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Commentary

A Brief Note on Medical Devices

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DESCRIPTION

This is a broad category that includes all health-care products that are not primarily chemical (e.g., medicines) or biological (e.g., vaccines) in nature and do not involve metabolism to reach their intended results.

A medical device is intended to be used in a certain situation:

- determining the cause of a sickness or other condition
- in illness prevention, mitigation, treatment, or cure

Pacemakers, infusion pumps, the heart-lung machine, dialysis machines, artificial organs, implants, artificial limbs, corrective lenses, cochlear implants, ocular prosthetics, facial prosthetics, somato prosthetics, and dental implants are all examples of artificial organs, implants, and artificial limbs.

An example of a biomedical engineering application of electronic engineering to electrophysiology is a biomedical instrumentation amplifier schematic used in analyzing low voltage biological signals. Stereo lithography is an application and web of medical modelling for such production of regular items. Emerging engineering techniques are currently being employed in the research and development of new devices for innovative therapies, treatments, and patient monitoring of complex diseases, in additional to modelling organs and the human body.

Medical devices are regulated and classified as follows:

Class I devices have a low risk of causing injury to the user and are frequently simpler in design than Class II or Class III devices. Tongue depressors, bedpans, elastic bandages, examination gloves, and hand-held surgical instruments, as well as other similar items, fall into this category.

Class II devices are subject to additional controls. Special labelling regulations, required performance criteria, and postmarket surveillance are examples of special controls. X-ray equipment, PACS, powered wheelchairs, infusion pumps, and surgical drapes are examples of non-invasive devices in this category.

Class III devices typically require Premarket Approval (PMA) or premarket notice (510k), as well as a scientific study to assure the device's safety and efficacy. Replacement heart valves, hip and knee joint implants, silicone gel-filled breast implants, implanted cerebellar stimulators, implantable pacemaker pulse generators, and endosseous (inside-the-bone) implants are only a few examples.

Medical imaging

Medical/biomedical imaging is a significant part of the medical device market. This field is concerned with allowing physicians to "see" items that are not visible in normal sight (due to their size and/or placement). Ultrasound, magnetism, UV, radiology, and other methods are used.

An example of a biomedical engineering application of electrical engineering to diagnostic imaging is an MRI scan of a human head. Seeing an animated series of slices, go here.

Imaging technologies, such as fluoroscopy, Magnetic Resonance Imaging (MRI), nuclear medicine, Positron Emission Tomography (PET), PET-CT scans, projection radiography such as X-rays and CT scans, tomography, ultrasound, optical microscopy, and electron microscopy, are often essential to medical diagnosis and are typically the most complex equipment found in a hospital.

Implants

An implant is a medical device that is designed to replace and function as a missing biological structure (as compared with a transplant, which indicates transplanted biomedical tissue). Depending on what is most functional, the surface of implants that contact the body may be made of a biomedical material such as titanium, silicone, or apatite. Artificial pacemakers and cochlear implants, for example, contain electronics in some circumstances. Subcutaneous medication delivery devices in the form of implantable tablets or drug-eluting stents are types of bioactive implants.

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Bionics

One of the many uses of bionics is artificial body component replacement. Bionics, which is concerned with the in-depth study of the qualities and functions of human body systems, could be used to tackle various engineering difficulties. The study of the various functions and processes of the eyes, ears, and other organs paved the way for better cameras, televisions, radio transmitters and receivers, and a variety of other devices.

Biomedical sensors

Biomedical sensors based on microwave technology have received a lot of attention in recent years. Microwave sensors, for example, can be used as a complementary tool to X-ray to monitor lower extremity trauma, and different sensors can be produced for specific usage in both diagnosing and monitoring illness conditions. When measuring at different stages during the healing process, the sensor monitors the dielectric properties and can thus help detect in tissue (bone, muscle, fat, etc.) beneath the epidermis, so the response from the sensor will change as the resolving.