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MAGAZINE NOTES

Dr Shubha Venkatesha Iyengar — Padma Shri 2026: Making Indian Skies Safer

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Dr Shubha Venkatesha Iyengar — Padma Shri 2026: Making Indian Skies Safer

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Every time an aircraft lands safely in fog at an Indian airport, part of the credit goes to a scientist who spent four decades at CSIR's National Aerospace Laboratories, Bengaluru. Dr Shubha Venkatesha Iyengar, recipient of the **Padma Shri 2026** (Science & Engineering), is the brain behind the **Drishti** system — India's first indigenous runway visibility measurement technology.

WHO IS DR SHUBHA VENKATESHA IYENGAR?

PARAMETER	DETAIL
Institution	CSIR–National Aerospace Laboratories (NAL), Bengaluru
Designation	Former Distinguished Scientist
Career span	4+ decades (joined NAL in 1974)
Education	BSc (Hons) Physics, MSc — Central College, Bengaluru (Rank 1 in both); PhD
Award	Padma Shri 2026, Science & Engineering category
State	Karnataka

THE DRISHTI SYSTEM: INDIA'S FOG-FIGHTING TECHNOLOGY

Problem: India's airports — especially in North India — face severe **winter fog** that reduces runway visibility to near zero, causing flight cancellations and accidents. Measuring **Runway Visual Range (RVR)** accurately is critical for pilot decision-making.

Pre-Drishti Situation:

- India relied entirely on imported foreign transmissometers (visibility sensors) from European manufacturers
- Import costs were high; maintenance dependent on foreign OEMs
- No indigenous capability for an aviation-critical system

Drishti (Transmissometer System):

- Developed at CSIR-NAL under Dr Iyengar's leadership
- India's **first indigenously developed runway visibility measurement system**
- Measures forward scatter of light to calculate Runway Visual Range (RVR) in real-time
- Deployed at **100+ airports and airstrips across India**, including major international airports
- DGCA (Directorate General of Civil Aviation) certified; meets ICAO standards

Impact:

- Enabled low-visibility operations at Indian airports during winter fog
- Reduced flight cancellations and diversions
- Saved airlines hundreds of crores annually in delay-related costs
- Demonstrated India's capability in aviation safety instrumentation

ADVANCED INFRARED DETECTORS

Beyond Drishti, Dr Iyengar's team at CSIR-NAL developed **Advanced Infrared (IR) Detectors** with applications in:

- Aviation: night vision, terrain awareness systems
- Defence: missile seekers, night surveillance
- Space: IR imaging for ISRO missions

These represent critical **dual-use technologies** — civil aviation safety + defence capability.

CSIR-NAL: INDIA'S AEROSPACE R&D HUB

PARAMETER	DETAIL
Founded	1959
Location	Bengaluru, Karnataka
Parent	CSIR (Council of Scientific & Industrial Research)
Key projects	Saras aircraft, Hansa trainer, FMRE (light aircraft), GTRE Kaveri engine components
Specialisation	Aeronautical R&D, composite materials, aerospace instrumentation

UPSC RELEVANCE

GS3 — Science & Technology:

- Import substitution in aviation safety technology — Atma Nirbhar Bharat in high-tech sectors
- CSIR's role in applied science: from lab to deployment
- Dual-use technology development (civil + defence applications)
- DGCA and ICAO: regulatory framework for civil aviation

GS2 — Governance:

- Padma Awards: civilian honour recognising extraordinary contribution; Government of India; announced Republic Day eve
- Women in STEM: Dr Iyengar's career as inspiration (joined NAL 1974 — a pioneering era for women in Indian science)

Key Institutions:

- **CSIR-NAL** (Bengaluru) — aerospace research; not to be confused with ISRO (space) or DRDO (defence)
- **DGCA** — civil aviation regulator under Ministry of Civil Aviation
- **ICAO** — International Civil Aviation Organisation (UN body setting global aviation standards)

FACTS CORNER

- Padma Shri 2026: Dr Shubha Venkatesha Iyengar, Science & Engineering, Karnataka
- Institution: CSIR-NAL, Bengaluru (joined 1974)
- **Drishti System:** India's first indigenous Runway Visual Range measurement system
- Deployed: 100+ airports and airstrips across India
- Reduces fog-related flight disruptions; DGCA-certified, ICAO-compliant
- Also developed: Advanced Infrared Detectors (defence + space dual-use)
- Education: BSc, MSc (both Rank 1), PhD — Central College, Bengaluru

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