



Case Study ➔

Advanced Autonomous Robotics for Defense R&D

Delivering Mission-Ready Navigation in GPS-Denied Environments

40%
Field-Testing Reduction

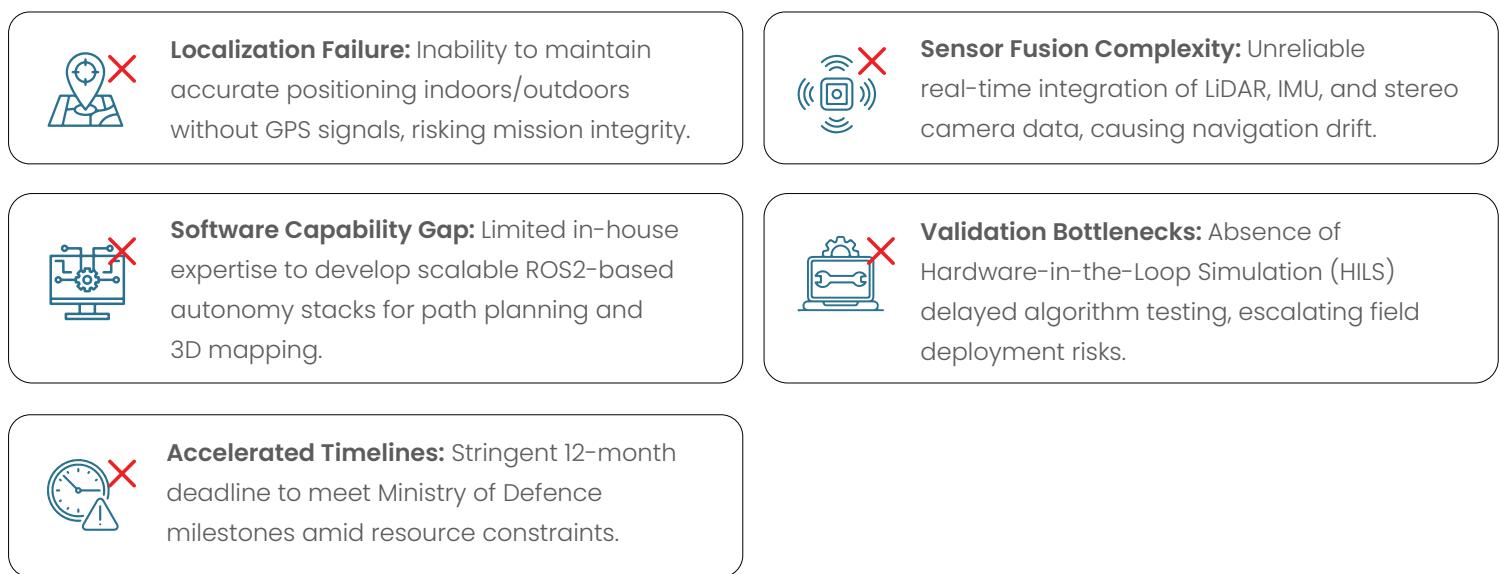
30%
Deployment Acceleration

Client Profile:

Our client is a premier government research organization operating under the Ministry of Defence, Government of India. Based in Bengaluru, this strategic R&D institution specializes in advanced robotics, autonomous systems, and underwater defense technologies. With a highly skilled workforce of 500+ scientists and engineers, it drives cutting-edge innovations for national security applications, including unmanned platforms, AI-enabled systems, and secure communication solutions.

