David J. Rios ENT. 3340

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The Sonic Spectral To Nano-Vision Conversion Actuator

The conceptualization and implementation of a device that utilizes frequencies to enable sight is a rather unusual and radical proposition. The goal of such an enterprise is for this device, which I will name The Sonic Spectral To Nano-Vision Conversion Actuator (SSNVCA), to essentially and quite literally replace the need for the presence of our eyes to enable sight. Through the analyzation and sophisticated interpretations of sound waves within our surrounding environment, the device will process this information and coordinate all pertinent data between the inner ear cavity and the appropriate nerve centers of the brain to give us an imprint in our mind of what is contained within our environment. Through the course of this paper, I will elaborate on how the SSNVCA will function, how it will be designed, and elaborate on some of the inherent advantages that such an invention will bring to mankind.

First I will discuss the process of human haptic perception, which refers to tasks involving the active motor exploration of stimuli. Multisensory processing research has revealed that various cortical areas of the human brain which are responsible for processing specific aspects of visual input are also activated during analogous haptic or tactile tasks (tactile refers to tasks in which stimuli are applied to a skin surface). For example, the Positron emission tomographic (PET) test, a test where participants must determine the width of the grooves on gratings that are presented to the immobilized right index fingerpad, has indicated that a specific region of the visual cortex responds to a tactile analog of the relevant visual task, leading researchers to the conclusion that visual cortical activity might be independent of the sensory modality in which a task is presented, what seems to me to be the physical or actual seeing itself. The PET has uncovered selective activity for tactile discrimination of grating orientation in the left extrastriate visual cortex at a focal point that is very close to the parieto-occipital fissure, which is also known to be active during spatial imagery, where both vision and touch are prevalent. Through this haptic and tactile perception, we can systematically control the haptic signals/variables that constitute the stimuli and calibrate the data that these signals/ variables produce to feel or touch our environment with our auditory faculties. I believe that haptic devices can be integrated into the SSNVCA to serve as sensors and actuators for the facilitation of analyzing all haptically rendered analog that is received from our ears and sent simultaneously to our haptic cortical areas of the brain and the areas of the brain where sound vibrations from the inner ear are sent for internal processing.

This may all seem to be extremely far-fetched, but I am approaching this realm of haptic perception from the point of view that all analog sound is perceptible, at least in theory, to our nerve endings; we can feel all sonic wavelengths. The fundamental key is to calibrate with exact precision all analog input through haptic experiences in order to reconstruct the visual reality of our environment, not a virtual computerized version of reality. To do this, we must look to the central nervous system, where all elements involved with touch are coordinated. Our bodies are equipped with mechanoreceptors, from our joints and muscles to subcutaneous tissues within our layers of skin, and polymodal receptors, free nerve endings that react to thermal and/or painful stimuli. The first type of mechanoreceptor housed within the human body, Ruffini corpuscle, consists of one or several cylinders formed by flat perineural cells whose nerve terminals contain accumulations of mitochondria and empty vesicles. Functional Ruffini corpuscles are highly sensitive to the stretching of collagen fibres. Figure 1 below illustrates the left, middle and right cross sections through the second type of mechanoreceptor, Vater-Pacini corpuscles, with a length of up to 2 mm and a diameter of up to 1 mm. Cytoplasmic spines extend from the non-myelinated part of the axon

