1. Therefore, in my opinion, the Petition fails to show that any of the dependent claims are obvious for the same reasons that it has failed to show that claim 1 is obvious.

X. CONCLUSION

67. For at least the reasons discussed above, it is my opinion that the claims of the '582 Patent have not been shown to be unpatentable.

68. All statements made herein of my own knowledge are true, and all statements made on information and belief are believed to be true. I further understand that willful false statements and the like are punishable by fine or imprisonment, or both under Section 1001 of Title 18 of the United States Code. I declare under penalty of perjury that the foregoing is true and correct.

Executed on September 2, 2025



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 - Speech and Audio Coding
 - Biometrics, Watermarking & Security
 - Engineering Acoustics
 - Speech and Audio Processing
 - Automatic Speech and Speaker Recognition
 - Natural Language Processing and AI
-

Professional Summary

Dr. Michael Scordilis retired from his academic position at the Department of Electrical and Computer Engineering at the University of Miami, Florida in May 2021. He holds a Ph.D. in Electrical and Computer Engineering from Clemson University (1990). He has also held academic positions at Universities in Australia and Greece and visiting scientist positions at Bell Communications Research and Sun Microsystems Laboratories. He has supervised several Master and Ph.D. projects in acoustics, digital speech and audio processing research and statistical language learning. He was associate editor of the Journal of the Franklin Institute, has served in the Audio Technical Group of the MPEG Standards Committee, the International Coordinating Committee for Speech Databases and Assessment and in the organization and technical committees of numerous conferences. He holds patents in the area of audio watermarking. His expertise, research and consulting experience include artificial intelligence and machine learning, acoustics, digital signal processing, speech and audio coding, speech synthesis, speech and speaker recognition, intelligent man-machine interfaces, natural language processing, multimedia signal processing, telecommunications, computer networking and security, digital watermarking, and biometrics.

Education

<u>Year</u>	<u>College/University</u>	<u>Degree</u>
1990	Clemson University	Ph.D. in Electrical and Computer Engineering
1986	Clemson University	M.S. in Electrical Engineering
1983	Royal Melbourne Institute of Technology	Bachelor of Engineering in Communications Engineering

Employment History

From:	1997	University of Miami,
To:	2021	Coral Gables, FL
Position:	<i>Associate Professor, Research Professor and Associate Professor of Practice</i> Teaching and research in electrical and computer networks; real time digital signal processing, acoustics, speech, audio and music processing, pattern recognition, machine learning, speech recognition and synthesis, biometrics, digital watermarking, immersive audio for telepresence applications; communication systems; engineering acoustics.	
From:	1995	University of Patras
To:	1996	Greece
Position:	<i>Visiting Senior Scientist</i>	
From:	1990	The University of Melbourne
To:	1995	Melbourne, Australia

Position: *University Lecturer*

1994 **Sun Microsystems Laboratories**, Chelmsford, MA
 Position: *Visiting Senior Scientist, Speech Recognition Group*
 Adapting speech recognizers to new acoustic environmental conditions

From: 1994 **Bell Communications Research (Bellcore)**
 Morristown, NJ
 Position: *Visiting Senior Scientist, Speech Analysis and Synthesis Group*
 Improving the ORATOR speech synthesis system

From: 1984 **Department of Electrical and Computer Engineering**
 To: 1990 Clemson, SC
 Position: *Graduate Research Fellow and Teaching Assistant*
 Neural networks and speech processing research

From: 1982 **LM Ericsson**
 To: 1984 Melbourne, Australia
 Position: *Technical Officer*
 Production and Testing of the AXE and ASB900 Digital Telephone Exchanges and
 Centers and Computer communication modems

From: 1980 **CompuServe**
 To: 1981 Newcastle, Australia
 Position: *Computer Hardware Developer (summer intern)*

Consulting History (supported parties are in bold)

2024-25 **Law Firm of Willkie Farr & Gallagher LLP**
 Speech recognition, Biometrics, large language models, AI; District Court case of the
 State of Texas v. **Google**

