ARRAKIS TECHNOLOGIES
2026 Spring

Vision & Mission

"Every intelligence begins with perception"

"We build an input layer for the era of AI and Autonomy, deployable in the real world"
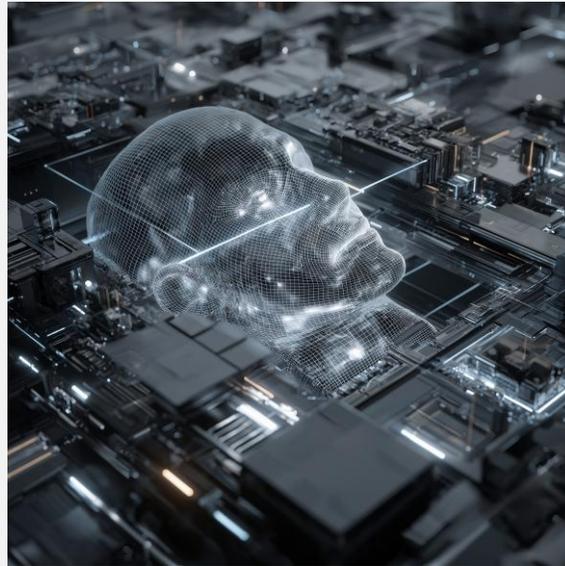
What We Are Aiming For

Objective Function

Quality of input data prescribes quality of decision

advancing how machines sense, understand, and interact with the world is mission to true autonomy
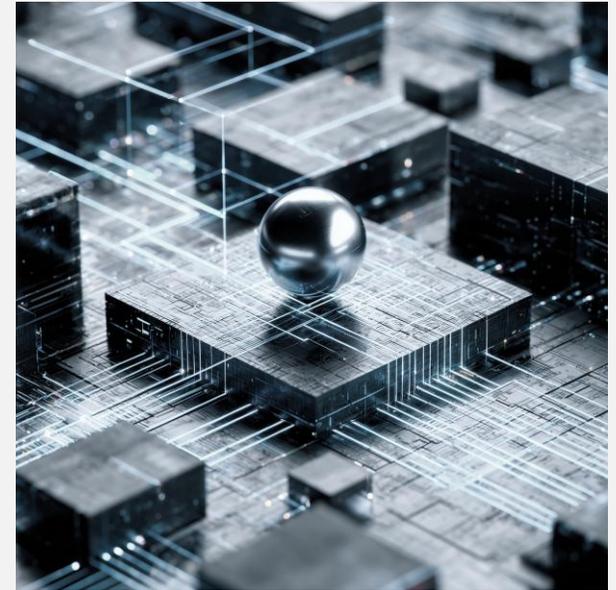
Open Sensing Platform

Input layer of intelligence system

unifying all sensors into one coherent system that delivers high-fidelity, actionable intelligence.

Quantum in Chip Scale

Ultimately all technology ends at chip

To ensure high-performance but reliable application, packaging should be in form of chip. Same applies to quantum technology.

The Problem 1 – Autonomous Systems

Autonomous systems and AI focus on sophisticated computation and output layers,

Performance is ultimately bounded by the quality of the input data - perception
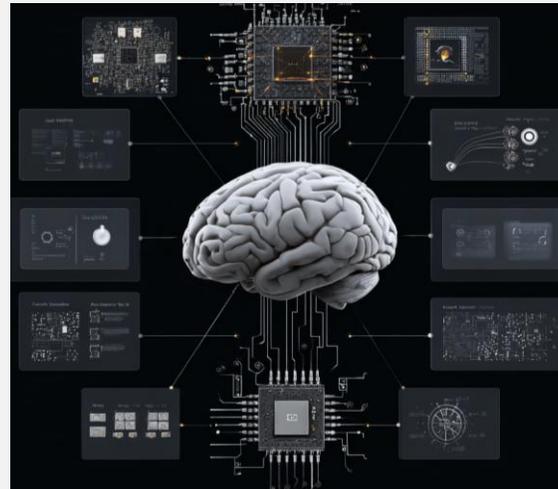
Input layer = Sensors

Step-change in data depth and breadth

Advanced sensors can perceive a wide spectrum of data with high sensitivity

Computation layer = Algorithm, AI engine

Recent AI needs more data

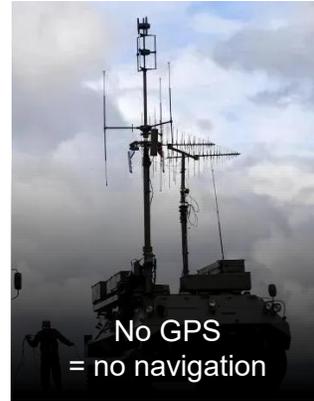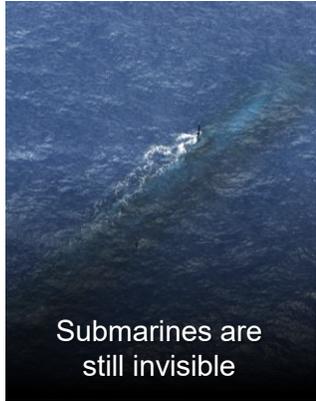High dimensional, non-linear AI models require larger and more diverse datasets

Output layer = UAV, USV, UUV, and so on.

