Active Electrode Based Electrical Impedance Tomography System

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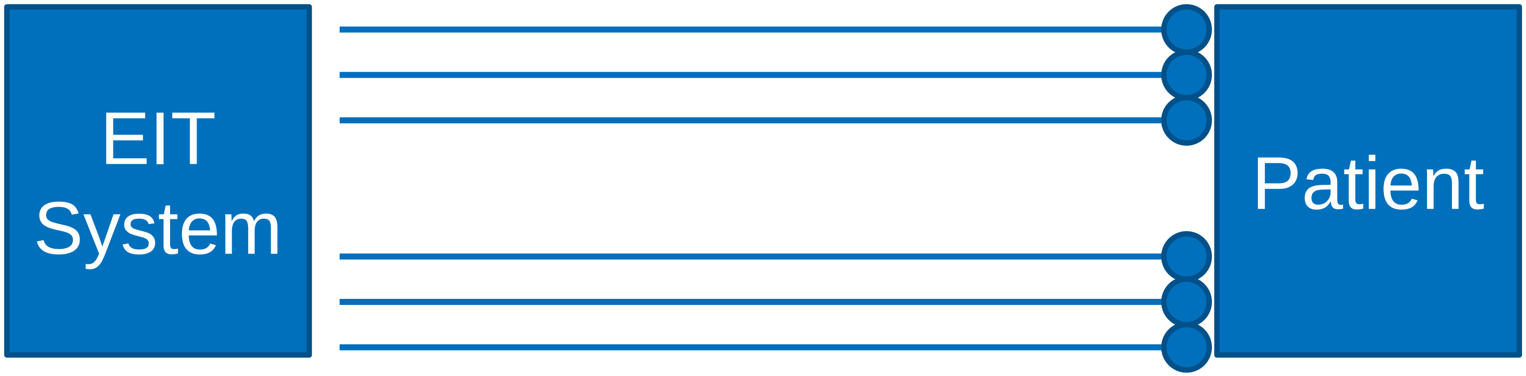
Bath, 05.05.2011

Outlook

- Active vs passive electrode
- Why active electrode?
- Active EIT Electrode architecture
- A thoracic Application
- Conclusions

