



Odor-based Biomarker Detection

The Future of Health Monitoring for Pets, Kids & Humans

Silent Needs Smart Care. Let odor be the signal, so you're always aware.

June 2025 version

Research methodology



for the technology overview report



3500+ patent families analyzed
100+ market players analyzed



Evaluated patent portfolio strength based on multiple quantitative & Qualitative parameters



Analyzed top market players for their product offerings and activities such as collaborations, joint ventures, Investments, etc.



Study period:
From Jan 2015 to Jun 2025



200+ hours invested

Some of the Eminent players covered in this report:

TOTO

Panasonic



KYOCERA

FUJITSU



roboscientific

RICOH



Midea



Sanyo Chemical

Introduction



Sniffing Out the Future of Health:

Odor-Based Biomarker Detection in Pets and Kids

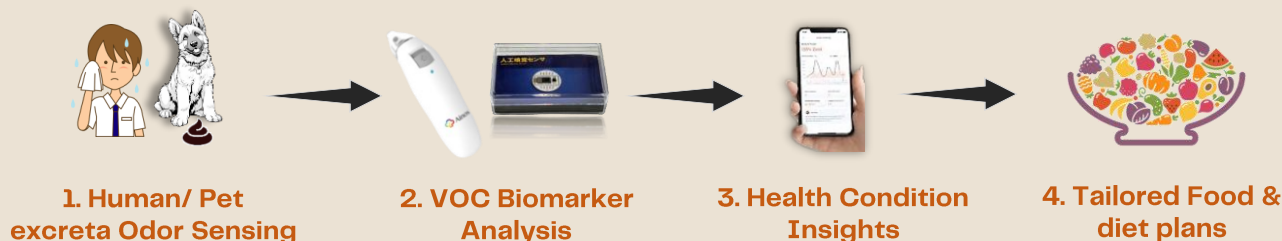


What if a simple sniff could detect disease? Odor-based health monitoring is revolutionizing early diagnosis—no needles, no stress, just scent. By analyzing breath, sweat, urine, or feces, researchers can uncover hidden health issues through invisible chemical signals called **VOCs (volatile organic compounds)**.

For pets and young children, who can't verbalize symptoms, this non-invasive approach is a game-changer. Specialized **electronic noses (eNoses)** use **AI-powered sensors** to detect early signs of infections, digestive problems, and more. The tech **integrates seamlessly into everyday items like litter boxes, collars, or wearables**, providing real-time alerts that could one day trigger personalized food recommendations tailored to specific health needs.

As this technology matures, strategic partnerships are forming between **sensing/diagnostic innovators, pet nutrition specialists, and veterinary health platforms**. These **future collaborations could create complete wellness ecosystems**—where early **odor detection automatically suggests dietary adjustments or preventive care, closing the loop between diagnosis and treatment**.

With **strong patent growth (2019–2024)** and **startups driving commercialization**, odor-based diagnostics are making early detection as simple as a sniff. The future of health monitoring isn't just painless—it's invisible.



Biomarkers: The Body's Chemical Clues



Biomarkers (biological markers) are measurable indicators of health status, acting as the body's early warning system. They enable detection, diagnosis, and monitoring of diseases through:

- **Traditional biomarkers:** Glucose (diabetes), Cholesterol (heart disease), Urea/Ammonia (kidney function)
- **Odor-based biomarkers:** VOCs emitted via breath, sweat, urine, or skin that reveal infections, cancer, or metabolic disorders – especially vital for pets and infants who can't verbalize symptoms.

Why Odor-based biomarker detection?



1. Non-Invasive & Needle-Free

No pricks, pokes, or pain—just a whiff is enough! Ideal for pets and children who can't tolerate traditional tests.



2. Home-Friendly Health Monitoring

Think smart diapers, scent-detecting collars, and air-monitoring devices—diagnosis can happen right at home.



3. Early Detection = Early Action

Odors change before symptoms show. Catch diseases like diabetes, infections, or metabolic disorders at the earliest stage.



4. Perfect for the Silent Sufferers

Infants and animals can't say what's wrong—odor-based tools can speak for them.



5. Continuous, Real-Time Tracking

No more waiting for lab results. Some devices can monitor 24/7 and alert caregivers instantly.



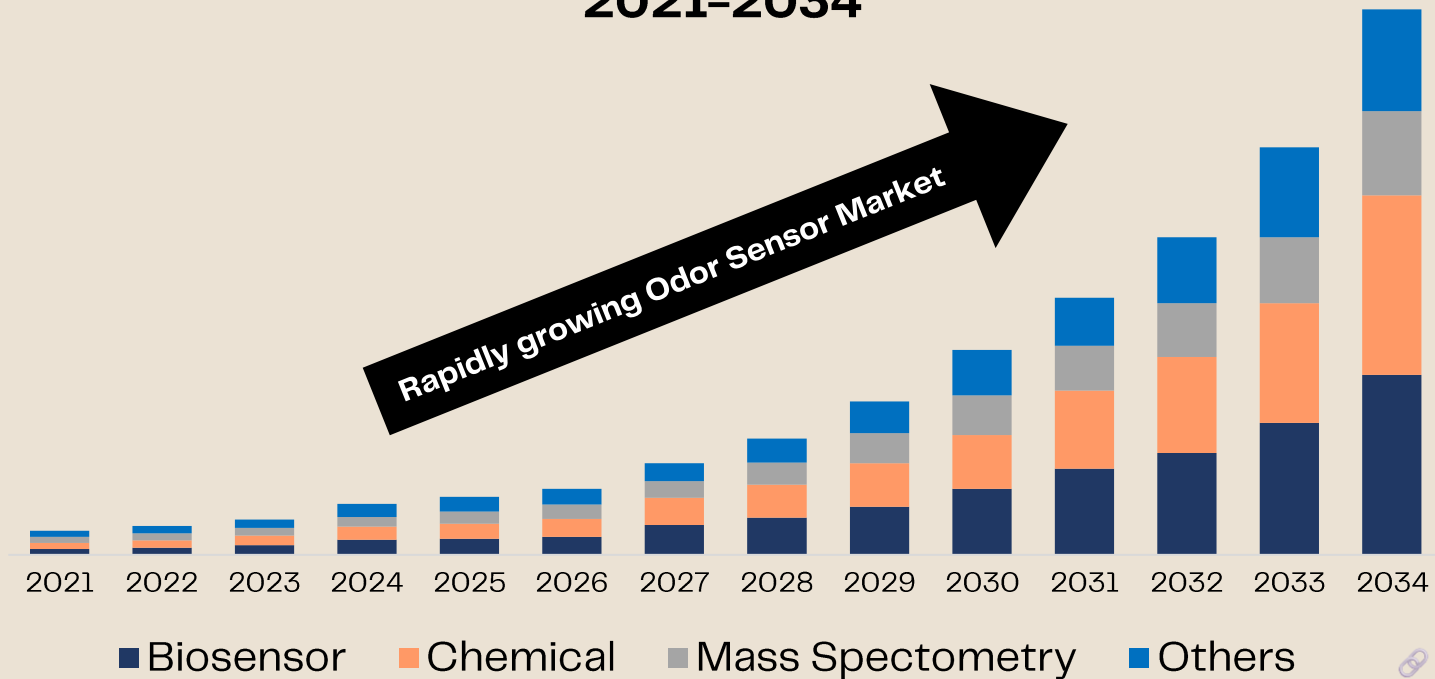
6. Low Cost, High Impact

After initial setup, many odor-detection systems are cheaper than repeated lab tests or vet visits.