Quality of autonomous system

No matter how advanced autonomous systems, outcomes are only as good as input data

The Problem 2 – Perception

Submarines are still invisible

Mines remain unreliable to detect

Decoys deceive existing sensors

Cracks and cavities go unnoticed

Deep resources stay unmapped

No GPS = no navigation

Underwater navigation is blind

Perception Gap

Legacy sensors create blind spots

Quantum Gap

Quantum sensors work, but only in lab settings

We bring quantum sensing into real-world applications

The Problem – Physics Research

Telecommunication's History

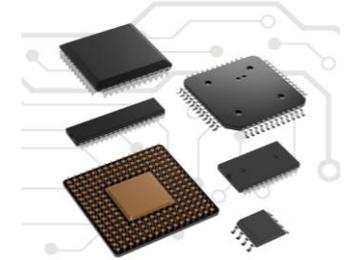Started from entire room at Bell Lab. Most components were bulky, fragile and expensive.

Commercialization began with miniaturization and boomed with chip scale component from Qualcomm

Bell Lab at early days

Packaged for commercial uses

Chip for smartphones

Quantum Technology's Future

90% of size, cost, and power comes from lasers, optics, and packaging. Manual alignment, bulk optics, low yield, poor reproducibility

Chip-scale is ultimate goal of frontier technology. Low cost, high performance, great efficiency.

Optical table at the Quantum Lab

Miniaturized module for field test

Quantum on Chip

Chip-scale photonic integration and scalable packaging are prerequisites for any quantum technology to reach market.

The Solution: Quantum-Level Sensors

Quantum Technology for Sensors
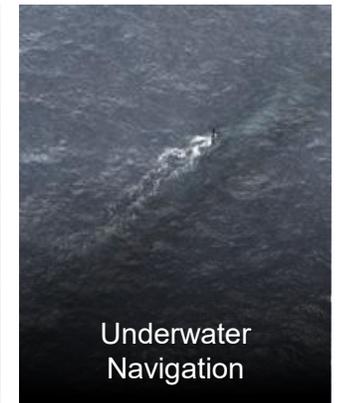
the hardest sensing problems become solvable.

Target Recognition

reveals hidden, shielded, or deceptive targets.

Navigation & Control

enables uninterrupted autonomous operation.

Ex) Magnetometer

Underwater Detection

Mine Detection

Decoy Discrimination

Structural Insight

Resource Mapping

GPS-Free Navigation

Underwater Navigation

The Solution: Open Modular Architecture Sensor Platform

We integrate the full sensor landscape—from classical active sensors to quantum-level—using open architecture SDK.

Sensors	Integration	Perception to Decision

Sensors

Quantum Sensors

Magnetometer

E-Field Probe

EO / IR

Gravimeter

Gyroscope

Classical Sensors

Complementary Sensors

RADAR

LIDAR

SONAR

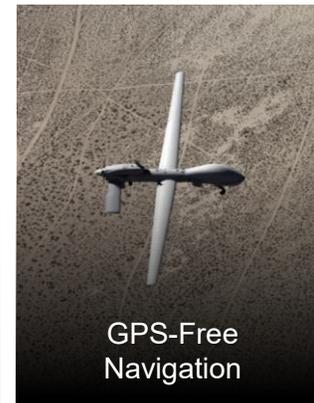**Integration**

HW
Sensor Fusion

SW
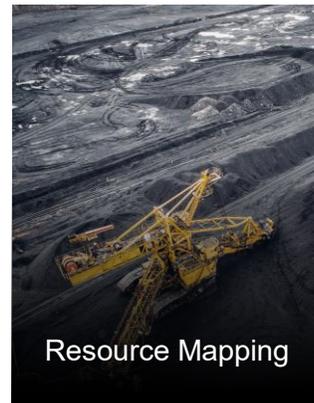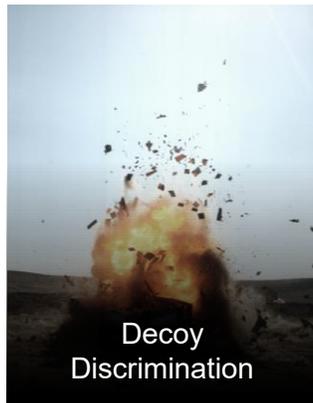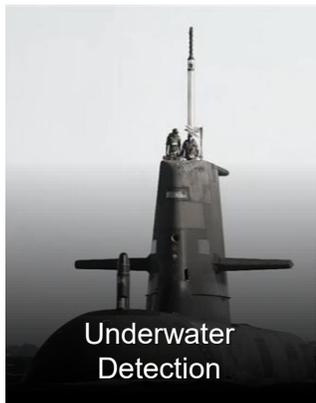**Open Architecture Sensor SDK**