Passive Electrode

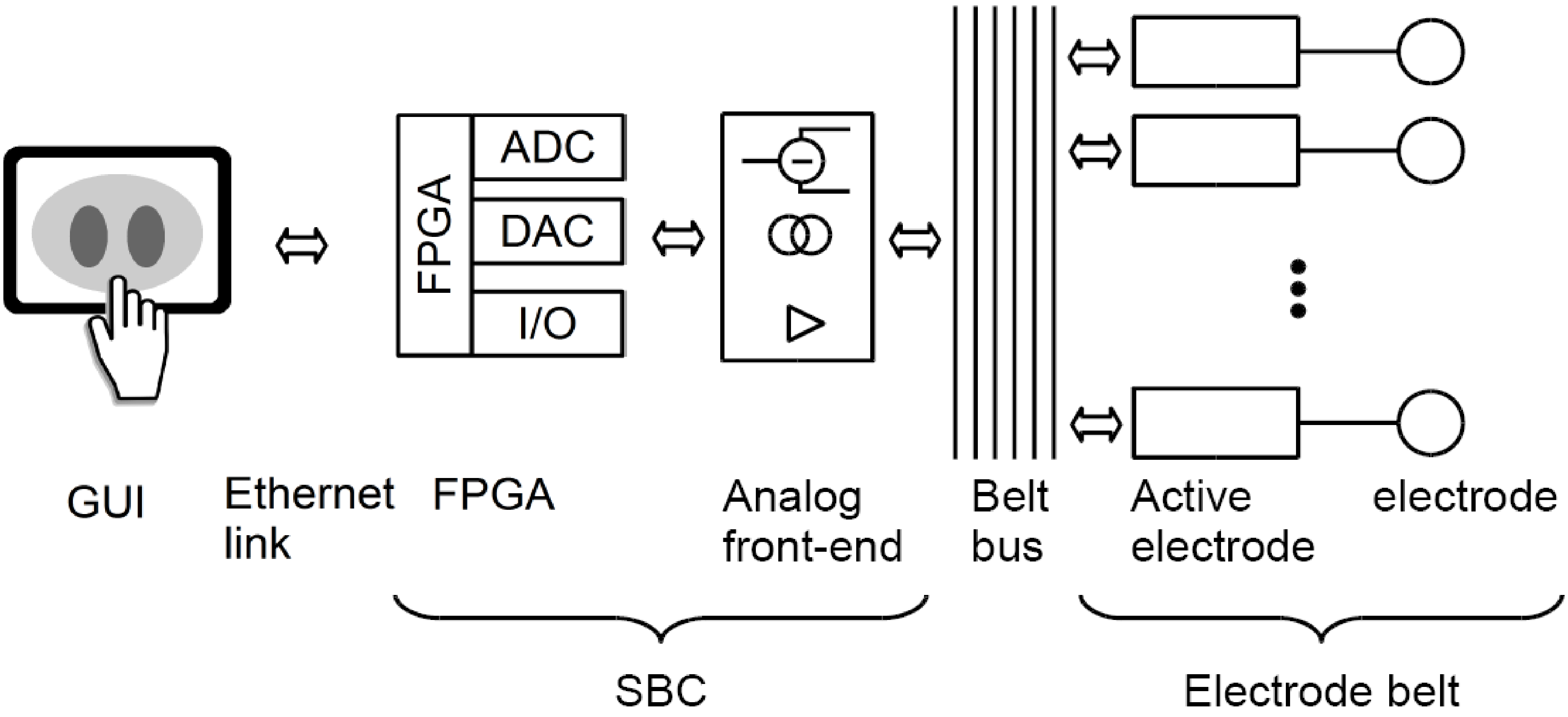


Challenges	Results
High impedance lines	cable shielding
Stray capacitance	cable shielding
Scalability	1 cable per electrode
Precision	Uncontrolled Input impedance

