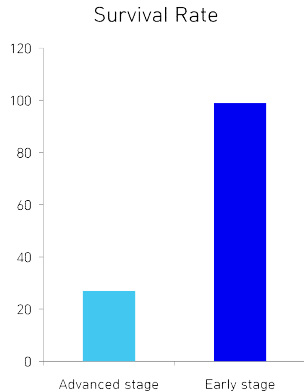


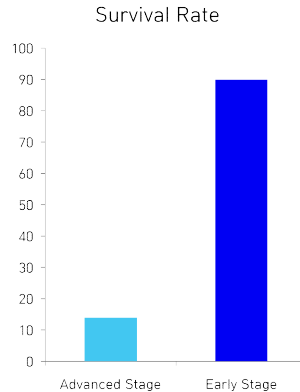
Cancer Survival Rate

Breast



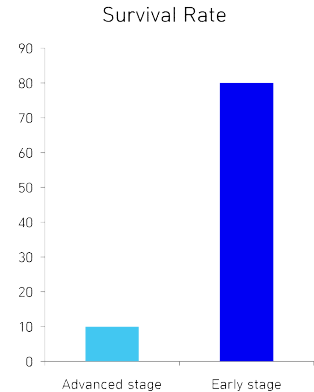
27% → **99%**

Colorectal



14% → **90%**

Lung



10% → **80%**

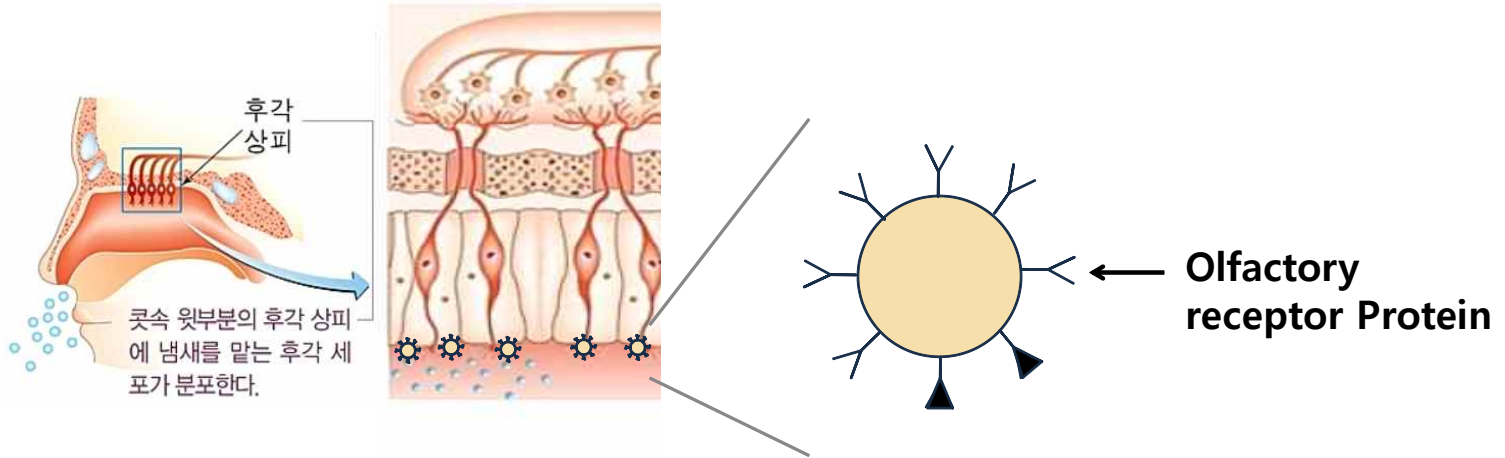
How?

Through Smell

Do you know?

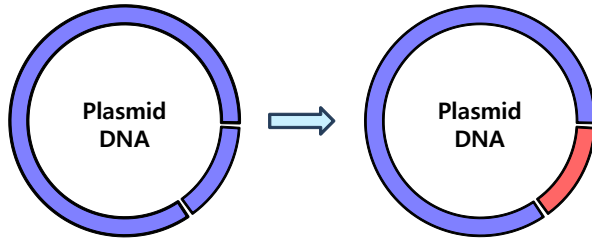
A solid blue square with a thin dark blue border. In the center of the square is a large white number '1'.A solid blue square with a thin dark blue border. In the center of the square is a large white number '2'.