Market Landscape



Odor Sensors Market Size, By Sensor Type, 2021-2034



The Odor Sensor market is projected to grow at a rate exceeding 20% during the forecast period, with chemical-based sensors expected to experience the highest growth, followed by biosensors—particularly within the healthcare and medical diagnostics sectors. This trend indicates a robust and expanding market for odor-based biomarker detection instruments.

In Pets, fecal odor changes provide early warning signs of developing health issues. Research reveals stool volatile organic compounds (VOCs) can detect gastrointestinal disorders and metabolic conditions before symptoms emerge. The U.S., Japan, China, and South Korea lead development of innovative detection tools like smart litter boxes and odor-sensing collars. These analyze biochemical changes, enabling proactive care through early intervention.

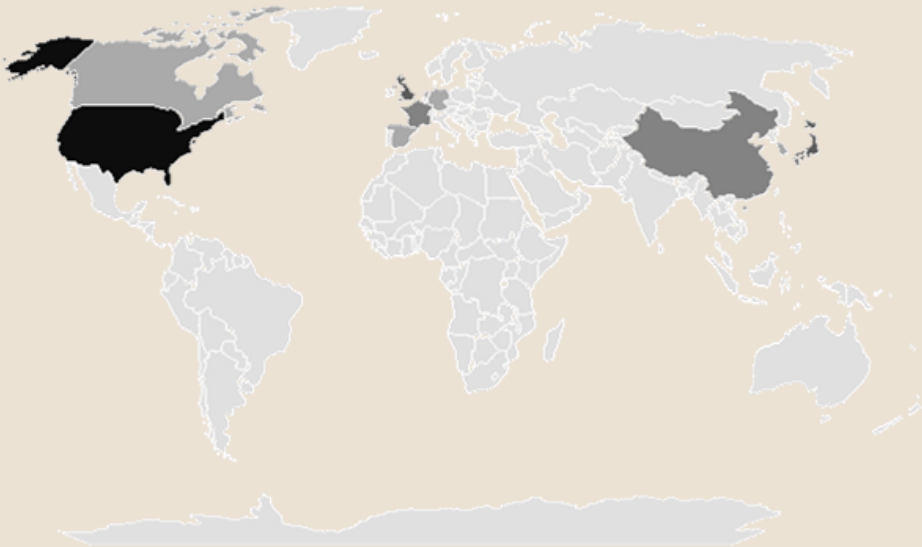
Key Market Drivers:

- **Preventive Care Revolution:** Pet owners are increasingly seeking convenient, proactive & non-invasive ways to monitor health and detect issues early & offer data-driven diet plans.
- **Global Pet diagnostics Market Momentum:** Valued at over \$3.2B, with projected CAGR of 9–10%, creating strong tailwinds for innovation.

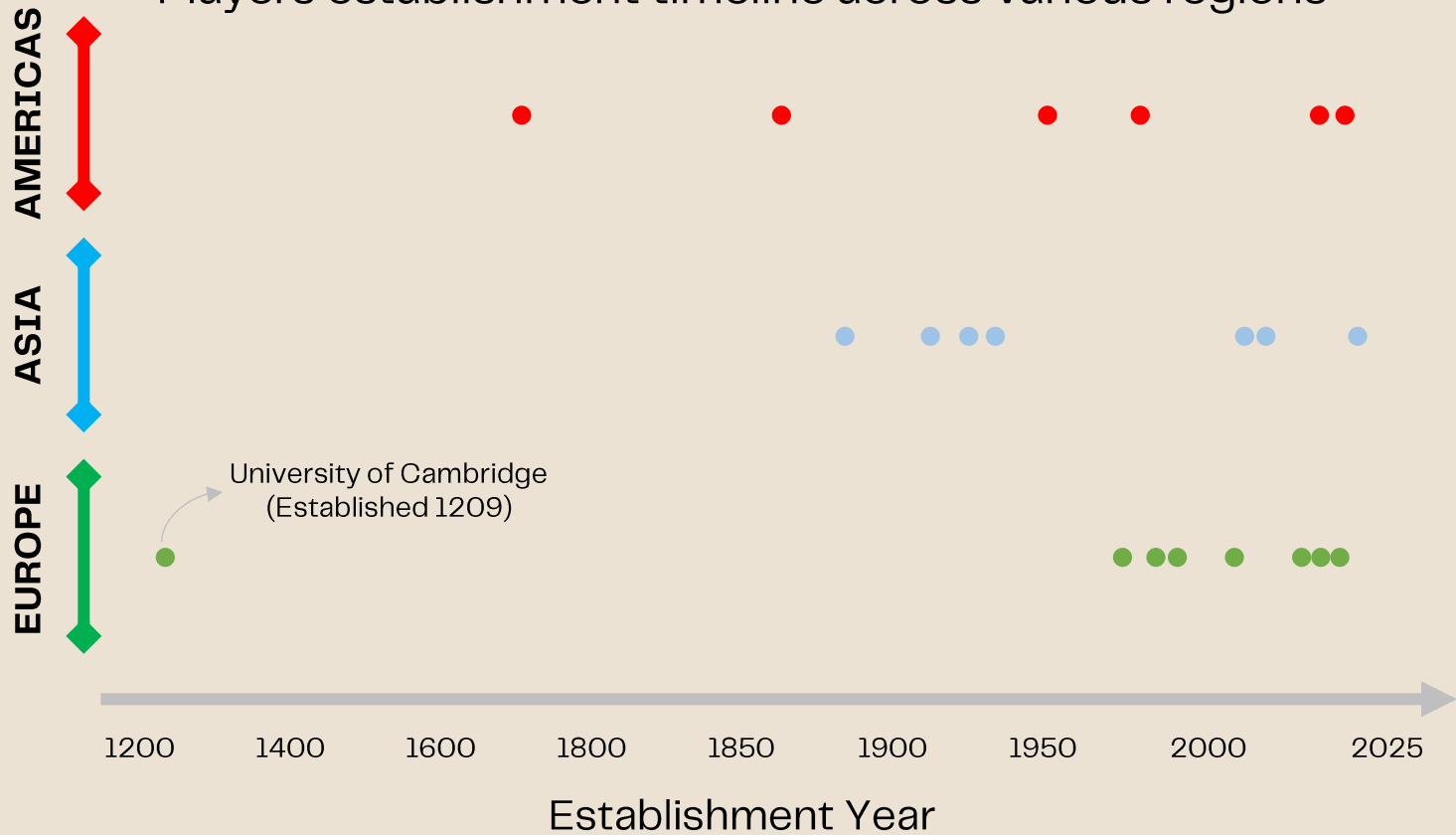
The players across the industry



The technology landscape features multinational players actively engaged in market developments and driving product innovation.



Players establishment timeline across various regions



A diversity of product offerings (1/2)



These innovators are redefining diagnostics with odor-based sensors that detect health conditions— **no needles, no samples, just scent-driven insight into your health.**

The listed products span odor sensors, electronic noses, and breath analyzers designed for medical diagnostics and healthcare. These technologies detect volatile organic compounds (VOCs) in breath, skin, or environments, enabling non-invasive, real-time analysis for disease detection, infection monitoring, and hygiene control—advancing personalized medicine and early diagnosis across various clinical settings.

Panasonic

Panasonic's odor sensor **detects biomarkers in breath and body odor**, enabling non-invasive **health monitoring, stress detection, and early diagnosis by mimicking insect olfaction** for high sensitivity and accuracy.