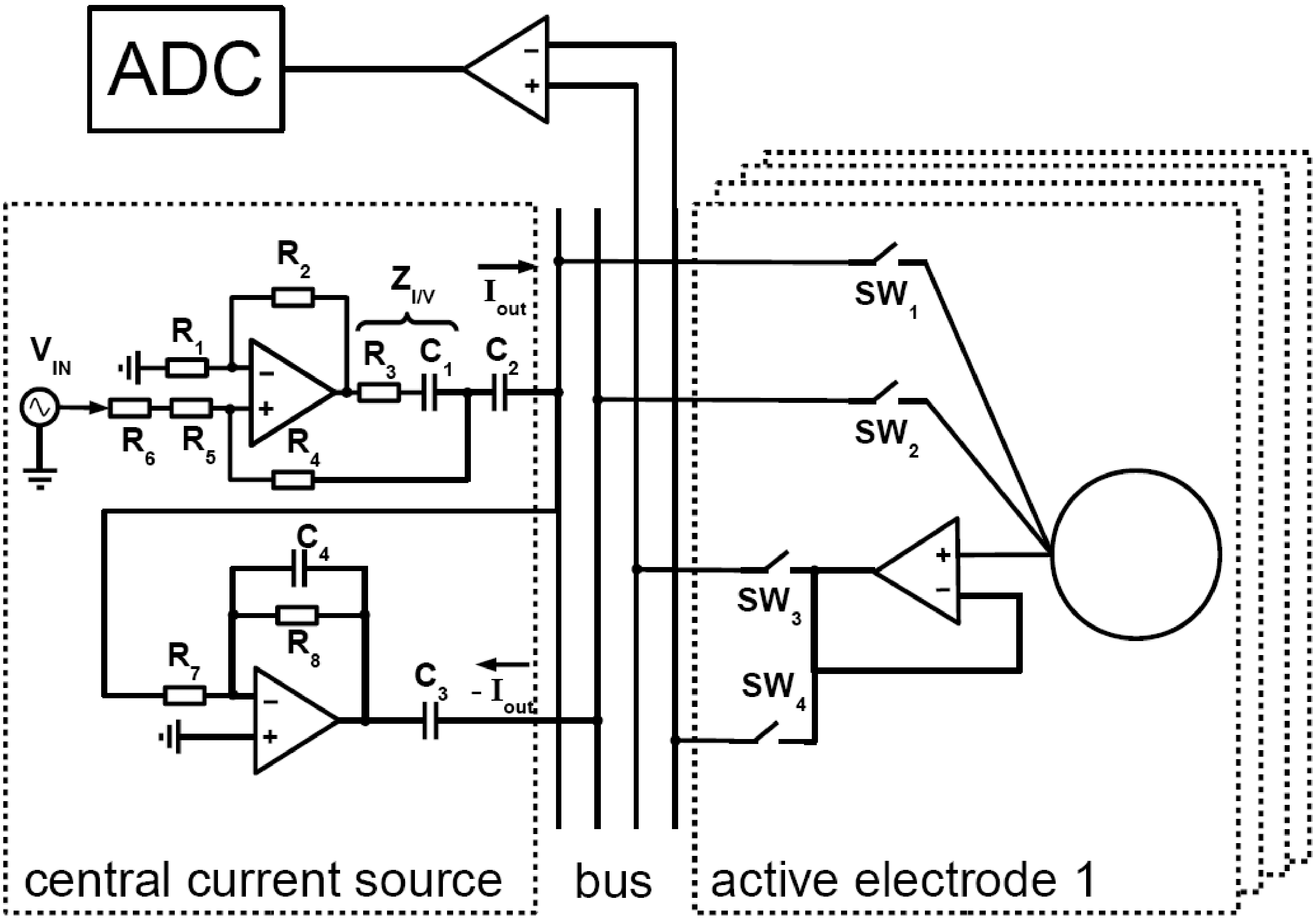
Active Electrode

Challenges	Results
Low impedance lines	No cable shielding
Stray capacitance	No cable shielding
Scalability	Fixed bus cable number
Precision	Controlled Input impedance