Perception to Decision

Target Recognition
reveals hidden, shielded or deceptive targets

Navigation & Control
drift-free navigation and stable autonomy

Equipment Diagnostics
fault diagnosis of battery, medical devices, etc

Mineral Exploration
Geophysical survey to enhance probability

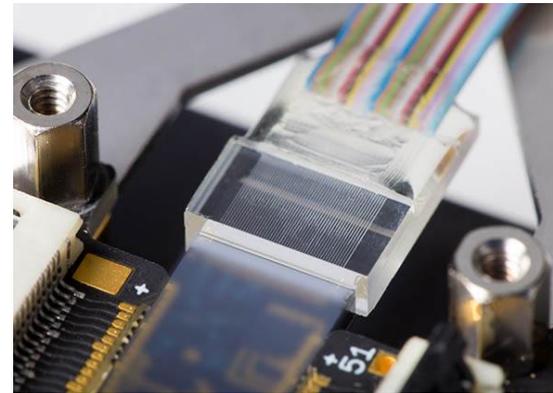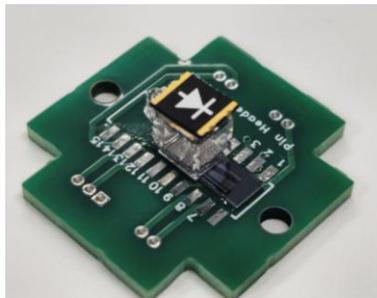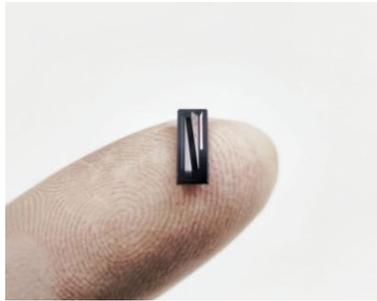**Healthcare Diagnostic**
Medical imaging such as MEG, MCG

→ Quantum-Level Sensor Platform with Multiple source sensors

The Solution: Quantum on Chip

Just like Qualcomm's telecommunication chip,

The Path from Room-sized Optical Tables to Chip-Scale Quantum Systems

Quantum-optimized photonic integration

- SiN for low-loss visible/IR wavelengths
- Thin-film lithium niobate for fast modulators
- Roadmap for integrated lasers & nonlinear optics

Packaging & alignment as core IP

- Robotic fiber alignment
- Wafer-level bonding
- Design-for-assembly photonic interfaces

Atoms integrated at chip level

- On-chip vapor cells / vacuum interfaces
- Photonics and atomic physics co-designed
- Eliminates bulk optical alignment entirely

Quantum Photonic Foundry, starting from packaging platform

the only viable path to market-scale adoption of quantum technologies

Traction: Fast and Efficient

It is engineered product,

not scientific research idea

| Time	What we did
Sep 2018.	**Start a Project OAQ (start an academic, lab-level research project)**
...	**Fundamental Research for Quantum magnetometer / gyroscope / accelerometer includes:** • high-purity atomic vapor cells fabrication • noise-free optical alignment • long-term measurement stability
Jul 2024.	**Established OAQ Corporation** (Korea)
<u>...</u>	**Additional Research for for field deployable quantum technology includes:** • Driver board advancement and integration • Real-time signal processing with ML models • Mechanical parts for drone deployable system
Nov, 2024.	**1st round of field tests (lab to field test) completed** • Demonstrated performance in real-world outdoor conditions. • Achieved 1 pico level sensitivity = 1,000 times sensitive than magnetometer in satellite • Discriminated military vehicle target from decoys
Jan 2025.	[Contracts] 2 consecutive contracts awarded from Israel Weizman Institute (atomic cells)
May 2025	**Set up own R&D center (lab for quantum sensor)**
May 2025.	[Contracts] Contract awarded by Korea defense agency for 'Magnetic sensor calibration system delivery + PoC discussion for ATR
Sep 2025	**Completed 2nd round of field test of drone-mounted sensors** • Proprietary sensor head fabricated using own equipment • Deployed ML signal processing algorithm tested with mission computer • Successfully validated detection of subsurface anti-tank mines
Oct 2025	**3rd round field test completed** • Proprietary driver board, ground control system, mechanic module • Deployed Real-time Ground Control System for drones and magnetometer • Detected small electric objects (AirPod) covered under the ground • Advanced driver boards – from lab-style board to single board (60mmx60mm) / updated version every 10 days
...	[Attraction] In active partnership discussions with multiple emerging defense firms (drones, USVs, autonomy, SW, etc)
Dec 2025	**Established Arrakis Technologies Corp. (Delaware / HQ)**

