



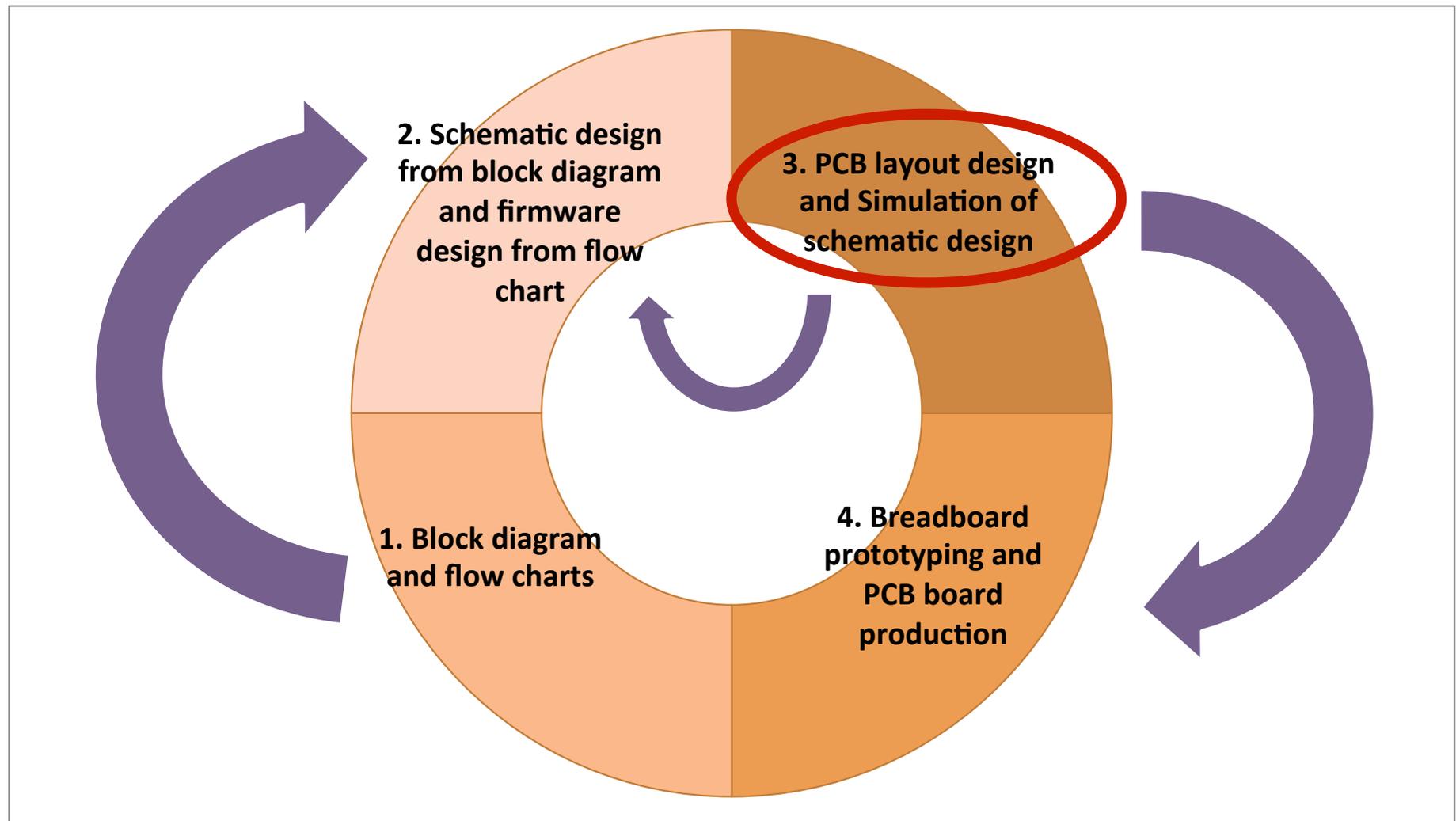
Electronic Simulation of the Signal Acquisition Process

Proteus Design Suite v8.0

Philippa Makobore, Hudson Kagoda, Martha Mulerwa, Mathew Ocheng and Paul
Niyitanga

Instrumentation Division
Technology Development Center
Uganda Industrial Research Institute

- What's the purpose of simulation and how does it fit into the design of open medical devices?
- How does simulation fit into our design process?



- Schematic capture- simulation and design of PCB layout
- Microcontroller simulation
- PCB design
- 3D verification – 3D viewer module

