

Cardio Clarity - Wearable Cardiac Monitoring

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Motivation

- ❖ 80% of cardiac events are preventable by monitoring²
- ❖ Preventive health care is costly²

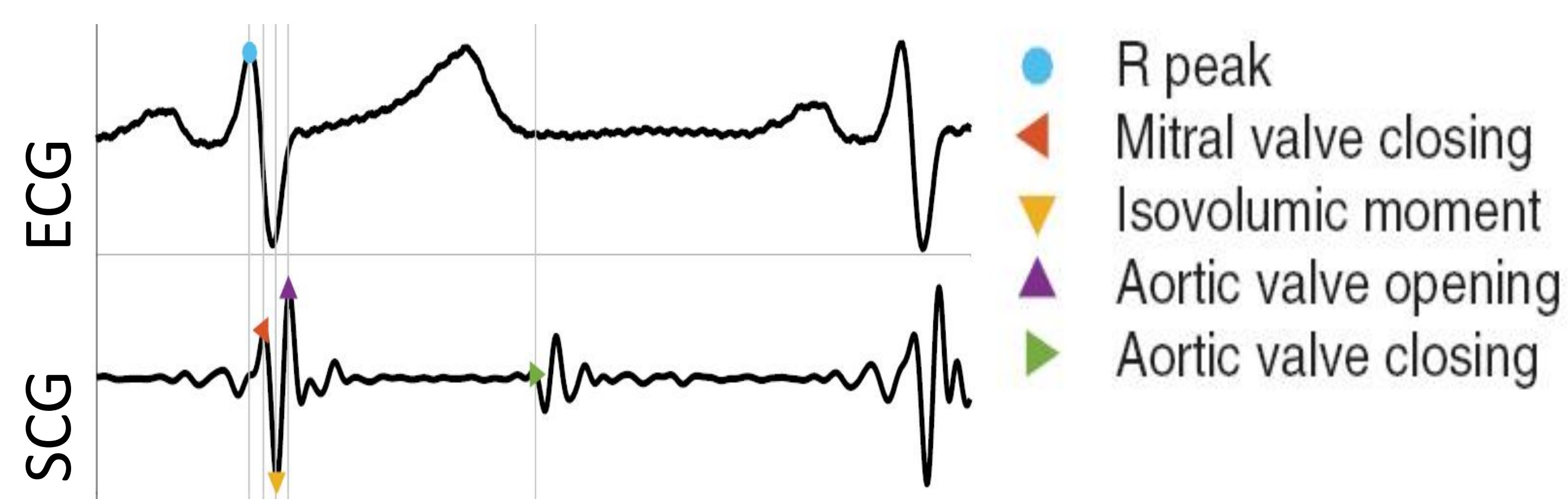


Fig 1. ECG and SCG Signals Labeled with Fiducial Points⁴

Objective

Purpose: Develop a low-cost wearable system for an accessible cardiac monitoring platform