How humans perceive Smell

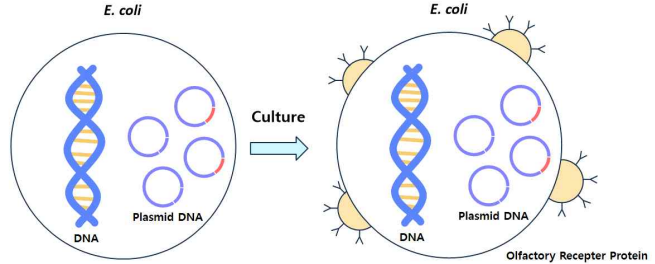


Bio-Enose based on FET

1 DNA Recombination

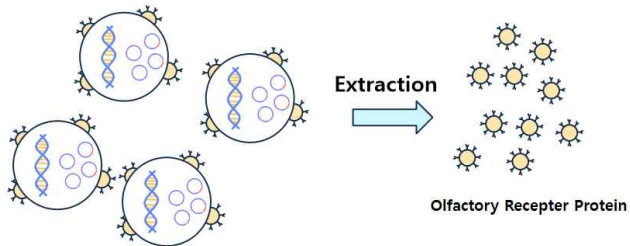


2 Cell culture

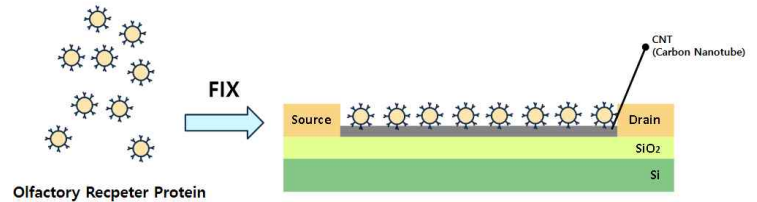


3 Olfactory Receptor Protein Extraction

Mass Production



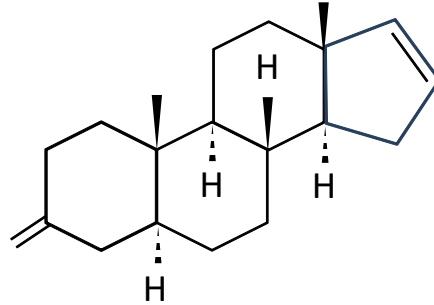
4 Receptor FIX on FET



The Smell of Sweat

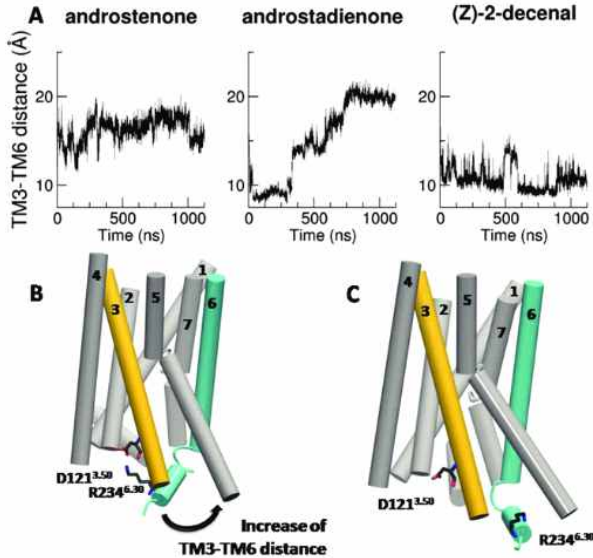
3

Androstenone

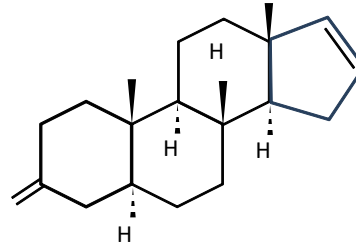


- Male Human Hormone Odor
- Male Pig Pheromone
- Truffle Odor

The Smell of Sweat



Androstenone



OR7D4

NIH National Library of Medicine
National Center for Biotechnology Information

Gene: Advanced

Full Report

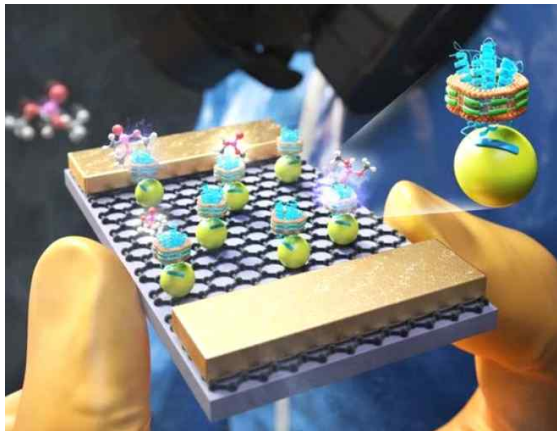
OR7D4 olfactory receptor family 7 subfamily D member 4 [*Homo sapiens* (human)]
Gene ID: 129594, updated on 3-MAR-2024

Summary

Official Symbol: OR7D4 provided by HGNC
Official Full Name: olfactory receptor family 7 subfamily D member 4 provided by HGNC
Primary source: EUCAL:ENSGAL00000000000
Gene type: protein coding
RefSeq status: VALIDATED
Organism: HUMAN
Location: Chromosome 16p11.2
Also known as: OR105, NG105, OR10-7, OR10-B, OR7D4P