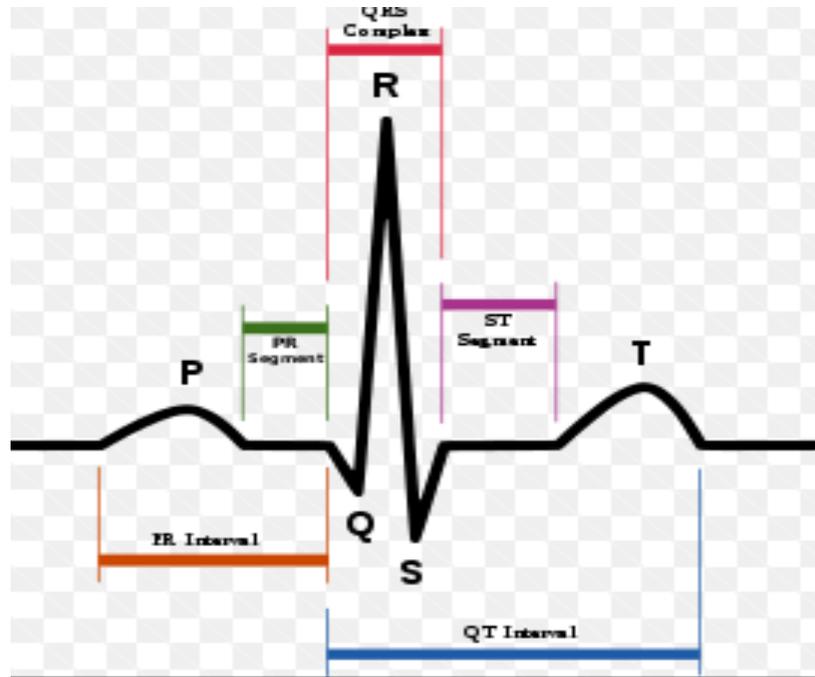
Definition: signals that are being generated in all living organisms

- They describe a physiological phenomenon.
- Examples: Heart beating (ECG), muscle contraction (EMG),
- These activities produce electrical, chemical or mechanical activities that can be analysed.
- Provide assessment of one's functional state
- Diagnosis and therapy



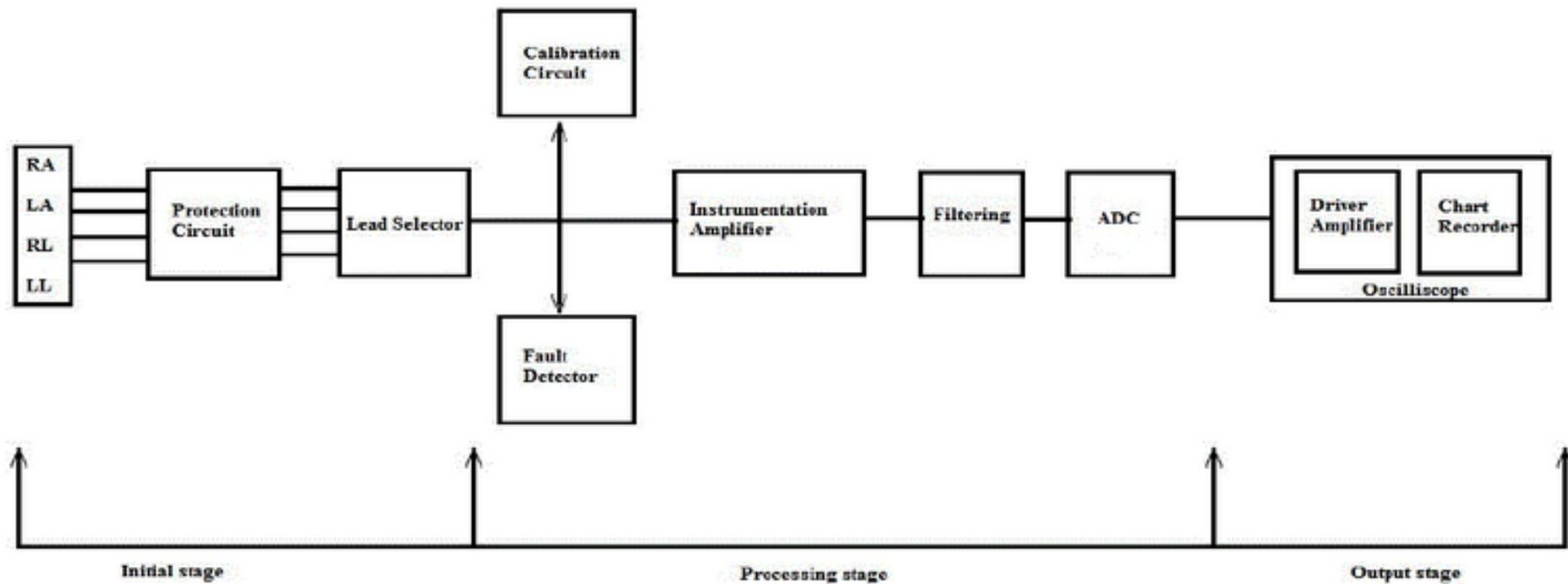
- **Bioelectric signals:** result of the changes in the electric currents produced by the sum potential differences across the tissues and organs. ECG
- **Biomagnetic signals:** EEG
- **Biomechanical signals:** Mechanical signals, displacement, BP
- **Bioacoustic signals**

Very low amplitude voltages	Need for amplification
Noise (Other body organs, 50/60Hz noise)	Filtering
High offset voltages	Amplification



Useful info in its peaks - PQRS complex
 Diagnosis of heart arrhythmias, heart attacks,
 Monitoring of heart activities.

Parameter	Duration	Clinical significance
QRS duration	0.06–0.10 s	Prolonged duration hyperkalemia
Q wave	Duration up to 0.04 seconds in leads other than III and aVR	Abnormality indicates presence of infarction



Thank you



UBORA: Euro-African Open
Biomedical Engineering
e-Platform for Innovation
through Education

This Project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 731053

