ILias AI · TSM VISION

Turning smell into data.
Building the standard with TSM.

Color became data with RGB. Sound became portable with MP3. ILias AI is building TSM — the **Transformer Scent Model** — so that smell can become a shared, machine-readable standard.

1 · Vision — smell is the last sense without a digital standard

Once a sense has a shared coordinate system, the world can store it, search it, compare it, send it and teach it to machines. Color became data when everyone agreed on **RGB**; sound became something we stream and share when it was encoded in formats such as **MP3**.

Color	Sound	Smell
RGB	MP3	TSM ?

Smell never got that moment. There is no widely adopted standard for **capturing, describing and exchanging measured odor as data**. People describe the same smell in different words, instruments respond differently and datasets use incompatible labels — so odor knowledge stays locked in noses, trained dogs and isolated lab instruments.

ILias AI's ultimate goal is to digitize human olfaction: a future where scents are **searched like text, compared like images and generated like audio** — with ILias AI as infrastructure of the olfactory AI stack.

2 · TSM — the Transformer Scent Model

TSM (Transformer Scent Model) is the basic structure that **defines an odor by linking its chemical formula, molecular structure, raw materials and the scent people perceive** — together with the sensor fingerprint that measures it — through a transformer-based model into **one digital odor record**. Smell becomes data that can be stored, searched and exchanged: the **coordinates of a smell**, just as RGB values made color objective. ILias AI's goal is to **propose TSM to international standards bodies** so it becomes the standard data-storage technology for smell.

What TSM contains today (from company sources)

- **One digital odor record** — chemical formula · molecular structure (SMILES) · raw material · perceived odor labels · sensor fingerprint, linked by one ID and embedding.
- **Bidirectional inference** — forward: molecular structure (SMILES) → numeric scent labels such as "floral" or "earthy"; inverse: a target scent label → matching molecular structures, as data accumulates.
- **Four-step data pipeline** — collect molecule–odor datasets → standard SMILES format → tokenize and vectorize into scent embeddings → train a transformer that defines the olfactory vector space.
- **Three-layer data schema** — Assets (Molecule_Info, Scent_Label) · Mapping (Molecule_Scent_Map with intensity and confidence; Scent_Label_Map unifying external vocabularies) · Log & evolution (Prediction_Log, Model_Info versions).
- **Sensor bridge** — sensor response curves → substance identification → TSM coordinates and labels.

Toward an international odor-data standard

PROPOSED items for the standard submission

- **Odor fingerprint format** for raw sensor-array signals
- **Measurement & calibration protocol** — reference samples, temperature / humidity, drift
- **Labeling ontology** — shared TSM reference vocabulary
- **Quality & uncertainty metadata** on every record
- **Exchange API** — query, compare and share odor records
- **Goal:** propose TSM to international standards bodies

3 · How ILias AI technology connects to TSM

SENSE
Multichannel olfactory sensor array
Desktop reference · quadruped robot-mounted payload

›

ENCODE
TSM
Odor fingerprint → vector coordinates, labels, confidence

›

PLATFORM
Digital olfactory data platform
Patent 10-2912639 · odor library · planned data center

›

APPLY
Applications
Safety · security · industry · robots

- **Sensor array + deep learning (not spectroscopic).** Learns the full odor fingerprint, not a single concentration value — the raw signal TSM standardizes.
- **Desktop model = lab reference and odor-library builder.** A thin pin-type probe on a hose samples air from closed boxes through small gaps without opening them, producing clean reference entries for the TSM library.
- **Quadruped robot-mounted payload = field data.** Real backgrounds, humidity and mixtures teach TSM how odors behave outside the lab.
- **3D odor mapping (R&D).** Odor-fingerprint maps with uncertainty, source estimation and active search — TSM gives every map point a common vocabulary.
- **Korean Patent No. 10-2912639,** "Digital Olfactory Data Service Platform" (registered Jan 9, 2026) — the service layer that stores and delivers odor data; new library entries can be pushed to deployed devices over the cloud.
- **Commercialization based on ETRI technology transfer** (Electronics and Telecommunications Research Institute, Korea), and a **planned olfactory data center** in the Ulsan/Busan region.

4 · Imagining the future

VISION — an imagined future, not current products, customers or partnerships

Humanoid & service robots
Humanoid and service robots carry a TSM-compatible nose: they notice a leak, name it and walk toward its source.

Smart factories & industrial safety
Smart factories and industrial sites see invisible gas hazards as a continuously updated map.

Customs, airports & security
Shared odor libraries, updated over the air, help screen for illicit substances.

Healthcare, food & environment
Freshness, quality and air are checked against reference fingerprints.

Digital media & communication
The aroma of bread and coffee travels with a family photo — odor exchanged like images today.

Standards & data infrastructure
TSM adopted through international standards bodies: scents searched like text, compared like images, generated like audio.

> *"TSM aims to be a digital coordinate system that links the physical definition of a smell with how people perceive it — so that every sensor, robot and lab can speak the same language of odor."*

Let's build the standard for smell — together

We invite robotics teams, AI labs, industrial-safety and research partners to co-develop TSM reference data, run pilots with our desktop and quadruped robot-mounted systems, and shape an open odor-data standard.

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