Aryballe's NeOse Advance is a **digital olfaction device that utilizes silicon photonics technology** to detect, record, and **recognize odors with high precision**. It is designed for industrial, food, and healthcare applications

A diversity of product offerings (2/2)



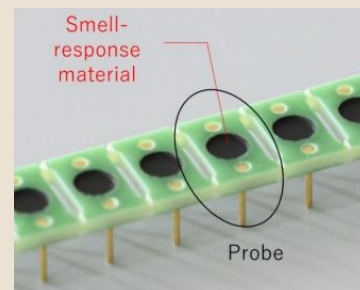
Ainos Flora is a non-invasive, AI-powered digital nose that detects vaginal and sexually transmitted infections at home. It offers fast results, telehealth integration, and privacy-focused women's health diagnostics.



Winsen ZP510 is a compact semiconductor-based odor sensor module ideal for designed for detecting various volatile organic compounds (VOCs) such as hydrogen sulfide, ammonia, etc. It is used in smart pet products.



FlavoTone is a digital olfaction sensor developed that visualizes complex and diverse smells. It can identify both specific and intricate odors, making it suitable for applications in quality control, characteristic comparison, and monitoring.



Collaborative initiatives across the industry



Cambridge Enterprise presents a cutting-edge electronic nose technology that **mimics advanced mammalian olfaction for comprehensive volatile profiling**, with broad applications across agritech, veterinary, environmental monitoring, and healthcare. **Cambridge Enterprise seeks industry partners or spin-out opportunities to bring this flexible, intelligent e-nose to real-world applications.**

04 Sep 2023



Sanyo Chemical and NAGASE & CO., LTD. are collaborating to develop AI-powered electronic nose technology. Sanyo will create high-precision probes using proprietary resins, leveraging its polymer and surfactant expertise. NAGASE will design the sensor system and process odor data. Together, they aim to launch a digital transformation (DX) business offering real-time odor analysis for applications in healthcare, manufacturing, and safety, enabling advanced, customized odor detection solutions.

13 Jul 2021



Dreamtech will invest an additional US\$ 2million into Israeli electronic nose firm Nanoscent. Dreamtech has also secured the exclusive sales right of their co-developed electronic nose solution in South Korea. Supported by a \$9.5 million EIB funding round, Nanoscent aims to commercialize its COVID-19 breath-detection e-nose, delivering results in just 30 seconds

30 Nov 2020

Recent Innovations in Pet Odor Detection



Corporate & Startup R&D:

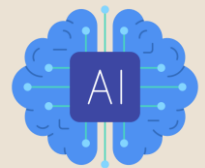
- **Large pet food players (Mars, Nestlé Purina) and veterinary conglomerates are investing in odor-based pet diagnostics R&D, partnering with tech startups to expand beyond nutrition.**



- **RoboScientific (spin-out of Lancaster Univ.) is commercializing an eNose to detect canine diseases via hair VOCs** (lab prototype identified visceral leishmaniasis with >97% sensitivity).



- **Sanyo Chemical & Nagase Co.:** Developing an **AI-powered eNose platform for real-time VOC detection**, with potential future pet wellness applications.



Research Breakthroughs:

- **Studies have characterized 58 significant VOCs in canine feces** (via GC-MS), laying groundwork for fecal odor biomarkers.



Opportunities in Pet Odor Detection



1. End-to-End Health Solutions:



- No market leader currently combines odor-based diagnostics with personalized nutrition plans, creating opportunities for strategic partnerships or IP licensing to develop comprehensive pet health ecosystems that bridge detection, analysis, and dietary intervention.

2. Smart Pet Tech Products:



- The market lacks commercialized smart litter boxes and collars with odor-sensing capabilities. These products could revolutionize early disease detection through automated waste/breath analysis, presenting a first-mover advantage for innovative pet tech developers.

3. Connected Pet Health Ecosystems:



- Linking odor sensors with existing pet health tech (wearables, microbiome tests, telehealth platforms) could create seamless home monitoring systems, enabling veterinarians and owners to track wellness indicators remotely through unified data dashboards.

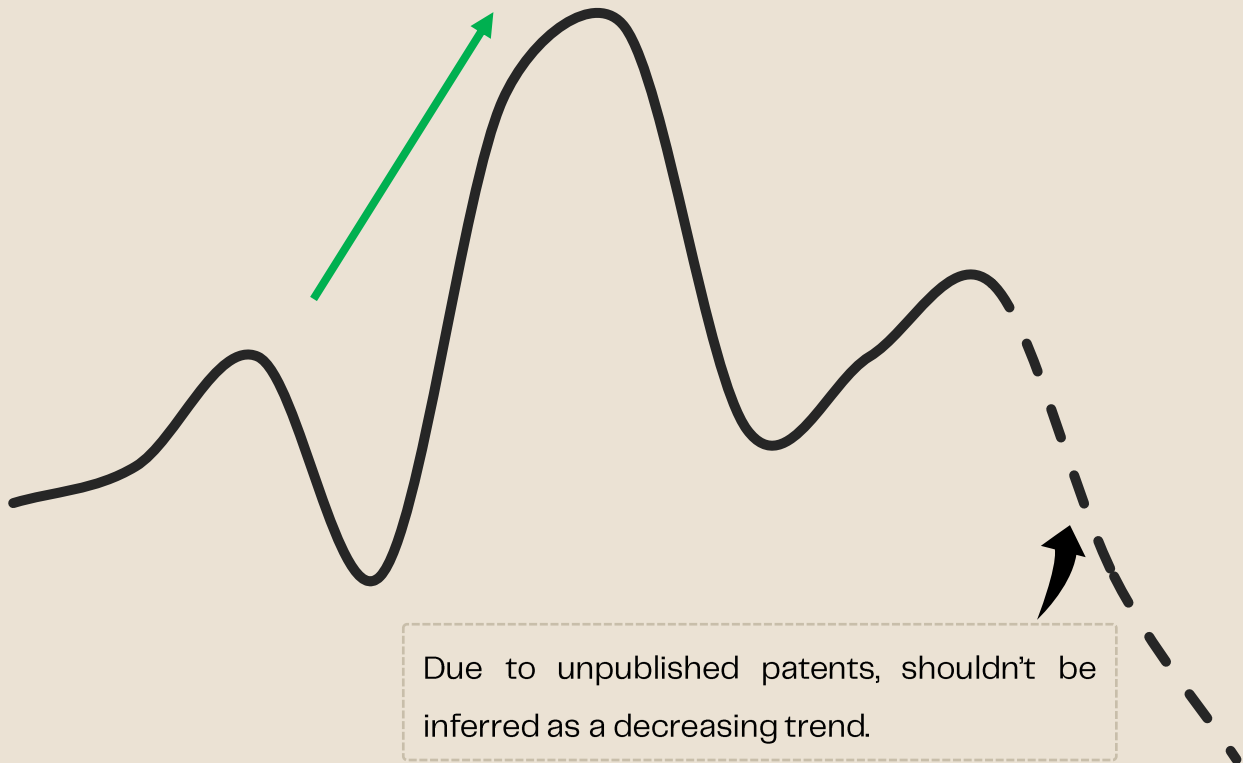
Innovation pacing up across the patent segment



Filing trend



The patent filings in the domain of odor-based biomarker detection have seen an exponential peak in 2019 and 2020.