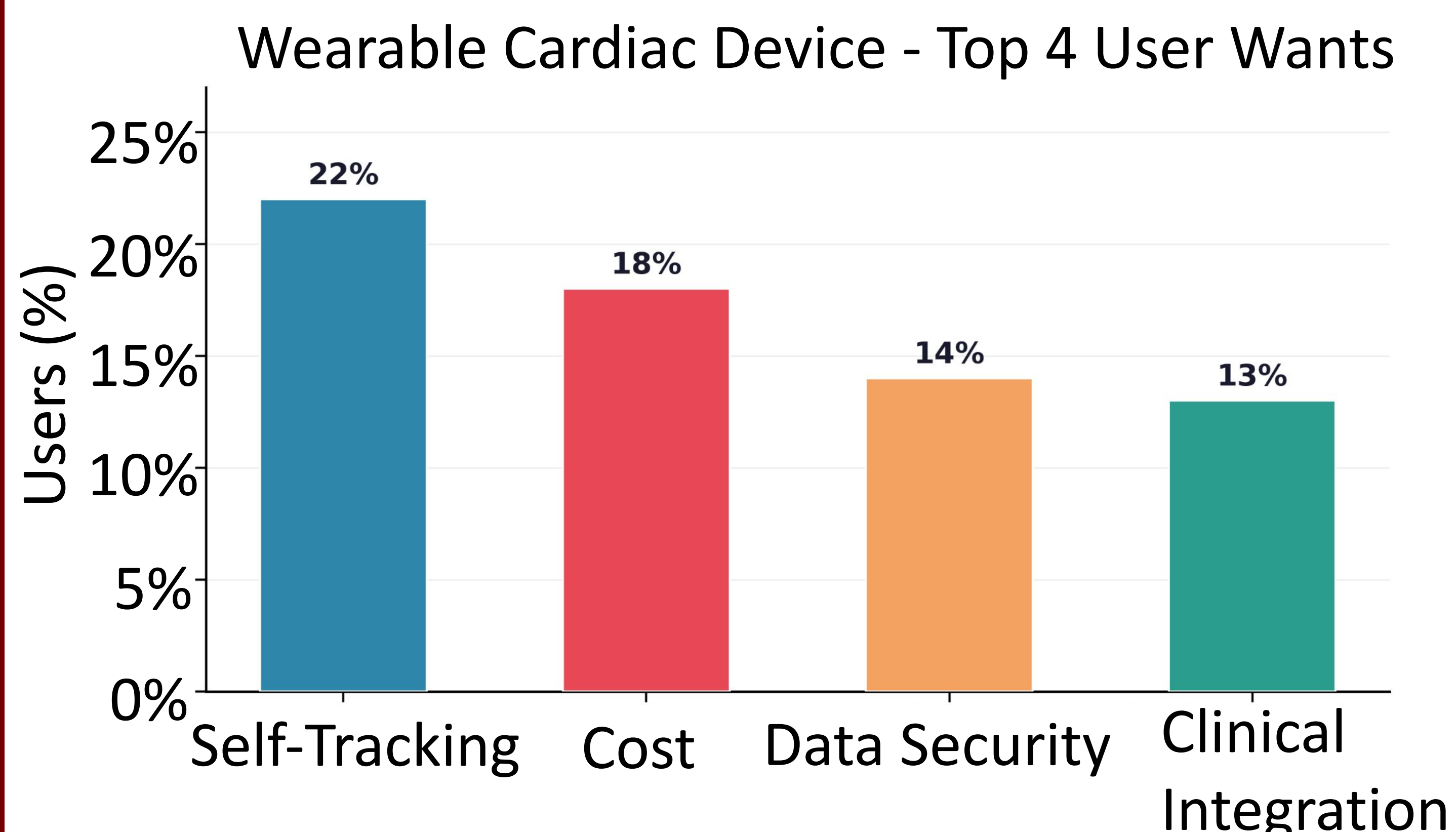


Fig 2. Top 4 qualities in Wearable Cardiac Devices³

Market Comparison

Capability	Cardio Clarity	Cardio Tag
ECG waveform	✓	✓
Number of Leads	3	1
Valve timing (SCG)	✓	✓
HR Detection	✓	✓
Cost	Less than \$50	\$20,000