2024 **Law Firm of WilmerHale LLP**
 Speech recognition, natural language processing, AI; patent infringement case for **Intel**

2022-23 **Law firms of Greenberg Traurig and Alston & Bird LLP**
 IPR Expert Declarations on smart audio devices, automatic speech recognition and
 speaker recognition/identification in Roku v. **Universal Electronics**

2022-23 **Law firm of Fish & Richardson P.C.**
 Voice detection and noise suppression in Jawbone Innovations v. **Apple**

2022 **Law firm of Arnold & Porter**
 Expert Reports and patent invalidity analysis on two-microphone audio processing for
 noise cancellation in headset and cellular phone devices, District Court case of Jawbone
 Innovations v. **Samsung**

2022 **Law firm of Dykema Gossett**
 Expert Reports on **Honeywell's** speech recognition and biometric technologies as related
 to the Illinois Biometric Information Privacy Act (BIPA)

2022 **Law firms of Wolf Greenfield and Perkins Coie LLP**
 IPR Expert Declaration on audio watermarking in MZ Audio Sciences, v. **Sony and**
Verance

2022 **Law firm of Fisch Sigler**
 5G architecture and physical layer, technical analysis of three IPR Declarations for
5G IP Holdings

2020 **Law firm of Baker & Hostetler**
 Expert Report: Computer network security & watermarking in patents infringement in
 Blue Spike v. **Comcast**

2018 **Law firm of Fisch Sigler LLP**
 IPR Expert Declarations on Computer network security & watermarking in patents
 infringement Blue Spike v. **Juniper Networks**

2017 **Law firm of Fisch Sigler LLP**

- IPR Expert Declarations on multisource 3D spatial audio processing in **Broadcom v. Amazon**
- 2017 **Law firm of Colson Hicks Eidson**
Expert report on physical injuries caused by electric burns (**private**)
- 2016 **Law firm of Greenspoon Marder**
Expert Report on electrical circuit and prediction analysis of physical injuries caused by electrical burns in **Nico Goodman v Ningbo Litesun Electric Co., Ltd.**
- 2015 **Law firm of Cooley LLP, Law firm of Upshaw LLP**
Expert Report and analysis of patents, standards, algorithms, source code for digital communications and speech coding in mobile telephony and devices applications for:
SLC v **HTC** (Law firm of Upshaw PLLC)
SLC v **Motorola** (Law firm of Cooley LLP)
SLC v **ZTE** (Law firm of Upshaw PLLC)
- 2015 **Law firm of Colson Hicks Eidson**
Analysis and evaluation of electrical systems involved in a pool electrocution (**private**)
- 2013 **Soundmouse, London, U.K.**
Audio watermark development for Digital Rights Management
- 2011 **Patent portfolio evaluation for Alcatel-Lucent**
EVRC speech coding and communication protocols (3GPP2) patents analyses and technical reports
- 2008 **Patent portfolio evaluation for Alcatel-Lucent**
MPEG-2 and MPEG-4) patents analyses and technical reports
- 2007 **Patent portfolio evaluation for Alcatel-Lucent**
AAC audio coding patents analyses and technical reports
- 2007 **Patent portfolio evaluation for Alcatel-Lucent**
MP3 audio coding European patents analyses and technical reports
- 2005 **SunnComm, Phoenix, AZ**
Audio watermark development
- 2003 **TradeHarbor, St. Luis, MO**
Robust Speech Recognition and Speaker Verification
- 2003 **US Department of Justice**
Forensic Audio Signal Analysis
- 2001 **KNOWLEDGE, S.A., Greece**
Speech Synthesis
- 1988- **Several private companies and public institutions, Australia and the U.S.**
- 1996 Project Consultant and Software Developer: Digital signal processing, data security, analog and digital modem design, speech, and audio research projects, engineering in-house training, speech pathology issues, aids for the handicapped, development of a Greek speech synthesizer for the blind
- 1995 **Robotron, Melbourne, Australia**
R&D for the world's first Greek text-to-speech speech synthesis
- 1994 **Sun Microsystems Laboratories, Chelmsford, MA**
Automatic speech recognition systems
- 1993 **Analog Devices, Norwood, MA and Melbourne, Australia**
Professional development and seminars on digital signal and speech processing for Analog Devices; R&D into real-time enhanced stereo systems
- 1993 **EDL, Melbourne, Australia**
R&D of digital audio coding. Modem design.
- 1992 **Australia National Acoustic Laboratories, Melbourne, Australia**
Evaluation of acoustic phonetics from speech pathology practitioners using digital signal processing techniques for speech analysis, feature display and evaluation
- 1992 **Royal Eye & Ear Hospital, Melbourne, Australia**
Software development for ocular melanoma growth monitoring using an ultrasound