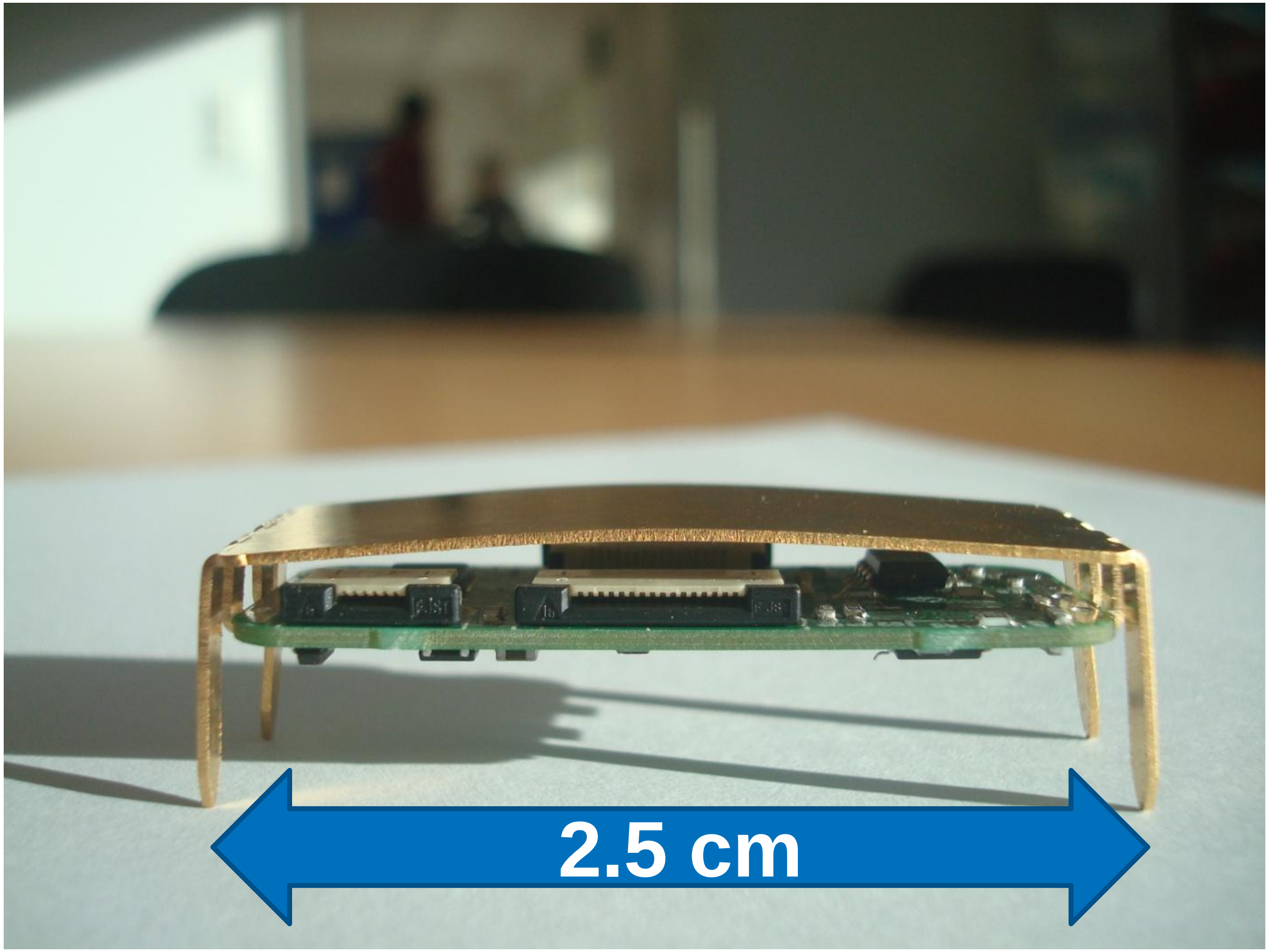
System Architecture



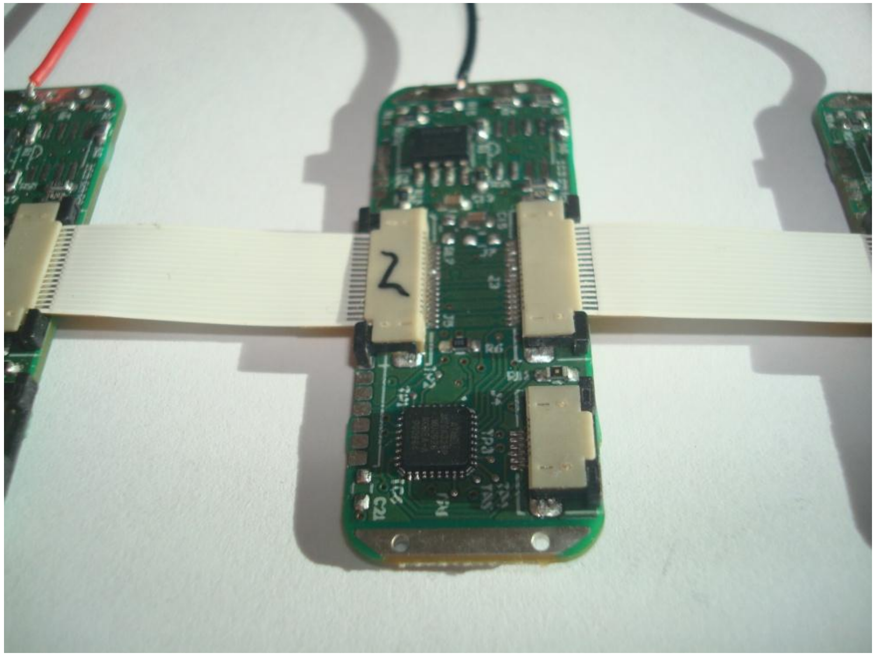
Multiplexing



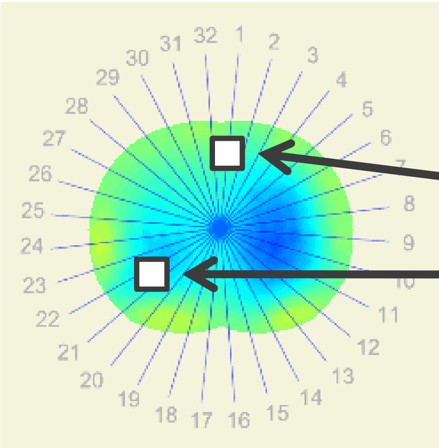
Prototype of active electrode



Prototype of the thoracic belt