Summary: Olfactory receptors interact with odorant molecules in the nose, to create a neuronal response that triggers the perception of a smell. The olfactory receptor proteins are members of a large family of G-protein-coupled receptors (GPCRs) arising from single coding exon genes. Olfactory receptors share a 7 transmembrane domain structure with many neurotransmitter and hormone receptors and are responsible for the recognition and G-protein-mediated transduction of odorant signals. The olfactory receptor gene family is the largest in the genome. The nomenclature assigned to the olfactory receptor genes and proteins for this expression is independent of other organisms. (provided by RefSeq, Jul 2016)

Orthology

WHALE - BACO



01

Detecting

Identify **Complex Odors**

02

Very Small - Portable

Biosensor Size(2cm x 1cm x 2mm) - Nail Size
2~300 times smaller than other company

03

Low Price

Biochip 10\$(US) (Mass Production), **Very Cheap**

04

Contactless

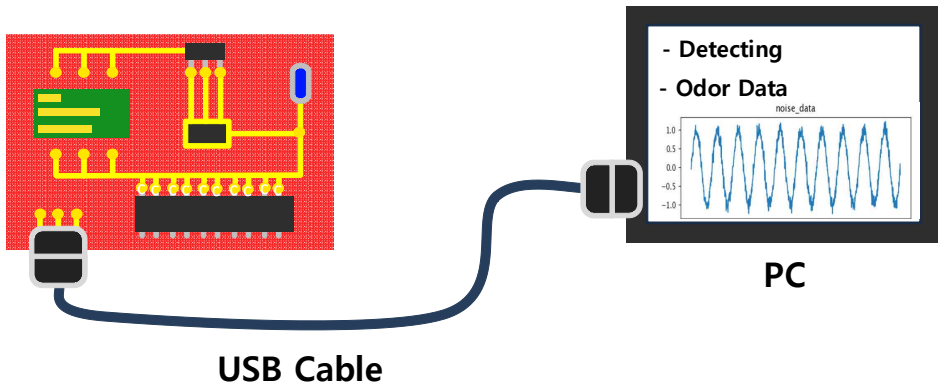
Just Breathe

05

Powerful Software

Analysis and visualization of Odor Waveform Bigdata

WHALE - BACO



You can identify disease quickly in your house.