Our focus at this moment

Magnetometer

Measures B-field from currents and magnetic materials

Magnetic Field
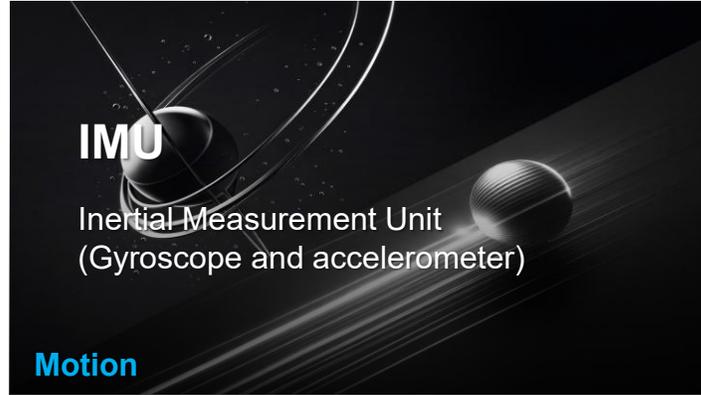
IMU

Inertial Measurement Unit (Gyroscope and accelerometer)

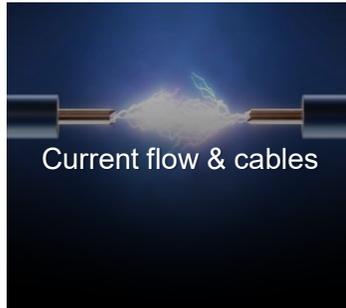**Motion**
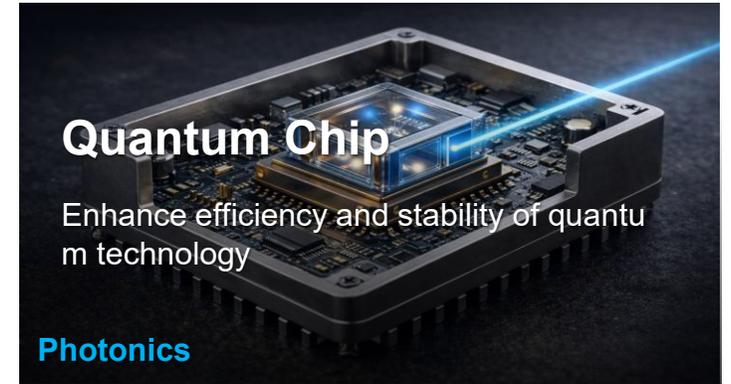
Quantum Chip

Enhance efficiency and stability of quantum technology
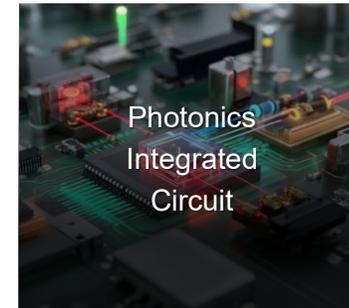
Photonics
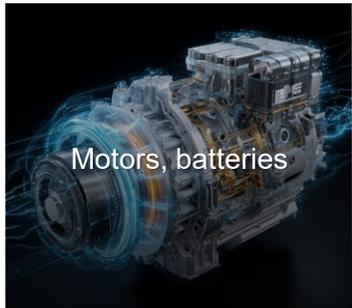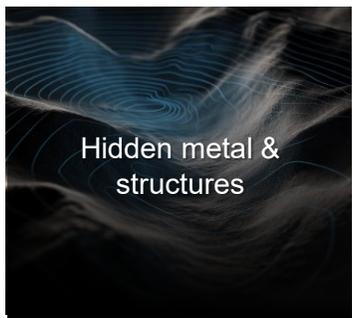
Motors, batteries

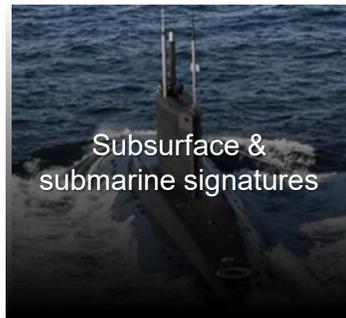Current flow & cables

Orientation / Motion
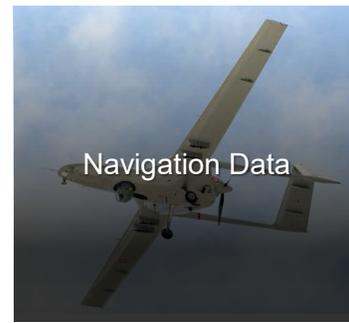
Stabilization & Pointing

Photonics Integrated Circuit

Packaging

Hidden metal & structures

Subsurface & submarine signatures

Navigation Data
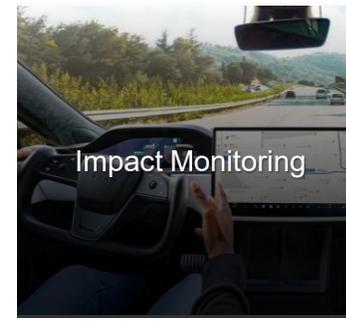
Impact Monitoring
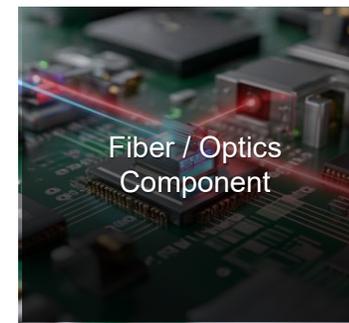
Fiber / Optics Component
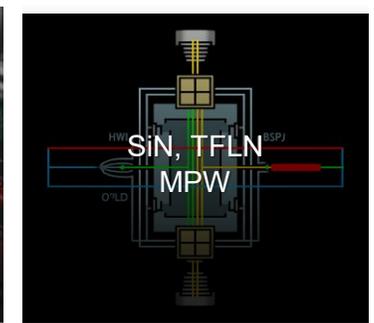
SiN, TFLN MPW

