

# Automatic camera-based arrhythmia classifier has 96% sensitivity and 94% specificity

## Camera-based detection of cardiac arrhythmias in clinical setting

I. Cramer<sup>1,2</sup>, R. van Esch<sup>1,2</sup>, C. Verstappen<sup>1,2</sup>, A. Dierick<sup>2</sup>, C. Kloeze<sup>2</sup>, J. Bergmans<sup>1</sup>, S. Stuijk<sup>1</sup>, M. van t Veer<sup>1,2</sup>, L. Dekker<sup>1,2</sup>, L. Montenij<sup>1,2</sup>, S. Zinger<sup>1</sup> and R. Bouwman<sup>1,2</sup>  
 1 Eindhoven University of Technology, Eindhoven, the Netherlands  
 2 Catharina hospital, Eindhoven, the Netherlands

Contact information : i.c.cramer@tue.nl

### INTRODUCTION

- Remote photoplethysmography (rPPG) enables unobtrusive heart rate monitoring with video-cameras
- rPPG is based on **detection of facial color changes** caused by pulsatile bloodflow (1)
- Atrial fibrillation (AF) is the **third most common postoperative complication**, therefore useful to detect fast and with high accuracy on hospital wards

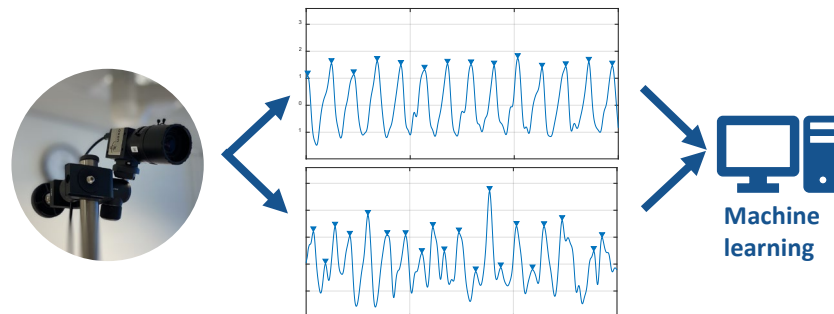
### OBJECTIVES

- Validity of rPPG in heart rate measurement during sinus rhythm (SR), AF and atrial flutter (AFI) in comparison with ECG
- Performance of a rPPG-based cardiac arrhythmia detection algorithm

### METHODS

- Population: 56 patients having cardioversion for atrial fibrillation or atrial flutter
- Assessment heart rate: **visible light (RGB) camera vs standard ECG** monitoring
- **Algorithm development** to distinguish SR signal vs arrhythmia signal

Figure 1. Algorithm development with camera-based SR signal and AF signal



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#### References:

1. Wang W, den Brinker AC, Stuijk S, de Haan G. Algorithmic Principles of Remote PPG. IEEE Transactions on Biomedical Engineering. 2017 Jul 1;64(7):1479–91.

### RESULTS

Figure 2. Performance arrhythmia classification algorithm (n=40)

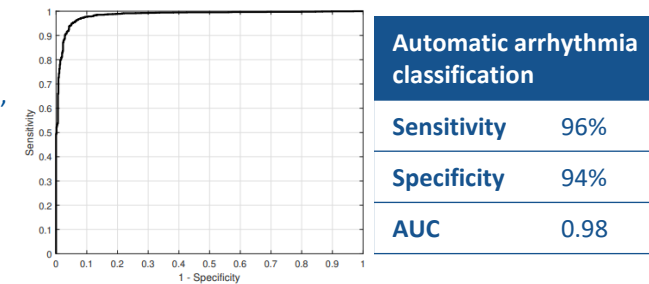
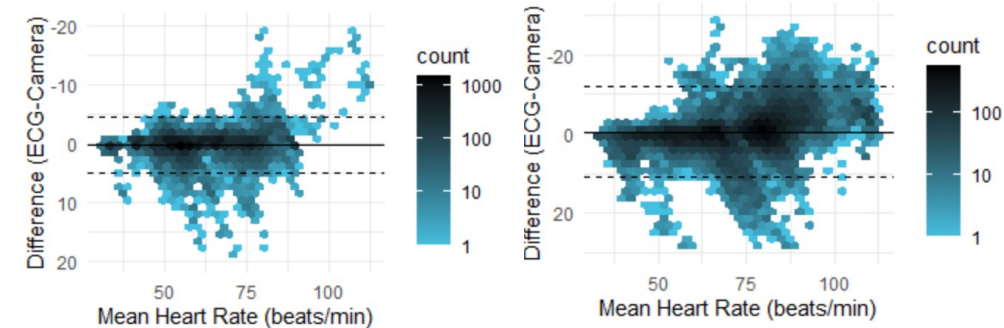


Figure 3. Bland altman plots sinus rhythm (left) (N=38) and atrial fibrillation (right) (N=27). Bias is indicated by the black line, dashed lines indicate the limits of agreement (LoA).



### CONCLUSIONS

- rPPG provides HR measurements within 5 bpm of the reference ECG in **97%, 90% and 87% for SR, AF and AFI**, respectively
- Automatic camera-based rhythm classification is feasible with a **sensitivity of 96% and specificity of 94%**