PiQuant

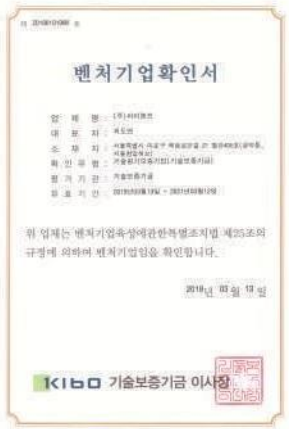
Customizable Components Detection Devices based on Spectroscopy

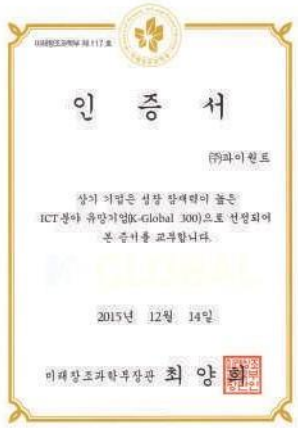
Expose Light, Analyze Right

LOCATION	2nd Floor, C Tower, 372, Hangang-daero, Yongsan-gu, Seoul, Republic of Korea	
DATE OF ESTABLISHMENT	2015.07.12	
CORPORATE REGISTRATION NUMBER	380-81-00114	
CEO	Doyeon Pi	
MAJOR BUSINESS	**Spectrometer Development and System Buildup**	
	Components analysis device based on spectroscopy 1. Milk powder melamine detector 2. Water bacteria detector 3. Pesticide, heavy metals detector	Indoor-Outdoor / Environment Monitoring Device - Fine Dust(PM0.5, PM1.0, PM2.5, PM4.0, PM10.0) - Harmful Gas(TVOC, SO2, NO2, CO, O3) - Environmental Parameters(Temperature-humidity sensor, Illumination, Noise, Air pressure) - Early Fire Detection
INTELLECTUAL PROPERTY RIGHTS	Korea - Patent Granted : 7, Patent Applied : 13 Trademark Registration - Granted : 9, Applied : 15 Oversea - Patent Granted : 2, Patent Applied : 1	
OTHER CERTIFICATIONS	Venture Company Certification (Number : 20190101986) Research and Development Department Certification (Number : 2018110342)	

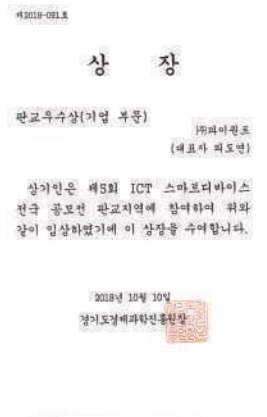
Licenses, Awards, Patents

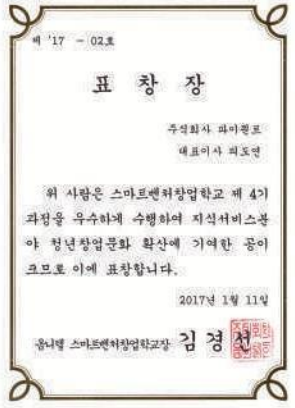
Licenses

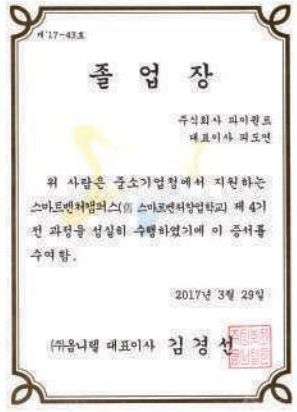




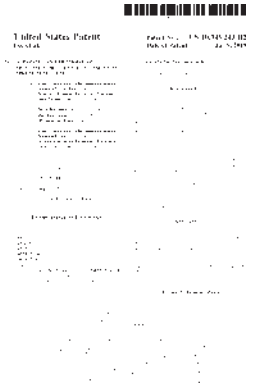
Awards







Patents



PiQuant provides customized component detecting solution based on spectroscopy

- Form of measuring material : solid, liquid, and gas
- Limit of Detection : 100 nano mol / liter
- Product type : mini-spectrometer module or detection equipment using the mini-spectrometer

High Sensitivity

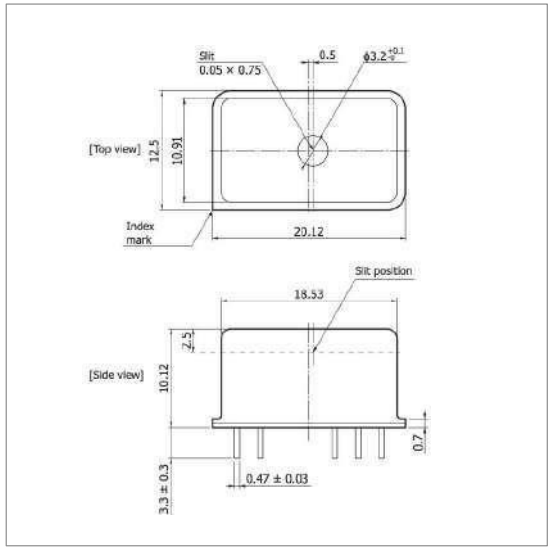
High sensitivity to measure up to 100 nano mol/L

Reasonable Price

An affordable price of up to 100 times lower than the existing price of $10,000 or more.