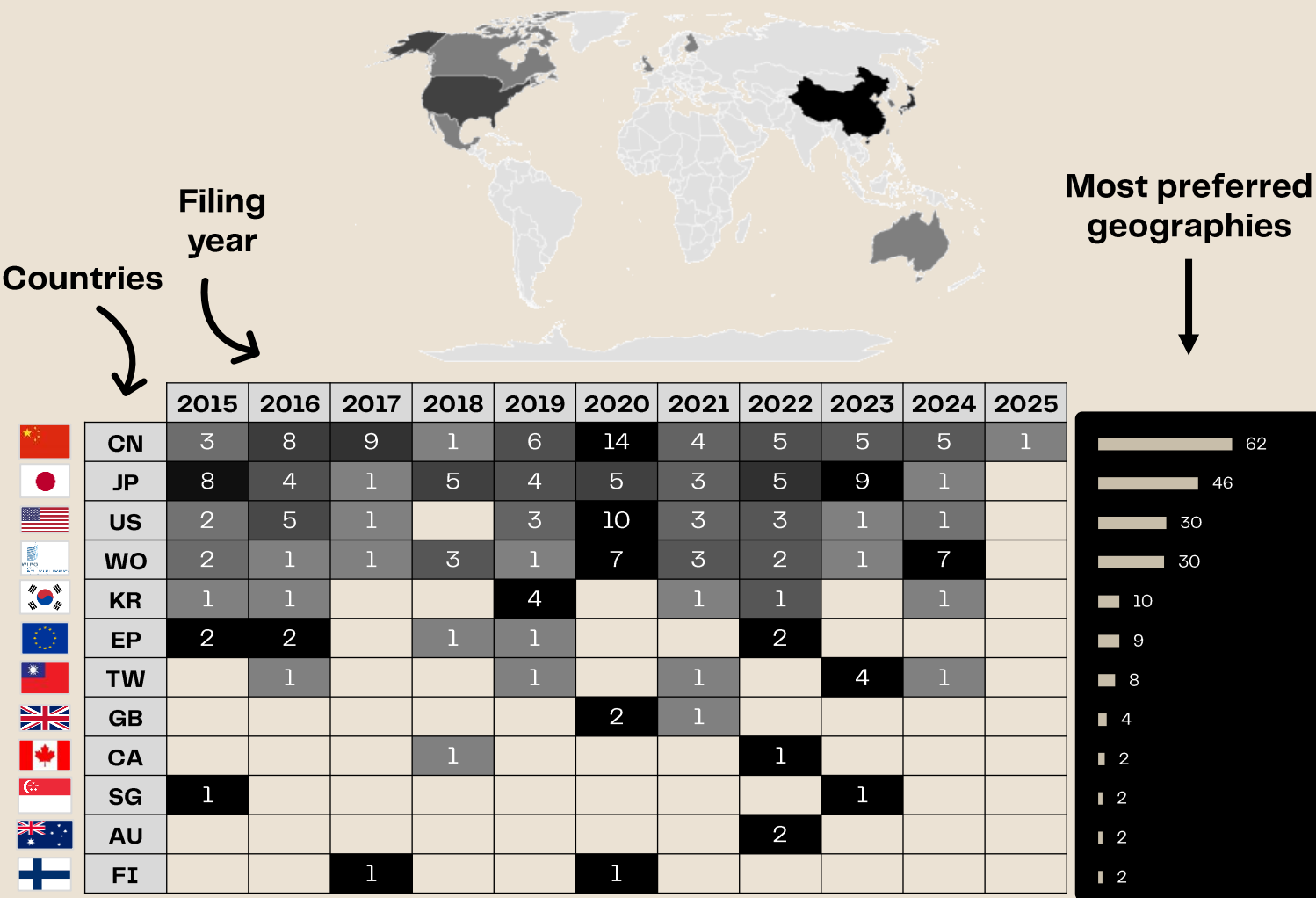


Due to unpublished patents, shouldn't be inferred as a decreasing trend.

2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025

From the above graph, we can observe that there is a significant increase in the filing of patents in the domain odor-based biomarker detection 2015 onwards. There is a sharp increase in the year 2019 and 2020. So, from this abrupt increase, we can conclude that the domain is an emerging technology with a continuous increase in the number of patents filed in this domain.

Preferred regions for patent protection



China and Japan are currently the most preferred regions for odor-based biomarker detection. Recently, there has also been a significant increase in filings in countries like the US and South Korea.