Design & Methods

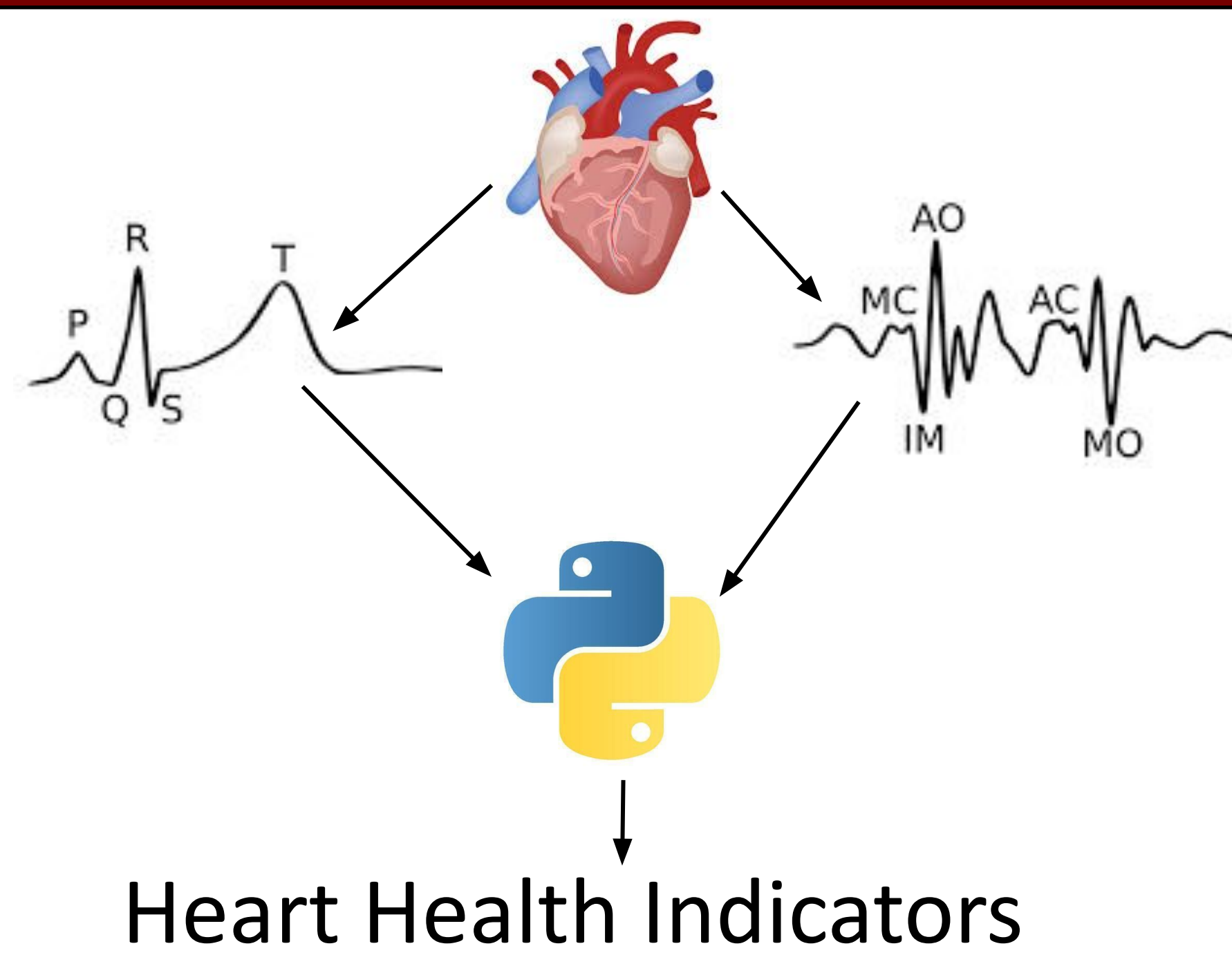


Fig 3. System Flow with Subcomponents

Arduino Nano 33 IoT (SCG)

