Haemoglobin measurement

Red LED  Infrared LED

Photodetector

LED and sensor
Light excluding
Enclosure
Haemoglobin Measurement

- Non-invasive
- Continuous
- Functional haemoglobin
Oxygen delivery to tissues

$$DO_2 = 1.38 \times Hb \times SpO_2 + 0.003 \times PaO_2 \times CO$$
Pulse oximetry

How it works

Probe is placed over a vascular bed (finger, ear lobe, heel)

LED of 2 different wavelengths are used - Red 660nm, Infra red 940 nm
Pulse oximetry
Change in reflectance during cardiac cycle

- Change in erythrocyte axis

![Diagram showing changes in reflexion during systole and diastole](image-url)
Wavelength absorption of various Hb
Potential uses of this co oximeter

- Pre hospital
- Pre operative
- Per operative
- Post operative
Per operative

- Major orthopaedics surgery
- Major abdominal
- Plastic surgery
- Obstetrics
- Urology

Non invasive & continuous
Post operative

- Compare with pre operative figures
- Situations when it's difficult to measure blood loss
- Continued blood loss
- Small but significant continuous loss
Pulse oximetry

- Some light is absorbed by
  - Arterial blood
  - Venous blood
  - Tissues
- Light that passes through the tissues is measured by the photo detector
Pulse Co Oximetry
Pulse Co-Oximetry
Finger Clip

(a)

(b)

LED Array

Photo diode
Development Board

UB232 COMs to PC

Power Optimized Circuit

LCD Connector

Sensor Probe Connector

Analogue Front End

PIC MCU

In Circuit Debugger

Function Switches

Memory devices
Reading Chart

![Graph showing data with x-axis labeled 'Sample No.' and y-axis labeled 'Amp.']
In conclusion

- Measure the oxygen supplied to tissue
- Assess blood loss continuously
- Assess haemodilution
- Rationalise infusion of blood
- It will revolutionise our monitoring
- Changes the way we monitor our patients