



صنع في السعودية
SAUDI MADE

DEFENSE ROBOTICS · CONFIDENTIAL

THAR

TACTICAL QUADRUPEL ROBOT

BUILT FOR THE MISSION.
DESIGNED FOR THE FUTURE.

THAR is an advanced all-terrain quadruped robot engineered for reconnaissance, security, transport, and tactical operations in the most demanding environments.



THAR

Tactical Quadruped Ground Robot Engineering & Architecture Specification

ALL-TERRAIN

Operates in all environments with unmatched agility.

VERSION 2.0

RECONNAISSANCE

Advanced sensors and real-time intelligence.

JULY 2026 | A4 TECHNICAL BRIEF

SECURITY

Force protection and surveillance missions.



PAYLOAD VERSATILITY

Modular design for weapon systems, sensors, and mission-specific gear.



AUTONOMOUS

Intelligent navigation and autonomous operation capability.



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CONTENTS

A concise engineering brief covering mobility architecture, materials, perception, edge AI, power, and payload integration for the THAR platform.

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OPERATIONAL PARADIGM

Built for Saudi topography—from Empty Quarter dunes to Sarawat ridgelines—THAR projects autonomous capability into zones where wheeled and tracked platforms fail.

By leveraging a biomimetic quadrupedal architecture, THAR delivers dynamic balancing, omnidirectional mobility, and terrain adaptation that conventional UGVs cannot match. The mission is clear: maximize precision while removing soldiers from the highest-risk edge of the fight.



FIG 1.1 DYNAMIC POSE SHEET — STANCE ADAPTATION AND PAYLOAD BALANCE ACROSS MISSION PROFILES

Core mission: When the task is extreme, machines absorb the risk. THAR operates as a frontline shield for reconnaissance, logistics, and force protection.

CHASSIS & MATERIALS

Structural integrity is engineered for kinetic shock, high-frequency vibration, and abrasive dust while preserving a low mass profile for endurance and payload margin.

2.1 MATERIAL COMPOSITION

The primary endoskeleton is CNC-machined from **Aerospace-Grade Aluminum Alloy (7075-T6)** for strength-to-weight and fatigue resistance. Exterior ballistic and dust-shielding panels use **Carbon Fiber Reinforced Polymers (CFRP)** with Kevlar weaves over vital-component zones.