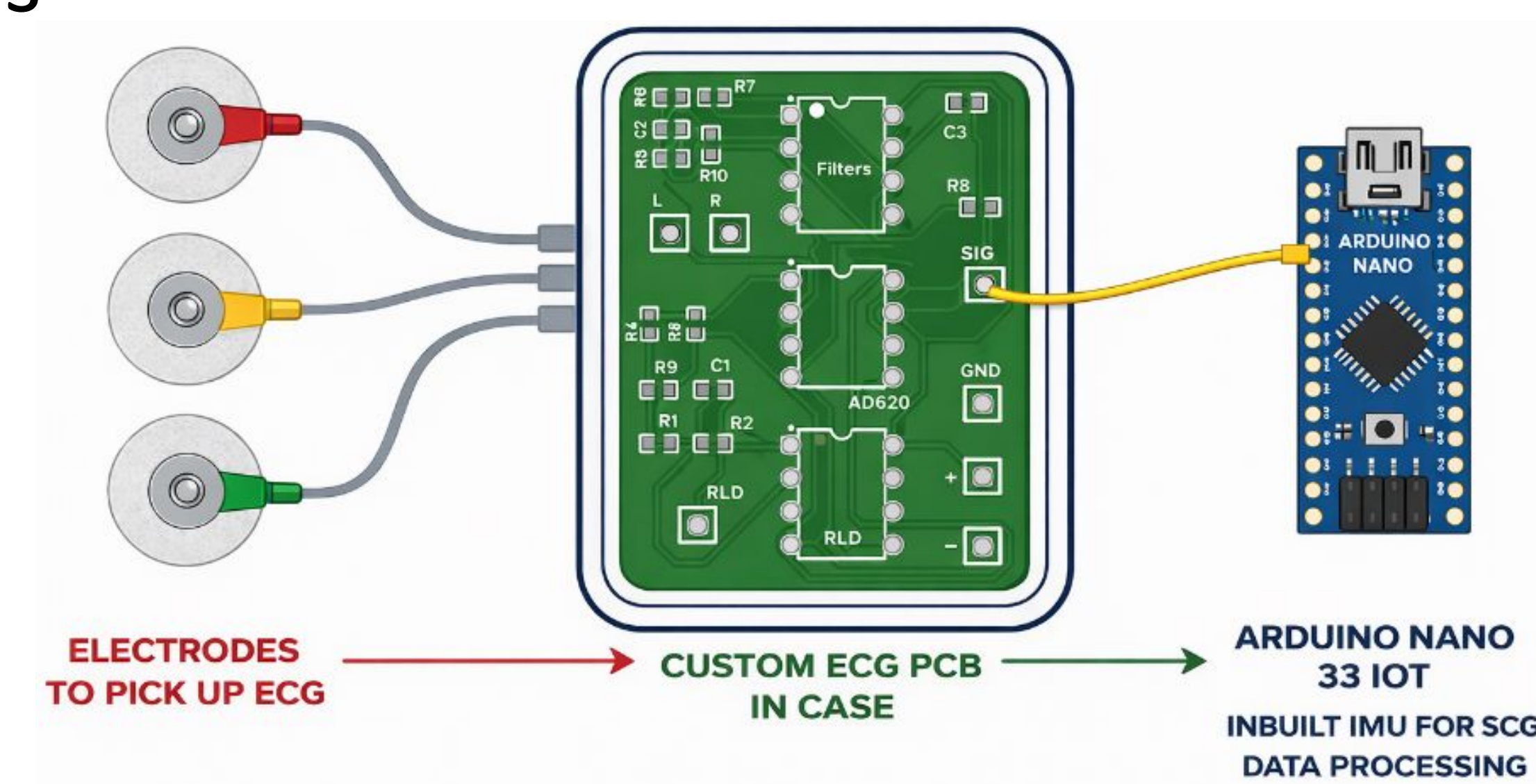
