

# OVERVIEW OF ARTIFICIAL INTELLIGENCE AND NANOROBOTICS

1.kakade. Swati,2.pawar Priti,3.bhagyshri pawar,4.magar Ganesh

1.kakade Swati babasaheb

2.pawar priti Sanjay

3.pawar bhagshri Ananda

4.magar Ganesh machindra

## Abstract

According to various international reports, Artificial Intelligence in Education (AIED) is one of the currently emerging fields in educational technology. With the increase in neurological disorders and the demand for new drug development, a focus on expedite brain research can be seen in recent times. Alarming attention to develop novel neuropharmaceutic raised the urgency to develop in vitro models, mimicking in vivo like blood-brain barrier (BBB) structure/function relationship. In this review, we focus on revisiting the nanoparticles based bimolecular engineering to enable them to maneuver, control, target, and deliver the theranostic payloads across cellular BBB as nanorobots or nanobots. Subsequently we provide a brief outline of specific case studies addressing the payload delivery in brain tumor and neurological disorders (e.g., Alzheimer's disease, Parkinson's disease). Human medical data are at once the most rewarding and difficult of all biological data to mine and analyze. Humans are the most closely watched species on earth. Human subjects can provide observations that cannot easily be gained from animal studies,

**Keywords :** Artificial intelligence (AI), Nanorobotics, Blood brain barrier (BBB), Machine learning (ML), Biochip, Nubote, emerging, 3D motion

## Introduction:

Artificial intelligence: Artificial intelligence (AI) is a stream of computer science that deals with the study of problem-solving with the help of symbolic programming. It is carried out study of a science of problem-solving with huge application in business, health care, engineering and research. The main goal of this AI is to identify useful information processing problems and give a design of application of algorithms for analysis of learning of interpretation of data. (1) Artificial intelligence is (AI) involves several method domains, like reasoning, knowledge representation, solution search, and, among them, a fundamental paradigm of machine learning (ML). Machine learning algorithms that can recognize patterns within a set of data that has been further divided. A subfield of the ML is deep learning (DL), which engages synthetic neural networks. These comprise a set of interconnected state of the art computing elements involving 'perceptrons' analogous to human biological neurons, mimicking the transmission of electrical impulses within the human brain. (2) The first time used of the phrase- 'Artificial Intelligence' was appeared in 1956. The concept of AI was employed since 1950 with the uses of problem-solving as well as symbolic methodology. In 1956, starting of AI may be traced to classical philosopher's tries to explain human wondering as a symbolic system. But the sector of AI officially based till 1956, at convention at Dartmouth College, in Hanover, New Hampshire, where the time period is determined through synthetic intelligence. The start of AI is Year 1955-Allen Newell and Herbert A. Simon created the primary synthetic intelligence application which changed into named as "Logic theorist". This software had proved 38 of fifty two arithmetic theorems, and discover new and greater stylish proofs for a few theorems. In 1956-The phrase AI first followed via way of means of American laptop scientist John McCarthy at Dartmouth convention. (3) Artificial intelligence are fastly growing on

nanotechnology, such as Nanorobot, Nanorobote, and drug Discovery and development. 56, starting of AI may be traced to classical philosopher's tries to explain human wondering as a symbolic system. But the sector of AI officially based till 1956, at convention at Dartmouth College, in Hanover, New Hampshire, where the time period is determined through synthetic intelligence. The start of AI is Year 1955-An Allen Newell and Herbert A. Simon created the primary synthetic intelligence application which changed into named as "Logic theorist". This software had proved 38 of fifty two arithmetic theorems, and discover new and greater style

**Nanorobotics:** The scale of nanotechnology is defined by the National Nanotechnology Initiative (NNI), a United State government initiative to promote the development of nanotechnology research and development, as "science, research, and technology conducted on the nanoscale. The NNI defines this scale as approximately 1 to 100 and (10-9) nanometers. To give a practical idea of the nanoscale, a cell surface receptor is approximately 40 nanometers<sup>1</sup>, a strand of DNA is about 2 nanometers in diameter, and a molecule of albumin is about 7 nanometers.(4)

### 1. components of Nanorobote:

**1.Biochip:** Synthesis includes the joint use of Nano electronics, photolithography, and new biomaterials. It may be used for production of Nano robots for not unusual place scientific applications, including for surgical instrumentation, analysis and drug delivery. Electronics industries presently use biochips for production. Nano robots with biochips may be incorporated in Nano electronics devices, that allows you to permit tele-operation and superior skills for clinical instrumentation.(5)