Handy-sized

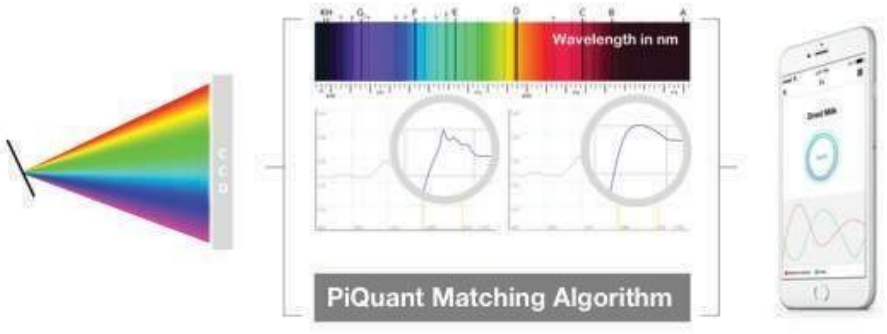
A portable size which is possible to operate with one-hand



PiQuant has a core technology to make high-sensitive spectrometer at small size and affordable price

Unique Matching Algorithm

Based on its unique matching algorithms and cumulative data, PiQuant compares and analyzes user-measured wave lengths to provide accurate measurement results.

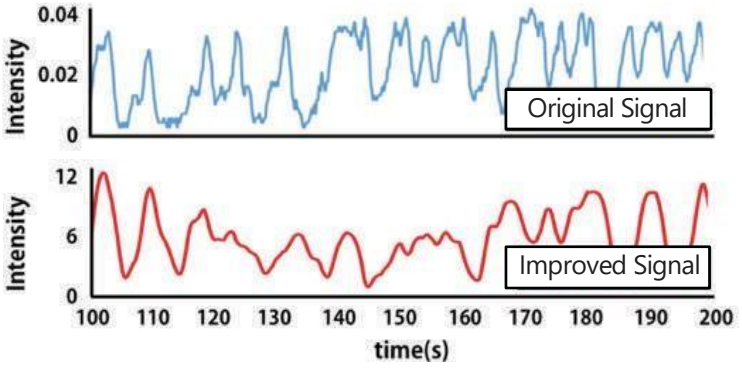


Noise-Cancelling and Signal Amplifying Technology

PiQuant has a technology that 1) distinguishes and removes noise from specific signal and 2) amplifies the refined wave -lengths.

- Increase signal-to-noise ratio (SNR) up to 48,000 times to improve measurements results accuracy.
- Able to measure up to nano mol/L units

*The mole (symbol: mol) is the unit of measurement for amount of substance. It is defined as 6.022×10^{23} particles, which may be atoms, molecules, ions, or electrons. 1 nmol ("nanomole") = 1×10^{-9} mol



PiQuant

Partners

PRODUCTS WITH PiQuant's TECHNOLOGY

1. AIRQUANT

AirQuant

Smart City & Home Solutions for Indoor Air Quality Management

PiQuant aims to develop technologies based on modular detection. PiQuant employs major cutting edge technologies such as IoT, AI and Big Data to measure indoor air quality to provide basis for detection.

AirQuant

Air Quality Monitoring Solution

- Real Time Monitoring
- Limit of Detection : PM1.0 ~ PM10
- Size : 153*153*60(mm) Weight : 550g
- Type of Power : PoE (Power over Ethernet) / DC 5V

DLS(Dynamic Light Scattering) : Technique of particle size analysis in the nanometer range
PM3.0 : Minimum size of particle that can be filtered by a HEPA grade 14 (High Efficiency Particulate Air) filter

