Scope of Presentation:

- Biomedical Engineering
- Study options at tertiary level
- Projects and examples
Biomedical Engineering is the application of engineering principles to problems in the field of biomedicine. It uses the theoretical background from the physical, chemical and computational sciences to achieve solutions. The goal of this branch of engineering is to provide a healthier future for society.
encompasses many diverse areas

- Biomechanics, prostheses
- Artificial organs, implanted materials
- Medical imaging x-ray, MRI ...
- Clinical measurement ECG, EEG ...
- Hospital, clinical engineering
- Research & teaching
Qualifications

- Undergraduate degree (4 years) Bachelor of Engineering + major in biomedical, Bachelor of Medical Engineering

- Master of Engineering ME (Biomedical)
  - Course work (+ project)
  - Project based

- Masters of Philosophy MPhil (2 year)

- Doctor of Philosophy PhD (3 year program)
Programs from which RHD can be completed

- Electrical Engineering
- Computer Systems Engineering
- Chemical Engineering
- Mathematics
- CS or IT degree
Local Realities

• Need $upport!

• Usually, APRS
  • Competitive, Honours IIa
  • ~$20k (top-ups)
  • *Influenced heavily* by local interests/support

• Look to the web
Projects

- Heart rate and analysis
- Chaos theory and breathing
- Space, microgravity & muscle research
- MRI projects, cardiac image analysis
Ambulatory ECG

Wearable ECG monitor, for logging and analysis

PC based host S/W for nonlinear analysis
Can measuring chaos in breathing patterns tell us about our health?

Phase plots
Poincare plots
Recurrence plots
Lung capacity (FRC) measurement in infants

Volume Displacement Plethysmograph (VDP)
Microgravity & Muscle Function

- Low back stability requires abdominal pressure.
- Antigravity muscle groups waste
- Tremendous terrestrial application for noninvasive measures of antigravity function.
Transversus Abdominus
Berlin Bed Rest Study

A sponsored multi team investigation
Bio-electromagnetics

What are the effects of radio frequency signals on human tissue?

MRI, mobile telephones
Cancer treatment with hyperthermia
Magnetic Resonance Imaging

- Relatively new technology
- Local groups active in this area
Seeing the brain think

functional MRI
Questions?