**Research and Critical Analysis**

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References:

Parsons, T., Gaggioli, A., Riva, G. (April 2017). Virtual reality for research in social neuroscience. *Brain sciences, 7(4)*. Retrieved from <http://search.ebscohost.com/login.aspx?direct=true&db=aph&AN=122753109&site=ehost-live>

The current innovations and advancements in social neuroscience developed an entire new view in the concept of social processes and our neurons in the brain. The research in this field consist of simple and constant spur that miss sometimes the details of our routine life activities and our social interaction with that. It is true that it is a qualitative research, but the increasing attentiveness in this research has allowed researchers to measure the emotional activities taking place with neurons. And in this research along with maintaining control in experiments, virtual reality’s possibilities are also focused. Virtual reality is a computer-generated scenario that gives us the reality experience. And it is a technology that describes a three-dimensional, computer generated environment which can be explored and interacted with and by a person. In this entire research, the technicality and features of virtual reality and how it works has been discussed and then the effects and possibilities of virtual reality on social neuroscience customs with some experiments.

As a professional in the fields of both virtual reality and neuroscience research, Thomas D., Andrea, and Giuseppe have authority on and investment in the field of virtual reality for research in social neuroscience that has been discussed in this article. Their knowledge for virtual reality for research in social neuroscience is sound and well-supported. This article is intending to research of effects and possibilities of virtual reality on social neuroscience. The possibilities in this field are immense and some advanced research has already been done in this field, but it requires to go ahead and achieve it. The experiments that have been already conducted and the small successes which has been received by the researchers, it works as a link in connecting them. Overall, this article illuminates the research about effects of virtual reality on neuroscience by providing valuable insight into a potentially overlooked connection in virtual reality for research in social neuroscience.

Zhou, W., Wang, J., Wang, K., Huang, B., Niu, L., Li, F., Cai, F., Chen, Y., Liu, X., Zhang, X., Cheng, H., Kang, L., Meng, L., Zheng, H. (May 2017). Ultrasound neuro-modulation chip: activation of sensory neurons in caenorhabditis elegans by surface acoustic waves. *Lab on a chip - miniaturization for chemistry & biology, 17(10)*. Retrieved from <http://search.ebscohost.com/login.aspx?direct=true&db=aph&AN=123077234&site=ehost-live>

Ultrasound neuro-modulation is becoming now a topic of discussion as a non-invasive method. In this research, entire work is going on a chip, which has an ability to commence reversal behavior and energizing neurons of C. elegance under the tonic of a single shot of short pulse ultrasound. Approx., 86% of worms respond to this ultrasound neuro-modulation chip. In vivo calcium, results depicts that the activity of a polymodal neurons (ASH), in C. elegance can be directly awaken by the ultrasound. And on the contrary sound, s thermal neurons cannot be initiated by the ultrasound at the same temperature and parameter when this initiating process is very tiny. So, the effects of the ultrasound are the reasons for neural behavior modulation.

Being a practitioner in the stream of ultrasound neuro-modulation, researchers in this field have supremacy on and contribution in the right of ultrasound neuro-modulation chip which is capable of initiating a reversal behavior. Their research in this technical field is supported by the National Natural Science Foundation of China, the China Postdoctoral Science foundation, the Shenzhen Basic Science Research and the Shenzhen Science and Technology Innovation Committee Grant, which shows the credibility about the research. This article is intending about responses of C. elegances to ultrasound stimulation on a neuro-modulation chip. Researchers in this research acknowledged the worth that has already been done in regards this connection, but explicitly states why this result is viable and realistic. In contrast with the customary ultrasound transducers, the feeble energy created by the chip is restricted along the exterior of the substrate, which enables the neuronal stimulation with a tiny contributed power. Overall, this article is about the device which is ready and compatible with electrophysiological recording and calcium imaging and so on which provides strong tool to research more about the working pattern of ultrasound neuro-modulation.

