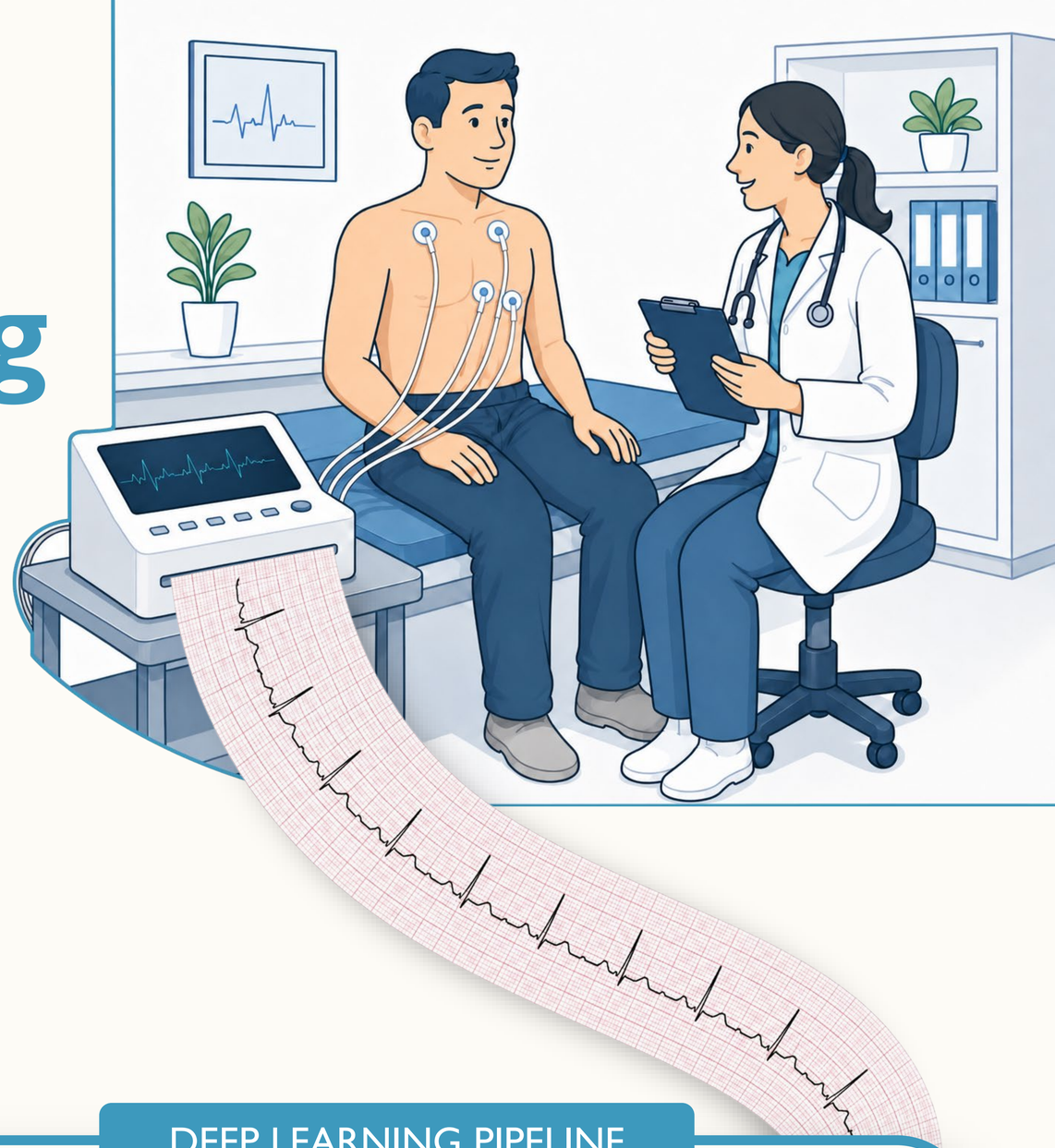
Are ECGs Becoming Medical E-Waste?

