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ILLIQUIDITY

This investment is illiquid and may be difficult to sell or exit.

CAPITAL LOSS

You could lose all your money.

NO FSCS / FOS PROTECTION

You are not protected by the Financial Services Compensation Scheme or the Financial Ombudsman Service.

COMPLEXITY

This is a complex investment and may be difficult to understand.

ELIGIBILITY (ART. 48): This offer is only available to persons who qualify as High Net Worth Individuals under Article 48 of the Financial Promotion Order 2005 (as amended). Participation is only permitted after completion and signature of the prescribed Article 48 statement.

NO INCENTIVES: No monetary or non-monetary incentives or inducements are offered in connection with this investment.

CONSUMER DUTY: This document is intended to be fair, clear, and not misleading, and to support informed decision-making.

REGULATORY STATUS: This financial promotion is made only to persons who qualify as High Net Worth Individuals under Article 48 of the Financial Promotion Order 2005. It has not been approved by an FCA-authorized person.

COOLING-OFF: You will be provided with a 24-hour cooling-off period after receiving this information before you are able to invest.

UNREGULATED STATUS: This arrangement is an unregulated collective investment scheme (CIS) and/or a Non-Mainstream Pooled Investment (NMPI) under FSMA 2000 s.235. It is not authorised or regulated by the FCA and is not subject to the same protections as regulated investments.

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APPROPRIATENESS ASSESSMENT (COBS 4.12): Before you are permitted to invest, an appropriateness assessment will be conducted to determine whether this investment is appropriate for you based on your knowledge and experience of high-risk investments. If we determine the investment may not be appropriate, you will be warned. You may still proceed but should consider the warning carefully.

TAX DISCLAIMER: Nothing in this document constitutes tax advice. The tax treatment of your investment depends on your individual circumstances and may be subject to change. You should seek independent tax advice from a suitably qualified adviser before making any investment decision. sparse-supernova.com does not provide tax advice and accepts no liability for any tax consequences arising from participation in this arrangement.

Radar Cardiac Biometric

R&D Project Overview · sparse-supernova.com

R&D STAGE — PRE-HARDWARE VALIDATION

THE PROJECT

Every person has a unique mechanical cardiac signature — the precise pressure waveform, valve timing, and ventricular geometry that produces a characteristic micro-motion pattern at the chest wall. **This R&D project investigates contactless radar-based capture of this signature** to enable biometric identification at 0.5–1.5 m without cameras, fingerprint readers, PIN pads, or active subject cooperation.

WHY RADAR WINS IN THESE ENVIRONMENTS

DATA CENTRES

Camera biometrics require GDPR-compliant data handling. Fingerprint readers fail with gloved hands or frequent sanitisation.

Radar: no image stored, no skin contact, glove-transparent, functions in low light.

PHARMA / CLEANROOMS

Touch surfaces are contamination vectors. Face recognition is defeated by masks and visors worn as standard PPE.

Radar: fully touchless, functions through standard PPE, no active positioning required.

HIGH-SECURITY ACCESS

Face recognition is spoofable with photographs. No existing modality is both passive and spoof-resistant at short range.

Radar: cardiac signature cannot be photographed, replayed, or easily coerced.

The contactless biometrics market is estimated at **\$27B in 2025**, growing at **~20% CAGR** to **~\$66B by 2030**. Cardiac radar biometrics is an emerging sub-segment with no dominant commercial incumbent. Academic results (2024–25) report 90–98% accuracy on 10–30 subjects — **these are field benchmarks, not sparse-supernova.com's own validated claims**. Our 30-subject trial will establish an independent baseline.

TECHNICAL APPROACH

Signal Detection & Authentication

A 60 GHz pulsed coherent radar transmits a signal at the subject. The chest wall displaces 0.3–0.5 mm per heartbeat, phase-shifting the reflected signal by ~0.75 rad. Proprietary USAD gating + inter-window phase coherence detection extracts the cardiac waveform.

Works in darkness, dust, and PPE environments.

Range: 0.5–1.5 m **Enrollment: ~30 s**

Auth target: <5 s

Target Verticals

- Data centres
- Pharma / cleanrooms
- High-security access
- Healthcare
- Border control
- Defence
- Prison / court access

Near-term: data centre and pharma access, where incumbent technology gaps are clearest.