Herta, J., Koren, J., Fürbass, F., Zöchmeister, A., Hartmann, M., Hosmann, A., Baumgartner, C., Gruber, A. (July 2017). Applicability of neuro trend as a bedside monitor in the neuro ICU. *Clinical neurophysiology, 128(6)*. Retrieved from <http://search.ebscohost.com/login.aspx?direct=true&db=aph&AN=123015156&site=ehost-live>

The main objective in this research is to evaluate that ICU can read the EEG data and interpret it properly or not with the Neuro Trend algorithm with the focus on detection of seizure and sedation depth. There are different methods for it but in one experiment 18 nurses’ review was taken for 120 screenshots of Neuro Trend. And then Interrater and Multirater agreements were compared with the opinion of expert and it was computed for items like location and types of pattern, consistency of frequency, detection of seizure and sedation path. In the current study it has been found that Neuro Trend can be appropriate in bedside monitor and to decide the perfect sedation depth by ICU caregivers needs a more practice and instruction.

As a professional in the field of neuro science, authors have authority on and investment in the connection between Neuro Trend and EEG data in neuro monitor. Their knowledge about Neuro Trend is sound and well supported. The results in this research about Multirater and Interrater agreements were ideal interruption in recording, actions in rhythmic delta and so on. And a considerable corresponds was found for periodic discharges, electrographic seizure patterns, and seizure suspicion. But it got lower agreements in the cases of whose level of sedation is 41.10% and frequency’s consistency is around 47.47 to 79.15%. But overall we can say that in the case of ICU patients, in reducing cEEG’s workload, computer algorithms can be greatly helpful.

Nikita A. (December 2017). Developing a neurochip to replace damaged brain areas. Retrieved from: [http://neurosciencenews.com/brain-damage-neurochip-8111](http://neurosciencenews.com/brain-damage-neurochip-8111e)

Brain is a very important part of not only our body but also for life. And to protect it from getting damaged and if get damaged, then to replace that damaged part of the brain, researchers in Lobachevsky university are developing a neurochip. And in the experiments of this neuro research, the initial results reported by researchers were positive and they got success in transmitting signals from artificial to neurons and devices can be used with this neurochip for replacing the damaged part of the brain.

As a professional in the field of brain damage and neuro chip research, researchers of Lobachevsky university have authority on and investment in the field of Neurochip for replacing damaged brain area that has been discussed in this article. Their knowledge for replacing damaged part of brain by the Neurochip does not need others recommendation because the experiments they have conducted and the success that they got, is enough for proof. The possibilities in this field are immense but though it requires to go ahead and achieve it completely. The experiments that have been already conducted and the small success which has been received by the researchers, it works as a link in connecting them. Overall, this article illuminates the research about the mechanisms of replacement and transmission of signals from one neuron to another. Like, in the case of nature of paralysis in humans, with the help of this neurochip, it is possible to restore the lost transmission.

Hayley D. (November 2017). New way to write magnetic information may pave way for hardware neural networks. Retrieved from: <http://neurosciencenews.com/neural-network-megnetism-7999>

The current innovations and advancements in neural networks developed an entire new view in the concept of writing magnetic information for hardware neural networks. Composing attractive examples onto nanowires could enable PCs to better copy how the mind forms data, another investigation reports. Registering frameworks that are intended to process data in comparable approaches to our brains are known as 'neural networks.'

Being a practitioner in the stream of neural networks and magnetic information, researchers in this field have supremacy on and contribution in the right of finding new ways to write magnetic information which can make an easy way for hardware neural networks. Their research in this technical field is supported by the Imperial college London, which shows the credibility about the research. This article is intending about the new written method that researchers from Imperial College London have found, varieties of attractive nanowires might have the capacity to work as hardware neural networks – possibly more effective and proficient than programming based methodologies. Overall, this article is about the technique that could be utilized to think about basic parts of complex frameworks, by making attractive states that are a long way from ideal and perceiving how the framework reacts.