Key players leading the patent race

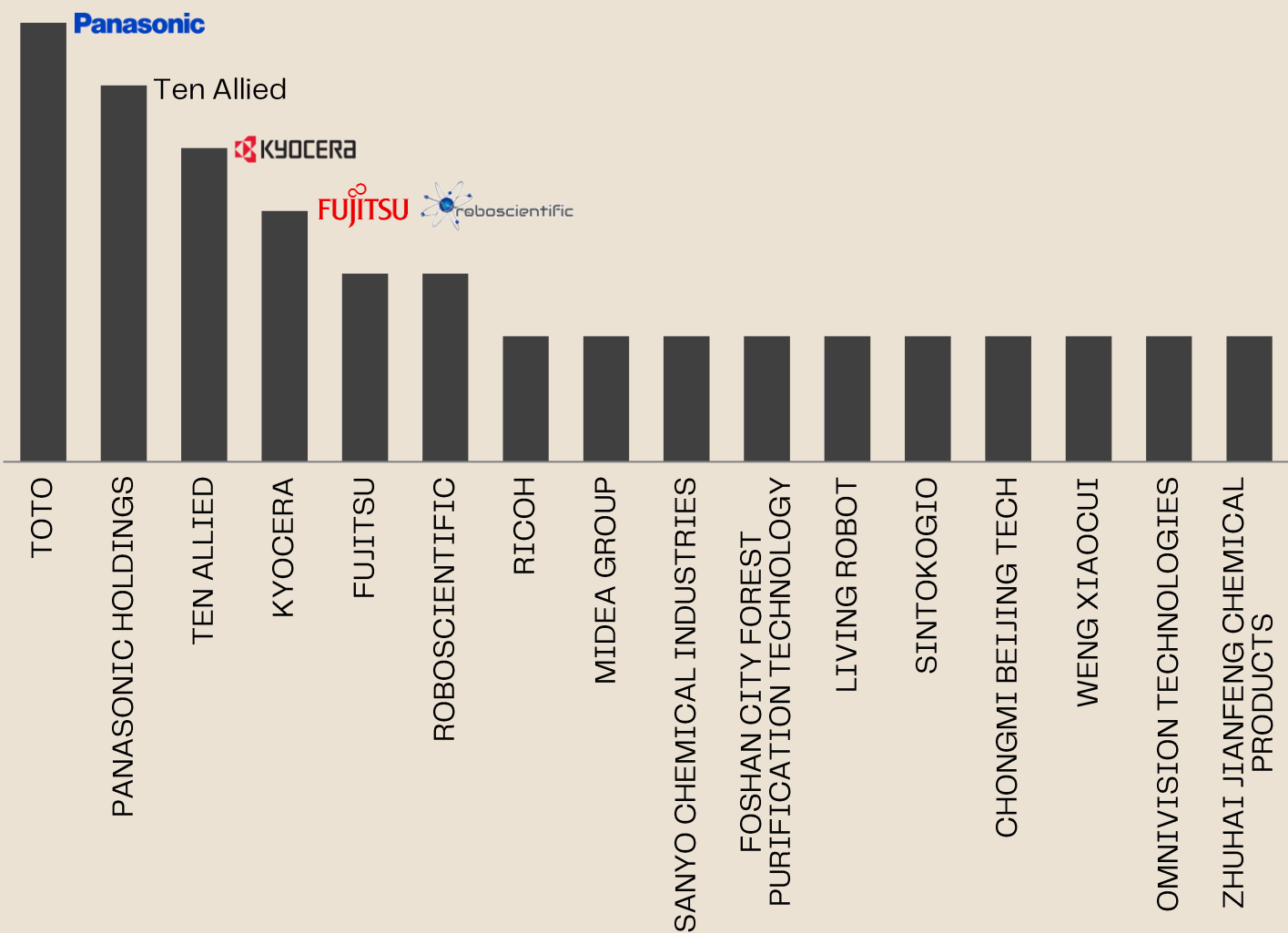


TOTO

TOTO

Panasonic

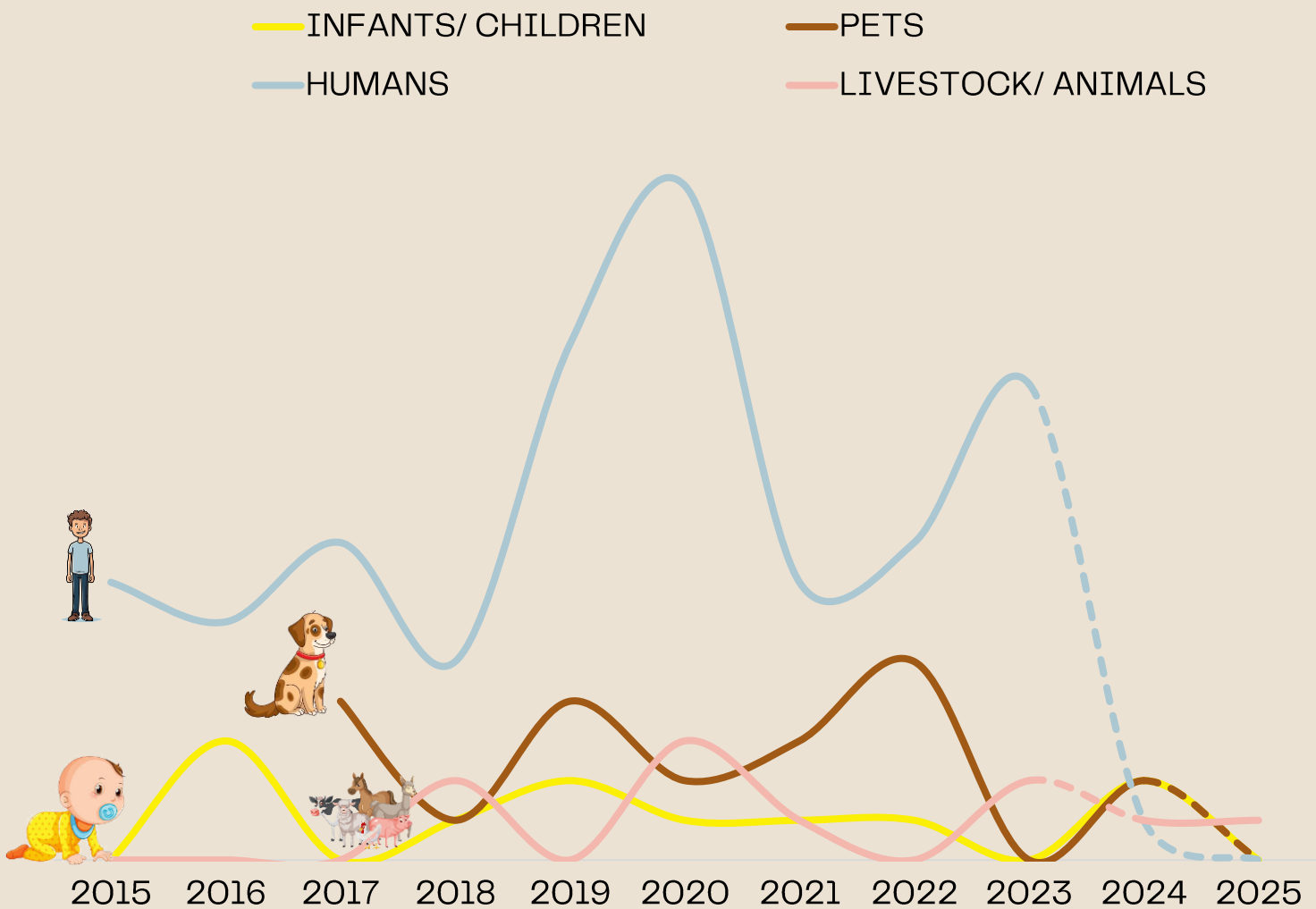
TOTO and Panasonic hold the maximum number of patents related to odor-based biomarker detection.



Focused targets over the years



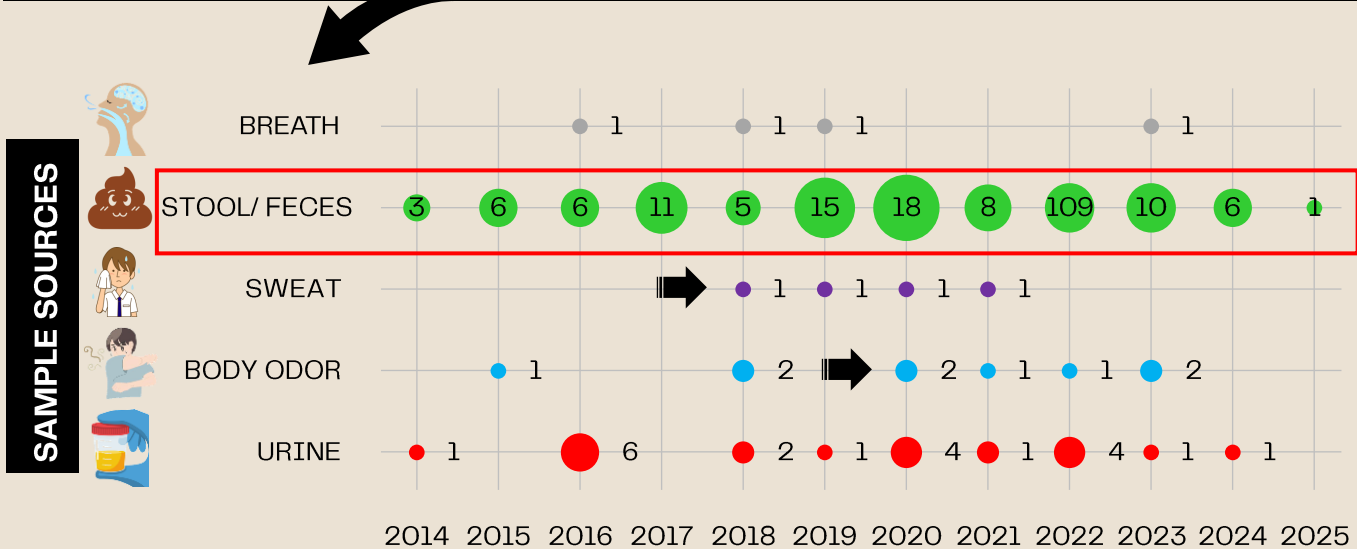
Over the past decade, innovators have significantly focused on human based biomarker detection systems while the areas of infants, pets, and livestock animals are still in the initial stages with very limited patent filings across the globe.



