NATIONAL INSTITUTE OF TECHNOLOGY RAIPUR

BIOMEDICAL ENGINEERING

ASSIGNMENT

Emerging Technologies in Healthcare

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Semester : First

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1 Emerging Technologies in Healthcare

1.1 Artificial intelligence

Artificial intelligence is based on the principle that human intelligence can be defined in a way that a machine can easily mimic it and execute tasks, from the most simple to those that are even more complex. The goals of artificial intelligence include learning, reasoning, and perception. Deep learning techniques enable this automatic learning through the absorption of huge amounts of unstructured data such as text, images, or video. When most people hear the term artificial intelligence, the first thing they usually think of is robots. That's because big-budget films and novels weave stories about human-like machines that wreak havoc on Earth. But nothing could be further from the truth.

1.2 Nanotechnology

Nanotechnology refers broadly to a field of applied science and technology whose unifying theme is the control of matter on the molecular level in scales smaller than 1 micrometre, normally 1 to 100 nanometers, and the fabrication of devices within that size range.

It is a highly multidisciplinary field, drawing from fields such as applied physics, materials science, colloidal science, device physics, supramolecular chemistry, and even mechanical and electrical engineering.

Much speculation exists as to what new science and technology may result from these lines of research.

1.3 Blockchain

Blockchain is a system of recording information in a way that makes it difficult or impossible to change, hack, or cheat the system.

A blockchain is essentially a digital ledger of transactions that is duplicated and distributed across the entire network of computer systems on the blockchain. Each block in the chain contains a number of transactions, and every time a new transaction occurs on the blockchain, a record of that transaction is added to every participant's ledger. The decentralised database managed by multiple participants is known as Distributed Ledger Technology (DLT).

Blockchain is a type of DLT in which transactions are recorded with an immutable cryptographic signature called a hash.

1.4 3D bioprinting

3D bioprinting is an additive manufacturing process that uses bioinks to print living cells developing structures layer-by-layer which imitate the behavior and structures of natural tissues. Bioinks, that are used as a material in bioprinting, are made of natural or synthetic biomaterials that can be mixed with living cells.

The technology and bioprinted structures enable researchers to study functions of the human body in vitro. 3D bioprinted structures are more biologically relevant compared to in vitro studies performed in 2D.

Mostly, 3D bioprinting can be used for several biological applications in the fields of tissue engineering, bioengineering and materials science. The technology is also increasingly used for pharmaceutical development and drug validation. Clinical settings such as 3D printed skin and bone grafts, implants and even full 3D printed organs are currently at the center of bioprinting research.

1.5 electronic medical record

An electronic medical record (EMR) is a digital version of all the information you'd typically find in a provider's paper chart: medical history, diagnoses, medications, immunization dates, allergies, lab results and doctor's notes. EMRs are online medical records of the standard medical and clinical data from one provider's office, mostly used by providers for diagnosis and treatment. Comprehensive and accurate documentation of a patient's medical history, tests, diagnosis and treatment in EMRs ensures appropriate care throughout the provider's clinic.

EMRs are more than just a replacement for paper records. They effectively allow communication and coordination among members of a healthcare team for optimal patient care.