**2.Bacterial based :** These methods makes use of the organic microorganisms just like the Escherichia coli bacteria. The version makes use of the flagellum for the propulsion purposes. To manage the movement of this form of the organic incorporated tool using the electromagnetic fields is typically applicable.(6)

**3.Nubote:** Scientific area has given new sort of robots to the arena which might be called nubots. Nubot is the abbreviation of Nucleic Acid . These gadgets are operated at nano- scale and are quite useful for demonstrating the DNA take a look at and blood mobileular detection. Capabilities of Nanobots –Since this tiny length offers them the cappotential to engage on the microorganism and virus level, nanobots fundamental feature will possibly be clinical. They have the capacity to revolutionize the clinical network in nearly each way. Nanorobots are so tiny that they can be without problems injected into the bloodstream, wherein they might then flow via the circulatory device which will discover and connect hassle regions of the body.(7)

**4.positional nano assembly:** The Robert Freitas & Ralph Merkle in 2000 are growing the realistic studies schedule which is particularly aimed toward the growing positional-managed the diamond mechanic synthesis & the diamonded Nano manufacturing facility that might be able to the constructing diamonded scientific nano robots.(8)

### Types of nanoraorobotics:

**3D-motion nanomachines from desoxyribonucleic acid:** movement nanomachines from desoxyribonucleic acid: Mechanical engineers at Ohio State University have designed and made superior nanoscale mechanical additives using 'DNA origami' — proving that an equal fundamental layout ideas that observe to usual large device additives will currently also be implemented to DNA — and can manufacture superior, controllable additives for destiny nanorobots.(9)

**Crock screw like motion :** nature, many microorganisms can coordinate their propulsion and orientation behaviors in line with outside stimuli with a motile appendage known as a flagellum. Eukaryotic cells (e.g., spermatozoa) can produce a traveling-wave movement via way of means of utilising a bendy beating flagellum. In contrast, prokaryotic cells can carry out a corkscrew-kind movement via way of means of rotating their helical flagella. Bacteria (e.g., E. coli (10)

**Bio nanorobots :** Nanorobots designed (and stimulated) with the aid of using harnessing homes of biological materials (peptides, DNAs), their designs and functionalities These are stimulated now no longer most effective via way of means of nature however machines too. • Nanorobots could endorse answers at maximum of the nanomedicin(11)

## Application of Nanorobotics:

**1. In cancer therapy:** New advances in medication delivery have resulted in greater quality in targeted drug delivery that to detect particular cells and regulate discharges through the use of smart medicines. Traditional chemotherapeutic drugs act by eliminating swiftly replicating cells, which is a primary feature of malignant cells. Most anticancer medications have a limited therapeutic boundary, often resulting in cytotoxicity to normal stem cells that proliferate quickly, such as bone marrow, macrophages, gastrointestinal tract (GIT), and hair follicles, causing adverse effects like myelosuppression (lower synthesis of WBCs, producing immunosuppression), mucositis (inflammation of the GIT lining), alopecia (hair loss), organ malfunction, thrombocytopenia/anaemia, and haematological side effects, among other things. Doxorubicin is used to treat numerous forms of cancer, including Hodgkin's disease. (12)

### 2. In emerging:

1) cross BBB: Blood vessels are the number one infrastructure concerned in the delivery and shipping of oxygen and vitamins to all organs. Being the maximum complicated detail of human body, the mind needs a greater complicated microvasculature. Research on this dynamic conduit has been ongoing for 2 centuries with numerous extensive findings. Though the original idea at the life of a barrier that stops motion of molecules turned into recognized via way of means of Paul Ehrlich primarily based totally on dye injection studies, the term "blood-mind barrier" became initially coined through biochemist Lina Stern, after the systematic look at of delivery of numerous molecules from blood to mind. (13)

**3. Nanomedicine and Tuberculosis Vaccine:** Vaccines focused on each pulmonary and systemic illnesses are presently being developed. Most of them are injectable vaccines and wishes to be saved at bloodless temperatures, wishes a sterile surroundings and educated body of workers to administer. RSV (respiratory syncytial virus) vaccine is an injectable vaccine used to save you continual lung infections and asthma. (14) Artificial intelligence in drug Discovery and development:

## Artificial Intelligence in Drug Discovery :

The planning stage of Research and Development in the drug discovery technique lasts up to 6 years. Whereas the following segment of medical trials, on average, takes greater than five years. Just 10 out of ten thousand first of all examined applicants for brand new pills make it to scientific trials throughout this time. By and large, on the stop of this prolonged drug layout procedure, simply one clinical product out of each ten that enters scientific trials is ultimately authorized to be used in sufferers through . (15) discovery is that the initiative of the really well worth chain that identifies new candidate therapeutics for treating or curing human diseases. it is the preliminary level of biopharma studies and development (R&D) and includes the identity and optimisation of capacity new pills and a preclinical in .vivo validation thru mobile assays and animal models. (16)

