

ADVANCED BIO MEDICAL INSTRUMENTATION

LECTURE 10: BIOTELEMETRY

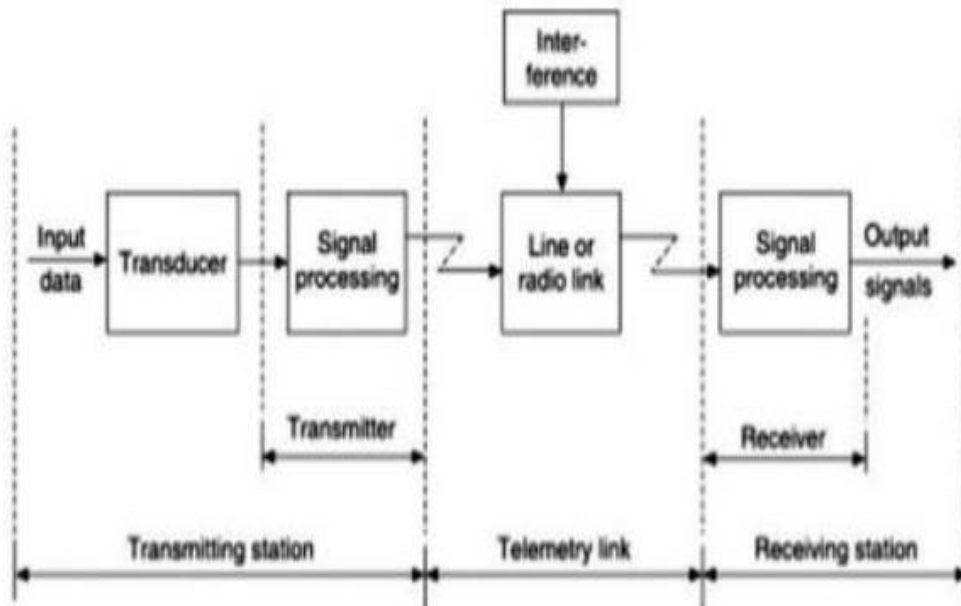
Biotelemetry is defined as the transmission of biomedical signals and parameters to remote recorder by means that do not cause substantial disturbances and restraints to the animal or human being monitored.

Elements/Design of Biotelemetry system

A typical biotelemetry system comprises:

1. Sensors appropriate for the particular signals to be monitored
2. Battery-powered, Patient worn transmitters
3. A Radio Antenna and Receiver

A display unit capable of concurrently presenting information from multiple patients



Implantable Units

These are small, reliable and low-power-consuming biomedical devices that can be implanted inside a patient's body by means of a surgical operation. Contrary to traditional, external medical

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devices, these implanted devices can sense data from inside the human body in real-time, offering a unique opportunity for early diagnosis and treatment of diseases.

Powering is the delivering of energy to the implant from the external world in order to make it work. Telemetry includes data transmission from the implanted device to an external one, and vice versa.

Sensors measure a biosignal from inside the body and transmit this information to an external device. They can measure body temperature, blood pressure and glucose concentration, for example, and detect respiratory, cardiac and arterial wall movements, the contraction of blood vessels and cardiac pressure disorders. The information received by the external device is post-processed by monitoring units and medical experts who treat the patient accordingly.

Problems

- Reliability and long operating life.
- Low weight, small size, and protection against body fluids by hermetic metallic sealing.
- Tissue incompatibility
- Lead breakage.
- Power supply

Progress in hybrid and integrated circuit production have partly solved problems of size, weight, reliability, and lifetime.

The power supply occupies more than 50% of the total space and weight of the implanted system and is responsible for more than 50% of system failures.

Application of Telemetry in Patient Care

1. The most common usage for biotelemetry is in dedicated cardiac care telemetry units

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2. Step-down units in hospitals.

Application is typically limited to cardiac monitoring and SpO₂.

3. NASA used biotelemetry to provide biomedical data from orbiting astronauts to medical personnel. Biomedical data transmitted to earth from space included astronaut's heart rate, body temperature, ECG, and oxygen and carbon dioxide concentration.

4. Compact, low power, implantable system for in vivo monitoring of oxygen and glucose concentrations.