

Lecture 1

Non invasive monitoring of the human body

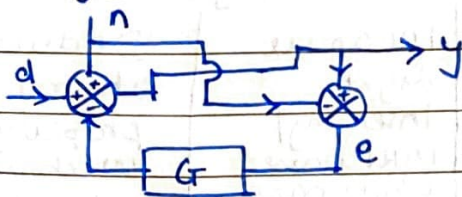
Stability & feedback

- Negative feedback: input $\uparrow \rightarrow$ output \uparrow
 \uparrow in o/p leads to \downarrow in i/p (-ve feedback)
so now input \downarrow and output \downarrow
leads to stability (prevents o/p from shooting up uncontrolled)
eg. Holding breath, cycling balance, pancreas-glucose, Body temp regulation.
Food chain, Homeostasis in cells to maintain conc. of ions.
- Positive feedback: input $\uparrow \rightarrow$ output \uparrow
 \uparrow in o/p leads to further \uparrow in i/p (+ve feedback)
so now i/p \uparrow more and output \uparrow more
leads to instability (o/p shoots up uncontrolled)
eg. Cutting employee investment due to financial pressure
Action potentials (hodgkin cycle), Heart impulses ^(oscillator) \rightarrow switching b/w 2 stable ph
- Cell structures, fn / Circulatory system.
- Control system for feedback

for body temp, Actual value = disturbance + normal value + error \times gain

eg1 $98 = 0 + 98 + 0$

eg2 $99 = 34 + 98 - 33$



Biomedical Instrumentation and measurement

- Anatomical Info (about body parts) \Rightarrow physical inspection, xray, MRI
- Physiological Info (parameters/value) \Rightarrow EEG, ECG, Ultrasound, NIRS (pulse oximetry, perfusion MRI)
- Non Invasive: No skin break + no contact with internal cavity.