

TECH SCAN

SEMICONDUCTOR IN DEFENCE



The landscape of modern defence is undergoing a remarkable transformation with the growing role of semiconductors. These tiny yet powerful devices are becoming the backbone of advanced military systems, enabling faster communication, smarter surveillance, and more reliable weapon technologies. Their importance stems from the need for precision, speed, and resilience in safeguarding nations, where every microsecond and every signal can make a difference.

Patents in the semiconductor field span innovations such as chip designs and specialized manufacturing processes that allow defence equipment to perform under extreme conditions. Protecting these breakthroughs ensures that developers maintain technological superiority while fostering healthy competition in the defence industry.

Equally vital is the collaboration between defence organizations and semiconductor innovators. This partnership helps overcome production challenges and guarantees that systems meet the highest standards of reliability, security, and operational excellence—ultimately strengthening national defence capabilities.



INNOVATION TIMELINE

1940s - Semiconductors revolutionized defence by replacing vacuum tubes in radar systems

1950s - U.S. military advanced semiconductors for precision targeting and control systems

1960s - Integrated circuits advanced satellite communication and missile defence systems

1980s - Microprocessors enhance stealth aircraft, warfare, and computing

2000s - Semiconductors enhance command, drones, and advanced surveillance

2010s - Semiconductors enhance cybersecurity, military weapons, and IoT integration for real-time battlefield awareness in defence.

2020s - Chips drive artificial intelligence, quantum encryption, and autonomous defence systems

PATENTABLE COMPONENTS

Microprocessors

Custom-designed chips for battlefield computing, stealth systems, and autonomous vehicles

Integrated Circuits

Specialized ICs for radar, satellite communication, and secure defence networks

Power Amplifiers

High-efficiency amplifiers that sustain long-range communication with minimal energy loss

Sensors

Semiconductor-based infrared, thermal, and radiation sensors for surveillance and missile defence

Memory Devices

Ruggedized RAM and flash storage designed to withstand extreme conditions in defence systems

Chip Packaging

Advanced packaging techniques that protect chips from radiation, heat, and mechanical stress

Communication Modules

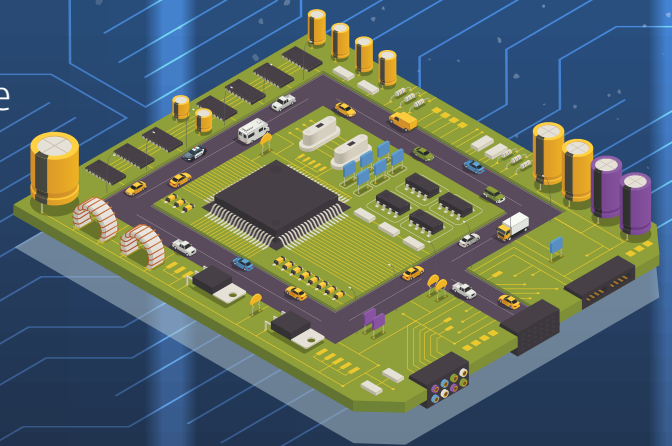
Secure semiconductor modules enabling encrypted military communication

AI Accelerators

Chips optimized for artificial intelligence tasks in cyber defence and autonomous weapons.

Quantum-Resistant Circuits

Emerging designs for secure encryption against quantum computing threats



PATENT STATISTICS

36

Hesai
Technology

25

Institute of
Semiconductors - Chinese
Academy of Sciences

25

University of Electronic
Science & Technology of
China

24

Xidian University

21

Beijing University
of Technology

21

Robert Bosch

17

Wuhan Vanjee
Optoelectronic
Technology

16

VOLKSWAGEN

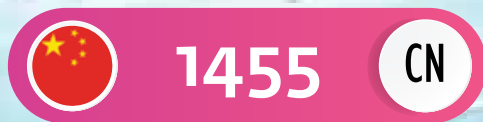
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Huawei

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Calterah
Semiconductor
Technology

PATENT LANDSCAPE



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YEAR WISE PATENT FILING TREND