Elaine S. (October 2017). Advanced artificial limbs mapped in the brain. Retrieved from

<http://neurosciencenews.com/artificial-limb-brain-mapping-7822>

The main objective in this research is focused on motor and sensory re-innervation, a technique that reroutes leftover limb nerves to in place muscles and skin in amputees, the cerebrum remaps both engine and tactile pathways. Furthermore, specialists note, TMSR may help check ineffectively adjusted cortical versatility following removal. In this research the questions like how does the cerebrum encode and coordinate such simulated touch and developments of the prosthetic limb and how does this effect our capacity to better incorporate and control prosthetics have been discussed.

As a professional in the neuroscience field, EPFL scientist are invested in the study of advanced artificial limb and, as such, are very qualified to speak to the issues facing artificial limbs in the brain. Their knowledge about these limbs in the brain is sound and well supported, which went in depth of more knowledge into the nature and the reversibility of cortical pliancy in patients with removals and its connect to limb appendage disorder and torment. The discoveries give the main point by point neuroimaging examination in patients with bionic appendages in light of the TMSR prosthesis, and demonstrate that ultra-high field 7 Tesla fMRI is an extraordinary apparatus for concentrate the upper-appendage maps of the motor and somatosensory cortex following removal.

At long last, the investigation additionally demonstrates that there is a need of further building advances, for example, the coordination of somatosensory criticism into current prosthetics that can empower them to move and feel as genuine appendages.

Jing T., Nan Q., Yan C., Yupu D., Yiliguma, Zhexuan W., Tian X., Min J., Jiayi Z., Gengfeng Z. (March 2018). Nanowire arrays restore vision in blind mice. *Nature Communications 9.* Retrieved from: <https://www.nature.com/articles/s41467-018-03212-0>

The reclamation of light reaction with complex spatiotemporal highlights in retinal degenerative infections towards retinal prosthesis has turned out to be a significant test over the previous decades. In this, roused by the structure and capacity of photoreceptors in retinas, we create counterfeit photoreceptors in view of gold nanoparticle-improved titania nanowire exhibits, for rebuilding of visual reactions in the visually impaired mice with worsened photoreceptors. Green, blue and close UV light reactions in the retinal ganglion cells (RGCs) are reestablished with a spatial determination superior to 100 µm. ON reactions in RGCs are hindered by glutamatergic enemies, recommending useful conservation of the staying retinal circuits. Moreover, neurons in the primary visual cortex respond to light after subretinal implant of nanowire arrays. Improvement in pupillary light reflex suggests the behavioral recovery of light sensitivity. Our study will shed light on the development of a new generation of optoelectronic toolkits for subretinal prosthetic devices.

Here, in this article scientist have believed that their new study could open new treatment options for people at risk of long-term visual degeneration. Their work could be helpful in the development of a new generation of optoelectronic tool kits for sub-retinal prosthetic devices in human patients. The researchers say that they are now improving the nanowire arrays’ sensitivity and their response to the color red. They will also perform more experiments that measure the visual acuity in mice with degenerated retinas.

Mateo C., Ali A., Konstantin S. (July 2013). Near infrared technology in neuroscience: past, present, and future. *Page 605-614.* Retrieved from: <https://www.tandfonline.com/doi/abs/10.1179/174313209X383286>

Utilitarian close infrared spectroscopy (fNIRS) is a rising practical neuroimaging innovation offering a moderately non-obtrusive, sheltered, convenient, and minimal effort technique for aberrant and direct observing of mind action. Most energizing is its capability to permit all the more biologically legitimate examinations that can make an interpretation of research center work into more practical regular settings and clinical conditions. Our point is to familiarize clinicians and scientists with the special and useful attributes of fNIRS by auditing its relative benefits and restrictions opposite other mind imaging advances, for example, practical attractive reverberation imaging (fMRI). We survey cross-approval work amongst fMRI and fNIRS and examine conceivable reservations about its organization in clinical research and practice. At long last, on the grounds that there is no exhaustive audit of utilizations of fNIRS to cerebrum issue, we likewise survey discoveries from the few examinations using fNIRS to research neurocognitive procedures related with neurological (Alzheimer's illness, Parkinson's malady, epilepsy, horrendous mind damage) and mental issue (schizophrenia, state of mind issue, tension issue).