01

Disease

Cancer, Fat, etc

02

Hormone

Secondary Sexual Characteristics,
Climacteric

03

Body Condition

Exercising Recording

04

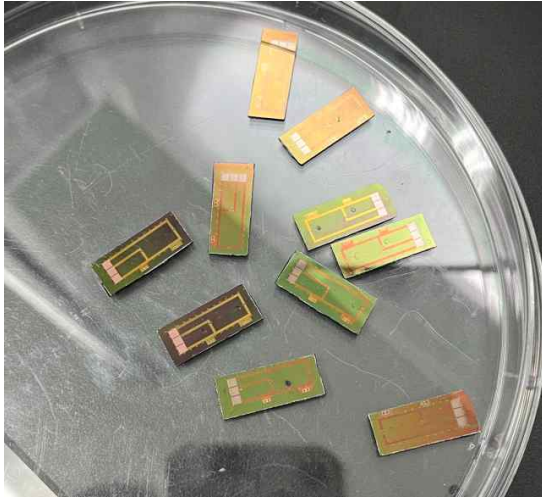
Hospital Booking

Hospital Booking, Matching Doctor

Product Development Phase

01

Biochip - G-FET



02

Biochip - Nanocellulose



Product Development Phase

01

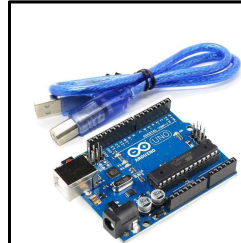
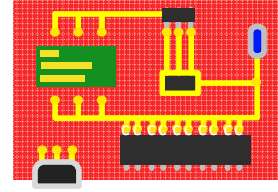
Biochip

4

Graphene FET : Using ZimmerPeacock

02

Analyzer



- **MCU**(Micro Control Unit)
ATmega328 Arduino Uno, Nano,
Raspberry Pi 3



- **ADC**(Analog to Digital Converter)
Analog to Digital converting
32bit(LTC2508-32)



- **Op-Amp**
(ADA4522-1)

Product Development Phase

03

BigData Analysis

```
# 기본 데이터
insert_data = [ ('2021년06월, 총인구수', 13055, '2021년07월, 총인구수', 13017, '2021년08월, 총인구수', 13007, '행정구역명', '경상남도합천시합동면', '행정구역번호', 4607020000)
data1 = data1.append(insert_data, ignore_index=True)

insert_data = [ ('2021년06월, 총인구수', 9893, '2021년07월, 총인구수', 9886, '2021년08월, 총인구수', 9862, '행정구역명', '경상북도구미시남산로동', '행정구역번호', 4018020000)
data1 = data1.append(insert_data, ignore_index=True)

insert_data = [ ('2021년06월, 총인구수', 11038, '2021년07월, 총인구수', 11030, '2021년08월, 총인구수', 11018, '행정구역명', '경상북도영주시남산로동', '행정구역번호', 4720020000)
data1 = data1.append(insert_data, ignore_index=True)

# (경상북도 영주시 남산로동) data 값은 입력해줘서 다시 입력하면(입력)

insert_data = [ ('2021년06월, 총인구수', 6600, '2021년07월, 총인구수', 6636, '2021년08월, 총인구수', 6635, '행정구역명', '경상북도영주시남산로동', '행정구역번호', 4720020000)
data1 = data1.append(insert_data, ignore_index=True)

insert_data = [ ('2021년06월, 총인구수', 11338, '2021년07월, 총인구수', 11330, '2021년08월, 총인구수', 11328, '행정구역명', '충청남도공주시공용동', '행정구역번호', 4410020000)
data1 = data1.append(insert_data, ignore_index=True)

insert_data = [ ('2021년06월, 총인구수', 20389, '2021년07월, 총인구수', 20383, '2021년08월, 총인구수', 20304, '행정구역명', '충청남도공주시공용동', '행정구역번호', 4408020000)
data1 = data1.append(insert_data, ignore_index=True)
```

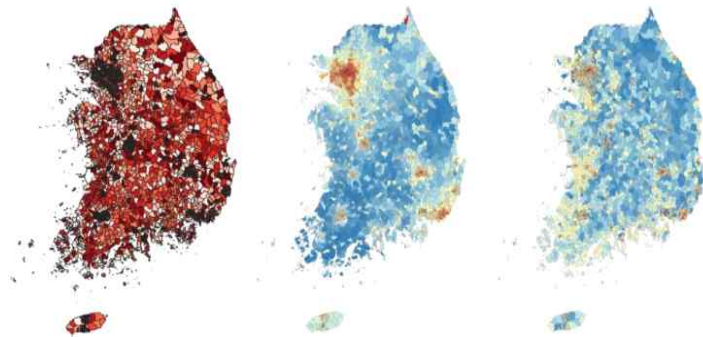
[1] data1

	2021년06월, 총인구수	2021년07월, 총인구수	2021년08월, 총인구수	행정구역명	행정구역번호
0	9503990.0	9504153.0	9502027.0	서울특별시	1100000000
1	1460279.0	1459812.0	1451511.0	서울특별시영등포구영등포동	1111000000
2	120244.0	120178.0	120144.0	서울특별시영등포구영등포동	1111051300
3	9571.0	9576.0	9560.0	서울특별시영등포구영등포동	1111052000
4	2498.0	2484.0	2475.0	서울특별시영등포구영등포동	1111054000
...
3857	39010.0	38986.0	38952.0	경상북도구미시남산로동	4719050000
3858	11028.0	11020.0	11008.0	경상북도영주시남산로동	4725052000
3859	8689.0	8636.0	8605.0	경상북도영주시남산로동	4514087000
3860	16309.0	16303.0	16268.0	충청남도공주시공용동	4415050000