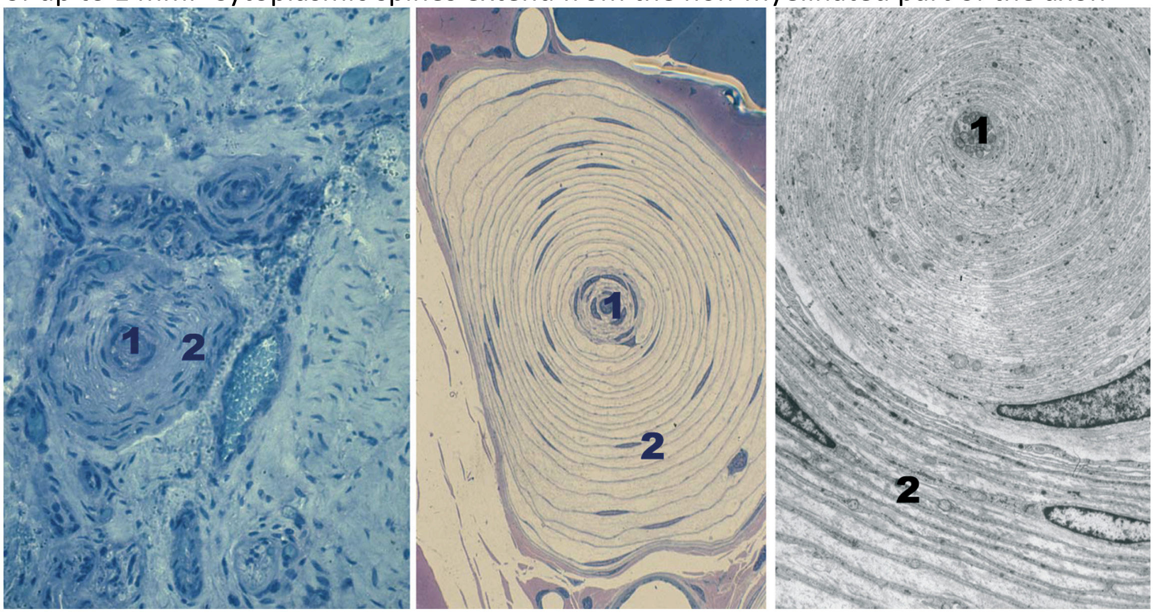
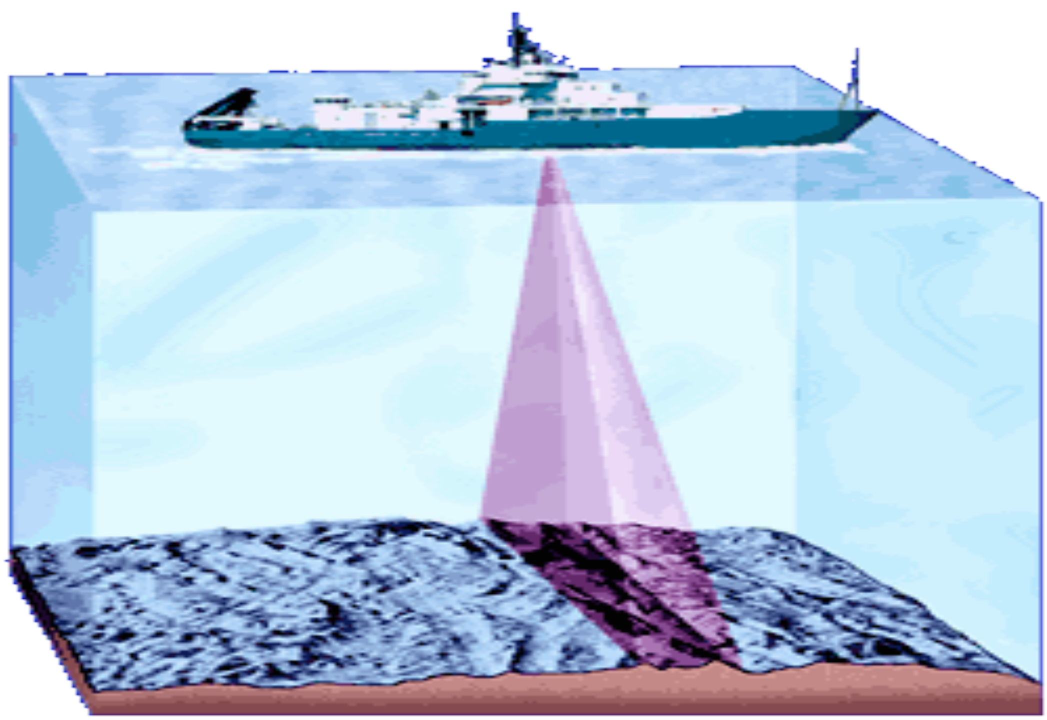


Figure 1. Vater-Pacini corpuscles: Cross sections through Vater-Pacini corpuscles
Left: Paraffin section of the fibrous layer of a joint capsule showing a Vater-Pacini corpuscle. (1) inner core, (2) perineural capsule. Magnification × 800.
Middle: Vater-Pacini corpuscle from the epimysium of hand muscles. (1) inner core with nerve terminal, (2) perineural capsule. Magnification × 1,200.
Right: Electron micrograph showing the central part of a Vater-Pacini corpuscle. (1) axon with inner core, (2) perineural capsule. Magnification × 6,000

anchoring between the lamellae of the inner core of the corpuscle. The axoplasm of the 'ball' and near the origins of the cytoplasmic processes contains accumulations of mitochondria and empty vesicles. The important thing to retain from all this is that these mechanoreceptors, nerve endings, joints, ligaments, and muscles are all connected to the spinal cord, where all stimuli information must travel to reach the brain and back to certain parts of the body where response to stimuli is designated accordingly. Therefore, it is imperative to the SSNVCA's design to incorporate an intricate interconnection network between the inner ear and spinal cord to establish an integration between our bodies nerve endings, mechanoreceptors and auditory hearing organs to further the quantification of analog input as visual or real-time imaging output.

