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Department/School	School of Advanced Technology	Date of viva voce	13 Aug, 2025
Title of Thesis	Robust Cardiac Feature Monitoring based on Millimeter-Wave Radar		
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List of Corrections:

General suggestions:

- To strengthen the structure and coherence, a clear mapping between each publication (published or under review) and the corresponding thesis chapters should be provided. This would help the reader understand how each study integrates into the overarching research narrative.

- Fine tune 'Abstract' section, i.e., first and second paragraphs.

- Double-check minor typos/grammar/formatting issues, e.g.,

  Title: 'based on' -> 'Based on' or change 'based on' to 'with'

  page 2, last line: 'after the design…' -> 'with the design' or 'through the design'

  page 3, section 1.2: 'with orders more amplitude…' -> 'with an amplitude orders of magnitude greater …'

Abstract

- The abstract identifies four challenges (a–d), but the methods are classified into three. It would be useful to discuss whether it is worth distinguishing short-term ECG recovery from long-term ECG recovery. Could one method address two challenges simultaneously?

- Line 2: 'this thesis will focus on…' -> change to present tense. In additional, the first

paragraph focuses on the clarification of general subject area. 'this thesis will focus…'seems out of place.

Publication:

- Clarify more clearly the connections between the thesis chapters and journal papers e.g., in the introduction section.

Contents:

- Section structure may be expanded to cover more subsubsection information for clarity.

Chapter 1

- In Section 1.3, the challenge is phrased as "Efficient High-SNR Signal Acquisition." It may be intended as "Inefficient High-SNR Signal Acquisition," to better reflect that acquiring high-quality signals remains a challenge. The phrasing of the other challenge statements should also be clarified.

- Clarification is needed on the intended meaning of the term ECG recovery. Does it refer to: denoising the ECG signal to enhance SNR, discovering or decoding ECG patterns such as heart rate; or as you might phrase it: "ECG recovery refers to the estimation of ECG-equivalent signals from radar data, either through denoising or signal reconstruction, enabling cardiac feature extraction without direct skin contact"?

- Please elaborate on the role of deep learning in noise handling. If radar sensing can denoise ECG over short-term windows with defined frequency, why is it less effective over long-term recordings? Is this due to signal misalignment? If so, what types of misalignment were considered (e.g., subject movement, sensor disconnection)?

- After defining each challenge (research gap), a separate paragraph should link each to a corresponding research question (RQ) to make the gap–question alignment explicit. For example: RQ1: How can radar sensing reconstruct ECG signals using [specific methods] to address [specific challenge]?

- Add appropriate citations for 1.3.3

Chapter 2

- Section 2.1 could be better linked to the challenges/research questions in Chapter 1.

- Section 2.2 (literature review) would benefit from division into 3–4 subsections, each reviewing current solutions relevant to one research question, and summarising the gaps that remain. Relevant background (currently in 2.1) could be integrated to focus on identifying research gaps.

- Regarding the use of the term "Evaluations", I assume this refers to evaluation metrics or processes for assessing current methods. However, from the text it sometimes reads as personal reflections or opinions; this should be clarified.

- Section 2.2: organise the key metrics of different methods into a table for better clarity.

- Page 22, last paragraph: 'infer on' -> 'infer from'

Chapter 3

- Figure 3.1: The caption does not explain the meaning of the original and blue lines. Why does the time axis start at 46 seconds?

- Figure 3.2: How is the boundary defined between high-SNR and low-SNR signals? What deep learning model architecture and training approach was used?

- Table 3.2: How were the training and testing datasets separated? Was the same procedure applied to all algorithms? How many runs were conducted? Was statistical significance assessed (e.g., $p < 0.05$)?

- Provide more details on the radar hardware setting/specifications of the MIMO radar and deployment considerations (e.g., the optimal transmission power and subject distance).

Chapter 4

- Figure 4.1: Could you clarify the differences between ECG Generation, ECG Recovery, and ECG Reconstruction? Why is long-term ECG considered here rather than in Chapter 5?

- Move the title of Fig. 4.17 to the caption for formatting consistency

Chapter 5

- Figure 5.2: How long does it take to perform single-cycle ECG recovery? How about long-term ECG recovery? For the module named "Cycle Length Decoder", How does this address inaccurate PPI estimation? Is it due to predicting the cycle length itself, or related to classifying different cycles across varying ECG patterns?

- Page 77, first paragraph: 'well-recovery' -> 'well-recovered'; 'a optimization' -> 'an optimization'

Chapter 6

- How are "limited labelled data" conditions defined (e.g., 40%, 60%)? How does this differ from the original dataset distribution?

- Shorten the Chapter title or use smaller font size to avoid misalignment/overlapping in the page header.

Chapter 7

- The conclusions should re-emphasize the provided answers to the research questions/objectives set in chapter 1/2.

- Page 134, line 4: 'car vibrations' -> 'platform vibrations'; 'enable a realistic radar-based ECG measurement' -> 'enable realistic radar-based ECG monitoring'