Predicting Cardiovascular Risk from Healthy ECGs

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CONTEXT

Most ECGs are considered healthy

Many ECGs are labelled as healthy after routine clinical review. If no clear abnormality is immediately found, they are rarely analysed again. However, some of these apparently healthy ECGs may still contain subtle signs linked to missed disease or future cardiovascular risk.

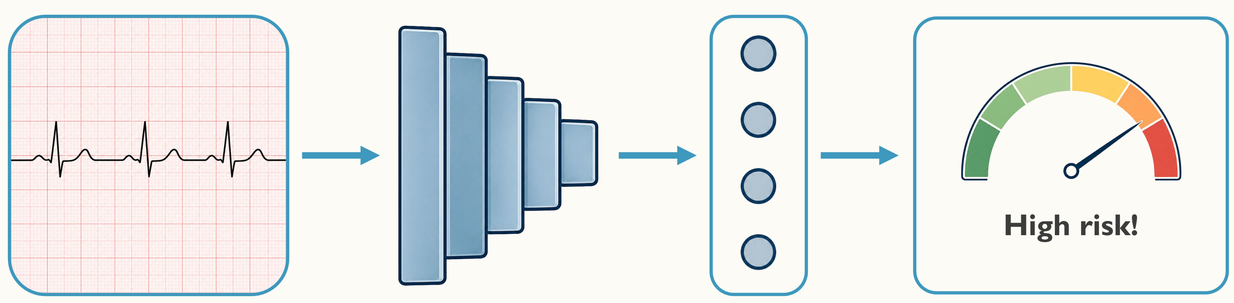
Deep Learning can help

Deep learning models can learn ECG patterns that are impossible to recognise by visual inspection alone. By training on large ECG datasets linked to diagnosis and follow-up data, these models can help detect hidden abnormalities and estimate future cardiovascular risk.

Better healthcare worldwide

These models can flag potentially missed diagnoses and identify patients who may benefit from follow-up. Because ECGs are already captured routinely in healthcare systems worldwide, these models could support scalable screening protocols.

DEEP LEARNING PIPELINE



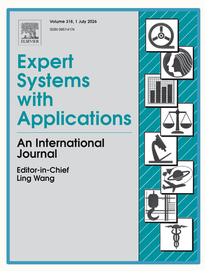
Novel Model Architectures

- Hybrid-AI solutions improve generalisability
- New interpretation techniques improve transparency
- Novel feature-interaction layers improve performance

Computational Efficiency

- Low FLOP counts reduce computational requirements
- Low parameter counts reduce memory requirements
- Highly efficient models enable edge deployment

RECENT RESEARCH HIGHLIGHTS



ECGencode: Compact and computationally efficient deep learning feature encoder for ECG signals

ECGencode is a compact, expert-inspired ECG feature encoder that preserves ECG structure while achieving strong analysis performance at a fraction of the computational cost.

L. Bontinck, K. Fonteyn, T. Dhaene, D. Deschrijver - Expert Systems with Applications 255, 124775



SWE: Augmentation-free longitudinal modelling through structuring whitened embeddings

SWE is an augmentation-free framework that structures whitened embeddings to capture smooth, progression-aware relationships between samples, improving prediction performance.

K. Fonteyn, L. Bontinck, T. Dhaene, D. Deschrijver - IEEE Access, Volume 13



CSD-AFNet: Computationally Efficient AFib Classification from ECGs using 2D Causal Strided Dilated Convolutions

CSD-AFNet is a highly efficient AFib-focused ECG classifier that combines feature-preserving pooled convolutions and causal padding to reduce computation while maintaining strong performance.

L. Bontinck, A Steyaert, H Chen T. Dhaene, D. Deschrijver – BHI 2025



Let's make ECG analysis smarter!

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