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"INTELLECTUAL PROPERTY BATTLES IN BRAIN-COMPUTER INTERFACES: NEURALINK VS. COMPETITORS"

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ABSTRACT

Neurotechnology, including brain-computer interfaces (BCIs), represents one of the most promising areas for future inventions. This paper explores the intellectual property regime governing BCIs, with an emphasis on key innovators (such as Neuralink) and their rivals. The analysis covers doctrinal aspects of intellectual property law, including patent subject-matter eligibility, patent novelty, and the inventive step, as well as trademark law. For instance, we will explore how the recent U.S. Supreme Court decisions on patentability (such as Alice Corp. v. CLS Bank) and obviousness (KSR Int'l Co. v. Teleflex), as well as Section 3(k) of the Indian Patent Act, influence neural devices. The issues discussed include such important cases as ***Lava International Ltd. v. Telefonaktiebolaget L.M. Ericsson***[1](Delhi High Court 2024). The current state of research lacks doctrinal studies on BCI IP law, although many relevant patent applications were filed.[2] Research questions include, among others: "Is it possible to patent decoding algorithms used with neural signals currently?" and "How should the IP doctrine address both innovation incentives and ethics and privacy issues?" Regarding methodology, this paper provides a comparative doctrinal analysis of American and Indian legislation, supported by technological sources. The argumentation includes the conclusion that, although being flexible, the current framework for Intellectual Property rights still leaves gaps

[1]*Lava Int'l Ltd. v. Telefonaktiebolaget LM Ericsson, CS(COMM) 65/2016, 2024: DHC:2698 (Del. HC, Mar. 28, 2024).*

[2] *Anastasia Greenberg, Alexis Cohen and Monica Grewal, "Patent Landscape of Brain-Machine Interface Technology" Springer Nature Research Communities, Oct. 8, 2021, available at: https://communities.springernature.com/posts/patent-landscape-of-brain-machine-interface-technology (last visited on May 6, 2026).*

concerning neural technology and BCI specifically, such as neural data might not be clearly classified as protected data and inventions in patenting legislation. Proposed policy recommendations include specific changes, like establishing new guidelines for neurotech patent applications in the USPTO and protecting neural data through privacy regulations. As a result, this interdisciplinary work demonstrates how aligning Intellectual Property doctrines to the specifics of BCIs would ensure innovations and their social utility.

INTRODUCTION

A brain-computer interface (BCI) is technology that helps create a connection between the brainwaves and the outer world. Numerous ventures have been established by businessmen, including Neuralink, created by Elon Musk. With the evolution of BCIs from science-fiction concepts into reality, many legal aspects have emerged. On the one hand, patents play an important role in stimulating investment in BCIs. On the other hand, many new issues emerge, such as whether the process of thought interpretation through algorithms can be patented. Moreover, as companies seek to create brands (Neuralink uses trademarks such as 'Telepathy'), numerous trademark battles will emerge. This paper will explore the problem of Intellectual Property Battles in BCIs: Neuralink vs. Competitors and analyse how current doctrines (such as patents, trademarks, and trade secrets) need to adapt to neurotechnology's. Some examples include the ***Alice Corp. v. CLS Bank***[3] case in the USA and the ***Lava Int'l Ltd. v. Telefonaktiebolaget*** L.M. Ericsson case in India. Thesis statement: Brain-Computer Interface devices show cracks in existing Intellectual Property laws. The criteria used in deciding the eligibility or the patentability of an invention or its obviousness can be problematic when applied to the neural device or brain processing algorithms. Also, due to the intersecting legal regimes that exist because of the diverse range of BCIs, from medical to software or personal data, a thorough examination of legal doctrines coupled with policy changes is necessary.

The structure of the paper looks like the following. Following this introduction, Section II analyses academic and legal literature on BCI IP problems, underlining that most of modern works pay special attention to the ethical and privacy concerns rather than provide detailed legal analyses of the existing patents, copyrights or trademarks. Section III sets our Research Questions, for example, whether neural decoding techniques could pass the Alice test; whether

[3] *Alice Corp. Pty. Ltd. v. CLS Bank Int'l, 573 U.S. 208 (2014).*

there could be an application of competition law principles or even FRAND, if BCI standards are created. Our methodology is described in Section IV and will involve doctrinal research and comparative law techniques.

