Biomedical Instrumentation and Its Applications in the Heart Surgery

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Accepted on July 29, 2021

Introduction

Biomedical instrumentation field is a combination of medical and engineering fields it is an application of biomedical engineering. It used to evaluate or measure by using the devices to treat the biological systems most commonly used in the heart surgeries. This biomedical instrumentation completely deals with sensors and transducers to sense the problem. It is developed recently from fifteen to twenty years back. But now biomedical instrumentation has a wide range of applications all over the world. Some of the examples of the biomedical instruments are ultra sound, MRI machines, PET and CRT scanners and X-RAY machines and some therapeutic equipment's etc., all these were used in the cardiovascular therapy.

The sensors are used to gain the information on pathology, whenever the sensor is placed on the body part the sensor takes the input signal and the input signal taken by the sensor is in the form of energy because human body emits energy and the energy is converted into the voltage by using transducer and the voltage reading is taken as output this is the original process of measuring a problem by using a biomedical instrument. Coming to the another class we have ECG means Electrocardiography, EMG means electromyography, EEG means Electroencephalogram where ECG and EEG are used for acquisition of electrical activity from heart and brain EMG is used to take the electrical activity of the muscle.

The basic part of the biomedical instrument is Measured, transducer, signal conditioner and the display, data storage and data transmission. Measured are the physical quantity and human body acts as source to the measured and the transducer converts energy from one form to the other form example piezoelectric sensor which converts mechanical vibrations to electrical signal. Signal conditioning is the next part of the transducer the output of the transducer is given to the signal conditioning circuit which converts the output of the transducer into the electrical values. The next part is display it is used for virtual presentation of the measured example for display is CRO which means cathode ray oscilloscope which is used to measure voltage, current, frequency, inductance, resistance, power factor etc. This CRO is also used to study the wave forms. Data storage is used to store the data in order to use in the future for reference. Data transmission can be seen in telemetric systems where transmission of data takes place using microprocessor bus system where data can be transferred from one location to another location remotely.

In olden days there are ammeters and voltmeters which work under mechanical configuration. In initial day's vacuum tube voltmeters are used. There are two types of voltmeters moving iron voltmeter and attraction and repulsion type voltmeter. Ammeters are used to measure the wide range of currents. Small currents are directly measured through meter mechanism. The recent example of development of biomedical instrumentation are fit bit watches where the steps are counted it means the energy coming out from the human body is taken by the transducer present in the watch and it is converted into digital form.

Acknowledgement

I thank my professor for his support in my study.

Conflict of Interest

Author declares there is no conflict of interest.

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Citation: *Suraj P. Biomedical Instrumentation and Its Applications in the Heart Surgery. J Cardiovasc Med Ther. 2021; 5(4):2*