Analog front-end and algorithm co-design for efficient biosignal acquisition
And its application to cardiac signal monitoring

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DOI
10.4233/uuid:c67851ba-c9ef-47ce-b58f-9e8558f53d07

Publication date
2024

Document Version
Final published version

Citation (APA)
Rout, S. (2024). *Analog front-end and algorithm co-design for efficient biosignal acquisition: And its application to cardiac signal monitoring*. [Dissertation (TU Delft), Delft University of Technology]. https://doi.org/10.4233/uuid:c67851ba-c9ef-47ce-b58f-9e8558f53d07

Important note
To cite this publication, please use the final published version (if applicable).
Please check the document version above.

Propositions

accompanying the dissertation

Analog front-end and algorithm co-design for efficient biosignal acquisitiong

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by

Samprajani Rout

1. At the core of all our conscious undertakings, such as doing a Ph.D. and designing a chip, lies a quest for self-discovery and, thus, a deeper understanding of the world.

2. By using a state-space synthesis method, sigma-delta ADCs with arbitrary signal transfers can be designed with an optimal dynamic range. (This proposition pertains to Ch. 3 of this thesis.)

3. Knowing the properties of a signal (a priori information) can help achieve higher reconstruction performance of the input signal and also design resource-efficient analog front-ends. (This proposition pertains to Ch. 4 of this thesis.)

4. In a multi-channel spread-spectrum analog front-end, the maximum achievable signal-to-noise ratio is limited by the code length of the sequence, the modulation rate, and the number of inputs. (This proposition pertains to Ch. 5 of this thesis.)

5. Labeling and stereotyping are divisive and undermine someone's contributions.

6. Logic is contextual, designed for a specific frame of reference, and optimized for a set of parameters. What works for one system may or may not work for another system.

7. Both rock music and chips need a steady beat (clock) to keep things in sync.

8. Laws in science, religion, or governance are subject to variables and are limited to our current understanding, requiring periodic review and modification.

9. The journey of climbing a mountain or conducting research can be as rewarding and significant as reaching the summit or achieving a research breakthrough.

10. Similar to an underdamped control system, in which overshooting the steady-state leads to quicker convergence to the desired outcome, to achieve a balance in gender roles in society, it may be necessary to over-correct in favor of women.

These propositions are regarded as opposable and defendable, and have been approved as such by the promotors prof. dr. ir. W. A. Serdijn and prof. dr. G. Setti.