TRL 7

TRL 5

TRL 4

Quantum Magnetometer / Project OAQ

Q-Pulse (TRL 7)
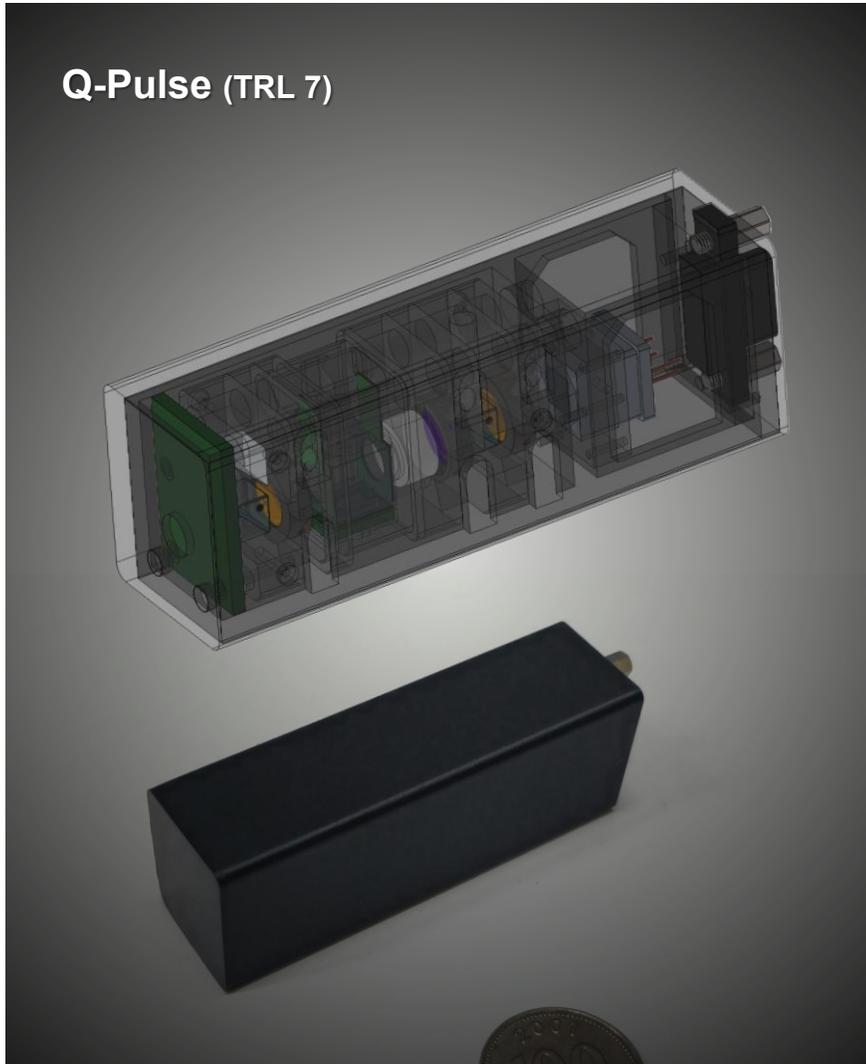
Defense & Security	Submarine detection, mine/UXO detection GPS-Free Navigation
Geophysics / Exploration	Mineral exploration, surface mapping
Medical Diagnosis	MEG / MCG Medical Image

Quantum magnetometers can be used for GPS-free navigation because the Earth has unique, location-specific magnetic patterns that can be matched to magnetic maps to determine position, which is especially useful when there are no visual references. Ferromagnetic materials and electric charges create subtle distortions in the Earth's magnetic field, adding more features to these natural patterns, and unlike light or sound, magnetic fields penetrate water and soil with minimal loss—distance, not occlusion, is the main limit.

Previous magnetometers did not have enough sensitivity or resolution to detect these small variations reliably, but quantum sensors are up to 1000 times more sensitive, making precise magnetic mapping practical. Using deployable quantum sensing hardware and software, we can now measure extremely small magnetic-field variations with exceptional precision, enabling GPS-free navigation and detection where conventional sensing fails.

Quantum IMU / Project AOQ

Atomic Spin Gyroscope (TRL 5)

& Accelerometer (TRL4)

Aviation / Aeroscope	Flight stabilization, Inertial navigation. SLAM
Consumer Electronics	Motion control, AR/VR tracking, impact sensing
Industrial Machinery	Equipment diagnostics, Imbalance detection Rotational vibration diagnostics

Movement and position are determined by measuring acceleration and rotation over time, using inertial forces that exist everywhere and do not rely on external signals. However, small measurement errors inevitably accumulate over time, causing position and orientation drift even when the sensors are isolated from external disturbances.