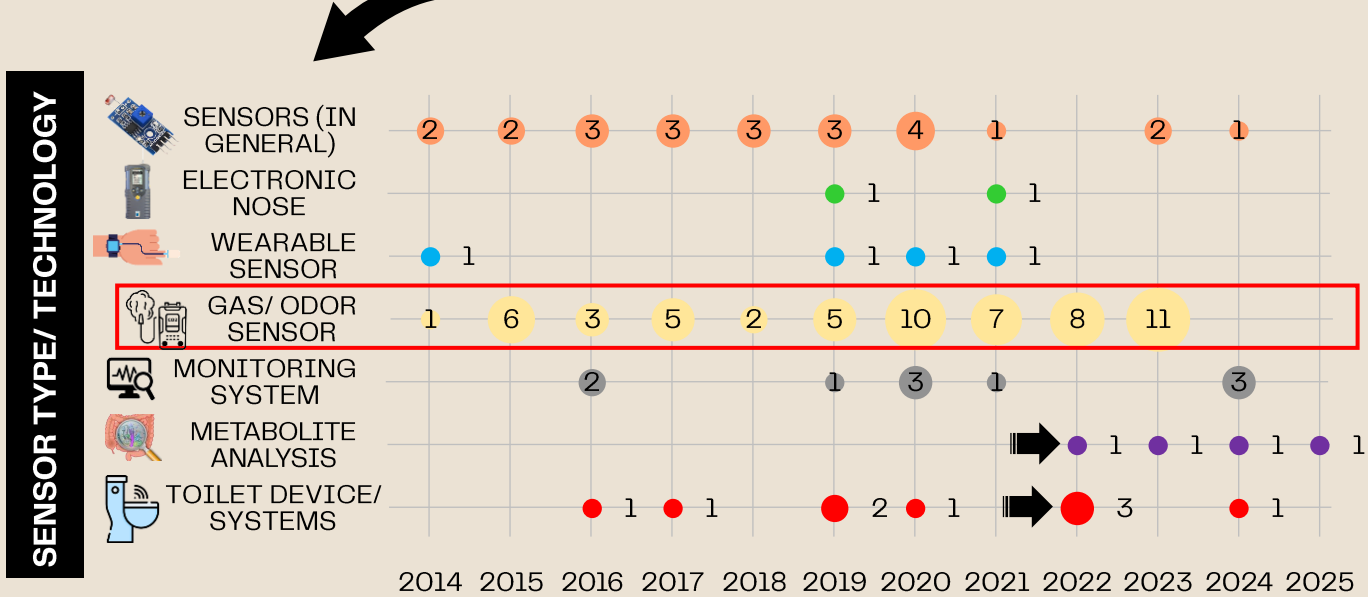
Technological fields have growth over the years



Over the past decade, research has primarily concentrated on stool/fecal and urine samples for odor analysis. Recently, however, body odor and sweat have emerged as promising new areas.



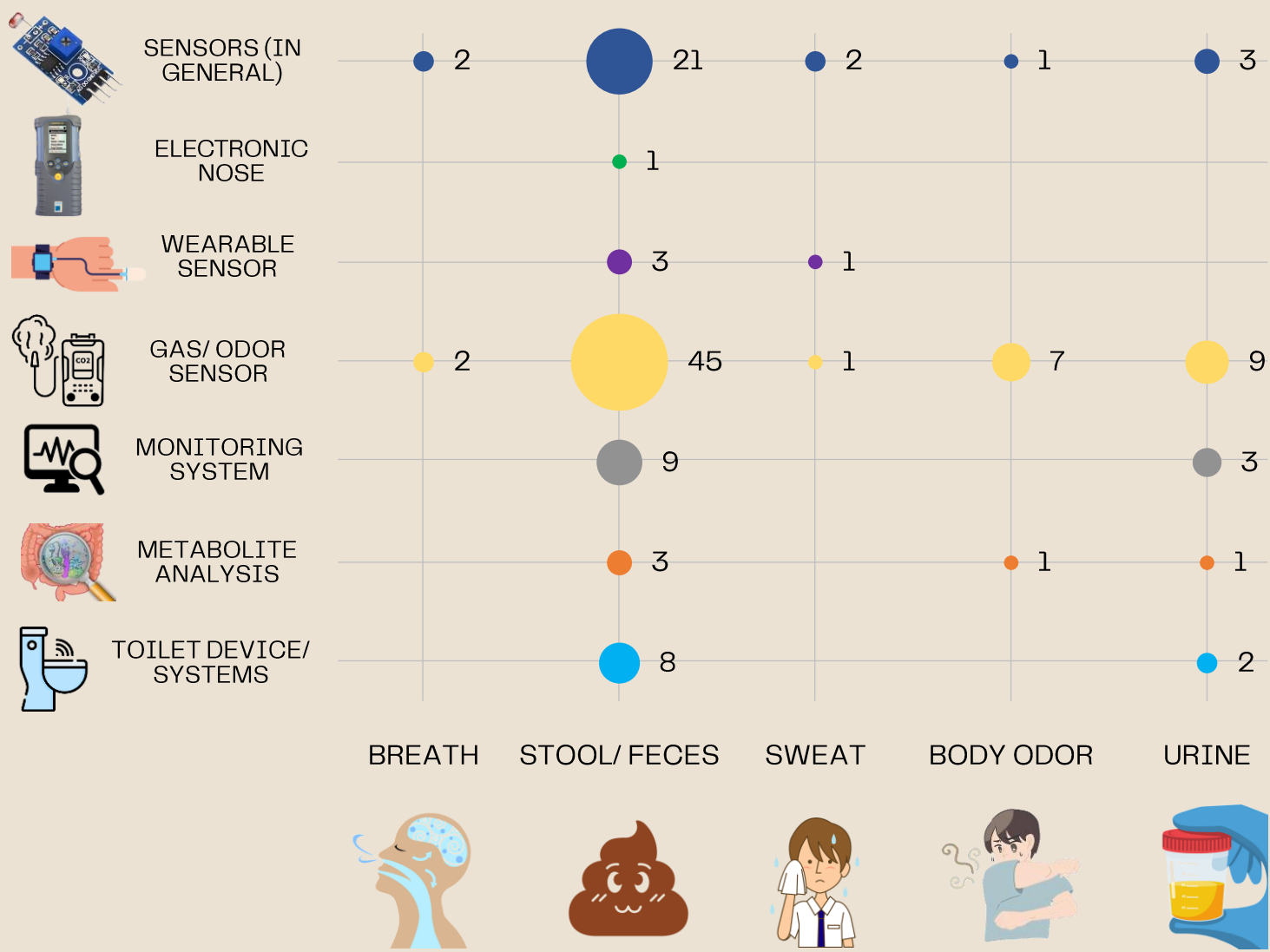
Since 2014, gas and odor sensors have been at the forefront, with metabolite analysis and smart toilet technologies now emerging.



How sample sources are related to the sensors/ technologies?



Most players have disclosed a gas/ odor sensor for stool/ feces.



Technology areas distribution for various target groups



	TARGET GROUP →	INFANTS/ CHILDREN	PETS	HUMANS (IN GENERAL)	LIVESTOCK/ ANIMALS
SAMPLE SOURCES	BREATH			3	2
	STOOL/ FECES	11	20	69	7
	SWEAT			4	1
	BODY ODOR			8	4
	URINE	3	3	15	2
APPLICATIONS	ODOR MONITORING	7	14	52	3
	DISEASE DIAGNOSIS	3	3	28	4
	FOOD RECOMMENDATION			6	
	HEALTH MONITORING	6	17	55	6
SENSOR TYPE/ TECHNOLOGY	SENSORS (IN GENERAL)	3	5	16	2
	ELECTRONIC NOSE	1		1	
	WEARABLE SENSOR		1	3	
	GAS/ ODOR SENSOR	2	7	49	6
	MONITORING SYSTEM	5	1	2	1
	METABOLITE ANALYSIS			3	1
	TOILET DEVICE/ SYSTEMS		2	7	

For **infants/ children,**
and pets, most
innovation is focused
on **stool odor-based**
diagnostics.

However, the area of
food
recommendations
remains largely
untapped, presenting
a significant
opportunity for future
development.

Emerging Applications: From Odor-Based Diagnostics to Personalized Nutrition



Recent advances in **odor-sensing now enable not just health diagnostics but also personalized nutrition**, with growing patent activity in this space over the past few years.