**1. Genetic algorithms in drug Discovery:** The genetic algorithms (GA) (26) is a computational method for fixing each restrained and unconstrained optimization troubles through adopting a genetic choice procedure. Gas "evolve" answers to issues the usage of the ideas of genetics. Several generations of answers are considered which contain many candidate answers in every technology. The transformation of statistics from one technology to the subsequent era occurs in particular in 3 ways - (i) as in step with a health function (ii) through crossover technique and (iii) mutated in a scientific manner. In this way, the number of candidate answers receives decreased marginally and the answers within the subsequent generation get better. (17)

## 2. USE OF DIFFERENT DRUG DISCOVERY TOOLS AGAINST COVID-19 –

**PREVENTION AND TREATMENT:** Toremifene, a first-generation selective estrogenic receptor modulator used to treat breast cancer, was identified as a potential drug candidate for testing in clinical COVID-19 research by CoV-KGE85 (knowledge-graph (KG)-based, deep learning methodology for drug repurposing in COVID-19) and Network Medicine Method. (86) Toremifene has also been shown in vitro to inhibit a variety of viral infections, including Middle East respiratory syndrome coronavirus, severe acute. (18)

**3.In machine learning:** Machine learning is a modern software of AI which promotes the fact simply a good way to supply machines the get admission to to records for extra ease in human paintings and simply to research them for themselves. Learning [2] is a key hallmark of synthetic intelligence. (19)

### Artificial intelligence in Drug development:

Applications of AI in drug developmentThe tasks of finding successful new drugs is daunting and predominantly the most difficult part of drug development. This is caused by the vast size of what is known as chemical space, which is estimated to be in the order of  $10^{60}$  molecules. The technologies that incorporate AI have become versatile tools that can be applied ubiquitously in various stages of drug development, such as identification and validation of drug targets, designing of new drugs, drug repurposing, improving the R&D efficiency, aggregate.(20)QSAR(Quantitative Structure-Activity Relationship) is a form of SAR in which statistical and computational modeling that is bolstered by AI and ML is employed to predict the biological and physical properties as well as the activity of novel drugs, in a cost and time efficient manner; this varies from traditional. (21) (QSAR) analyses performed by computational chemistry, machine learning is commonly applied to train artificial neural networks on ligand-based virtual screens to identify and optimize drugs interacting with candidate therapeutic targets(22)

### AI in obstetrics:

The first study of CTG interpretation using machines in 1989 by Bassil et al., there have been many studies on AI and CTG interpretation, including randomized controlled trials and retrospective cohort studies. Three randomized controlled trials including over 50,000 patients yielded inconsistent outcomes regarding risk identification and the reduction of adverse outcomes. (23)ML can be used to learn from existing data and make predictions from new data(24) section II, related work on AI is discussed and the context of pregnancy is presented. The methods employed to develop the scoping review and the protocol are described in section III. CTG is the most important device for evaluating fetal well-being through measurements of the fetal heart rate and uterine contractions.(25)

### Conclusion :

Artificial intelligence (AI) is an evolving set of technologies used for solving a wide range of applied issues. The core of AI is machine learning (ML)—a complex of algorithms and methods that address the problems of classification, clustering, and forecasting. The practical application of AI&ML holds promising prospects. This review includes an overview of artificial intelligence, robotics, nanorobotics, application of artificial intelligence and nanorobotics. It is carried out study of a science of problem-solving with huge application in business, health care, engineering and research. The main goal of this AI is to identify useful information in human body and research and development. The robotics are used generally in different fields like the transportation, medicine, army, commerce and communication. Due to the limited nanoscale & integration capabilities of the available power sources, control and computation schemes and tools, communication & coarse to fine motion mechanisms, manipulators, sensors & actuators, currently the robots sizes have from tens of the centimeters down to the millimeters.

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22. Applications of artificial intelligence in obstetrics

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25. Applications of artificial intelligence in obstetrics

Ho Yeon Kim<sup>1</sup>, Geum Joon Cho<sup>1</sup>, Han Sung Kwon<sup>2</sup>

<sup>1</sup>Department of Obstetrics and Gynecology, Korea University College of Medicine, Seoul;

<sup>2</sup>Division of Maternal and Fetal Medicine, Department of Obstetrics and Gynecology, Research Institute of Medical Science, Konkuk University School of Medicine, Seoul, Korea <https://doi.org/10.14366/usg.22063e> ISSN: 2288-5943 Ultr