BASIC BIOMEDICAL ENGINEERING (DISRUPTIVE INNOVATONS IN HEALTHCARE..)

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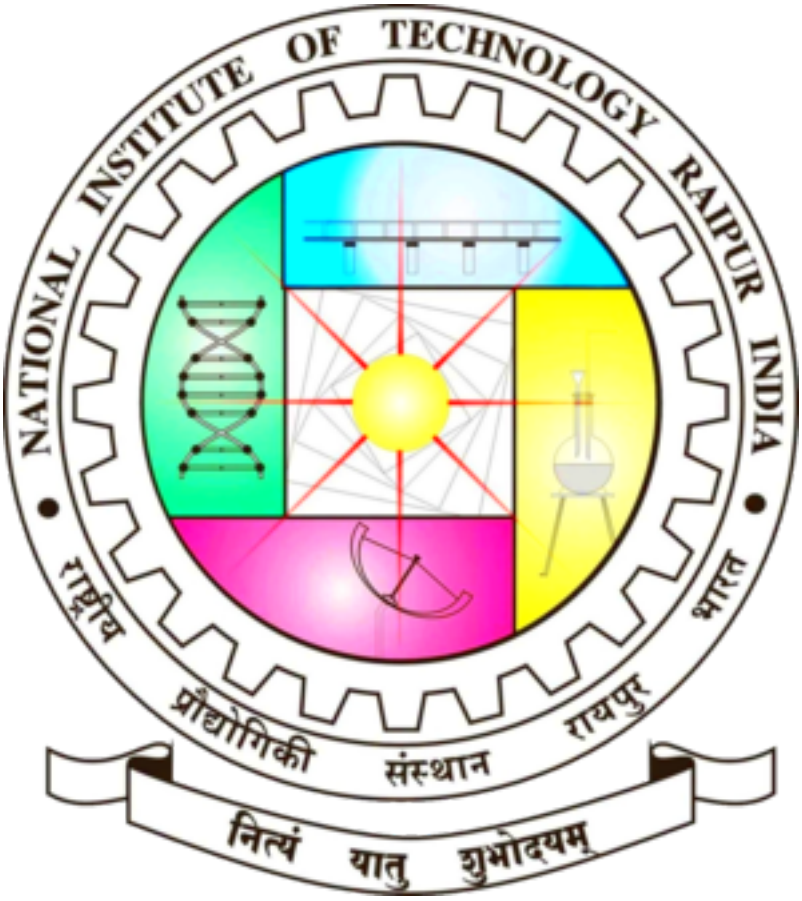

1 WHAT IS A DISRUPTIVE INNOVATION:

Disruptive innovation is innovation that creates a new market and value network or enters at the bottom of an existing market and eventually displaces established market-leading firms, products, and alliances. Disruptive innovations tend to be produced by outsiders and entrepreneurs in startups, rather than existing market-leading companies. Beyond business and economics disruptive innovations can also be considered to disrupt complex systems, including economic and business-related aspects.

2 FEW OF THE DISRUPTIVE INNOVATIONS-

2.1 COMPUTATIONAL APPROACHES IN HEALTHCARE:

Computer technology plays a crucial role in modern medicine, health care, and life sciences, especially in medical imaging, human genome study, clinical diagnosis and prognosis, treatment planning and optimization, treatment response evaluation and monitoring, and medical data management and analysis. As computer technology rapidly evolves, computer science solutions will inevitably become an integral part of modern medicine and health care. Computational research and applications on modeling, formulating, solving, and analyzing core problems in medicine and health care are not only critical, but are actually indispensable! In this talk, we present a set of important computational problems and approaches in modern medical research, clinical practice, and applications, with a focus on medical imaging.

2.2 SMART WEARABLES AND FITNESS TRACKERS:

In Healthcare, the Wearable IOT is a network of patient-worn smart devices (e.g., electronic skin patches, ECG monitors, etc.), with sensors, actuators and software connected to the cloud that enable collection, analysis and transmitting of personal health data in real time. Wearable technology is widely used in healthcare to enable patient condition monitoring, therapy delivery, and more.Medical wearable devices are powered by cloud-based software. The solution includes a cloud server, which receives data from wearable devices via gateways and a firewall. The cloud server includes data storage, processing,

and analytics models and hosts the solution's business logic and control applications. The solution also has user interfaces for patients, medical staff, medical device technicians, and admins, which help access the collected and analyzed data from wearables, send commands to the wearable devices.

2.3 GENE THERAPY:

Genes contain your DNA — the code that controls much of your body's form and function, from making you grow taller to regulating your body systems. Genes that don't work properly can cause disease.Gene therapy replaces a faulty gene or adds a new gene in an attempt to cure disease or improve your body's ability to fight disease. Gene therapy holds promise for treating a wide range of diseases, such as cancer, cystic fibrosis, heart disease, diabetes, hemophilia and AIDS. Gene therapy has some potential risks. A gene can't easily be inserted directly into your cells. Rather, it usually has to be delivered using a carrier, called a vector.

2.4 PACEMAKER:

A pacemaker is a device that sends small electrical impulses to the heart muscle to maintain a suitable heart rate or to stimulate the lower chambers of the heart. Pacemakers are used to treat brady-arrythmias, slow heart rhythms that may occur as a result of disease in the heart's conduction system. Pacemakers are also used to treat syncope, heart failure and hypertrophic cardiomyopathy.

2.5 BIOCOMPATIBLE MATERIALS:

Biocompatible materials are those used in medical devices within or touching the human body. Biomaterials can be derived either from nature or synthesized in the laboratory using a variety of chemical approaches utilizing metallic components, polymers, ceramics or composite materials. They are often used and/or adapted for a medical application, and thus comprise the whole or part of a living structure or biomedical device which performs, augments, or replaces a natural function. Such functions may be relatively passive, like being used for a heart valve, or maybe bioactive with a more interactive functionality such as hydroxy-apatite coated hip implants.

2.6 TELEMEDICINE:

Telemedicine refers to the practice of caring for patients remotely when the provider and patient are not physically present with each other. Telemedicine refers to the provision of remote clinical services, via real-time two-way communication between the patient and the healthcare provider, using electronic audio and visual means.In primary care, telemedicine is usually in the form of phone calls, where the patient seeks the doctor's advice about non-emergency medical problems which do not require the doctor to see the patient. The real role of telemedicine at present lies in the convenience it offers to patients and practitioners by obviating the necessity for a physical visit to get medical advice or treatment. It is also cost-effective in comparison to the process of waiting to see a doctor or other healthcare provider.