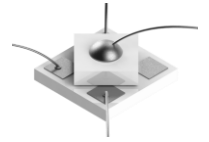


2022

Company Overview



'Environmental Gas Sensor Biz'

Advanced CO₂ Sensor Solution for IAQ

November 1, 2022

Junwoong Kim

EXSEN Inc. / CEO

URL : www.exsen.co.kr / E-mail : kjw@exsen.co.kr

1. Introduction
2. Company Overview
3. Solutions
4. Technology
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A company that supplies environmental sensors

to various life/safety fields such as smart home, home appliance, automobile, factory, and IOT.

Company Status

Mission A New Paradigm in Ceramic Sensor

Biz Sectors Manufacture of sensors, modules, and measuring devices

Date of establishment Oct 16, 2012 (Business Pivot_2015)

Stockholders CEO, Staff, Accelerator Venture Capital

Homepage www.exsen.co.kr
/Address 49, Techno 3-ro, Yuseong-gu, Daejeon

Company History

FY 2012 Company establishment
• Exhaust gas sensor for automobiles

FY 2015 Biz Pivot
• From NOx Sensor to CO₂, VOC Sensor

FY 2018 Mass production
• Construction, Home Appliance
• Automobile After Market

FY 2020 Overseas market Entry
• Collaboration with sensor companies

CEO Kim Junwoong

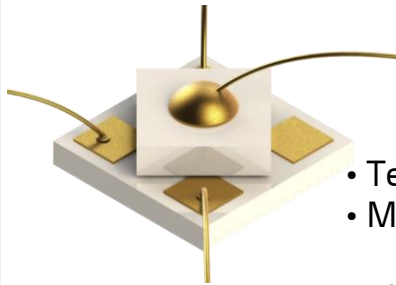
- Department of Materials Engineering, Korea University
- Department of Materials Engineering, KAIST, Ph.D.
- EXSEN Inc. CEO



Solid electrochemical gas sensor technology with reliability and price competitiveness

Emerging Tech.

“Solid Electrochemical Gas Sensor”

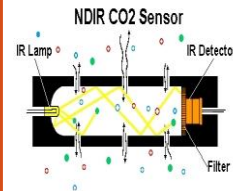


$$EMF = -\sum_i \frac{1}{z_i F} \int_I^{II} t_i d\mu_i$$

- Technology : Ceramic Tech.
- Market Valuation : Low Cost & Good Durability
- Players : Figaro, EXSEN Inc.

Conventional Tech.

“Non Dispersive Infrared Gas Sensor”



$$I_0 = I_0 \exp(kP_{CO_2})$$

- Technology : Optical Tech.
- Market Valuation : Good Accuracy & Reliability
- Players : Sense Air, Sensirion etc.

Reliability

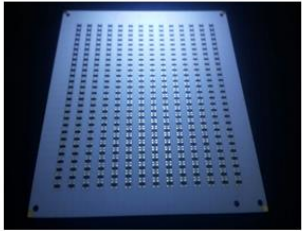
Cost-Effective

Miniaturization

Scalability

“ IDM (Integrated device Manufacturer) Platform ” From device design to component production!

01 Chip



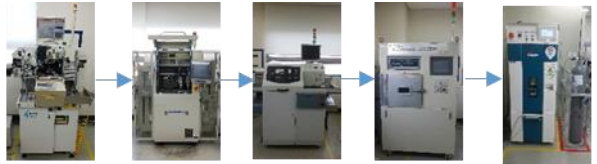
02 Package



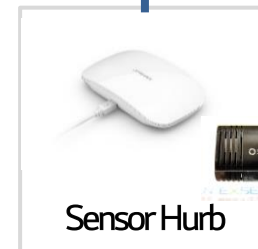
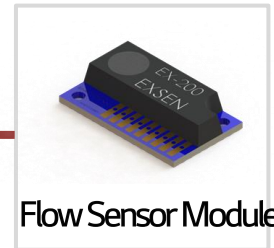
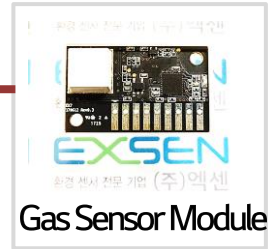
03 Module



04 Calibration








Wire Bonder Dispenser Die Bonder Plasma Calibration



“EXSEN” is the only solution suitable for high volume consumer applications.