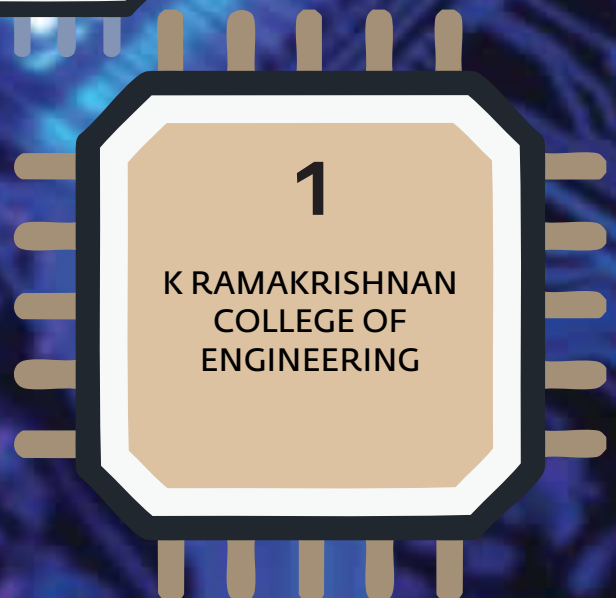
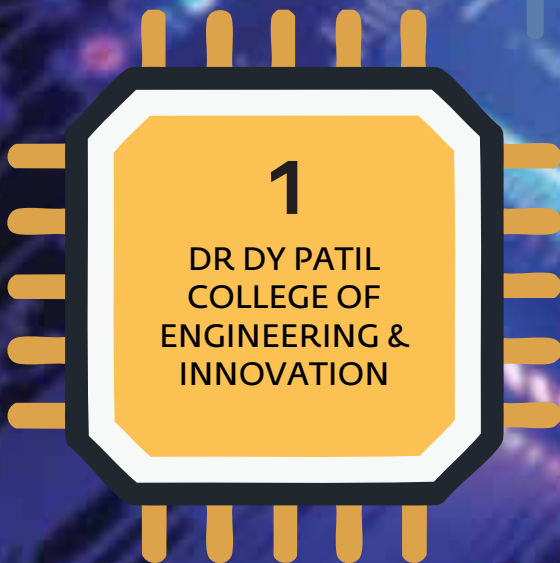
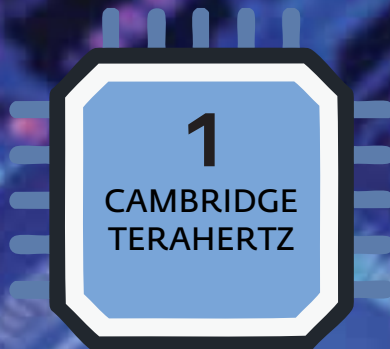
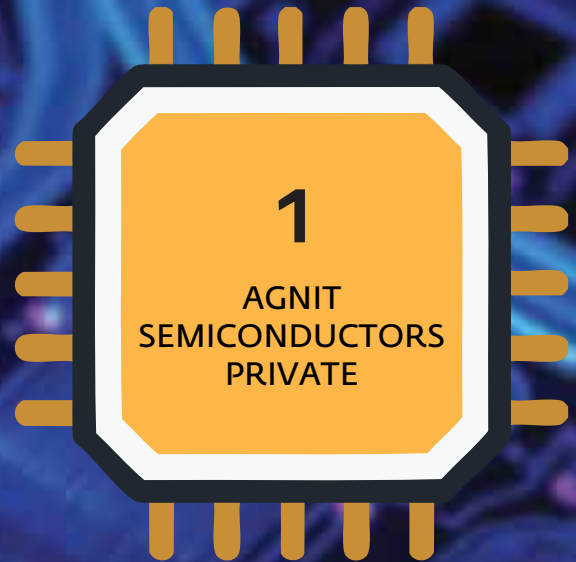
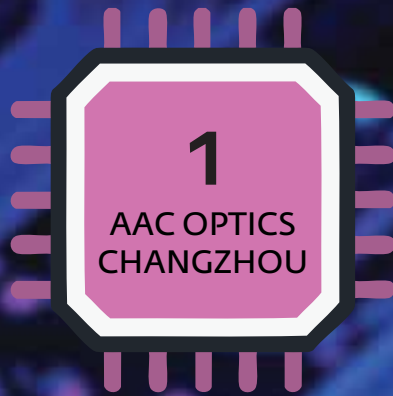
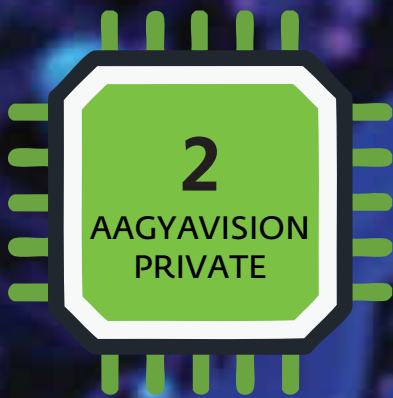