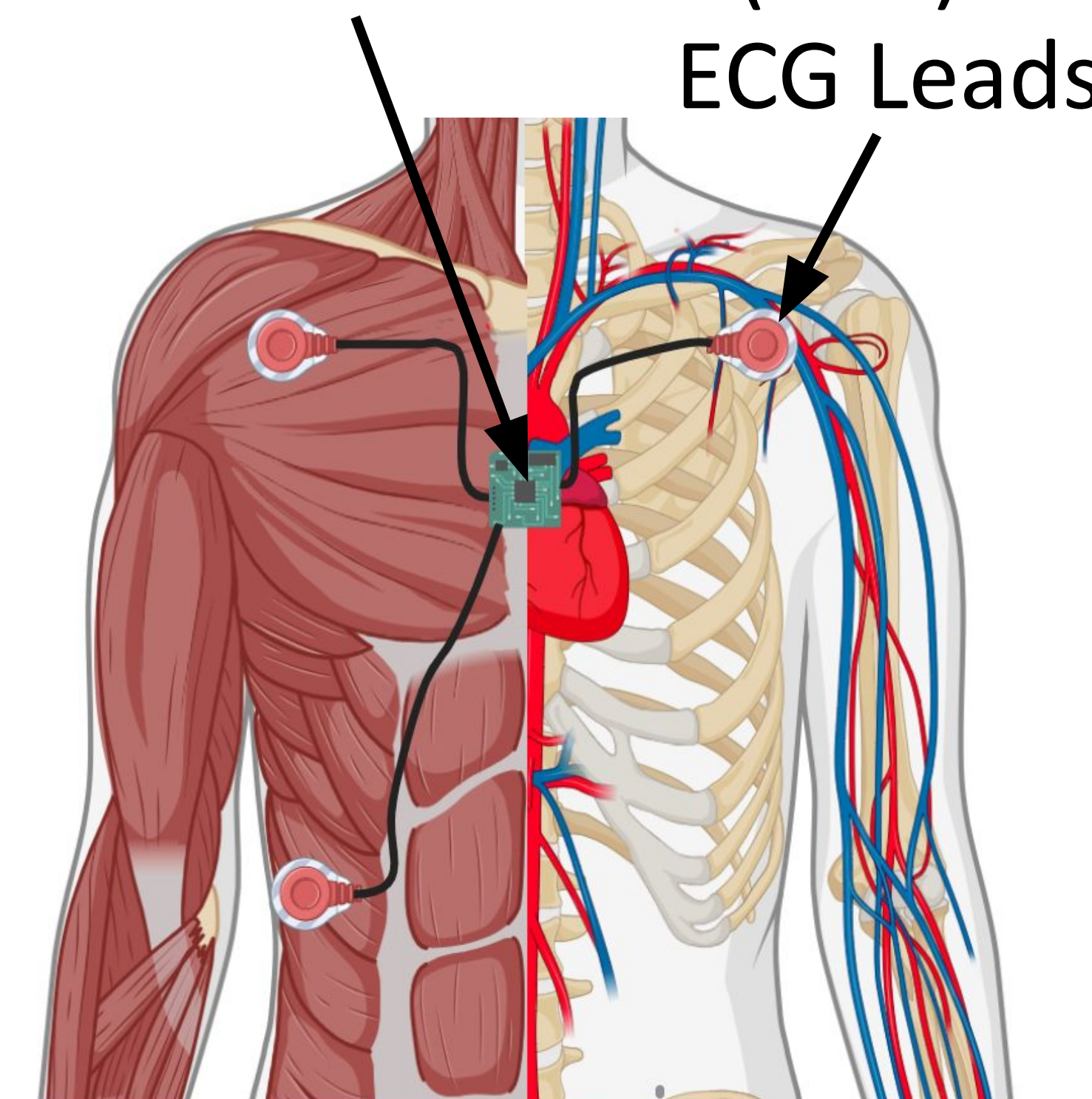