Detecting extremely small changes in acceleration and rotation, while minimizing this unavoidable error accumulation, requires sensing precision and stability beyond what classical dynamics. We used quantum technology, which leverages the fundamental properties of atoms and is deployable in real-world systems, to enable high-accuracy navigation in GPS-denied environments.

Atomic Vapor Cell

Atomic Vapor Cell
Core component of Quantum Technology
(Generating recurring revenues from research institutions)

High Quality	Ensures precise quantum behavior stable vapor density and uniform atomic polarization.
Customizable	Tailored for target systems tunable cell size, material, coating, and buffer gas for optimal performance.
Quality Assured	Produced via microfabrication and vacuum sealing, enabling scalable supply and consistent sensor reproducibility

Without a high-performance, stable atomic cell, there is no quantum sensor. The atomic cell acts as the quantum core, converting external physical signals into measurable quantum states.

We developed a customizable and mass-producible atomic cell platform that meets defense-grade reliability and is compatible with future upscaling needs. This allows integration not only into lab environments but also into drones, vehicles, and handheld systems.

Open Architecture Sensor SDK / Project QQQ

Open Architecture for sensors SDK

(for Ally Defense Partners only)
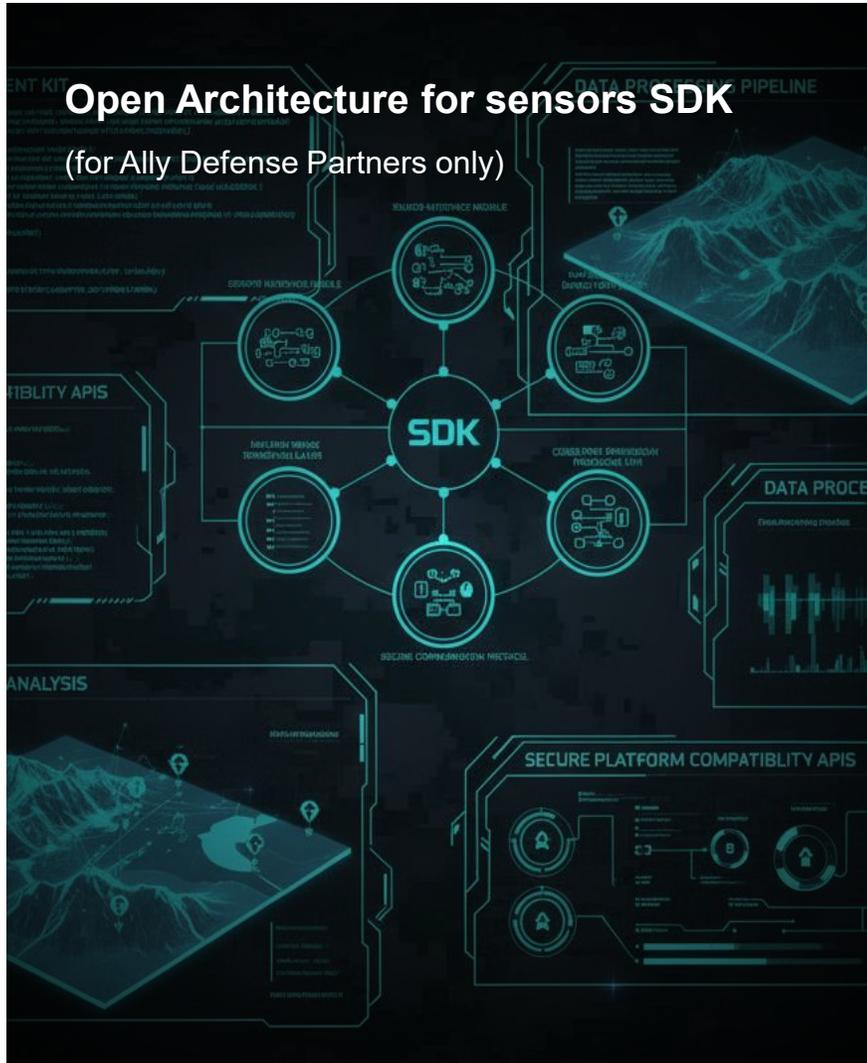
Multi-Sensors	Multi-sensor data ingestion and normalization
Real-Time	Real-time sensor fusion and state estimation
Embedded System	Embedded vehicle integration and system interoperability

A core element of our strategy is transitioning from a hardware vendor to a sensor-fusion solutions provider. While initial revenue comes from high-performance hardware, we are developing an SDK and platform that fuses quantum and conventional sensor data using AI-driven algorithms.

Designed for ally defense tech firms building autonomous air, maritime, and ground vehicles, the platform uses open, modular embedded architectures with standard protocols and lightweight APIs. This enables rapid vehicle integration, accelerates deployment, improves interoperability, and supports scalable adoption through licensing, subscriptions, and a growing partner ecosystem.