Phase Coherence Gate — Noise Robustness			
Atmospheric turbulence stress test — not operational range			
Noise scenario	σ (rad)	Phase coh.	Result
Moderate turbulence	0.0037	0.959	✓ PASS
Moderate turbulence	0.0066	0.960	✓ PASS
Strong turbulence	0.0373	0.965	✓ PASS
Empty — FP test ×10	—	<0.30	✓ 0/10 FP

Noise tests validate gate robustness. Operational range is 0.5–1.5 m.

Core Gate: Inter-Window Phase Coherence		
Cardiac sinusoid vs. stochastic noise discrimination		
Signal type	Coherence	Gate decision
Cardiac — person present	0.958–0.965	✓ DETECT
Kolmogorov noise — empty	–0.39 to +0.30	✗ REJECT

3× gap. To our knowledge not described in prior cardiac radar literature.

OPEN QUESTIONS — PENDING HARDWARE VALIDATION

▲ KNOWN VARIABLES NOT YET CHARACTERISED ON LIVE SUBJECTS

Respiratory interference (~25 dB above cardiac) — SVF separation validated in simulation; live erratic breathing requires further characterisation.

Template drift over time — adaptive update strategy and re-enrollment interval TBD from live study.

Clothing & PPE attenuation — 60 GHz penetration through heavy garments vs. thin PPE not yet quantified.

Authentication throughput — target <5 s; DTW latency on embedded edge hardware not yet measured.

PROPRIETARY STACK

USAD — Conformal Anomaly Gate

Calibrated on null realisation. Zero calibration leak. In production on Sparse Sentinel.

PRODUCTION VALIDATED

Phase Coherence Gate

Inter-window phase advance tracking at cardiac frequency. To our knowledge not in prior literature.

SIMULATION VALIDATED

SVF Bandpass + IBI Extraction

Andy Simper TPT state-variable filter. Cardiac-band separation from respiratory signal.

SIMULATION VALIDATED

Biometric Classifier

DTW template matching on per-cycle cardiac waveform. Deep learning as later-stage option.

DESIGN STAGE

NEXT STEPS

01 Hardware Validation

Acconeer XE125 (60 GHz). Live IQ → pipeline. BPM vs. reference. Characterise PPE signal loss.

02 30-Subject Study

Own accuracy baseline. Respiratory interference, template drift, edge cases. Prove <5 s auth.

03 IP Filing

Patent the inter-window phase coherence gate and USAD-gated cardiac biometric architecture.

04 Lighthouse Pilot

First pilot in data centre or pharma access control. Prove repeatable authentication.

Collaborative R&D Pool

Radar Cardiac Biometric — Participation Structure · sparse-supernova.com

<h2 style="margin: 0;">40</h2> <p style="margin: 0; font-size: small;">Participant slots available</p>	<h2 style="margin: 0;">£500</h2> <p style="margin: 0; font-size: small;">Per unit contribution</p>	<h2 style="margin: 0;">£20,000</h2> <p style="margin: 0; font-size: small;">Total project budget</p>
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1. THE OPPORTUNITY

sparse-supernova.com is opening a Collaborative R&D Pool to fund the transition of its Radar Cardiac Biometric project from simulation to live validation. This is a **pre-hardware validation phase** designed to test whether the project can move from simulation confidence to live-subject proof. We are seeking **40 participants** to contribute **£500 each**, creating a total project budget of **£20,000**.

Funding supports: validation setup and live test preparation · specialist sensing and test equipment · a structured 30-subject validation study · technical characterisation across real operating variables · technical analysis and reporting · initial IP protection and filing work.

The project is focused on short-range access control (0.5–1.5 m) in environments where existing biometric methods create friction, hygiene risk, or privacy overhead, including data centres, pharmaceutical manufacturing, cleanrooms, and high-security facilities.

2 & 3. PARTICIPANT PROFILE & TAX POSITION

Who Can Participate	Tax Position	IP Participation Right
<ul style="list-style-type: none"> · UK limited companies · Individuals investing personally · Self-employed sole traders, subject to own tax treatment <p>Participants may apply for one or more units, subject to availability.</p>	<p>Intended to align where possible with the UK R&D tax framework (merged scheme, April 2024 onwards).</p> <p>UK companies: may be eligible; ERS available for qualifying SMEs.</p> <p>Individuals: company R&D relief does not apply.</p> <p>International: R&D Map Calculator at sparse-supernova.com/randd — 51 jurisdictions.</p>	<p>Contractual economic participation right in New IP arising from this funded phase.</p> <p>10% total pool participation right across the pool</p> <p>0.25% of pool per £500 unit</p> <p>Pro-rata share of qualifying future licensing receipts from the defined pool share.</p>

<p>Not equity</p> <p>Not equity in sparse-supernova.com</p>	<p>Not the full stack</p> <p>Not ownership of the full product stack</p>	<p>Not background IP</p> <p>Not a claim over pre-existing background IP, methods, or signal-processing stack</p>
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New IP means IP first created during the funded project phase and does not include pre-existing background IP, software, methods, know-how, or prior signal-processing stack unless expressly stated in the Collaborative R&D Agreement. sparse-supernova.com retains an exclusive, royalty-free licence to integrate the resulting technology into its own products and services.