Court Case Support - Deposition Experience

- 2023 Client: **Law firm of Greenberg Traurig**
Expert Deposition in Roku v. **Universal Electronics**
Case No. IPR2022-01289
Subject: Protocols for voice-enabled smart remote-control devices, speech recognition engines.
- 2023 Client: **Law firm of Perkins Coie**
Expert Deposition in MZ Audio Sciences, v. **Sony and Verance**
Case No. IPR2022-01544
Subject: Audio watermarking.
- 2023 Client: **Law firm of Greenberg Traurig**
Expert Deposition in Roku v. **Universal Electronics**
Case No. IPR2022-00943
Subject: Speech recognition and audio signal conditioning for voice-enabled smart remote-control devices.
- 2022 Client: **Law firm of Arnold & Porter**
Expert Deposition in Jawbone Innovations v. **Samsung**
Case No. NO. 2:21-CV-0186-JRG-RSP
Subject: Microphone arrays for noise suppression in headset and cellular phone devices.
- 2021 Client: **Law firm of Greenspoon Marder**
Expert Deposition in **Nico Goodman** v Ningbo Litesun Electric Co., Ltd., a Chinese Company.
Subject: Physical injuries caused by electrocution.

Patents

<u>Patent Number</u>	<u>Date Issued</u>	<u>Title</u>
US 7,079,633 B2	07/18/2006	Coding a masked data channel in a radio signal
US 6,996,521	02/07/2006	Auxiliary channel masking in an audio signal

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1. Iliev, A.I. and Scordilis, M.S., "Spoken Emotion Recognition using Glottal Symmetry," EURASIP Journal on Advances in Signal Processing – Special Issue on Emotion and Mental State Recognition from Speech, 2012
2. Nocito, C.D., Scordilis, M.S., "Monitoring jitter and packet loss in VoIP networks using speech quality features," Proceedings of the 8th Annual IEEE Consumer Communications and Networking Conference - Work in Progress (Short Papers), January 9-12, 2011, Las Vegas, NV, (CCNC2011), pp. 685-686
3. Jin W., Liu, X., Scordilis, M.S., Han L., "Speech Enhancement Using Harmonic Emphasis and Adaptive Comb Filtering," IEEE Transactions on Audio, Speech and Language Processing, Volume 18 (2), Feb. 2010, pp. 356 - 368
4. Scordilis, M.S., Iliev, A.I., Papa, J.P., Falcão, A.X., "Spoken emotion recognition through optimum-path forest classification using glottal features," Journal of Computer Speech and Language - Special Issue on Emergent Artificial Intelligence Approaches for Pattern Recognition in Speech and Language Processing, 24 (2010) 445–460