Quantum Technology on Chip

Quantum Chips (TRL4)

Fully Photonics Integrated Circuit(PIC)-based high-performance quantum applications
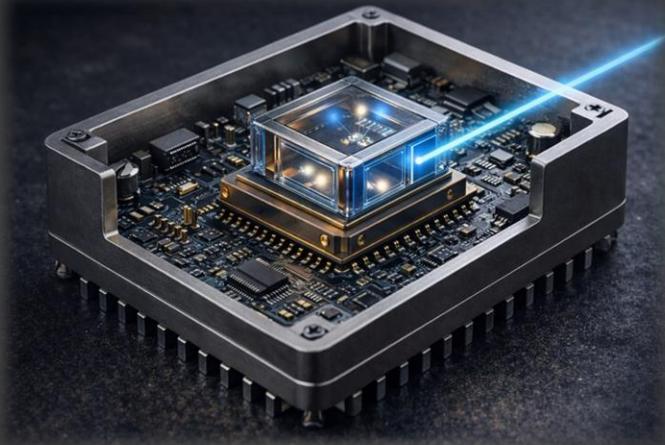
High Performance — Enables ultra-low-loss optical routing, high-speed modulation, and phase-stable light delivery for precise quantum control.

Fully Integrated — Monolithically integrates waveguides, modulators, couplers, and routing on a single chip, eliminating bulky free-space optics and manual alignment.

Manufacturable — Fabricated using scalable semiconductor processes with design-for-packaging interfaces, ensuring high yield, repeatability, and volume production.

Without a high-performance, fully integrated photonic quantum chip, scalable quantum systems are impossible. The quantum chip acts as the optical brain of the system, generating, shaping, routing, and stabilizing light that directly controls and reads out quantum states.

We developed a fully photonic integrated circuit platform optimized for quantum applications, delivering low noise, high stability, and chip-scale integration. The platform is designed for mass manufacturability and seamless packaging, enabling deployment not only in laboratory systems but also in field-ready platforms such as autonomous vehicles, aerospace systems, and portable quantum devices.

Our Difference

From Lab to Field: Engineering Quantum for Real-World Use (outside of lab)

Our engineering-focused quantum hardware and open, user-friendly SDK bring quantum sensing to real field operations.

Hardware-First = Scalable Deployment
Quantum at engineering level / Hardware centric

Most emerging defense tech companies are software-first. We started with hardware, so scaling to rugged, real-world deployment is built in—not an afterthought.

Open Architecture = Faster Adoption
Open Architecture for users / Ally users centric

Legacy systems are closed and hard to integrate. We built an open SDK and compatible architecture, so partners, developers, and operators can easily adopt and extend our platform.

From Core Component to Intelligence

Quantum with field test records

Sensor Fusion for problem solving & Lock in with open SDK ecosystem

Chip scale quantum technology can navigate lab to real-world application

Roadmap

Until Now

First quantum sensor outside of Lab
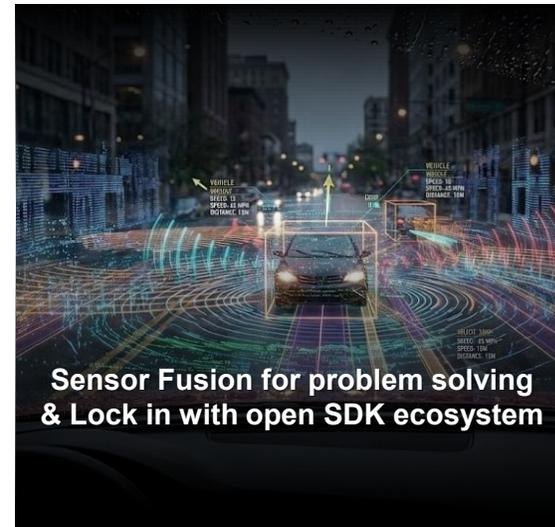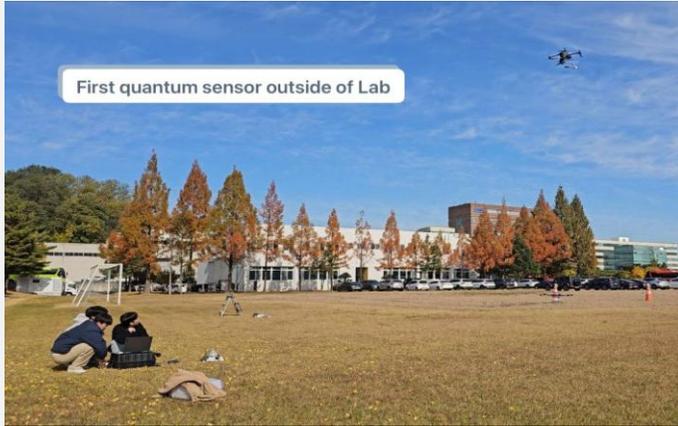
During 2026