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NOTABLE INNOVATIONS

Patent Application	Priority date	Title	Assignee
KR10-2834962	2022-09-06	Phase array jamming transceiver applied to electronic warfare system for aviation and electronic warfare system including the same	LIG NEX1
US10211116	2015-10-29	Semiconductor device	MITSUBISHI ELECTRIC
US9537605I	2015-07-22	Ultra-wideband high - power solid-state transmitter for electronic warfare applications	BAE SYSTEMS INFORMATION & ELECTRONIC SYSTEMS INTEGRATION
US7714777	2007-11-12	Semiconductor device for spread spectrum radar apparatus	PANASONIC
US8660671	2005-01-20	Multifunction receiver -on-chip for electronic warfare applications	BAE SYSTEMS INFORMATION & ELECTRONIC SYSTEMS INTEGRATION
US20100060507	2008-09-09	Electronic warfare receiver having digital antenna	LOCKHEED MARTIN

TOP APPLICANTS IN INDIA



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PATENT LANDSCAPE IN INDIA



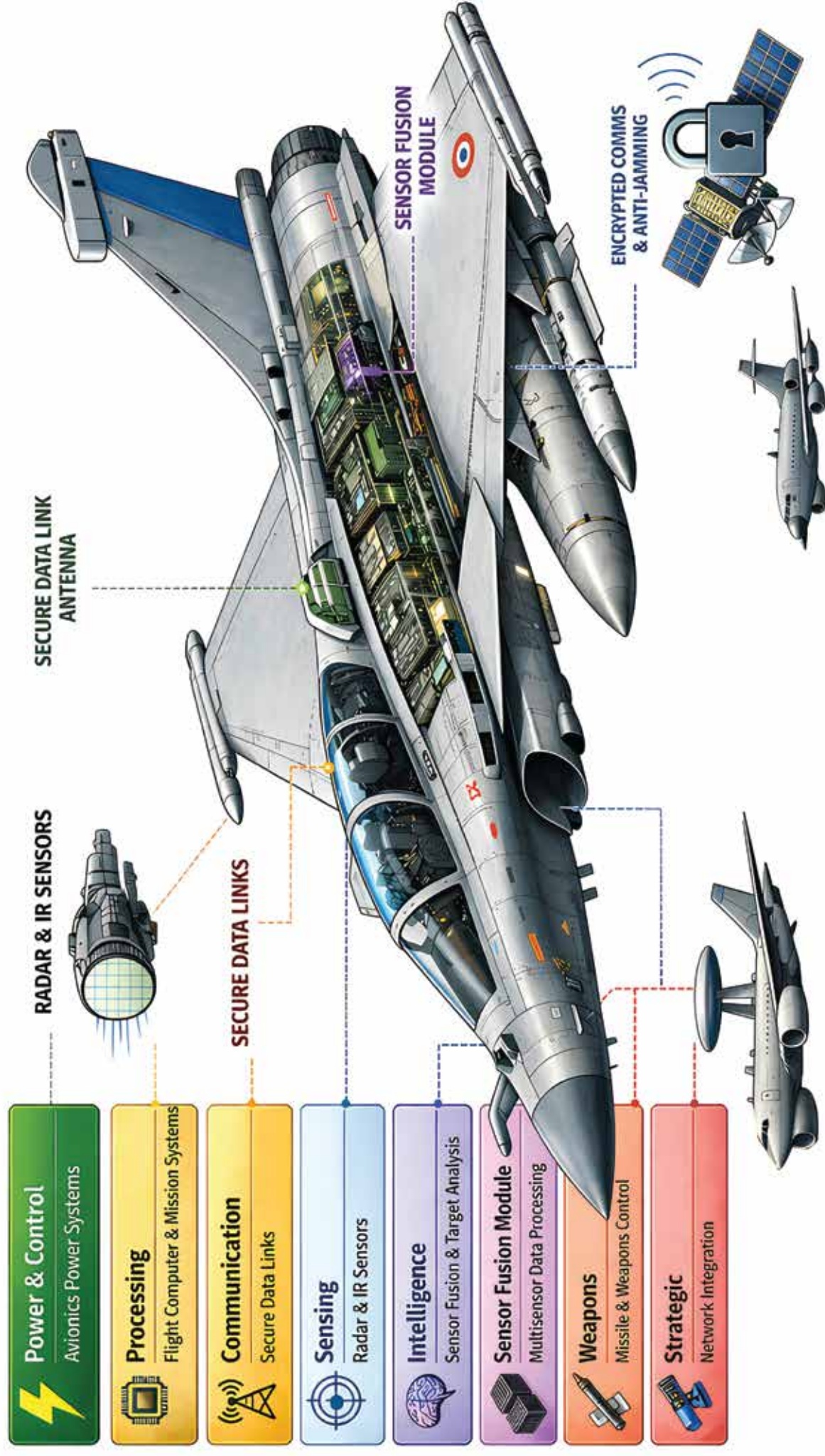