Search Desired Data for area-specific Odor bigdata
(Tool : Pandas Library)

04

BigData Visualization

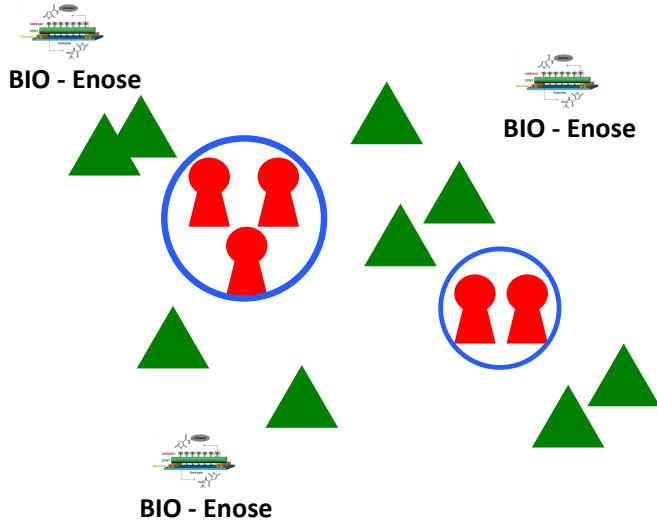


Displaying a real-time map based on location
(Visualizing the current location and direction of
propagation of odor)
(Tool : QGIS)

Our Project with AIS

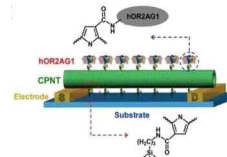
05

Technical Research Service Business

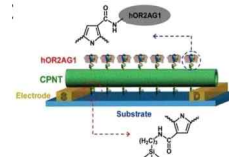


A Hidden enemy Detecting Using the Smell of Sweat

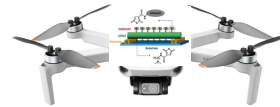
Detecting enemy forces in areas where visual identification is difficult by tracking the sweat smell of enemy forces hiding in operational areas.



BIO - Enose
(Fix)



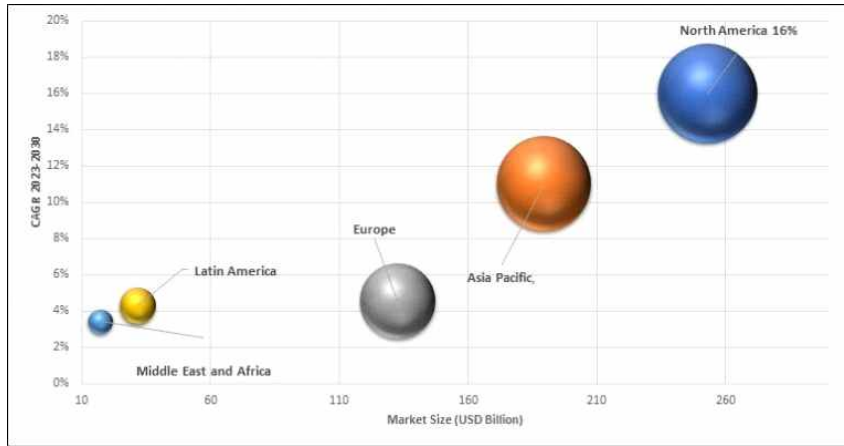
BIO - Enose
(Portable)



BIO - Enose
(Drone)

14

Target Country



Market Size

North America 251.7(USD Billion)
Asia Pacific 190
Europe 132
Latin America 33
Middle East and Africa 17.8

CAGR(Compound Annual Growth Rate)

North America 16%
Asia Pacific 11%
Europe 4.5%
Latin America 4.2%
Middle East and Africa 3.5%

* Country Trends and market entry Strategies

Middle East (Saudi, UAE)