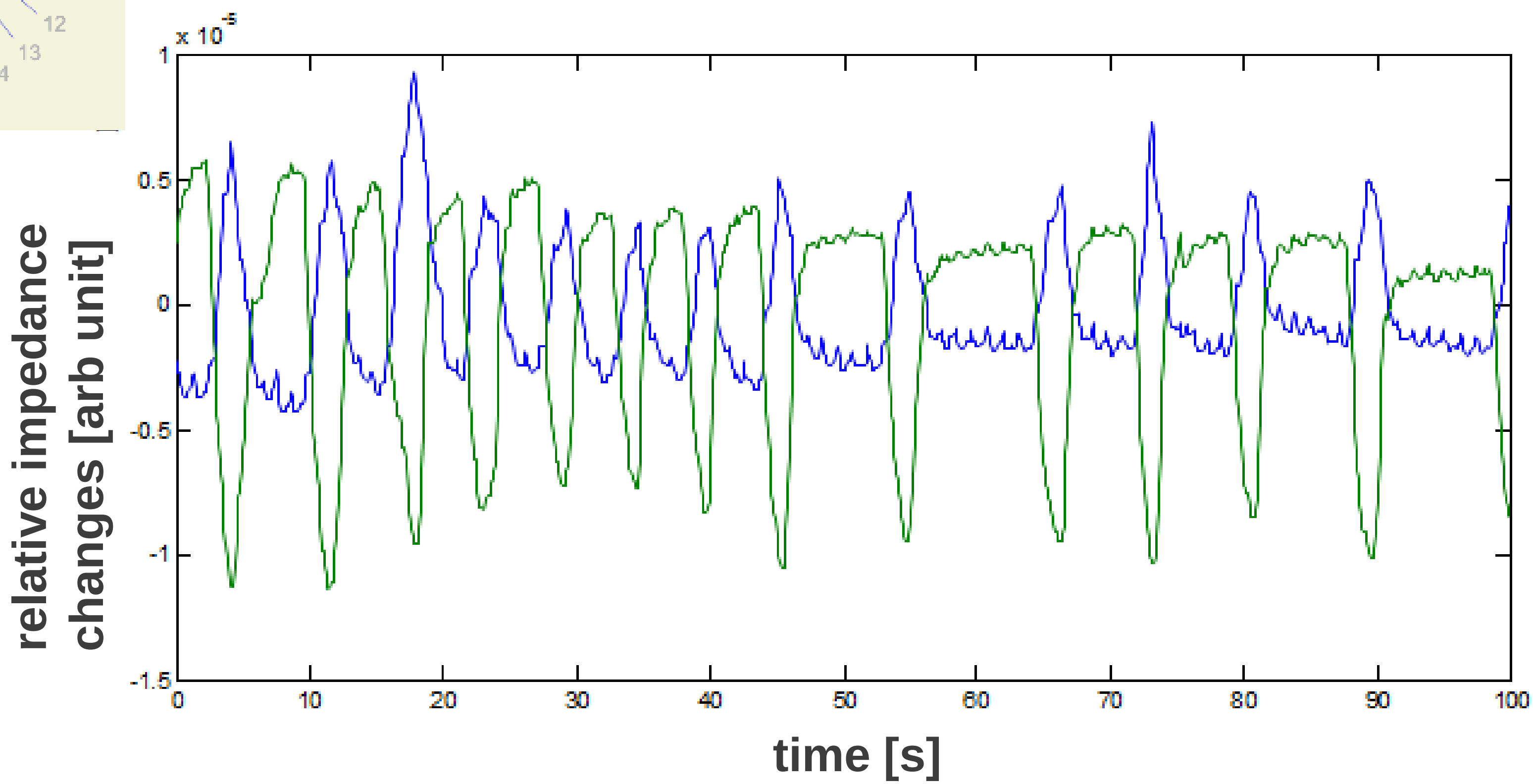


Ventilation and cardiac EIT signal



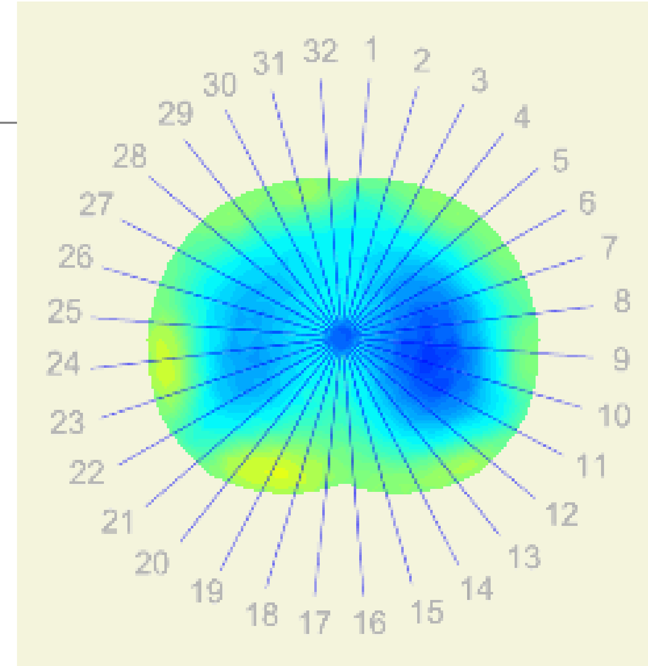
Blue: “ heart pixel ”

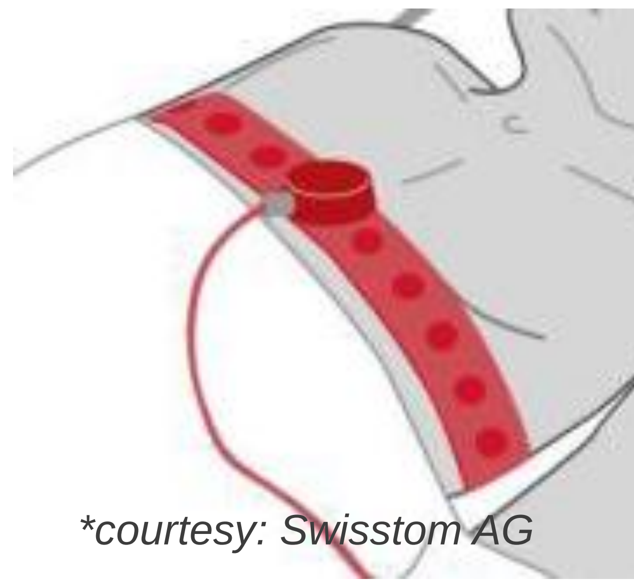
Green: “ lung pixel ”



Conclusions

- A working prototype for thoracic EIT was developed.
- Ventilation and cardiac related impedance changes were demonstrated.
- Miniaturization of the active electrode.
- More tests in volunteers.