The main body (Section V) consists of five parts as follows:

1. patentable subject matter in relation to BCI (both American and Indian law);
2. novelty/inventive step (KSR test and the Indian seven-stambha technique);
3. BCI standards and their FRAND obligations (considering the decision in Lava v. Ericsson);
4. Trademark protection and branding, exemplified by the Neuralink "telepathy" case E) trade secrets and data privacy considerations. Critical analysis of our findings will be provided in Section VI. Section VII suggests policy recommendations, namely, some legislative changes (guidelines for examiners, special laws on neurotechnology, etc.) to address existing doctrinal gaps.

LITERATURE REVIEW

Some academic and industry interest exists regarding BCI technology, but the study of the doctrines of intellectual property is relatively underdeveloped. Research highlights the exponential growth of patents in relation to BCI technology. According to Grewal et al. (2023), the number of brain-machine interface patent applications increased exponentially, from one application in 1984 to more than 500 applications in 2020, whereas most of the patent applications relate to the U.S., followed by China and Europe.[4] Although legal analysis has touched upon the moral and privacy aspects of BCI use, very little information has been provided on intellectual property rights issues. This was noted in an article published by the Cardozo Arts & Entertainment Law Journal, which stated that "raw brain data" is considered a natural phenomenon that cannot be patented under Section 101.[5] Asian and Indian sources highlight particular issues: when "multiple people's thoughts" are integrated in a BCI invention, an Asian IP article disputes inventorship and authorship.[6] The issues associated with Sections 3(k) (software) and 3(i) (medical procedures) of the Patent Act, 1970, have been highlighted

[4]*Supra note 2*
[5]*Kayla Flanders, The Legal Vacuum in Cognitive Privacy and Brain Data, Cardozo Arts & Entertainment Law Journal Blog (May 2, 2025), https://cardozoaelj.com/2025/05/02/the-legal-vacuum-in-cognitive-privacy-and-brain-data/*
[6]*Excel V. Dyquiangco, Brain Interfacing, Copyright and the Patent System, Asia IP (Feb. 28, 2022), https://asiaiplaw.com/article/brain-interfacing-copyright-and-the-patent-system*

by IP bloggers in India as a "double-deadlock," which makes it difficult for BCI innovations to receive protection.[7] The only relevant litigation concerning patent law and technology in India is that of telecoms, particularly the case of Lava International Ltd. vs. Ericsson.[8]

Even though there is some interest in the issue, there are still several missing parts that need to be mentioned. The existing body of research fails to establish a connection between legal principles and actual cases involving BCI. There are also very few studies on BCI outside of the U.S., while there is no mention at all about the use of trademark law in terms of BCI marketing8. The topic of trade secrets was also not analysed.[9]

RESEARCH QUESTION

1. Are BCI inventions (particularly, algorithms for deciphering neural activity) patentable under the laws of the United States and India currently? What is the relevance of the Alice decision (abstract ideas) and India's Section 3(k) (computer programs per se)?

2. Considering the accelerating pace of technological convergence, at what point would an innovation in the BCI area be considered obvious according to KSR v. Teleflex or India's inventive step criteria (e.g., "Seven Stambhas")?

3. Is there potential for BCI technology to fall into the category of standard essential patents? How can FRAND licensing conditions (such as Lava v. Ericsson) affect BCI innovations?

4. What is the legal status of brain-derived information and algorithms - whether patentable or trade secret, or something else?

5. In light of these legal issues, how should patent regulations and other IP laws be modified to better fit the BCI industry?