Space) Recently, Middle East invest huge amount of money in Space
(1st Target Market : Space Industry)

- Satrec eye sell Satellite Technology to UAE
- Korean Space Society(UAE Program)

Asia Pacific (Republic of Korea, China, Taiwan, Vietnam)

Environment) Expected to be used in semiconductor processing and environment industries
(1st Target Market : Air Environment)

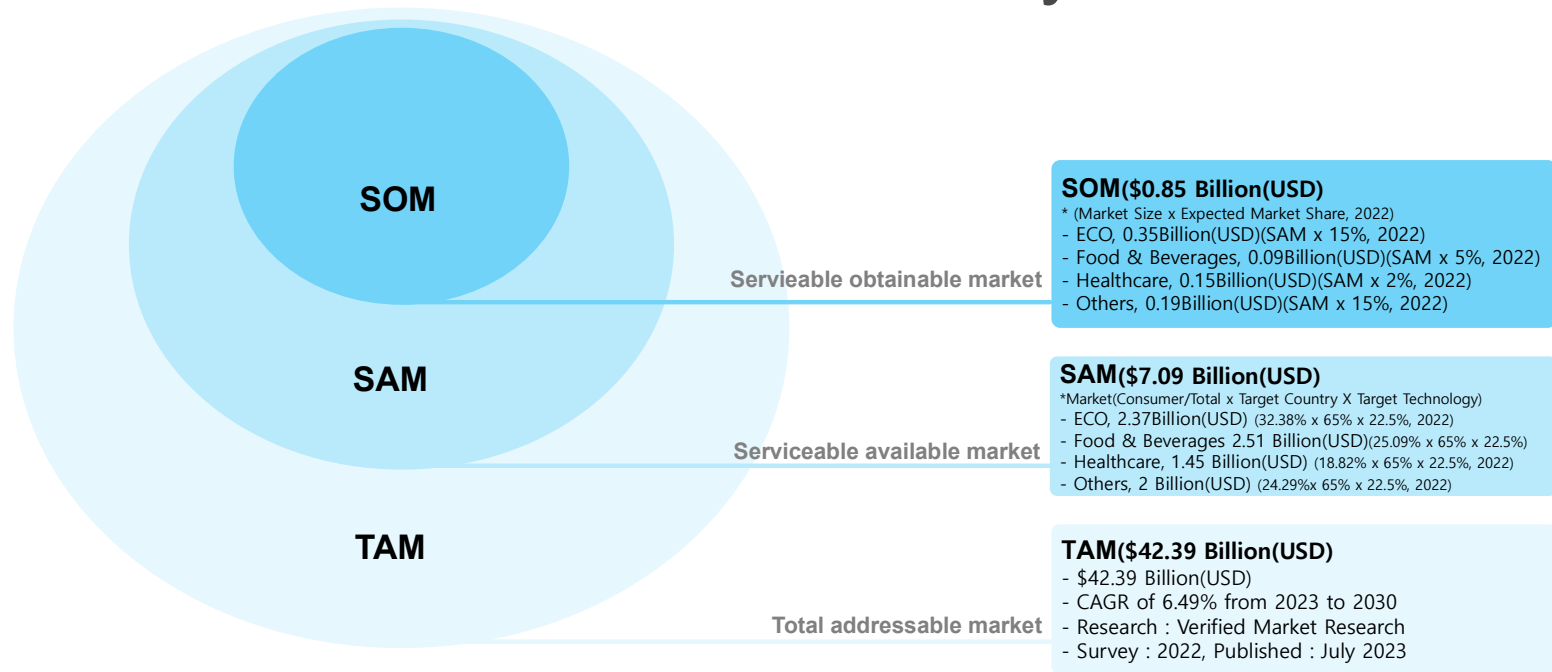
- Korea, China, Taiwan semiconductor company
- Vietnam Air Environment Industry Growth

North America (USA)

Everything) usa invest in various areas
(1st Target Market : Space Industry)

- Artemis Project(NASA)
- CIS Challenge

Market Size Analysis



Research

- Users : Environmental Monitoring, Food & Beverages Industry, Healthcare, Others