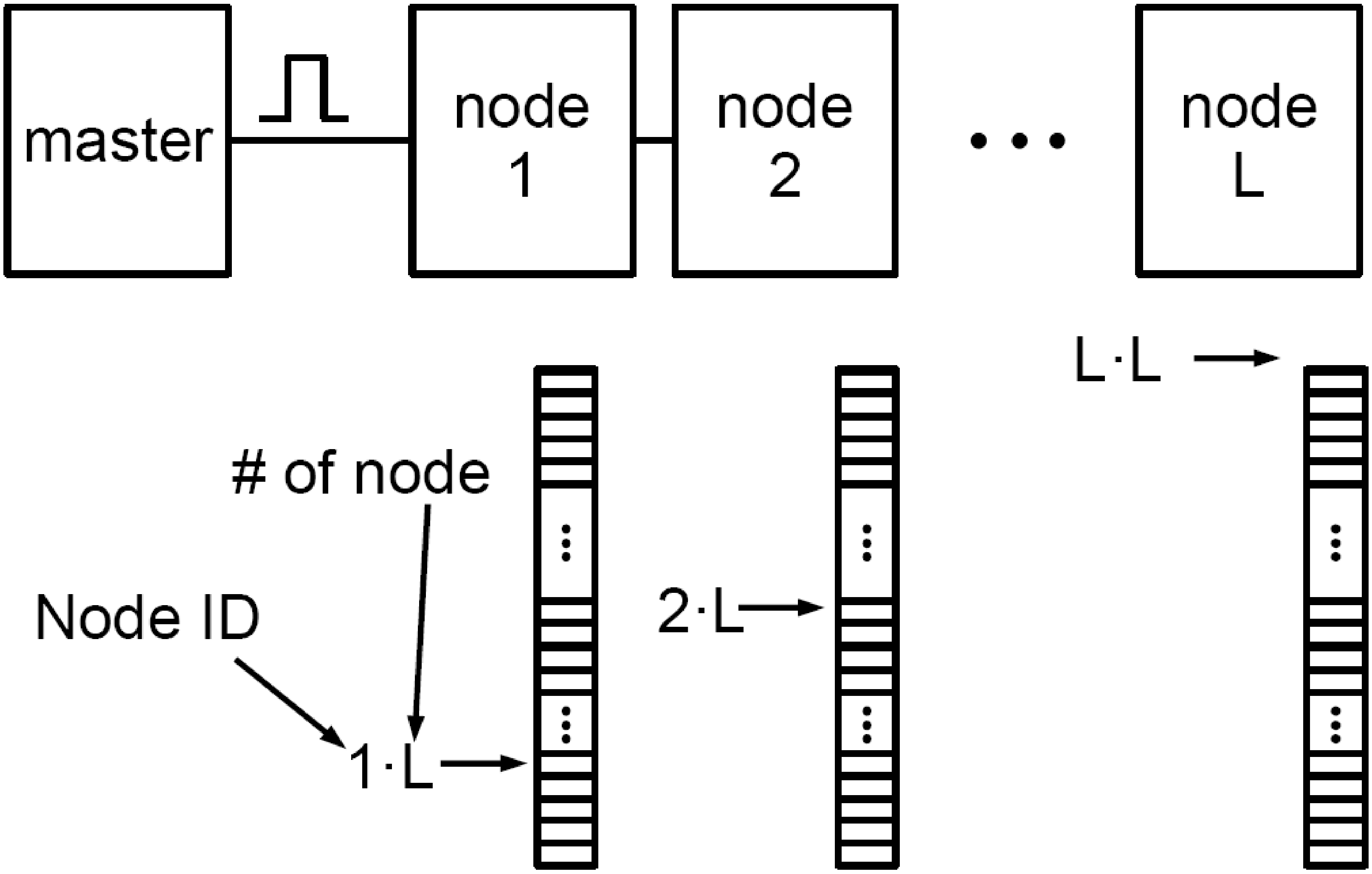




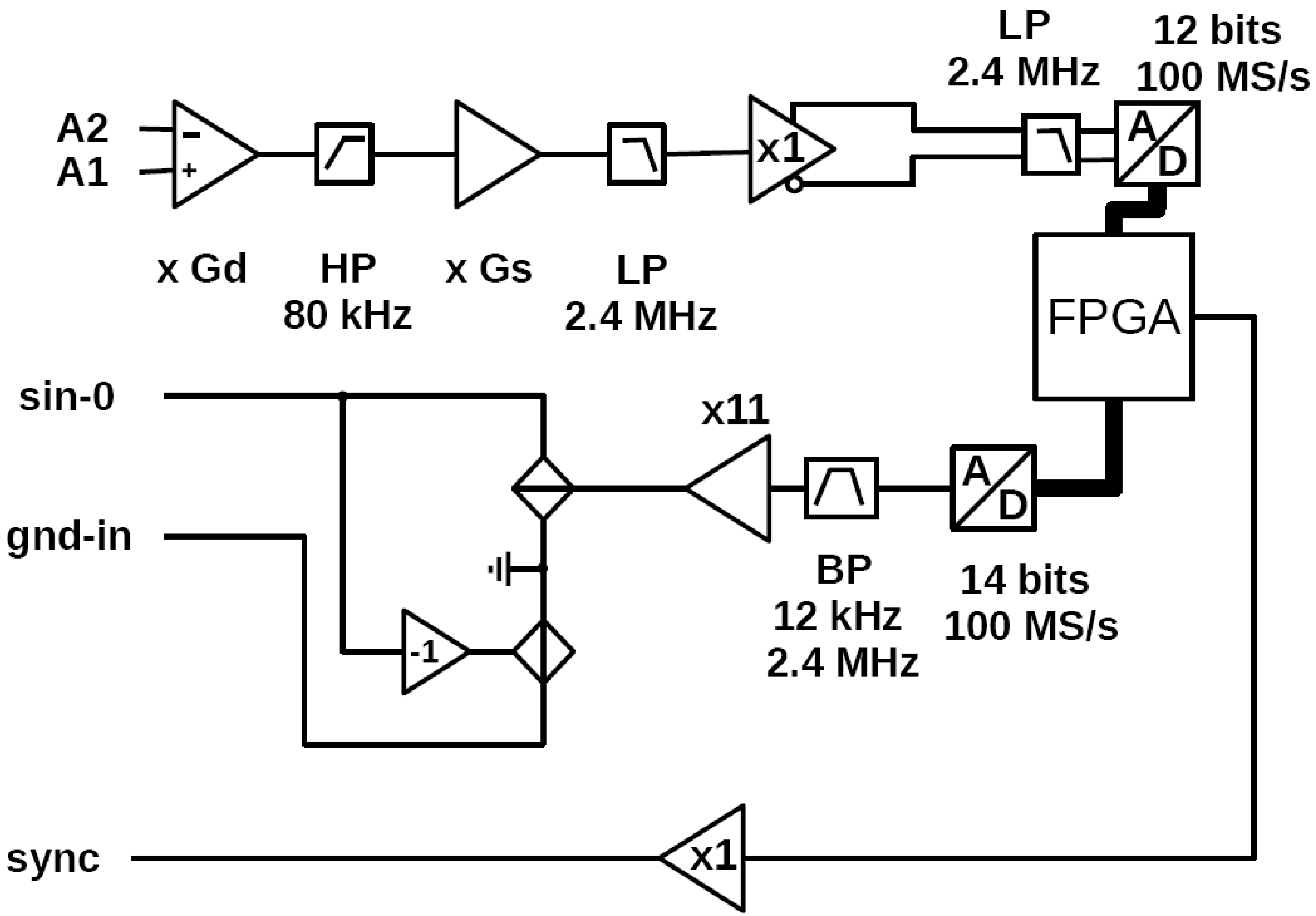
courtesy: Swisstom AG

Thank you for your attention!