5. He, X., Scordilis, M.S., "Psychoacoustic Music Analysis Based on the Discrete Wavelet Packet Transform," *Research Letters in Signal Processing*, Volume 2008, Article ID 346767, 5 pages
6. He, X., Scordilis, M.S., "'Efficiently Synchronized Spread Spectrum Audio Watermarking,'" *Research Letters in Signal Processing*, Volume 2008, Article ID 251868, 5 pages
7. Zhang, Y., Scordilis, M.S., "Effective Online Adaptation of Gaussian Mixture Models and its Application to Speech Classification," *Pattern Recognition Letters*, (Addendum to the Special Issue on Advances in Pattern Recognition for Speech and Audio Processing), 2008, vol. 29, pp. 735-744
8. Zhang, Y., Scordilis, M.S., "Online Acoustic and Pronunciation Adaptation Techniques in Automatic Speech Recognition," in Sorokin, V.N. (ed.), *Speech Communication at the Leading Edge*, ISBN 1-60021-786-0, Nova Science Publishers, 2008
9. Iliev, I.A., Scordilis, M.S., "Emotion Recognition in Speech using Inter-Sentence Glottal Statistics," *Proceedings of the 15th International Conference on systems, Signals and Image Processing, IWSSIP 2008*, Bratislava, Slovakia, June 25-28, 2008, pp. 465-468
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13. He, X., Scordilis, M.S., "A Psychoacoustic Model Based on the Discrete Wavelet Packet Transform," *Journal of the Franklin Institute*, Volume 343, Issue 7, November 2006, pp. 738-755
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18. He, X., Scordilis, M.S., "Improved Spread Spectrum Digital Audio Watermarking Based on a Modified Perceptual Entropy Psychoacoustic Model," *Proceedings of the IEEE Southeast Conference*, Fort Lauderdale, FL, April 8-10, 2005, pp. 283-286
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24. Zhang, Y., Scordilis M.S., "Optimization of GMM Training for Speaker Verification," Proceedings of ODYSSEY 2004, the IEEE Speaker and Language Recognition Workshop, Toledo, Spain, May 31 – June 4, 2004, pp. 231-236
25. He, X., Iliev, I.A., Scordilis, M.S., "A High Capacity Watermarking Technique for Stereo Audio," Proceedings of the IEEE International Conference on Acoustics Speech and Signal Processing, ICASSP2004, Montreal, Canada, May 2004, vol. 5, pp. 393-396
26. Zhang, Y., Fahmy, A.I., Scordilis M.S., "Speaker Verification Using Speaker-Specific Prompts," Proceedings of the 17th International Artificial Intelligence Research Symposium, FLAIRS 2004, Miami, Florida, May 17-19, 2004, pp. 826-832
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28. Veprek, P., Scordilis, M.S., "Analysis, Enhancement and Evaluation of Five Pitch Determination Techniques," Elsevier Science Journal of Speech Communication, Vol. 37, July 2002, pp. 249-270 (Best Research Paper Award; University of Miami College of Engineering 2003 Eliahu I. Jury Award for Excellence in Research. Most downloaded paper from the Elsevier website in 2002)
29. Iliev, I., Scordilis, M.S., "Binaural Phase Masking Experiments in Stereo Audio," Presentation at the First Pan-American/Iberian Meeting on Acoustics, Cancun, Mexico, December 2-6, 2002
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39. Veprek, P., Scordilis, M.S., "Enhanced Speech Classification and Pitch Detection," Proceedings of the Sixth Australian International Conference on Speech Science and Technology, SST-96, Adelaide, Dec 1996, pp. 521-526

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55. Scordilis, M.S., Gowdy, J. N., "Speech Synthesis of Phonemic Triplets through a Neural Network-Controlled Formant Synthesizer," Proceedings of the International Joint Conference in Neural Networks 1991, Seattle, USA, (IJCNN'91 SEATTLE), Vol II, p A-1007
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58. Scordilis, M.S., Gowdy, J. N., "Effects of the Vocal Tract Area Function on the Spectral Tilt of the Glottal Pulse Waveform," Proceedings of the 1990 IEEE Southeast Conference, New Orleans, USA, 1-4 April 1990, pp.86-89
59. Scordilis, M.S., Gowdy, J. N., "Neural Network-based Generation of Fundamental Frequency Contours," Proceedings of the IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP89), May 24, Glasgow, Scotland, 1989, pp. (S16.S5.2) 219-222
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61. Scordilis, M.S., Gowdy, J. N., "A Phoneme-Dependent Voicing Source for Speech Synthesis," Proceedings of the IEEE Southeastern Symposium on Systems Theory, Charlotte, NC, USA, 1988
62. Scordilis, M.S., Gowdy, J. N., "Comparison of Computerized Speech Synthesis Techniques," Proceedings of the IEEE Southeast Conference, Richmond, VA, USA, April 1986