Fig 4. Device Diagram

Results

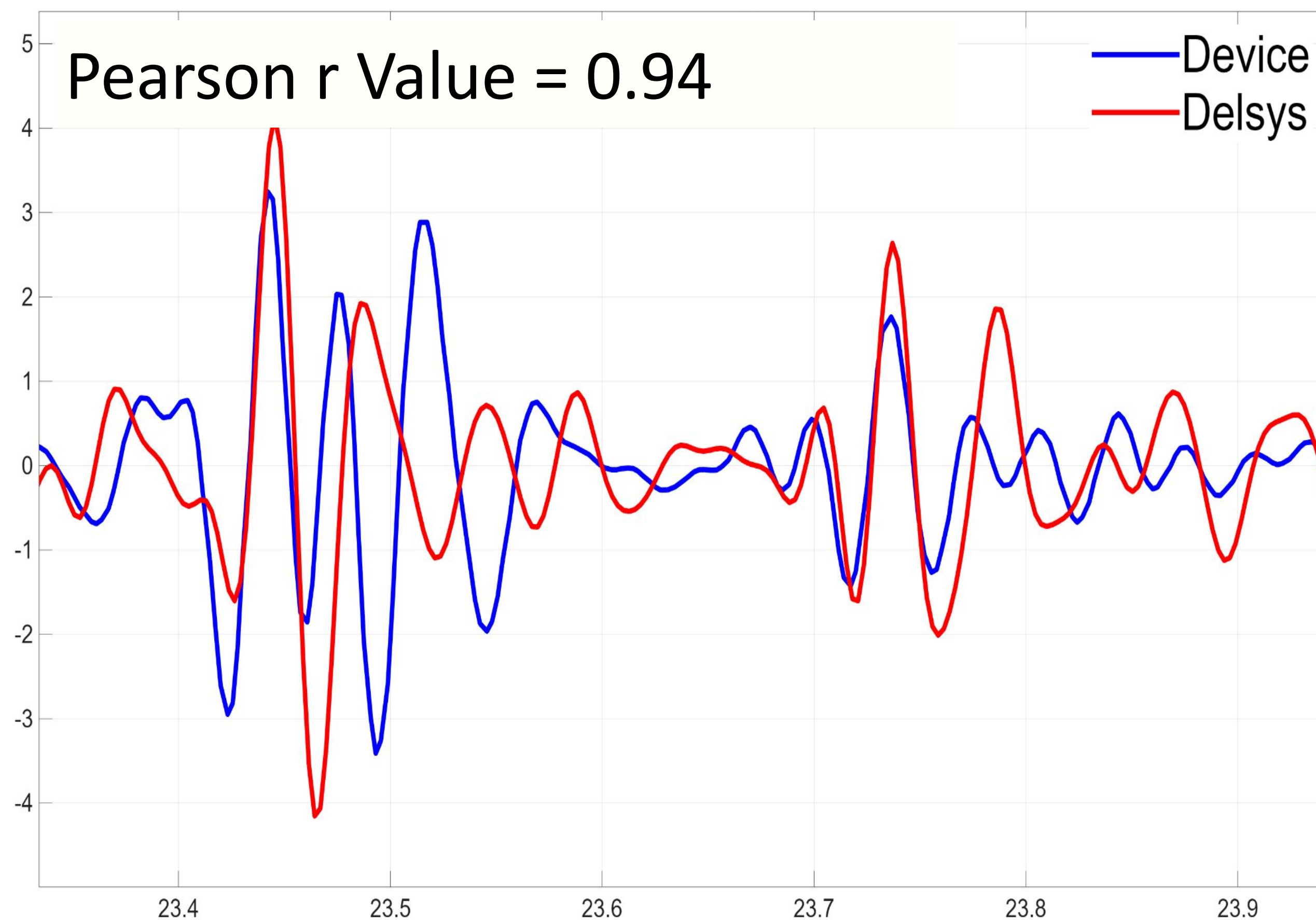


Fig 5. Device vs Gold Standard (Delsys) SCG Overlay

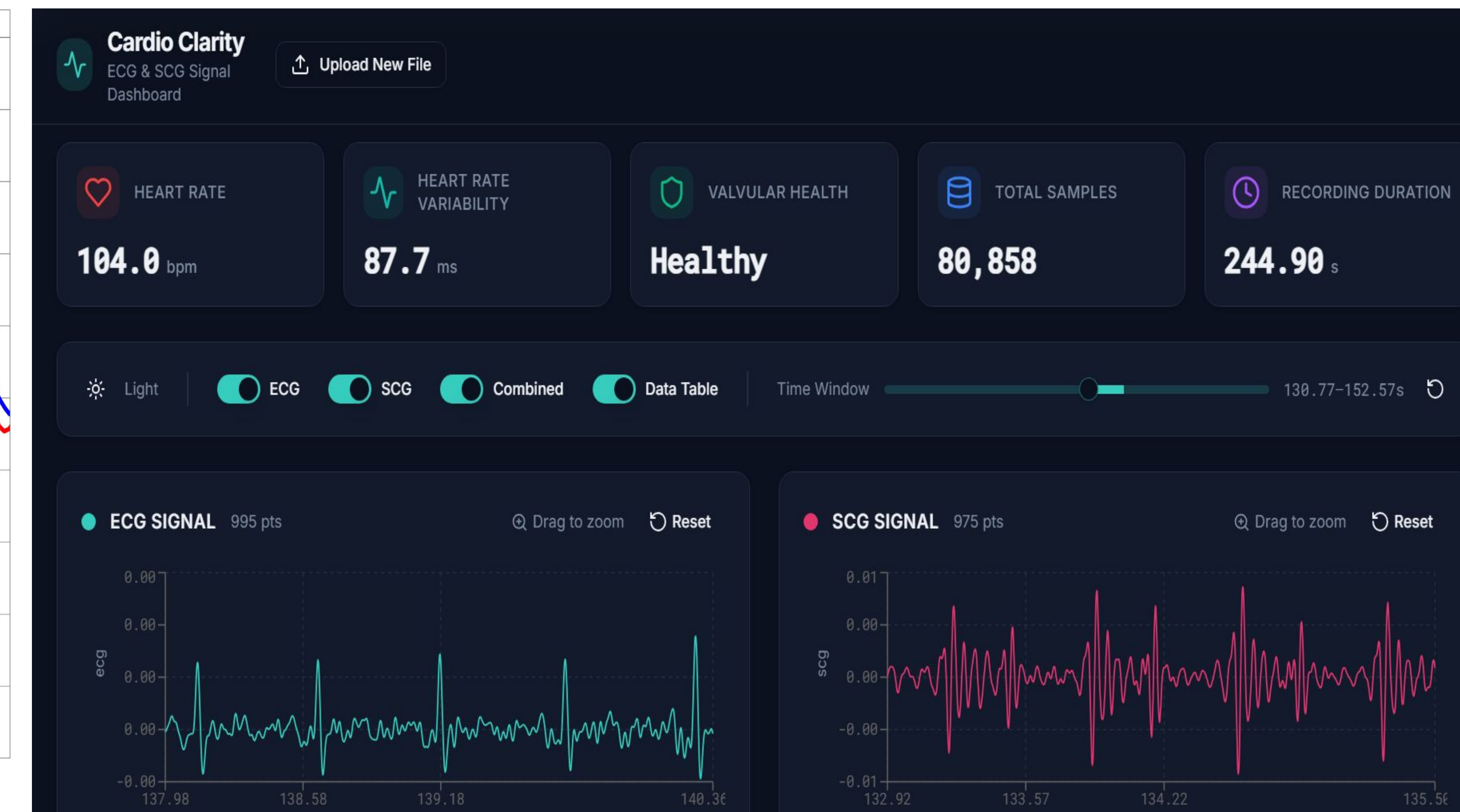


Fig 7. UI and Machine Learning with Cardiac Variables

Future Work & Limitations

- ❖ Transition to a fully wireless Bluetooth device
- ❖ Improve ML accuracy for disease detection
- ❖ Optimize the real-time processing pipeline

References

¹Centers for Disease Control and Prevention (2024), ²World Heart Federation (2024), ³Venn, R. A., Khurshid, S., Grayson, M., et al. (2023). ⁴Laurin, Alexandre et al. IEEE (2016)