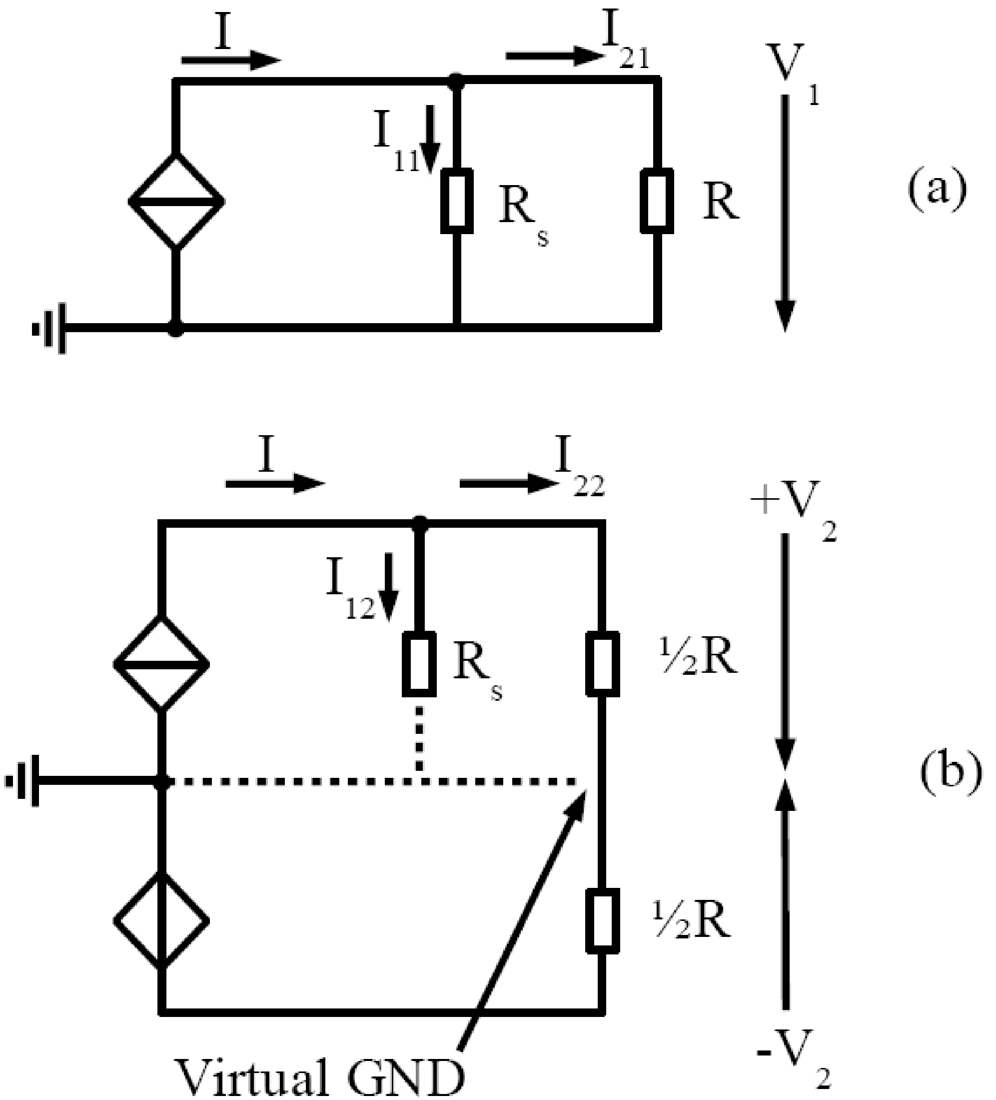
Control system



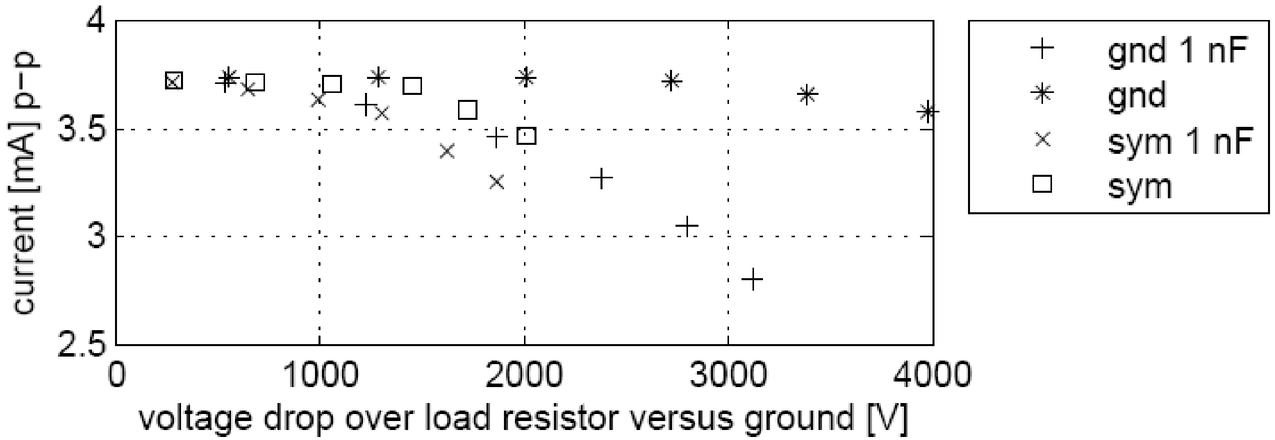
Central control system

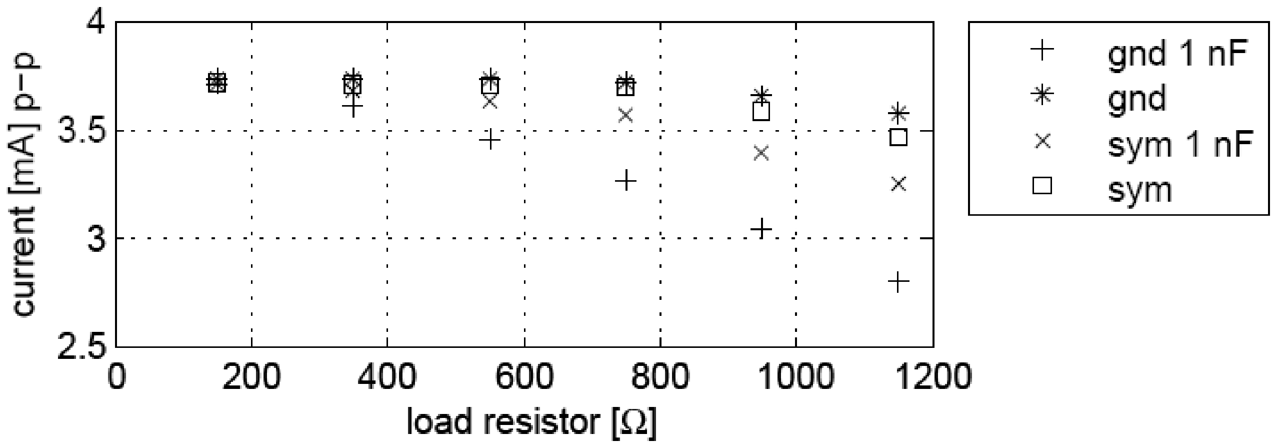


Stray capacitance reduction



Current source internal impedance





Current source internal impedance