[7] *Cheran S., The Indian Legal Challenges of Brain-Computer Interface Patents and Data Privacy, Khurana & Khurana (Dec. 2, 2025),https://www.khuranaandkhurana.com/the-indian-legal-challenges-of-brain-computer-interface-patents-and-data-privacy*
[8] *Simranjeet, Delhi High Court Awards Rs 244 Crore Damages to Ericsson Against Lava for Patent Infringement, SCC Online Blog.*
[9] *Will Knight, Neuralink's Bid to Trademark "Telepathy" and "Telekinesis" Faces Legal Issues, WIRED*

METHODOLOGY

This paper uses doctrinal legal analysis and comparative methodology. Relevant statutes are considered, such as 35 U.S.C. §§101, 103, and India's Patents Act, sections 3(k), 3(i). American case law from the U.S. Supreme Court, such as ***Alice Corp. v. CLS Bank*** and ***KSR v. Teleflex,*** provides the guiding principles for subject-matter eligibility and obviousness.[10] Indian case law, such as ***Lava Int'l v. Ericsson*** and recent patent cases involving algorithms, will be used to understand how these problems are handled in Indian courts. Secondary literature includes commentaries, law review articles, and tech policy reports on neurotech.

In addition, we examine industry literature (such as patent landscape analysis) to determine the competitive climate. We adopt an interdisciplinary approach, incorporating technological considerations (how BCIs work), where necessary, to comprehend the relevant legal principles, but focusing on legal logic and judicial analogy.

PATENT ELIGIBILITY OF BCI INNOVATIONS

Typically, BCIs utilise software applications capable of converting brainwaves into actions. As far as §101 is concerned, software-based patents need to clear the hurdle of abstract ideas. As per Alice's framework, one needs to first ascertain whether a patent application is claiming something abstract; if so, the next step involves determining whether there is any "inventive concept" capable of transforming it into statutory subject matter. The algorithm used to decode brain waves could be considered akin to a "fundamental building block of human ingenuity" or even an "idea itself." According to Alice, merely abstract ideas (such as performing certain mental tasks like decoding certain brainwaves) without any concrete practical application would not qualify. Usually, courts require that "significantly more" result from software operations than simply applying the abstract idea. For instance, in Alice, performing a generic escrow transaction via computers did not suffice.[11]

India, under Section 3(k) of the Patents Act, states the following regarding computer programs: "the mere statement of a computer programme per se or mathematical methods as such." In the

[10] *KSR Int'l Co. v. Teleflex Inc., 550 U.S. 398 (2007).*
[11] *Supra note 2*

case of ***Lava Int'l Ltd. v. Ericsson,*** the Delhi High Court adopted a narrow interpretation of the above rule by stating that although inventions incorporating algorithms were not automatically excluded from patentability, they would not qualify for protection if they comprised a simple computer program running on general-purpose hardware. The High Court made it clear that an application cannot be dismissed as a "computer programme per se" when it results in a "further technical effect." This shows that under Indian patent laws, a technical contribution must be added to the abstract idea, similar to the United States after Alice Corp.

Patent claims relating to BCIs that simply say "using computer X to decode brain signals" would likely be excluded; however, if the claims provide new hardware designs or signal processing techniques, then these would be patentable under Indian law.[12]

Furthermore, some BCIs have medical uses. India has an exclusion for diagnostic or therapeutic methods for treating humans under Section 3(i). In such a case where the BCI is applied for therapeutic purposes, such as for neural stimulation (e.g., an implant for seizure prevention), then it would be excluded from protection. The U.S. patent system does not have a specific "medical methods" exclusion, although medical methods of physicians may be non-patentable if there is no commercial purpose. To conclude, in both cases, patent applications for BCIs are granted provided they claim the device itself or its enhancement, rather than any theoretical conception. In accordance with Alice, a patent claim for "a brainwave classifier" requires a new application or inventive algorithmic methods that go beyond just the correlation between the two entities. As pointed out by scholars, correlations of raw brain data are comparable to natural processes and, thus, are unpatentable per se.[13]

NOVELTY AND INVENTIVE STEP

However, for patents related to BCI, even if the criteria have been satisfied, a patent will not be granted if it fails to meet novelty requirements and the requirement of being non-obvious. Obviousness, according to U.S. §103, when interpreted by ***KSR Int'l Co. v. Teleflex Inc.,*** is very lenient. It discarded all mathematical formulations like the Federal Circuit's TSM test in favour of the "common sense" interpretation, whereby a patent application can be considered

[12] *Supra note 8*
[13] *Kayla Flanders, The Legal Vacuum in Cognitive Privacy and Brain Data, Cardozo Arts & Entertainment Law Journal Blog (May 2, 2025),* https://cardozoaelj.com/2025/05/02/the-legal-vacuum-in-cognitive-privacy-and-brain-data/

obvious if a person of ordinary skill can see that the combination of prior art elements is obvious. Therefore, any small improvements on BCI devices can potentially become the subject of an obviousness objection.

