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① Describe briefly with example sensor and actuator or for Biomedical application.

Answer

Applicator of smart actuator in Biomedical field

In various areas actuator is utilized in the field of biomedical research and application are discussed. Application performed by the actuator, a smart actuator in the biomedical field are based on MEMS technology, smart actuator have multiple application in the biomedical field.

- ① Analysis
- ② prognosis
- ③ Drug delivery
- ④ cell culture

In the following briefly overview a smart actuator or in biomedical application.

Drug Delivery management using smart micropump

The success of this system is only possible through MEMS technology. The pump can be guided wirelessly and their effectiveness can be monitored with ease.

When current is applied to electrode (Platinum), water (electrolyte) splits into hydrogen and oxygen gases. This changes result in the pressure increase within the electrolyte chamber, which thus expands

and drives the drug out of the reservoir. When the drug quantity decreases below the desired limit this is sensed by the level detector, which sends a command to an external controller. This in turn refills the drug by placing a refill needle into a refill port and transferring the drug by placing a refill needle into a refill port and transferring the drug into the reservoir.

Microvalves for Controlled Precursor and Delivery of Fluid

Advanced in the field of micro fluid system in last two decades has raised concerns with regard to the manipulation and handling of minute sample of fluids, such as heating, transport, flow control or mixing. These advancement means the selected actuated microvalves are essential to current practices. These miniaturized valves utilize advanced sites digital transducer (DOTs) and a small scale reepion aparature to set up a safe remote connection to outside gadget. Power from the radio frequency beate is exchanged from the surface acoustic wave (SAW) gadget to the smaller scale actuator for opening and shutting of miniaturized scale valve.

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Application of sensor in Biomedical field

Implantable biosensors are used for orthopedic stress and strain screening osteoporosis and bone tumor are two of the bone disease that can be examined with the help of biosensor. Implantable biosensors are also used to examine cardiovascular system. Implantable biosensor must be light weight, small and separated. Important application of sensor in biomedical field.

- ① Brain simulator
- ② Heart failure monitoring
- ③ Blood glucose level
- ④ Orthopedic disease.

In the following briefly overview a sensor in biomedical application.

Smart Textile Biosensor

Smart material are thought to be a new product with potential in the material market. From filament till texture or even ready made dress the functionalization (main motive) of material is required. Intricate and imaginative innovative approach is required for assembling a brilliant material joining ordinary material assembling advances or sewing. Weaving and weaving form the electronic circle, for example lithography, covering

Surface Plasmon Resonance

The refractive index on the surface of a sensor can be detected using SPR. The sensor consists of a thin gold coating and using glass substrate, a beam is passed through a glass prism.

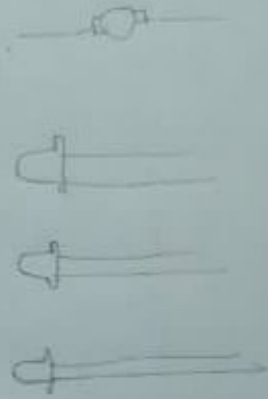
SPR is employed for the detection of organic from the very small up to the very large.

i2) Component of a basic measuring instrument

1) 16 x 2 LCP



2) LEP's



3) Hand held Transdermal Drug Delivery Device Challenges

Develop an electronic battery powered hand held topical drug delivery device the product was to sold.

Design Concept

The device was to efficiently incorporate electronic drug administration to enhance the effectiveness to a prescribed pharmaceutical. The design required a human factors analysis to determine forms that allowed for ease of use. The chosen design became a plastic molded single finger applicator with a front mounted application disc. The drug was to be loaded into the front end of the device at the time of manufacture to simplify use and the patient would slide a finger into the rear of the enclosure and apply the drug to the affected area while electronics applied a controlled electrical charge to the pharmaceutical.

Solution

The process designed feasibility and prototype units enhancing, at each iteration, the disposable and ergonomic function of the device. The investigation was at high speed assembly process to optimize design.

3) Describe briefly the case studies of two medical measurement instrument.

Answers

1) DSP based Telemetry system for Defibrillator and Pacemakers

Challenges
Design a PC card to implement new communication protocol with customers' new line of implantable pacemakers and defibrillators, keeping compatibility with all previous model, significantly increasing the data band width, improving immunity to EMI, and improving the interface to facilitate development of application software.

Design concept
An intelligent interface card, with the ability to access command from a host computer containing messages packet to be formatted and transmitted to the implaned device and to receive decode and format the responses of the implaned devices

Solution

An ISA bus card was developed to process the signals from an existing, handheld col. Data band width was increased an order of magnitude over existing product. Noise immunity was improved by processing the low level pulses in the frequency domain using a digital signal process. Power process engineeers designed and developed the PSF based electronic circuit board layout, the firmware that was resident on the board.