- Setting US lab / sensor fabrication facility

  (Photonics chip packaging lab setup and sensor fabrication

  capacity over 100 units a month)

- Quantum Magnetometer field test completed for PoC

  (Navigation, Target Recognition focus)

- Securing Military Spec certificate for sensors and

  quantum component standard

- 3+ partnership with defense tech or primes

  (co-development for co-branded product)

At 2027

- Setting US chip packaging foundry facility

  (Fully PIC-based high-performance quantum applications)

- USG / NATO Contract (PoC) for Quantum sensors

  (Focusing on magnetometer and INS)

- Release beta version of open sensors SDK

- Initial order for chip-packaging

- Series A investment round for facility/business dev team

- 5+ business partnership with defense contractors

  (co-development for co-branded product)

- Initial order for chip-packaging

Commercial Contract for Quantum Sensors and SDK Beta

SBIR for next phase research for Gravimeter, E-Field Probe, EO / IR

CHIPS R&D (Quantum manufacturing standards program) for quantum chip manufacturing scale

Investment including investors with strategic focus

Core Team

Daham Kim — Co-Founder, CEO, Product Owner (Platform)

Education (PhD Program drop-out)
Cornell Univ. | Master in Operations Research and Info Engineering

Expertise
Simulation, Signal Processing

Experience & Publication
Quant at asset management company
M&A advisory at actuarial consulting firm
Publications at AI / Simulation conferences / Journal
INFORMS Simulation, AAAI , ACM AI in Finance, PMR JFDS, ION, etc.

Deok-Young Lee — Co-Founder, CTO, Product Owner (Sensor)

Education
KAIST | Ph.D. in Physics (expected in March)

Expertise
Quantum Physics, Electrical Engineering

Experience & Publication
Research officer at national defence tech lab
Researcher at national standard and technology lab
Publications at atomic physics, optics journals
Physical Review, Applied Optics, AIP advance, ION, etc.

Dongwoo Lee — Lead Scientist (Platform)

Education
KAIST | Ph.D. in Aerospace Engineering

Expertise
Navigation, Mechanical Engineering

Experience & Publication
Researcher at AI-Transformed Aerospace research group
Recipients of Multiple aerospace engineering awards
Publications at robotics/aerospace conferences / journals
RITA, , IAC, EUCASS, IJCAS, IET, ION , etc.

Heonsik Lee — Lead Scientist (Sensor)

Education (PhD Program drop-out)
KAIST | Master in Physics

Expertise
Quantum Physics, Atomic Sensor

Experience & Publication
Researcher at neutral atom quantum
Hardware engineer quantum sensing research group
Inventor of multiple quantum HW patents

Technical Advisors and Joint Researcher

J.W. Cha

Education
ETH Zurich | Ph.D. in Physics
Expertise
Nanoelectromechanical Systems, Cavity Optomechanics
Experience,
Quantum Component researcher at National Institute of Standard
Nanoelectromechanical systems researcher at Caltech

H.C. Bang

Education
Texas A&M | Ph.D. in Aerospace Engineering
Expertise
Aerospace Systems and Control, Navigation, UAV
Experience,
Full Professor at KAIST
Navigation Researcher at Naval Postgraduate School

D.W. Nam

Education
Stanford Univ.| Ph.D. in Electrical Engineering
Expertise
Semiconductor fabrication, Photonic integration
Experience
Professor at KAIST
Professor at NTU (Singapore)

J.Y. Choi

Education
Seoul National Univ. | Ph.D. in Physics
Expertise
Atomic Physics, Quantum Simulation
Experience,
Associate Professor at KAIST
Quantum Optics researcher at Max-Planck Institute

J.H. Kim

Education
Stanford Univ.| Ph.D. in Aerospace Engineering
Expertise
Marine Robotics, Autonomous Underwater, Navigation and control
Experience,
Ships and Ocean Engineering researcher
Guidance, Control and Navigation researcher at Optimal Synthesis Inc.

E.S. Kim

Education
Penn State Univ. | Ph.D. in Physics
Expertise
Quantum Hybrid Systems, Quantum Computing
Experience
Full Professor at KAIST
Dean of KAIST Quantum Science Graduate School

S.H. Lim

Education
Korea Univ. | Ph.D. in Physics
Expertise
Atom based Quantum Sensor, Quantum and Atom Optics
Experience
Senior Researcher at National Defense Laboratory
Quantum Optics Researcher at National Institute of Standard

J.H. Kim

Education
MIT | Ph.D. candidate in Electrical Engineering
Expertise
Novel Qubits and Quantum gate, Photon-counting Regime Imaging
Experience
Research Officer at National Defense Laboratory

Y.T. Hwang

Education
UNIST | Ph.D. in Industrial Engineering
Expertise
Time Series Machine Learning, Stochastic Model, Simulation
Experience,
Assistant Professor at Pusan National University
Researcher at Oxford Machine Research Group

Summary

"We define the future of machine perception"

by advancing how machines sense, interpret, and interact with the world.

Something overlooked in today's autonomy

Thank you