Indian law also demands inventiveness as stipulated in Section 2(1) (ja) and Section 15(1). According to ***Lava v. Ericsson,*** Indian Courts use a "Seven Stambhas" framework while assessing novelty and multifactor approaches such as the TSM test and problem-solution test in relation to inventiveness. There is a clear distinction made by the Court between novelty and non-obviousness, and it asserts that a mere combination of prior-known things must necessarily entail an element of incentive to motivate. From the perspective of BCI patents, many components (for example, microelectrodes, amplifiers, and algorithms) have been previously used in neurology and signal processing. It will be incumbent upon BCI patent applicants to prove any novel results or improvements (highly accurate signal processing or low energy consumption).[14]

In other words, the threshold is quite high. In Neuralink's very patent filing, for instance, they have to sufficiently describe how their technology differs from existing brain-computer interface technology. It is interesting to note the ABA's discussion on how the mere execution of software without any new hardware is non-patentable under Section 3(k), based on the Indian case of the BlackBerry Appeals.[15] On the other hand, it is important to emphasise that there must be validation of any technical effect achieved from the improvement of their device. Adding something to the device, whether electrodes or additional processing, can be considered an invention.

STANDARDS, FRAND, AND SEP ISSUES

The competition surrounding wireless technology included conflicts related to standard-essential patents (SEPs) with FRAND conditions. Brain-computer interfaces (BCIs) do not currently have any international technical standards applied to them but could develop them (such as data encoding and communication protocols). In case a group developed international standards around some specific neural interface components, SEP negotiations would happen.

[14] *Simranjeet, Delhi High Court Awards Rs 244 Crore Damages to Ericsson Against Lava for Patent Infringement, SCC Online Blog.*
[15] *Aakriti Vadehra, Cracking the Algorithm: Blackberry's Patents Battle Section 3(k) in India, American Bar Association (2025).*

For example, in ***Lava v. Ericsson***, the defendant sued the plaintiff for violation of eight SEPs related to telecom industry standards and demanded a FRAND license agreement. According to the judgment of the Delhi High Court, refusal to enter into negotiations regarding FRAND conditions may be grounds for liability. Thus, the hypothetical scenario where a dominant BCI patent owner refuses to provide licensing for a vital protocol could constitute bad faith on their part. Although BCI standards are speculative, there is a definite lesson to be learned with regard to IP protection in nascent technology. Patent owners may be subject to pressure from both the general public and regulators to license on a broad basis in cases where an IP owner has a monopoly over the standard used by the technology. As a means of protecting against infringement of a patented technology, an owner might seek an injunction instead of offering FRAND licenses to infringers. However, in the EU, SEP holders must first offer a license according to the ***Huawei v. ZTE***[16] doctrine before obtaining an injunction.

TRADEMARKS AND BRANDING

Apart from patent disputes, trademark issues may come up when the brand name of the device becomes an issue. For example, Neuralink filed a trademark for "Telepathy" and "Telekinesis," which was rejected by the USPTO as an independent inventor previously applied for those trademarks with the intent to use them. This is known as a priority dispute, whereby the one who filed the first application has better rights under the Lanham Act. If Neuralink uses the name "Telepathy" after another person registers it, Neuralink may run into problems with infringement. Resolving that would require negotiations or lawsuits to establish likelihood-of-confusion: if Neuralink's BCI devices may cause consumer confusion with Telepathy Labs products, then the trademark application may be denied. [17]

Here, trademark law functions normally, and this is reflected in the USPTO refusal letter that cites prior trademarks and registrations. What matters to BCI is that brand protection is governed by the same legal principles as those applicable in other industries. Unique names such as "NeuroLink" can potentially be protected by trademarks, yet common words (like "Brain Adapter") might not work out well. For example, Neuralink will likely be engaged in

[16] *Huawei Techs. Co. Ltd. v. ZTE Corp., Case C-170/13, ECLI:EU:C:2015:477 (CJEU July 16, 2015).*
[17] *Emily Mullin, Neuralink's Bid to Trademark "Telepathy" and "Telekinesis" Faces Legal Issues, WIRED (Sept. 4, 2025),*

such branding IP fights, where success will depend on the application of common trademark law (15 U.S.C. §1052).