Problem Statement

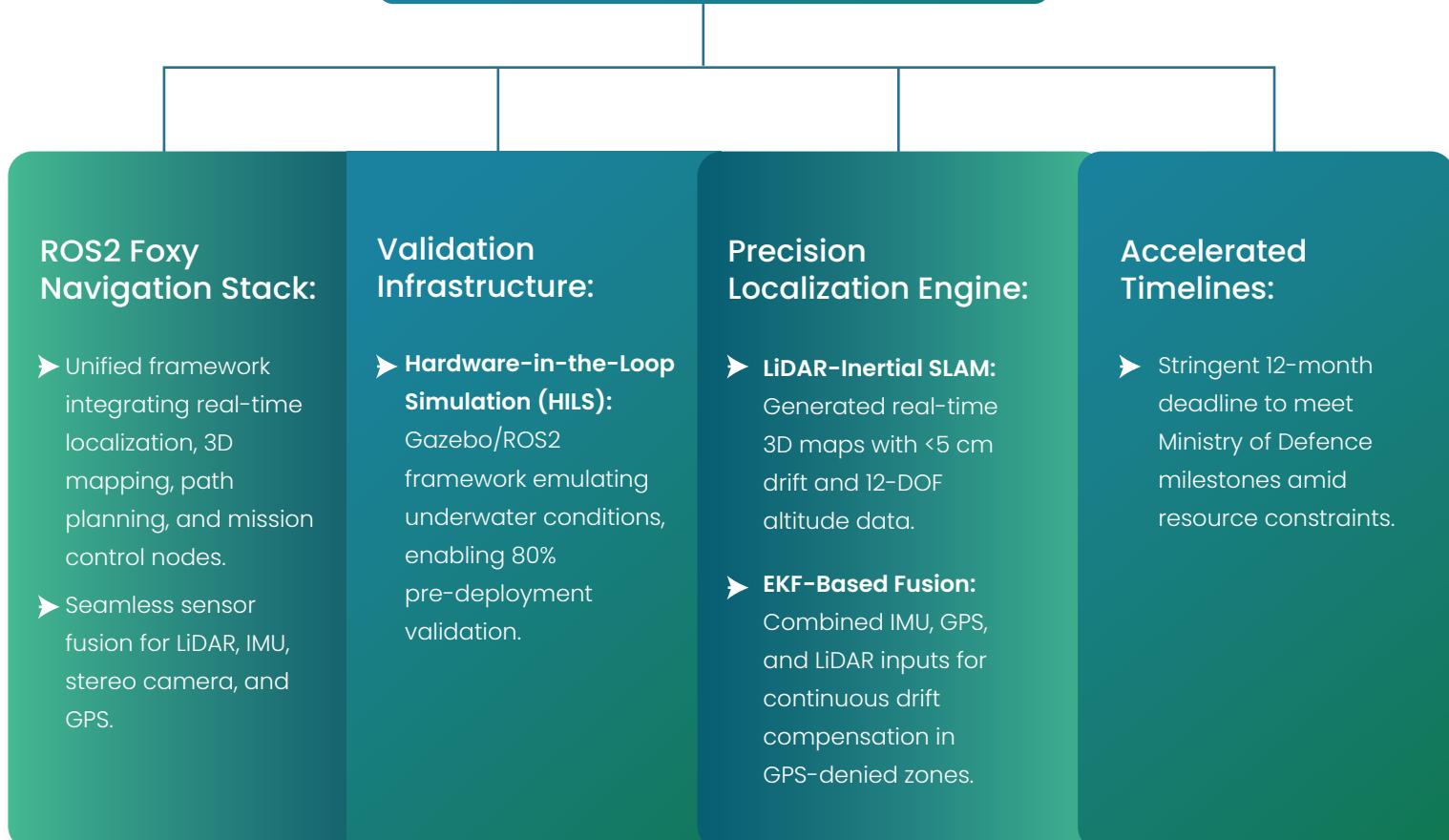
The client faced critical gaps in deploying autonomous systems for defense applications:



Our Solution:

MicroGenesis delivered a modular autonomous navigation stack with end-to-end capabilities:

Core Technical Architecture



Development Approach

Phase	Activities	Tools/Outputs
Development	Custom ROS2 nodes for SLAM, EKF, path planning	C++, Python, Nav2 Stack
Testing	HILS validation of obstacle navigation	Gazebo, RViz, Ubuntu 20.04
Deployment	Docker packaging; on-premises integration	Docker, GitLab CI/CD
Knowledge Transfer	SDD/ICD documentation; on-site training	Technical manuals, simulation reports

Business Impact:

The solution delivered mission-ready autonomy within 12 months, achieving quantifiable outcomes:

Performance Metrics

KPI	Result	Operational Impact
 Localization Accuracy	 <5 cm drift in GPS-denied environments	 Reliable navigation in critical zones
Testing Efficiency	80% validation via HILS pre-deployment	40% reduction in on-site testing time
Deployment Speed	Dockerized configuration	30% faster integration
Project Timeline Compliance	On-time delivery within 12 months	Met MoD defense milestones

Strategic Advantages



Future-Ready Architecture:

Modular design enables AI-based semantic mapping and swarm coordination upgrades.



Client Autonomy:

Comprehensive documentation/training empowered in-house team ownership.



Tactical Demonstration:

Successfully validated autonomous multi-floor transitions with dynamic obstacle avoidance.



MICROGENESIS

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