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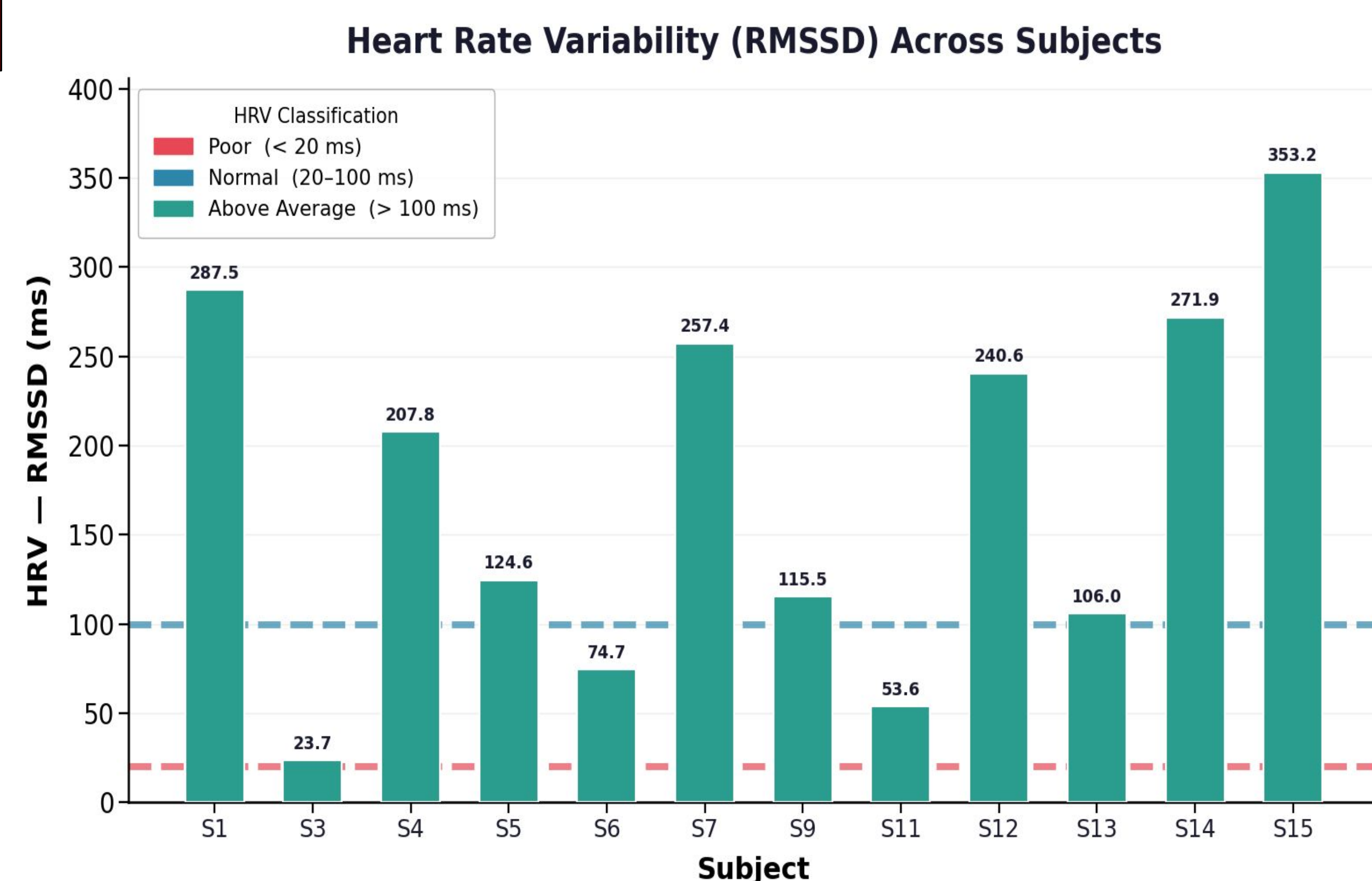


Fig 6. Device HRV Among Test Subjects