This technological evolution presents compelling opportunities for integration across multiple consumer applications, including **smart clothing, advanced toilets, wearables, air conditions/ purifiers, pet care products, automobiles**, etc.

TWI788834B

CHUNG YUAN CHRISTIAN UNIVERSITY

A toilet cover designed to detect fecal matter, equipped with gas composition detection and image acquisition modules for analyzing feces. It further includes a recommendation unit for food advice based on detected data.

A personalized diet recommendation based on a user's body odor to help reduce health risks. Using odor sensors in a clothes, it detects abnormal compounds linked to diseases. A knowledge graph then analyzes this data to assess health status and suggests suitable diets accordingly, promoting better health outcomes.

CN116682531A

GREE ELECTRIC APPLIANCES LEAYUN TECHNOLOGY

JP2023115613A

PANASONIC HOLDINGS

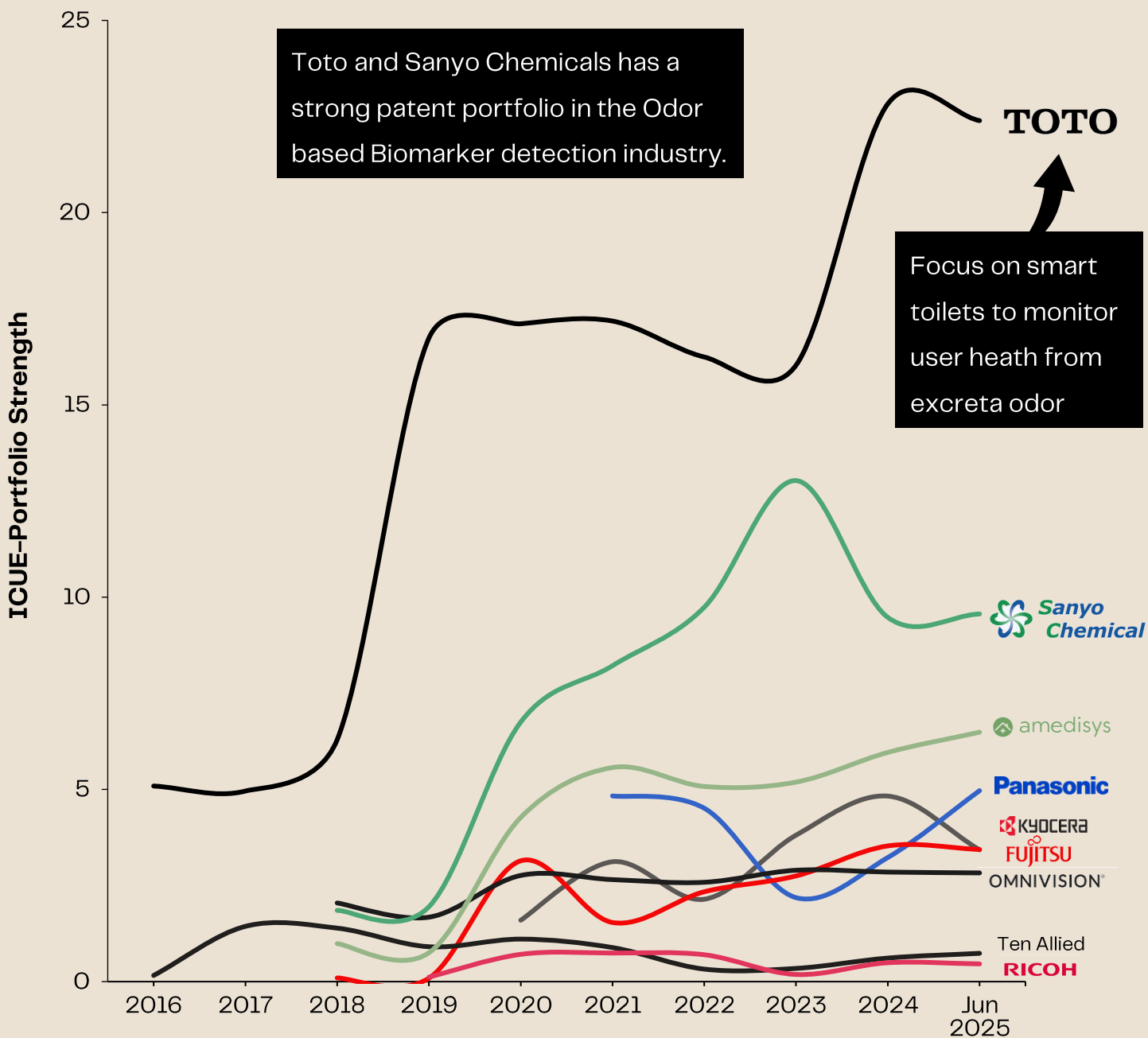
A system for analysis of excrement from an electric toilet to monitor user health. Images and odor information are transmitted to servers for analysis, producing discharge data . Users and physicians can access health insights via a mobile app for early detection or monitoring.

A microbiome analysis system for health monitoring, specifically using scent-based methods to profile and detect changes in the microbiome of subjects. It aims to provide a rapid, cost-effective way to monitor microbiome health and offer dietary recommendations (including supplements, functional foods, etc.).

US20220412952A1

NANOSCIENT

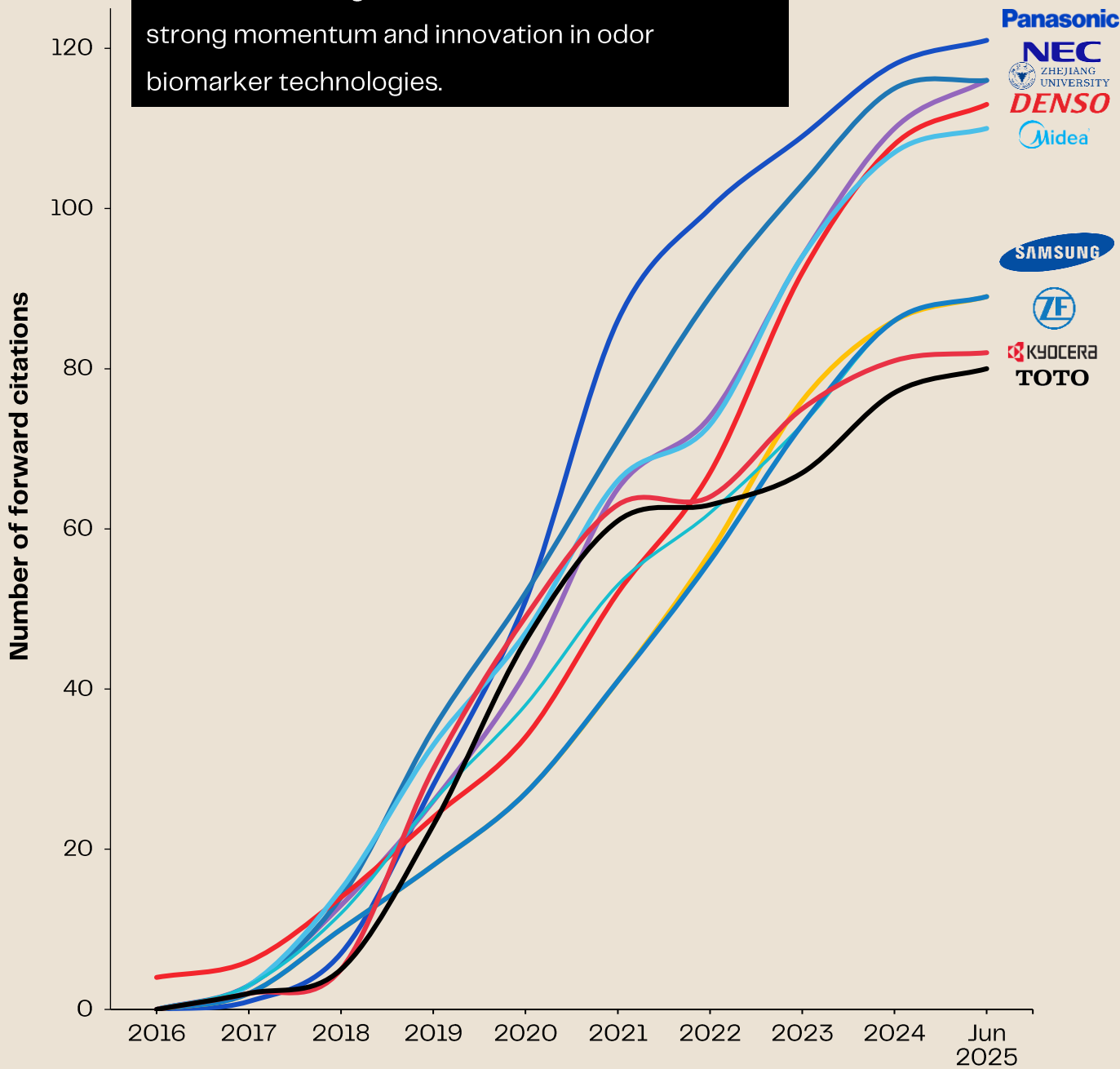
How top players patent portfolios have evolved over time?