Regardless of astounding advancements in the NIRS innovation and demonstrated unwavering quality of the cerebral oxygenation observing methodology, TCCO remains for the most part an adjuvant instrument for neuroscience applications. Newer NIRS technologies have become a source of quantitative information about brain oxygenation, cerebral blood volume and flow. Nonetheless, the clinical essentialness of this new data with regards to clinical neuroscience should be resolved and assist approval studies should be performed.

Lyric J., William N., David A., Cornelia B., Emery B., Karl D., John D., Kathy H., Geoffrey L., Peter M., Eve M., Richard N., Joshua S., Mark S., Terrence S., David T., Roger T., Kamil U., John W. (March 2015). The brain initiative: developing technology to catalyze neuroscience discovery*.* Retrieved from: <https://www.nature.com/articles/s41467-018-03212-0>

The advancement of the field of neuroscience has been moved by the approach of novel innovative capacities, and the pace at which these abilities are being created has quickened drastically in the previous decade. Gaining by this energy, the United States propelled the Brain Research through Advancing Innovative Neurotechnology (BRAIN) Initiative to create and apply new apparatuses and advancements for upsetting our comprehension of the mind. In this article, we survey the logical vision for this activity put forward by the National Institutes of Health and talk about its suggestions for the eventual fate of neuroscience investigate.

We are at a novel point in the field of neuroscience technology where technological advancements has made potential outcomes for disclosures that could in total prompt a transformation in our comprehension of the mind. It is inside reach to portray all type of cells in the sensory system, and to create devices to record, stamp and control these unequivocally characterized neurons in the living mind. We ought to grab the test of recording dynamic neuronal movement from thickly examined—and in some experiments finish—neural systems, over drawn out stretches of time, in every aspect of the cerebrum, in both mammalian frameworks and assorted model living beings. By straightforwardly enacting and hindering neurons in a behavioral setting, neuroscience is advancing from perception to causation, and significantly more is conceivable. These much research, data, theory and numbers are improving and assisting our comprehension of complicated, nonlinear cerebrum capacities where human instinct get crashed.

Paul M., Jacqueline H., Jon S., Courtney S., Jonathon S., Zachary T., Raviraj N., Dylan B., Michael D., Dan B., Satinder G., Brett M., Rafael G., Madeline N., Jason C., Beth O. (March 2018). Illusory movement perception improves motor control for prosthetic hands. *Vol. 10, Issue 432, eaao6990.* Retrieved from: <http://stm.sciencemag.org/content/10/432/eaao6990>

To complete an international movement without any difficulty, we need to keep providing

feedbacks to the brain about our movement’s progress. To a great extent non-cognizant sensation sense causes the mind to learn connections between engine charges and results to amend development blunders. Prosthetic frameworks for reestablishing capacity have transcendently centered around controlling mechanized joint development. Without the sensation sense, nonetheless, these gadgets don't turn out to be instinctively controllable. We report a method for endowing human amputees with a kinesthetic perception of dexterous robotic hands. Vibrating the muscles used for prosthetic control via a neural-machine interface produced the illusory perception of complex grip movements. In a few minutes, three amputees coordinated this sensation input and enhanced development control. This criticism approach for shut circle control opens a pathway to consistent coordination of brains and machines.

In this article analysts are presenting a framework that reproduces alleged sensation observation and fundamentally enhances the skill of people utilizing hand prostheses. Their innovation includes vibrators that fortify the muscles that are utilized to control the development of prostheses. As the fingers of the gadget are opened and shut, vibrations are initiated, the nature of which uncovers to the client where their hand is. Also, the people encountered a more noteworthy "feeling of agency" with respect to their gadgets, additionally helping them to have an instinctive, regular feeling of the prostheses.