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INTELLECTUAL PROPERTY LAW OFFICES | PATENT & TRADE MARK ATTORNEYS

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Navigating the deep tech frontier in the life sciences innovation

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Deep tech in life sciences

- Intellectual property in the field of life sciences is central to the development and commercialization of these innovations.
- In the field of life sciences, this could mean a unique use or a new way of using, a particular nucleotide sequence, protein sequence, or creating a multifunctional recombinant sequence, a new laboratory method to an age-old scientific technique (Molecular biotechnology).
- Patents encourage industrial and economic growth to a company/ individual and a country, by releasing intellectual property to the public, thereby allowing companies/institutions to invent using patents, through licensing, and around patents, by learning from the information disclosed in the patents and then the creating novel ideas and concepts.



Emerging & growing Opportunities

- The life science industry is highly competitive, as emerging technologies such as :
 1. Agrochemical Industry
 2. Pharmaceutical Industry
 3. Operational technologies
 4. Skin care formulation
 5. Recombinant Molecular Biotechnology
 6. Genetically modified plants and crop varieties
 7. Smart Watches to record all parameters for patients

Applications in deep tech

- Personalized medicines
- Drug Discovery and Manufacture
- Robotic Surgery
- Supply Chain Management and Logistics
- Next-generation of Radiology Tools
- Expanding Healthcare Access in Developing Regions
- Diagnosing of Diseases

Examples of applications

- **Precision Medicine** : Companies such as Foundation Medicine develop, manufacture and sell genomic profiling assays based on next-generation sequencing technology.
- **Drug discovery** : The Medicines Discovery Catapult, is testing an *in silico* (i.e. on a computer) pipeline for identifying new molecules for cancer treatment, for example, applying AI to find new disease ‘drivers’ and candidate drugs for lung cancer.
- **Synthetic Biology** : Neural networks (used in AI) in particular are great at applications that depend on sequential data such as DNA sequence data. Biofacturing companies, such as **Zymergen**, are exploiting protein structures, such as those produced by DeepMind relating to microbes (e.g. organisms like E. coli), and using them to make products with biology.

Examples of applications

- ***Diagnostics*** : Companies such as Brainomix specialise in the creation of AI-powered imaging biomarkers that enable precision medicine for better treatment decisions.
- ***Miniaturized medical hardware and robotics*** : Making use of advanced AI techniques, scientists in the US have developed a tiny camera the size of a coarse grain of salt that takes full-color images that are as good as ones taken with camera lenses 500,000 times larger in size – which may have real world use, for example in diagnostic imaging.
- ***Neurotechnology*** : CoMind is working on next-generation non-invasive brain-computer interfaces which will help to develop and improve understanding of the human brain and neurological disorders.

Scientific Researches

Example 1: TeraLumen

- TeraLumen was founded in 2019 by a technology driven motivated team.
- The company works for developing compact terahertz system at an affordable cost.
- TeraLumen has developed India's first intraoperative device for accurate and rapid cancer margin detection. The device combines state-of-art Terahertz technology along with Advanced Machine Learning algorithms to differentiate between benign and malignant tissues.
- The surgeons can visualize the cancer margin inside the operation theatre instead of transferring the tissues to the histopathology lab.
- The device has higher sensitivity and specificity; helps in taking quicker decisions without the need for an expert pathologist.

Example 2: Aduvo Diagnostics

- Aduvo Diagnostics is a technology-based social enterprise that focuses on creating platform technologies in the field of Opto-Electronics.
- The objective of Aduvo Diagnostics is to provide efficient assistance in early disease detection that is customized for low-resource settings.
- Aduvo is an innovative imaging device that can capture multispectral autofluorescence images. By utilizing machine learning algorithms on the spectral images obtained, this technology can assist in quick, label-free diagnostics.

Example 3: Bandicoot

- Kerela based start up [Genrobotics](#), manufactured a robot – [Bandicoot](#).
- It is a spider-shaped robot that cleans sewage and aims to eventually end the barbaric practice of manual.
- It is a 50-kg pneumatic-powered remote-controlled robot that goes down into a manhole, spreads its expandable limbs like a spider and scoops out the solid and liquid garbage that blocks urban sewers.
- It has a 360-degree motion robotic arm that can sweep the floor of the manhole to collect the debris in a bucket that cleans the manholes in 20 minutes.
- It was launched by engineers Vimal Govind MK, Arun George, Nikhil NP and Rashid Abdulla Khan in 2015.

Example 4: Babylon

- Developed by the Babylon Foundation, India in 2018. Babylon foundation is a company having headquarters in Iraq.
- It is a software that provides consultation to the user based on the symptoms reported by them. Initially, it asks the user few simple questions in spoken natural language and the user can answer in natural language.
- It functions by searching the listed symptoms in large databases and provides a medical consultation on the bases of inputs.
- It also immediately informs/advices the patient to approach a doctor in case of some emergency.

Applications of AI in life sciences

- ***Producing Personalized Medicine*** - Currently, we are following the 'one size fits all' theory in terms of medicine dosing. AI may enable medical practitioners to adjust the dose size or, if the disease mutates, revise the therapy and introduce a more effective alternative.
- ***Drug Discovery and Manufacture*** – Drug development is a time-consuming, tedious and an expensive approach Artificial Intelligence-based programs are able to scan and cross-reference through large and complex datasets more quickly and precisely as compared to humans .
- ***Introducing Robotic Surgery*** - Once trained, a robot will be competent enough to perform each operation consistently and accurately.
- ***Supply Chain Management and Logistics*** - Drug manufacturers and pharmaceutical companies can also transform their businesses through AI. For instance, AI makes it easier to anticipate demands and afterwards scaling the production on a need basis.

Applications of AI in life sciences

- **Developing the Next-generation of Radiology Tools** - The current diagnostics processes includes data from CT scans, X-rays, or MRI machines. AI-based radiology tools will enable the clinicians to develop a more precise and detailed understanding of how a disease progresses by performing virtual biopsies.
- **Expanding Healthcare Access in Developing Regions** - The AI-powered tool – ‘Telemedicine’, that equips patients to tackle and prevent certain health concerns has become popular in such regions. The health care start-up ‘WeDoctor’, can independently conduct eleven diagnostic tests and upload data for consultation in an automated fashion.
- **Diagnosing of Diseases** - Incomplete medical records and a large number of cases can lead to wrong predictions and disease diagnosis. Buoy Health is an AI-based chatbot that listens to the patient’s health issues and associated symptoms, and then using algorithms guides the patient to the correct therapy. AI platforms that scan through medical images, such as those generated during radiotherapy and mammography, and identify the disease have already been established.

Thank You!

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