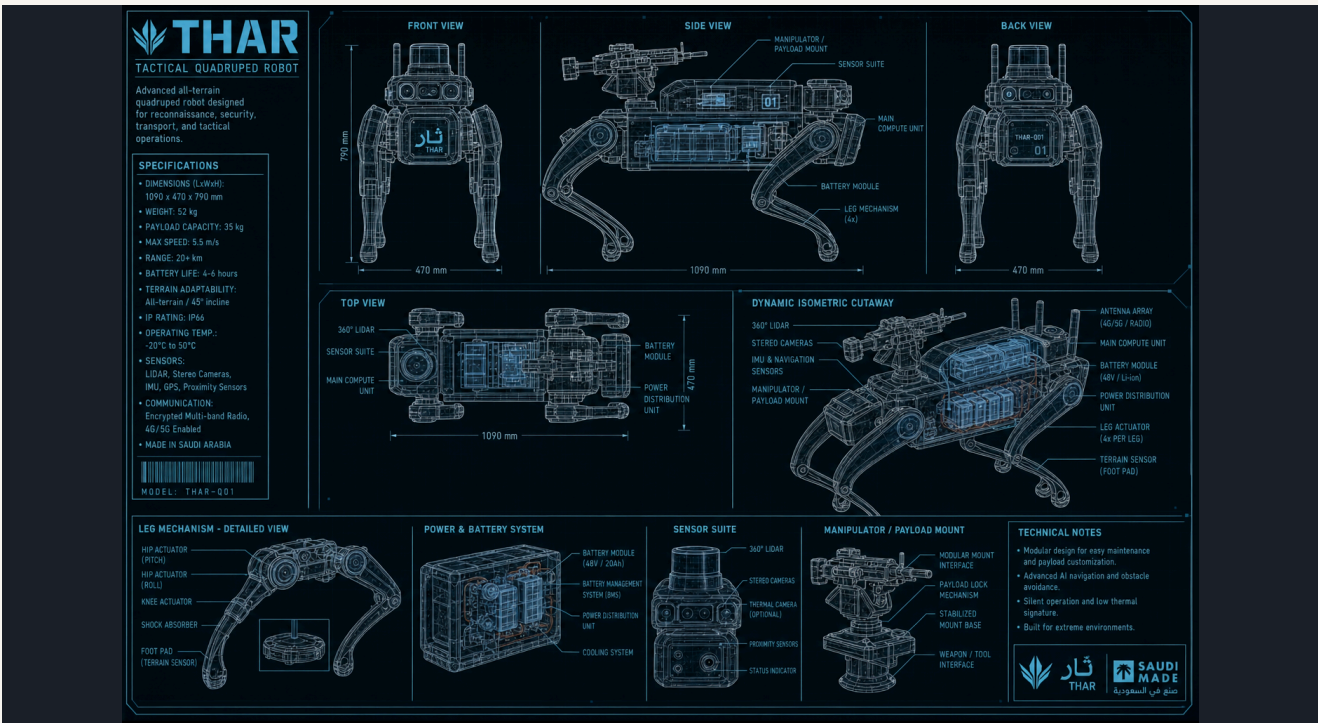


FIG 2.1 INTERNAL SCHEMATIC – ACTUATOR PLACEMENT, HARNESS ROUTING, AND MODULAR HARDPOINTS

2.2 THERMAL & SEALING

- Closed-loop liquid cooling for compute and motor controllers; chassis as passive radiator for continuous >50°C operation.
- IP67+ sealing with Teflon-coated labyrinth joints and positive-pressure electronics bay against silica ingress.
- Low center of gravity for high-speed locomotion and steep incline stability.

ENGINEERING PROJECTIONS

Orthographic views support payload integration, maintenance access planning, and rapid manufacturing readiness. Symmetry and modular hardpoints are intentional design constraints.



FIG 3.1 SIDE ELEVATION



FIG 3.2 TOP PLAN – VENTS & PAYLOAD BAYS



FIG 3.3 LEFT PROFILE



FIG 3.4 RIGHT PROFILE



FIG 3.5 REAR / BATTERY BAY

Kinematics: 12-DoF quasi-direct drive BLDC actuators with low-ratio planetary gearboxes enable proprioceptive terrain sensing and micro-second reflex recovery.

SENSOR FUSION & AI

Zero-visibility operations—sandstorms, night, GPS-denied zones—require redundant multi-modal perception and onboard inference with no cloud dependency for critical survival loops.

4.1 SENSOR HEAD

- 3D LiDAR — solid-state mapping & SLAM
- Thermal — FLIR Boson heat signatures
- RGB-D — HDR stereo for close obstacle work
- Sapphire lenses against sand abrasion

4.2 EDGE COMPUTE

NVIDIA Jetson Orin NX (up to 100 TOPS) on hardened Linux + ROS 2. Waypoint navigation, obstacle avoidance, and real-time threat classification run locally.



FIG 4.1 PRIMARY SENSOR SUITE



FIG 4.2 OPERATOR FPV — AI THREAT BRACKETS, TELEMETRY, AND ENCRYPTED TACTICAL OVERLAY

POWER & PAYLOADS

Mission endurance and modular lethality are governed by a high-discharge power architecture and standardized dorsal integration rails.

BATTERY	SWAP TIME	ENDURANCE	RAILS
60V Li-ion	< 60 s	~3 hrs	NATO



FIG 5.1 HOT-SWAP BATTERY BAY & REAR SENSING



FIG 5.2 PLATFORM ISOMETRIC – PAYLOAD SPINE VISIBLE

5.1 MODULAR MISSION KITS

- Reconnaissance optics and long-range ISR packages
- Logistics racks for ammunition or medical resupply (≤ 20 kg)
- Light Remote Weapon Stations (LRWS) and EW pods

BMS priority routing: Power is dynamically allocated between locomotion and payloads based on mission phase—sprint, loiter, or engagement.

CLOSING BRIEF

FORCE MULTIPLIER. HUMAN SHIELD.

THAR is an actionable defense manufacturing step—not a concept deck. It delivers lethal precision, superior situational awareness, and protection of human life on the modern battlefield.



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