Leading players citing the relevant publications?



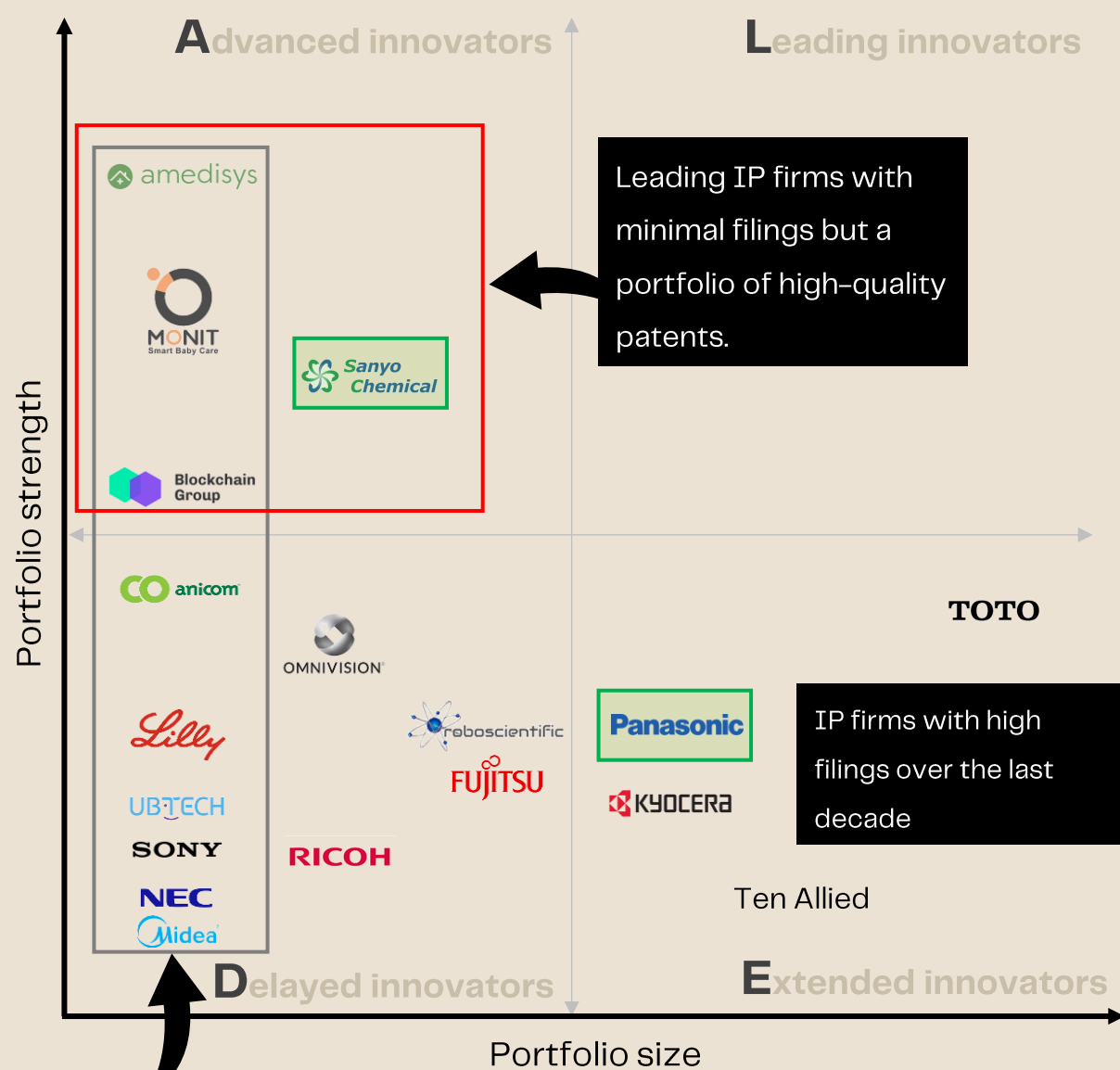
The involvement of top companies such as NEC and Denso through forward citations reflects strong momentum and innovation in odor biomarker technologies.



Technology LEADerboard chart™



IP Overview



The chart is divided into four sections, wherein each section defines a specific group of companies based on the **quantitative and qualitative strength of their patent portfolio.**

Key companies in IP with almost negligible filings

Key players also having a strong market presence

Panasonic and Sanyo have strong position in the IP LEADerboard chart, also retain a strong market presence

FAQs



- ✓ What key technologies are used in odor-based biomarker detection for pets/kids?
- ✓ Which companies/institutions hold the most patents in this domain?
- ✓ What are the major business domains showing interest in this field?
- ✓ What diseases can odor detection diagnose in infants/ humans/ pets today?
- ✓ What sources are used to detect odors from the target subjects?
- ✓ Which companies hold the best patent portfolio strength?
- ✓ What are the region-specific opportunities and threats for product launches?
- ✓ Which industries are investing heavily in this space?
- ✓ What product offerings currently exist in this domain?
- ✓ How can new entrants innovate to establish a strong market presence?
- ✓ Which technologies are used to diagnose specific diseases?
- ✓ Which academic institutions are open to collaboration in odor-based biomarker research?
- ✓ What recent market activities or collaborations stand out?
- ✓ How is patent strength evaluated based on industry-focused parameters?
- ✓ What are the technology trends across other types of contactless health monitoring technologies?
- ✓ What is the role of AI in medical diagnosis and diet recommendations?
- ✓ What are the various wearable vital monitoring technologies for infants/ pets?
- ✓ Could wearable devices integrate odor sensors for real-time pet health monitoring?
- ✓ How do microbiome tests complement odor-based diagnostics?
- ✓ Can odor detection identify emotional states (stress/anxiety) in pets?
- ✓ Could Acoustic/ Voice biomarkers emerge as a solution to diagnose stress, pain, or respiratory issues?



Do you want to see a complete report answering all these above questions along with other essential insights?



Then, you may set up a demo of our complete report by writing to us at info@icuerious.com or call at +1-(339)-237-3075 (USA) | +91-(988)-873-2426 (India)

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