Various types of CO₂ sensor modules for supplying universal customers

Model	LX-100	HX-105N	HX-2000U	HX-CWS0	RX-9
Picture					
Dim. (WxLxT, mm)	69 x 50 x 26.4	35 x 21 x 14.4	30 x 18 x 6.4	32.5 x 18.5 x 6.9	20 x 12 x 6.4
Feature	<ul style="list-style-type: none"> Outdoor Application Resin coated PCB to proof moisture 	<ul style="list-style-type: none"> Wide operating T Very high R.H. resistance Various Communication (I2C, UART, AVO) 	<ul style="list-style-type: none"> Compatible with P company product Low thickness Low price UART 	<ul style="list-style-type: none"> Compatible with C and W company product UART 	<ul style="list-style-type: none"> Smallest CO₂ sensor 2 Voltage output No MCU Very low price
Op. Volt (V)	5.5 ~ 13	3.5 ~ 5.5	3.5 ~ 5.5	3.5 ~ 5.5	3.2 ~ 3.4
Application	<ul style="list-style-type: none"> Outdoor High Reliability 	<ul style="list-style-type: none"> Indoor High Performance 	<ul style="list-style-type: none"> Competitive Price 	<ul style="list-style-type: none"> Competitive Price 	<ul style="list-style-type: none"> Competitive Price
Customer	LGE SAC	LGE BMS	힘펠 등	국내 및 중국	경동 등

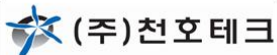
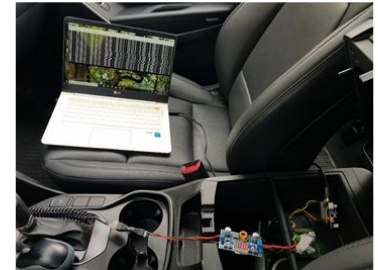
Customer Solution (Transport)

Our Reference

CO₂ sensor for ventilation control to provide a pleasant driving environment

공기를 읽어내는 놀라움

소다에어는 졸음 운전의 원인인 CO₂ 수치를 측정합니다. 소다에어를 비스킷과 연결하여 실시간으로 차량 내의 CO₂ 농도를 확인하고, 환기 알림을 받을 수 있습니다.



Customer Solution (Home Appliance)

Our Reference

CO₂ sensor for SMART Air home Appliance (Air Conditioner, Cleaner etc.)



LG PuriCare™ 空氣清淨機 CO₂濃度感應器

內建「CO₂濃度感應器」，當CO₂（二氧化碳）濃度上升，CO₂濃度感應器會顯示為紅色，為了保持室內空氣清新，建議打開窗戶換氣。

CO₂偵測

CO₂正常

CO₂濃度過高 建議開窗換氣

CO₂感測

正常CO₂濃度 600-1000ppm

←低 高→

LG PuriCare 空氣清淨機



CO₂ sensor for SMART Ventilation System

새로운 공기, 깨끗함을 채우다 나비엔 에어윈 청정환기시스템

환기와 공기청정을 동시에

환기와 공기청정을 모두 구현한 신개념 공기질 관리 솔루션으로, 내부의 오염된 공기는 밖으로 내보내고, 외부의 새로운 공기는 강력 필터시스템을 통해 깨끗하게 걸러 안으로 들어옵니다. 여기에 공기청정 기능까지 더해 생활 공간을 항상 깨끗하게 유지합니다.



외부 공기유입

외부 미세먼지 많은 날에도, 청정 필터를 통해 실내로 깨끗한 공기유입



실내 오염공기 밖으로 배출

실내의 냄새 및 유해가스 밖으로 배출



실내 공기청정

실내 미세먼지를 걸러, 깨끗한 공기를 다시 실내로 순환



실외기(본체)



에어 모니터



에어콤편드론터

실시간으로 공기질 확인하고, 간편한 터치로 다양한 동작 모드 설정



초미세먼지 센서
레이저 광원으로 PM2.5에서
0.3μm 사이즈까지의
아주 작은 초미세먼지 측정

CO₂ 센서
기준치를 초과할 경우 자동
환기등의 완인이 되는
이산화탄소 측정

TVOC 센서
표준인덱트를 비롯하여
사질중추균을 유발하는
휘발성 유기화합물질 측정



EXSEN Inc.

“Leading a New Paradigm in Environmental Sensor Technology”



THANK YOU!!



kjw@exsen.co.kr



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www.exsen.co.kr

EXSEN
환경 센서 전문 기업 (주)엑센

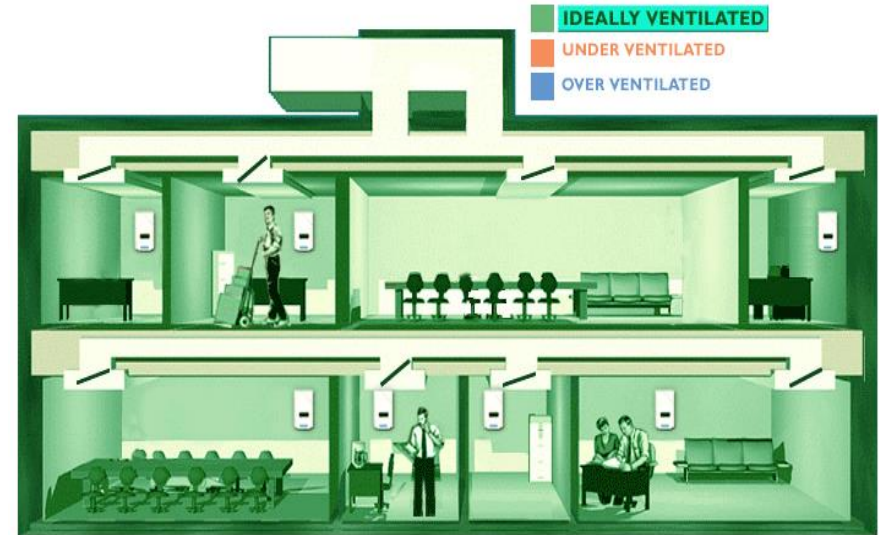
The Standard of Indoor Air Quality Regulation : Carbon Dioxide Concentration !

