

KARUKAAVALAN

கருகாவலன் — Guardian of the Unborn

"Every Heartbeat Counts — From Village PHC to Home"

AI-Powered Non-Invasive Fetal Health Monitoring System for Tamil Nadu

SHINKAI LABS PRIVATE LIMITED

R&D-Driven Deep-Tech Startup | Chennai, Tamil Nadu, India

Sector: Healthcare / MedTech / AI in Medicine | Current TRL: 4-5 → Target: 6-7

PROOF OF CONCEPT: WORKING PROTOTYPE ALREADY DEVELOPED

Shinkai Labs has already developed **FetalPulse Diagnostic V1** — a functional software prototype for non-invasive fetal ECG extraction and arrhythmia detection. This is NOT a concept; it is a working system validated on real clinical data.

KEY ACHIEVEMENTS:

- ✓ **95%+ Fetal Heart Rate Detection Accuracy** — validated on PhysioNet clinical datasets
- ✓ **IEEE ICC 2026 Publication** — peer-reviewed research accepted at premier international conference
- ✓ **Novel Algorithm: Earth Mover Distance + Deep Learning** — advanced signal separation technique
- ✓ **4-Channel Abdominal Signal Processing** — multi-lead maternal ECG analysis
- ✓ **Complete PQRS Wave Detection** — R Peak, Q Wave, S Wave, P Wave identification
- ✓ **Automated Arrhythmia Detection** — clinical decision support with diagnostic results
- ✓ **HIPAA-Compliant Architecture** — healthcare data security standards built-in

THE CRISIS: A Silent Emergency in Tamil Nadu's Maternal Healthcare

India witnesses approximately **25 million pregnancies annually**, with Tamil Nadu contributing nearly **10 lakh births per year**. Despite significant progress, a critical gap persists: the absence of affordable, continuous fetal health monitoring in Primary Healthcare Centers (PHCs) and rural settings. Current CTG machines cost ₹3-10 lakhs and require trained technicians, leaving 68% of rural pregnancies without continuous monitoring. This technology gap contributes to approximately 12,000 preventable stillbirths annually in Tamil Nadu alone.

9.8 Lakh+

Live births/year in TN

~12,000

Preventable stillbirths/yr

68%

Rural unmonitored

₹3-10L

Current CTG cost

THE SOLUTION: KARUKAAVALAN — Building on Proven Technology

Building upon our **validated FetalPulse Diagnostic prototype (95%+ accuracy)**, we propose developing an affordable (**under ₹30,000 per unit**) hardware device integrating our proven AI algorithms. The URP grant will enable us to: (1) Miniaturize our software into embedded hardware, (2) Develop low-cost electrode arrays, (3) Conduct clinical validation trials, and (4) Prepare for CDSCO regulatory approval.

SPECIFICATION	CURRENT STATUS → TARGET
Algorithm Accuracy	ACHIEVED: 95%+ (validated on PhysioNet) → Target: >95% on clinical data
Software Prototype	ACHIEVED: FetalPulse Diagnostic V1 → Embedded hardware device
Target Unit Cost	< ₹30,000 per unit (90% cost reduction vs. CTG)
Operator Training	Operable by ASHA/ANM with <2 hours training
Connectivity	Mobile app + offline mode + telemedicine integration

ALIGNMENT WITH CENTRAL & STATE GOVERNMENT PRIORITIES

Central: Ayushman Bharat HWCs, LaQshya, Surakshit Matritva Abhiyan, Make in India MedTech, SDG 3.1/3.2. **Tamil Nadu:** Dr. Muthulakshmi Reddy Scheme, TN Health Systems Project, CM Health Insurance, TN Startup Policy 2023, Vision TN 2030.

EXPECTED OUTCOMES & MEASURABLE IMPACT

YEAR 1	YEAR 2-3	YEAR 5
✓ Hardware prototype (TRL 6) ✓ Clinical validation: 2 hospitals ✓ 3 publications + 1 patent	✓ CDSCO regulatory approval ✓ 50 PHC pilot deployment ✓ TN manufacturing + 25 jobs	✓ 5,000+ units deployed ✓ 15% stillbirth reduction ✓ ₹50Cr revenue + 100 jobs

OUR COMMITMENT TO TAMIL NADU

Financial: ₹5 Lakhs + In-Kind: ₹25+ Lakhs (Existing R&D, Engineering Team, Infrastructure)

✓ Joint IP with Academic Partner ✓ Manufacturing in Tamil Nadu ✓ Technology Transfer to Govt.

"அன்னையும் பிதாவும் முன்னறி தெய்வம்"

(Mother and Father are the first Gods we know)

KARUKAAVALAN — Because every heartbeat deserves a guardian.

SUBMITTED BY

SHINKAI LABS PRIVATE LIMITED

Dr. Muthukumar K A | Founder & CEO

Chennai, Tamil Nadu, India