5. VALIDATION PROGRAMME SCOPE

- Pulse and waveform capture against reference devices
- Posture and body-position variability
- Repeatability across sessions
- Authentication speed and practicality benchmarking
- Clothing and PPE attenuation characterisation
- Respiratory interference and signal separation
- Template stability over time
- IP filing preparation and technical report

The objective is not simply to show that a signal can be detected, but to determine whether the approach can operate reliably enough to justify the next engineering and commercial phase. The £20,000 pool funds this defined first validation tranche only.

6. TIMELINE

By 30 April 2026	Weeks 1-8	Weeks 8-12	Weeks 12-14
Pool Funding Deadline Participation slots close. Agreements signed.	Validation Setup Sensing equipment, test preparation, protocol finalisation.	30-Subject Study Live characterisation across all validation variables.	Analysis & Filing Technical analysis, IP filing preparation, final participant report.

7. NEXT-STAGE PRIORITY

PRIORITY ACCESS — POOL PARTICIPANTS ONLY

If this validation phase is successful, pool participants will be given priority access to participate in any next development phase before any wider external offering.

A second phase may include expanded engineering and validation, increased funding participation, broader international IP protection, and larger participation amounts linked to a larger defined economic participation right for that next-stage programme. Any such phase would be documented separately and would remain subject to validation results, legal structuring, and final commercial terms.

- Expanded engineering and validation work
- Broader international IP protection
- Increased funding participation
- Larger economic participation right for next stage

8. COMMERCIALISATION OUTLOOK

This is an early-stage R&D project, not a mature commercial product. Commercial licensing or product deployment, if achieved, is expected to follow only after successful validation, further engineering work, and appropriate IP steps. Any participant return would depend on later licensing or commercialisation of qualifying New IP and **may be delayed, limited, or never arise.**

9. COMMERCIAL LICENSING BENCHMARKS

If the validation phase is successful and the resulting technology is later licensed commercially, sparse-supernova.com's current benchmark licensing model is as follows. **These figures are not a guarantee that licensing will occur, that any specific licence will be signed, or that participants will receive any particular return.**

FULL VERTICAL LICENCE
£4,000,000
 PER VERTICAL · PER YEAR

Licence across a full industry vertical for custom primitives, trust modules, sparse applications for internal operations, customer solutions, and services.

Includes:

- All domains and sub-domains within the licensed vertical
- Multi-site prototypes & embedded innovation
- Scalable intelligence deployment

SUB-DOMAIN LICENCE
£50,000
 PER SUB-DOMAIN · PER YEAR

Licence for one use case, technical layer, or domain.

Scoped to:

- One sub-domain only
- No parent, sibling, or adjacent domains unless separately added

Outcome: A validated prototype for the defined technical uncertainty.

These benchmark figures represent sparse-supernova.com's current licensing model as applied to its broader technology portfolio. The figures shown are not specific to the Radar Cardiac Biometric project alone and are provided solely to illustrate the intended commercial framework if the technology reaches a licensable stage. Any actual licence terms would be subject to negotiation, validation results, and final commercial and legal structuring.

10. HOW TO JOIN

<p>01 Register Interest Visit sparsesupernova.com to request a participation slot.</p>	<p>02 Review Agreement Review and sign the Collaborative R&D Agreement.</p>	<p>03 Contribute Transfer the £500 unit amount through the designated payment route.</p>	<p>04 Engage Receive periodic technical updates throughout the funded validation phase.</p>
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11. RISK WARNING

▲ HIGH-RISK COLLABORATIVE R&D PROJECT

- Live hardware validation may fail
- Signal quality may be affected by breathing, clothing, PPE, or posture
- Future licensing or commercial returns may be limited or never arise
- Technical performance targets may not be achieved
- Patent filings may not proceed as planned
- Participants should be prepared for partial or total loss of value

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