PATENT TIMELINE IN INDIA



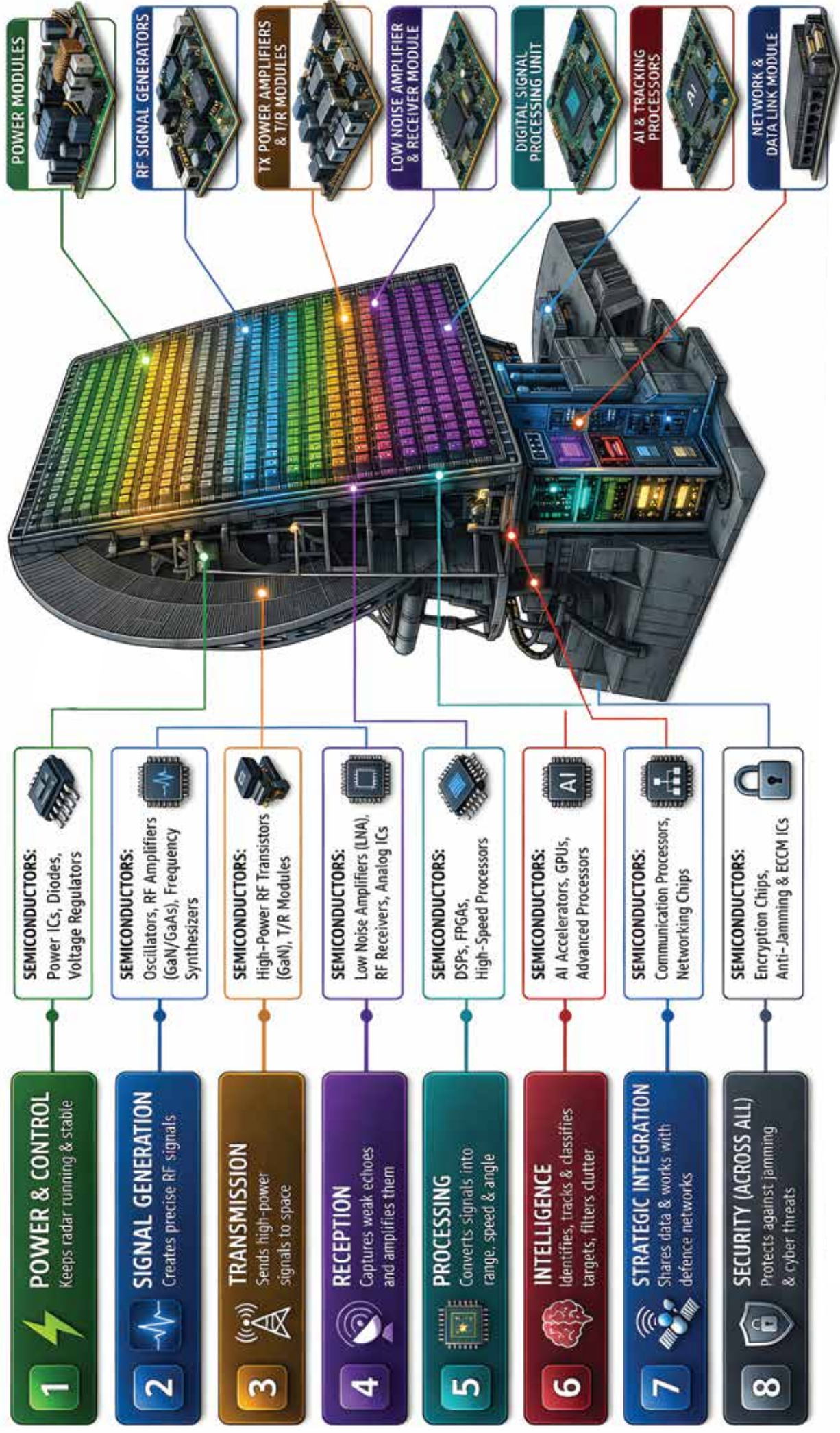
NOTABLE INNOVATIONS

Patent Application	Priority date	Title	Assignee
IN202311027432	2023-04-13	Novel ku-band front end chip	DRDO
IN2325/MUM/2015 A	2016-07-15	Method for manufacturing a radome	AIRBUS DEFENCE & SPACE
IN202021056346	2020-12-24	Real time smart police patrolling & management system	Kochar Jeetendra
IN2350/MUMN-P/2008 A	2009-05-15	Distributed jammer system	ELTA SYSTEMS
IN202441101572	2024-12-21	Anti-theft alarm system	Vignans Nirula Institute of Technology & Science for Women

Semiconductors in Fighter Jets



Semiconductors in Radar Systems



Semiconductors in Defence Surveillance System

Basic Layer

Raw Semiconductor Components



- Diodes & Transistors
- Integrated Circuits (ICs)



Circuit Layer

Signal Handling



- Analog & Digital Circuits
- Power Electronics



Sensor Layer

Data Collection



- Image Sensors & Radar Chips
- Acoustic & Motion Sensors



Processing Layer

Intelligence



- Microcontrollers & CPUs
- FPGAs / ASICs



Communication Layer

Data Transfer



- RF & Encryption Chips
- Networking ICs



System Integration Layer

Platforms



- Drones, Satellites & Radar Systems
- Border Monitoring

Advanced Layer

AI & Autonomous Systems



- AI Chips & Sensor Fusion
- Autonomous Decision Making

Specialized Defence Materials

Advanced Hardware



- GaN & SiC Chips
- Radiation-Hardened Electronics

Semiconductors in Battle Management Ecosystem



WHITE SPACES

Radiation-Hardened-by-Design (RHBD) Advanced Nodes (7nm and below).

Gallium Nitride (GaN) on Diamond Substrates.

Heterogeneous 3D Chiplet Integration for Defence.

Intelligent Power Management Integrated Circuits (PMIC) for Avionics.

Hardware-Level Cryptographic Obfuscation.

AI-Enabled Edge Computing for Missiles.

Secure Hardware Root of Trust (RoT) for Defense IoT.

"Passive" On-Chip Sensors for Structural Health.

Cryogenic Semiconductor Electronics.