Dissertations and Masters Theses Advised

- Iliev, I. Alex, "Emotion Recognition Using Glottal and Prosodic Features", Ph.D. Dissertation, University of Miami, 2009
- Jin, Wen, "Speech Enhancement by Linear Transformation and Constraint Optimization", Ph.D. Dissertation, University of Miami, 2006
- Zhang, Yongxin, "Acoustic Model and Pronunciation Adaptation in Automatic Speech Recognition", Ph.D. Dissertation, University of Miami, 2006
- He, Xing, "Psychoacoustic Modeling for Perceptual Audio Coding and Watermarking with Improved Synchronization", Ph.D. Dissertation, University of Miami, 2006
- Abdou, Sherif, "Confidence Measures and a Search Guide in Speech Recognition", Ph.D. Dissertation, University of Miami, 2003
- Grayden, David, "An Integrated Knowledge-Based Approach to Unrestricted Speech Recognition", Ph.D. Dissertation, University of Melbourne, 1999
- Nocito, Carlos, "Network Condition Estimator for Voice Over IP Objective Quality Assessment", Master Thesis, University of Miami, 2011
- Lu, Guipeng, "Prosodic Modifications in Speech Synthesis and the Effects of Pitch Errors", Master Thesis, University of Miami, 2004
- Fahmy, Adel, "Text Prompted Speaker Verification Using Isolated Whole Word Hidden Markov Models", Master Thesis, University of Miami, 2002
- Veprek, Peter, "Framework for the Development of Speech Synthesizers", Master Thesis, University of Melbourne, 1996
- Jenkin, Karen, L., "Automatic Stress Syllable Classifiers and their Application in Continuous Speech", Master Thesis, University of Melbourne, 1995

Honors & Awards

- University of Miami, College of Engineering 2005 Research Paper Award Finalist for the Eliahu I. Jury Award for Excellence in Research, November 2005
- University of Miami Invention Recognition Award - UM04-23 for "High Capacity for Monophonic Audio Signals Using Differential Encoding in the Short-Phase Spectrum," November 2004
- The University of Miami, College of Engineering 2003 Winner of the Eliahu I. Jury Award for Excellence in Research, November 2003 for "Veprek, P., Scordilis, M.S., "Analysis, Enhancement and Evaluation of Five Pitch Determination Techniques," most downloaded paper from the Elsevier website in 2002)"
- University of Miami Invention Recognition Award, "Auxiliary Channel Masking in Audio Signals," February 2001
- NCR Research Fellowship; 1984 – 1986

Editorial Responsibilities

- Associate Editor, Journal of the Franklin Institute (2007-2015)
- Finance Chair and Technical Committee Member for the 2009 IEEE 13th Digital Signal Processing Workshop & 5th IEEE Signal Processing Education Workshop (DSP/SPE)
- Technical Reviewer and Session Organizer, 17th International Artificial Intelligence Research Symposium, FLAIRS 2004, Miami, Florida
- Technical Reviewer and Session Organizer, 5th European Conference on Speech Communication and Technology, Rhodes, Greece; Member of the International Scientific Committee; 1997
- Technical Reviewer and Session Organizer, 5th Intl. Conference on Spoken Language Processing Sydney, Australia; Member of the International Review Committee; 1998