Market - Relation

EARLY - B2G : R&D

Middle - B2B : R&D

Late - B2C

LAM

SOM

SAM

TAM

BM

Military

Space

Aerospace

Environment

Medical Food



→ BORYUNG



CARE IN SPACE
CHALLENGE



STARBURST



KOREAN AIR



Marketing
Point

tree planet



KIOST
한국해양과학기술원

KOPRI
극지연구소

→ BORYUNG

R
E
L
A
T
I
O
N

Technical Competitiveness

01

Detecting Complex smell



Identify **Complex Odors**(Disease, fruits odors)

02

Very Small - Portable



Biosensor Size(2cm x 1cm x 2mm) - Nail Size

03

Low Price



Biochip 10\$(US) (Mass Production), **Very Cheap**
under

04

Contactless



Just Breathe

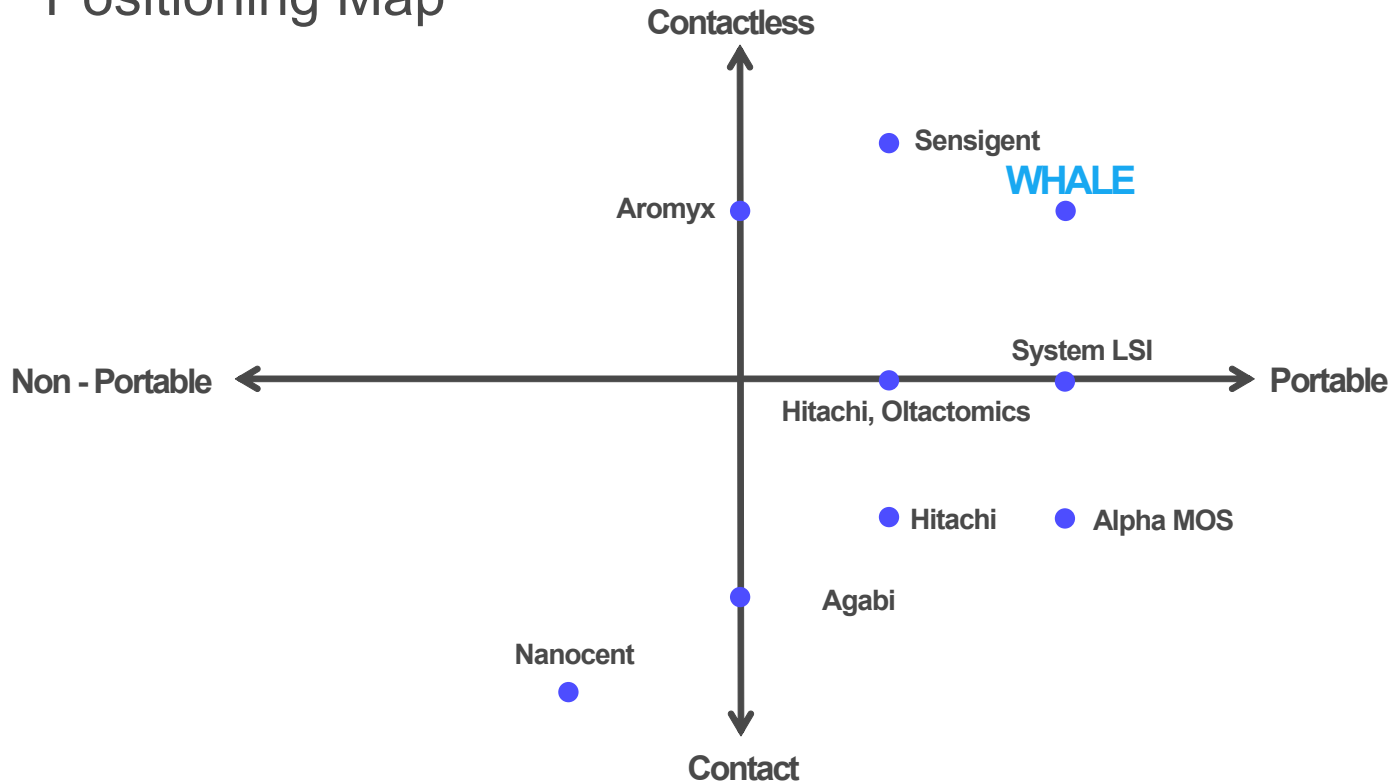
05

Powerful Software

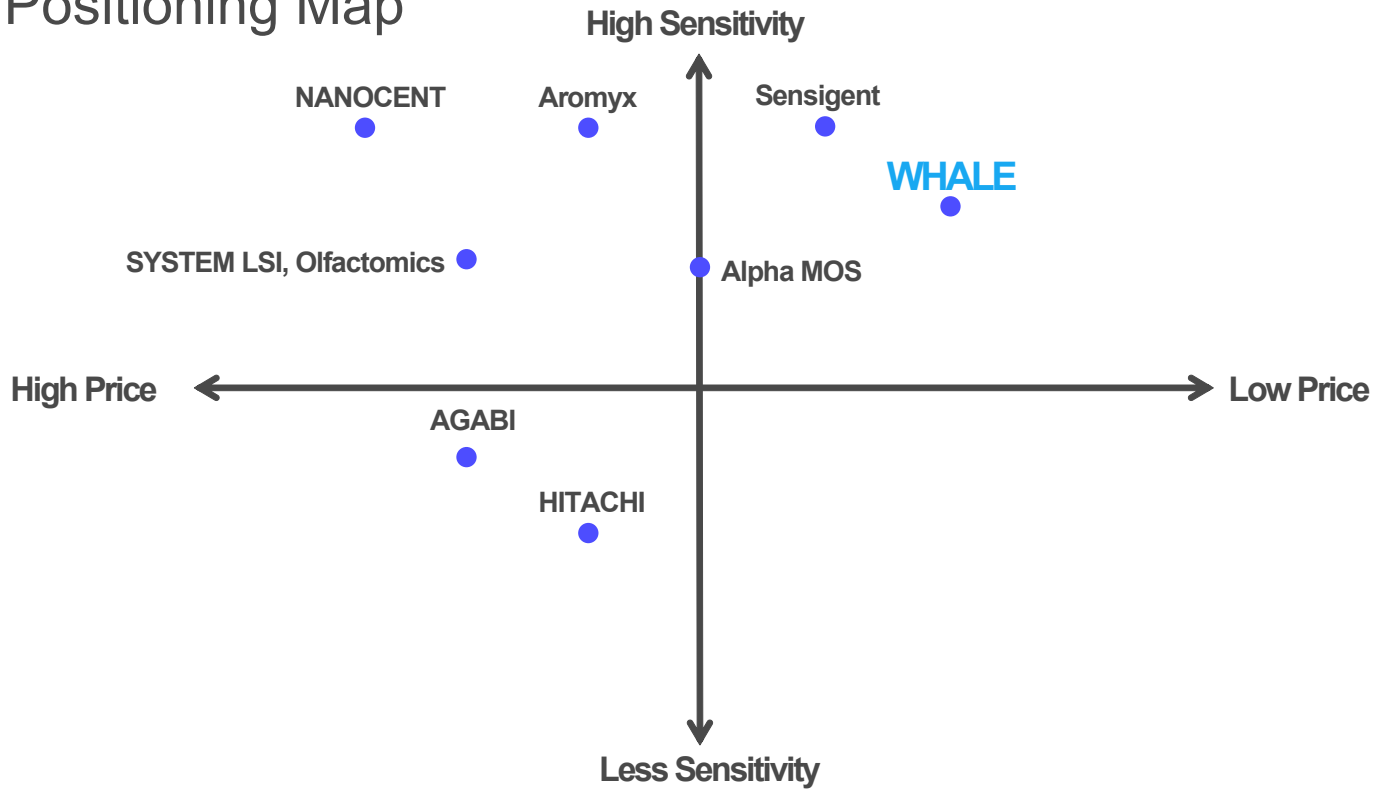


Analysis and visualization of Odor Waveform Bigdata

Positioning Map



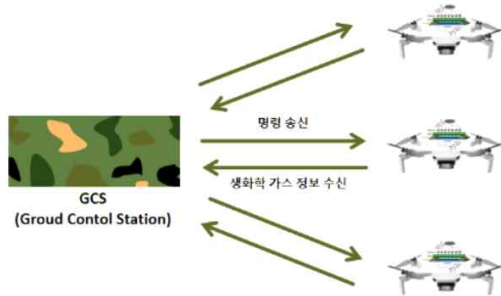
Positioning Map



Scalability

01

Biochemical weapon detection



02

Food freshness, Taste quality inspection



03

Drug detection



04

Early Diagnosis of (Seafood, Livestock Diseases)



WHALE - BACO

Until Smelling everything in the world