TRADE SECRETS AND NEURAL DATA

Developers of BCI technology must also rely on proprietary algorithms and data. Data from the neural system (such as training data that associates neural activity with intent) would have incalculable value as trade secrets. While inventions may be patentable, data, which cannot be patented, is not protected by any other form of intellectual property law because it qualifies as a "natural correlation." In contrast to a patent, a trade secret is subject to independent discovery and reverse engineering. Without any form of legal protection, privacy law becomes relevant.

In some jurisdictions (such as California), brainwaves are increasingly becoming categorised as highly confidential personal information. Currently, the only way for firms to handle this type of information is through contractual agreements and confidentiality provisions.

Regarding intellectual property, there is an emerging area of uncertainty regarding whether brainwaves can be considered intellectual property. According to the Times of Israel blog, this is problematic because the brainwaves generate ideas that do not align with conventional intellectual property ownership, since the "human mind" cannot be an author.[18] While the focus of this paper has been on patents and trademarks, it should be noted that the courts have yet to recognize a person's thoughts as intellectual property. Instead, it is the technology that engages with these thoughts that may be eligible for protection.

COMPARATIVE ANALYSIS AND GAPS

Comparison between the two regimes shows that despite convergence, there are some differences. The existence of a 'technical effect' is essential for patenting software in both countries, but in India's case, the per se exclusions are clearer than in the United States, which depends upon the precedent of case laws. With respect to the inventive step, it can be said that in the case of the U.S. post-KSR, there is a trend of increasing claims of obviousness, whereas in India, tests such as multi-factor analysis are followed. In all, the analysis suggests some degree of uncertainty. For one thing, it is unknown to what extent Alice will be extended to

[18] *Vincent James Hooper, Neuralink, BCIs and the Law: Protecting Mental Privacy, Autonomy and Human Rights, Times of Israel Blogs,*

cover neural algorithms because there has been no court ruling on anything that resembles BCI. Furthermore, no Indian court has adjudicated any patents pertaining specifically to BCI, so inventors are left wondering how 3(k)/(i) would apply in their cases. In trademark law, too, there appear to be no uncertainties, except when there are new trademarks to deal with.

POLICY RECOMMENDATION

Guidance should be provided by the patent office regarding neuro technologies. The USPTO could specify how current guidelines should be interpreted when dealing with "brain signal processing." One option could be to embrace the concept of "technical effect," as is done in Europe. In India, it would be wise to provide more guidelines under Section 3(k), such as accepting patents on computer-implemented devices when there is proof that such technology solves a technical problem (like the Delhi High Court did in Lava).

"Neural data" should be treated as its own distinct category by governments. This could entail modifying existing laws that address privacy issues (such as HIPAA or GDPR) to include explicit protection for neural activity data, which would necessitate obtaining consent from patients and restricting the use of brainwave data for business purposes.

Open standards for BCIs (interoperability of BCI devices) may be incentivized by policymakers. In case technical standards develop, regulators must ensure that FRAND commitments are made to avoid monopoly in key BCI interfaces. Telecom SEPs case law indicates that good faith negotiations for licenses are needed, and injunctions must be avoided without license offers. In light of the intricate nature of BCI technology, governments could consider supporting open research initiatives or creating patent pools to ensure the sharing of core knowledge and not fall into the trap of patent thickets, which tend to impede innovation.

CONCLUSION

Neuralink and others are venturing into a new realm where mind and machine intersect. In this paper, we have seen that using the prevailing IP doctrines for BCI innovations poses significant hurdles. Patent law's criteria for determining patentable subject matter, abstract ideas, and obviousness will be put to the test in cases involving brain signal decryption. Trademark law will continue to analyse products using established methods, but will need to accommodate the introduction of new product classifications. Significantly, data from the brain is both

intellectual property and personal data. Through our analysis, we see that both U.S. and Indian laws fail to consider the BCI framework. The proposed reforms from patent reformations to the protection of neural data are meant to ensure coherence between law and technology.