If you would like to learn more about any of these areas or have specific questions, we're here to provide further information and insights. Our team is dedicated to driving progress and staying at the forefront of Semiconductor in Defence.

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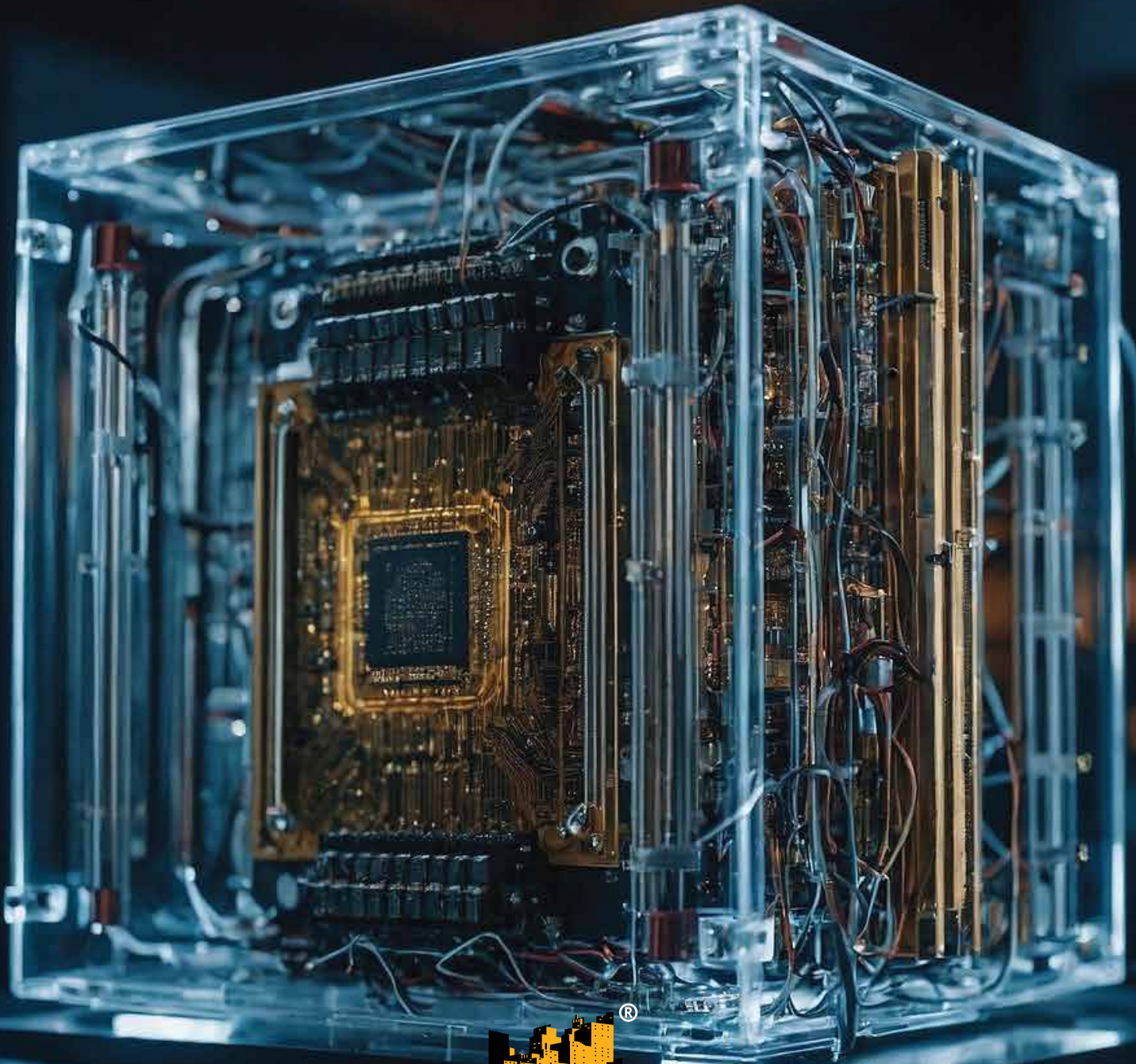
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