Scientific Reviewing

Reviewer for several journals including: IEEE Transactions on Audio, Speech and Language Processing, IEEE Signal Processing Letters, Speech Communication, Signal Processing, Journal of the Franklin Institute, EURASIP Audio, Speech and Music Processing, MIT Press Computer Music Journal, Journal of the Acoustical Society of America, Informatica - An International Journal of Computing and Informatics, and others

Professional Associations

IEEE (Computer and Signal Processing Societies); Senior Member 2003; Member 1984
 The International Speech Communication Association (ISCA); Member 1989-2000
 Professional Engineer (P.E.): The Institute of Engineers, Australia; Member 1984
 Professional Engineer (P.E.): The Technical Chamber of Greece; Member 1996
 The Audio Engineering Society; Member 1998-2005

Selected Funded Projects

“Spoken database collection and channel modeling for automatic speech recognition retraining”, 12/15/2006-12-14/2007, IBM Corporation, December 2006 – August 2008

“SGER: Music Telepresence”, 11/12/2005-10/31/2006, National Science Foundation (NSF), November 2005.

“Multi-microphone long probe for otoacoustic emissions (OAE) acquisition”, The National Institutes of Health (NIH), May 2005

“Auxiliary channel masking in audio signals”, Watermark Technologies, May 2001

“Acoustic Compensation of Miniature Speakers in Hearing Diagnosis and Hearing Aid Applications”; Summer Award in Natural Sciences and Engineering, The University of Miami; Principal Investigator; Summer 2000

“High Speed, ATM Networking for Improving Quality of Service (QoS) in Multimedia Communications”; The National Science Foundation (NSF); Principal Investigator; June 1997 – May 1999

Selected Proposals

Restoration and enhancement of sound in old cinematographic records: Bridging the quality gap,” National Endowment for the Humanities (NEH), March 2012

“Robust glottal airflow signal enhancement with application to speech analysis and emotion classification across various languages,” 2012 Air Force Summer Faculty Fellowship Program, December 2011

“Innovative enhancement of monophonic cinematographic records using audio and image processing techniques for immersive viewing experience”, National Endowment for the Humanities (NEH), September 2011

“Center for Computational Audio & Hearing Research”, NSF Science and Technology Center preliminary proposal headed by the UM School of Music, May 2011

“Enhanced acoustic detection and localization of partial discharge sources in high-power electrical transformers”, Florida Power & Light Company (FPL), June 1, 2011

“Remote detection and monitoring of cardiopulmonary functions using an ultrasonic Doppler radar system”, Provost Research Award Application 2011, P.I., October 2010

“Intelligent Loudspeaker Arrays for Enhancing the Learning Experience in Classrooms with Students of Varying Hearing Capabilities”, Capital Foundation, P.I., June 1, 2010

“Robust Biometric Identification Based on Otoacoustic Emissions”, The National Institute of Justice, P.I., March 24, 2010

“A Telehealth System Based on Remote Voice Quality Analysis and Assessment”, University of Miami Telehealth Network Grant Program, P.I., 2010

“Speech processing for the aid of foreign language learning”, U.S. Department of Education, co-P.I. with Center of Latin America Studies, Spring 2010

“Monitoring Patient Rehabilitation Progress Based on Remote Speech Quality Analysis and Assessment”, University of Miami Interdisciplinary Research Development Initiative, July 2008

“Collaborative Research: Music Telepresence” with University of Rochester and Wright State University, National Science Foundation (NSF), November 2006

“Music Telepresence”, National Science Foundation (NSF), January 2005

“Acoustical Design of School Classrooms for Enhanced Education and Learning”, Mondialogo Engineering Award, United Nations UNESCO and DaimlerChrysler, October 2004. Phase I approved. Currently, Phase II pending

“Improving Resources for Instruction and Research in Audio Engineering”, National Science Foundation (NSF) CISE Minority Institutions Infrastructure Program - Planning Grant, February 2004

Robust Video Communications Design for Ad Hoc Wireless Networks for Defense and Civil Applications”, U.S. Air Force, co-P.I. (collaboration with Florida Institute of Technology and Wright State University), May 2004