One of the enormous benefits of the SSNVCA is that it will cure the blind. No longer will they have to live in darkness. Their other sensory organs, which include hearing, touch, taste, and olfactory sense, are more highly developed than a person who has eyesight, so this device will utilize these advantages and enable sight. Another fringe benefit of this technology is that everyone will be able to have 20/20 vision and better as long as their hearing organs and haptic mechanisms are functional and intact. However, I should now elaborate on how exactly analog soundwaves will effectively map out a terrain to include properties of mass of objects and people with precise three-dimensional rendering. Oceanographers use the technique of echo sounding to transmit and receive sound waves to map the ocean floor. The time it takes for the sound to travel through the ocean medium and back is employed to ascertain water depths. Furthermore, the echoing of different frequencies or multibeam bathymetry has been effectively used to map out large areas of seafloor with a great degree of



accuracy and detail. The SSNVCA will incorporate multibeam bathymetry to calculate the densities and minute details of a surrounding environment to include with 100% accuracy the advanced intricacies of all that is seen, or I should say heard, incorporating all frequencies that lie in the range of human hearing in addition to frequencies which are outside our range of hearing but which we can perceive or feel. For example, low range frequencies are known to bend around and even travel through objects and can be heard in a diluted sense on the other side of such objects. The time it takes for these frequencies to travel around and through these objects as well as their reverberant characteristics can be calibrated with our haptic perceptions to imprint within our mind the equivalent of sight, down to every single perceivable detail. But it gets even better than that because in addition to seeing the way our eyes see, we will also be capable of viewing everything on a molecular level to truly see into things and even through objects with limited visibility around and on the other side of them. Thus, the second fundamental key is to calibrate with exact precision all analog input through the implementation of sonic spectral examination for all frequencies to accurately and acutely reconstruct the visual reality of our environment.

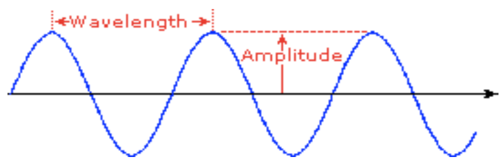
At this juncture, I should discuss something of extreme importance to this invention, the one thing that will put the SSNVCA over the top. I will include in my design an extraordinary offshoot frequency calculator that will adapt the measurements of frequencies in Hertz to values in nanometers(wavelengths). Yes, the inclusion of color information will be amalgamated from the sonic spectrum through a prism which will disperse all light information into nanometers which will complete the visual process that is the Sonic Spectral To Nano-Vision Conversion Actuator; almost. There is still the infrared and ultraviolet spectrum to consider. Here is a chart that includes all of the colors pertaining to the visible spectrum of light and their matching values in nanometers with infrared being too low in frequency and ultraviolet being too high in frequency to be perceptible to the human eye. Now, the measurements in Hertz that

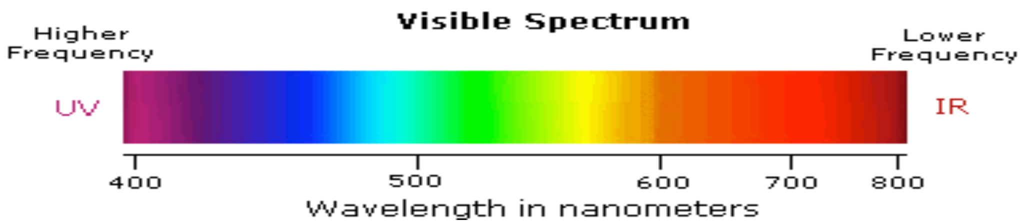
Violet: 400 - 420 nm **Yellow:** 570 - 585 nm

Indigo: 420 - 440 nm **Orange:** 585 - 620 nm

Blue: 440 - 490 nm **Red:** 620 - 780 nm

Green: 490 - 570 nm





are too low in frequency will be converted to infrared and enable exceptional night vision when the frequency calculator and the prism are configured accordingly. Should the need arise for ultraviolet light to be visible, the frequency calculator and the prism can also be configured to translate ultra-high sonic frequencies that are felt into UV light, although this is not recommended for more than very brief periods of time to avoid cranial overexposure to harmful radiations and inevitable lawsuits. In fact, this specific quadrant of the prism which contains UV information will in most cases have a built-in inhibitor chip that will minimize or even filter out these frequencies. Therefore, I will conclude by stating that the third fundamental key for the SSNVCA's optimal functionality is to calibrate with exact precision all analog input to include all light and color information through the implementation of the frequency calculator and the prism for all frequencies to accurately and acutely reconstruct the visual reality of our environment.