Indoor Standard by organization

Contaminant	Indoor standard (concentration of carbon dioxide/ppm)		
	Japan	WHO Europe	ASHRAE(USA)
Carbon dioxide	1,000	920	1,000

Indoor Standard by nation

Contaminant	Indoor standard (concentration of carbon dioxide/ppm)				
	Korea (Mechanical Ventilation)	Korea (Natural Ventilation)	Canada	Singapore	Japan (Ministry of Education)
Carbon Dioxide	1,000	1,500	3,500	1,000	1,500



Reference : Carrier & GE Sensing, "Demand Controlled Ventilation"

Efficiency

DCV system could save up to
55% in energy consumption

Economy

DCV system could save up to
25,700 \$ in 10 years.

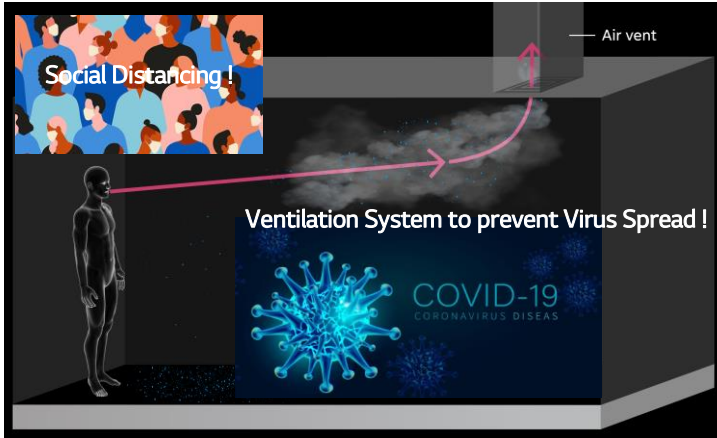
Ecology

DCV system could save emissions of up to
95 Tons of CO₂ in a 10-year period.

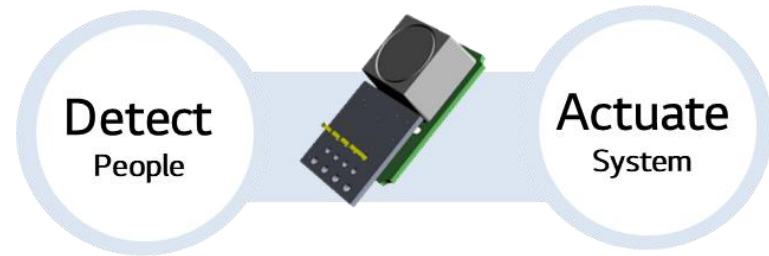
Active ventilation is required to suppress the spread of Corona 19.

Ventilation according to the presence of people is very effective in terms of reducing air conditioning energy.

COVID-19 Guidance



Ventilation Control ($CO_2 \propto$ Ventilation Rate)



"CO₂ Sensor can detect CO₂ emitted when a person breathes, and determine whether or not the person is indoors."

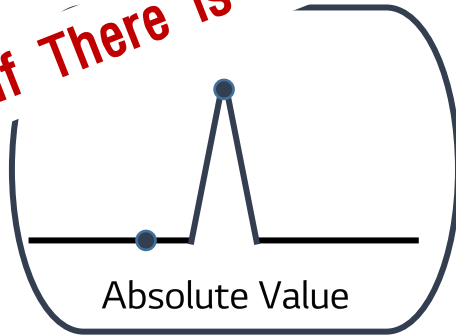


CO₂ Gas Sensor

CO₂ sensor is a product that outputs an electrical signal by detecting CO₂ gas generated from the respiration of humans or animals and plants.

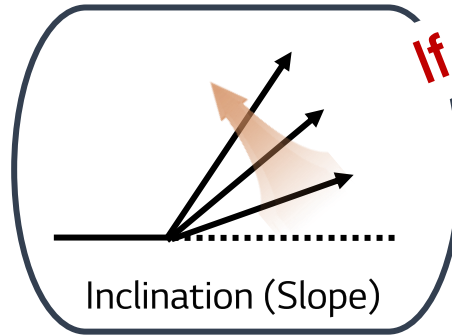


If There is...

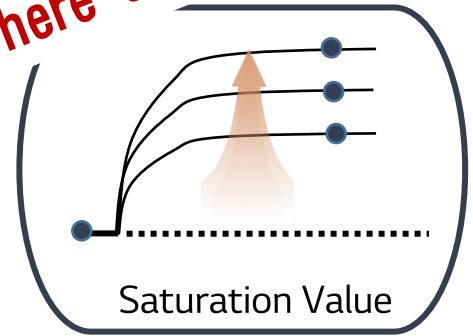


Occupancy Detection

If There are many,



Occupied Speed Detection



Degree of Occupancy