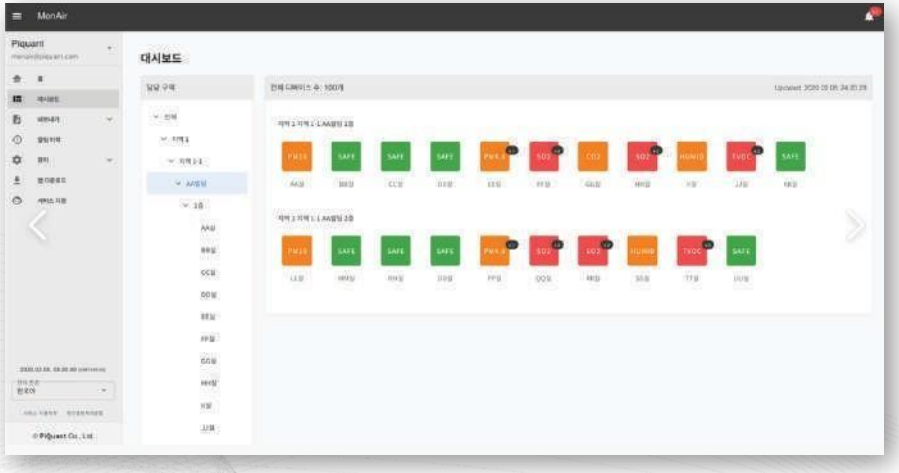
Detection List

Sensor	Unit	Range	Accuracy
Fine Dust	µg/m³	0 ~ 1000	±10%
TVOC	ppm	0 ~ 60	±5%
CO2	ppm	0 ~ 10,000	±4%
SO2	ppm	0 ~ 20	±3%
CO	ppm	0 ~ 1,000	±2%
NO2	ppm	0 ~ 5	±5%
Temperature	℃	-40 ~ 125	±0.2
Humidity	%RH	0 ~ 100	±2

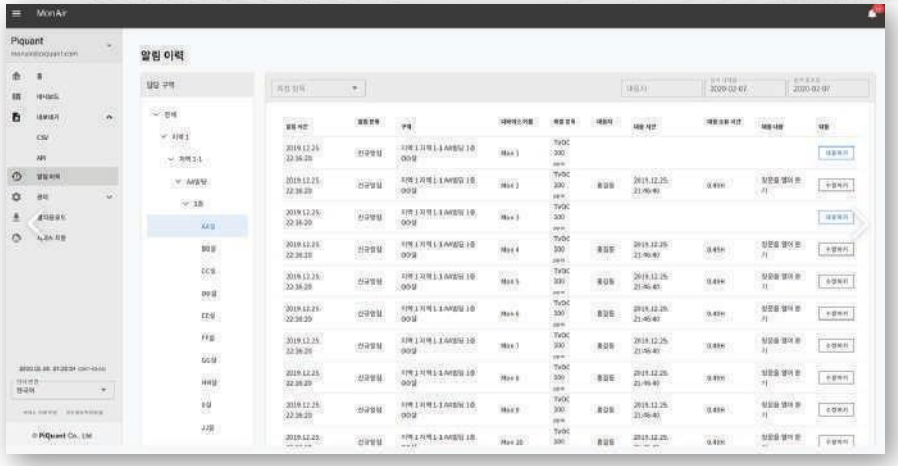
AirQuant Specifications

Dashboard Functions

Indoor environment data display



Measured parameters status per installation location



Data accumulation and history storage

Monitoring application

Indoor Air Quality Monitoring Solutions Applications

Indoor Air Quality (IAQ)

Fine Dust

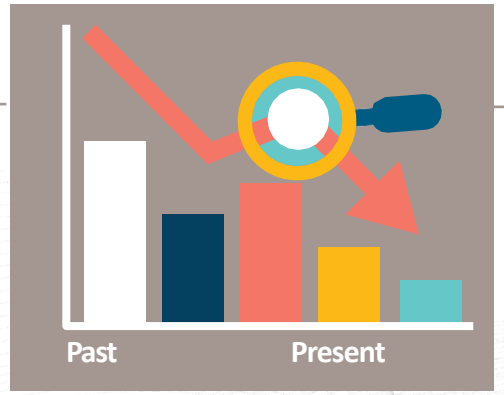
CO_2

CO/CO_2

TVOC

SO_2, NO_2

Temp/Hum



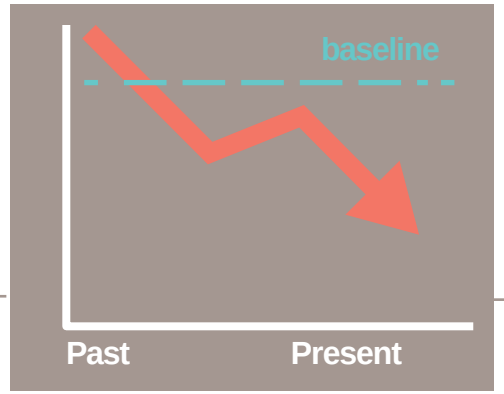
Platform

Collection

Analysis

Statistics

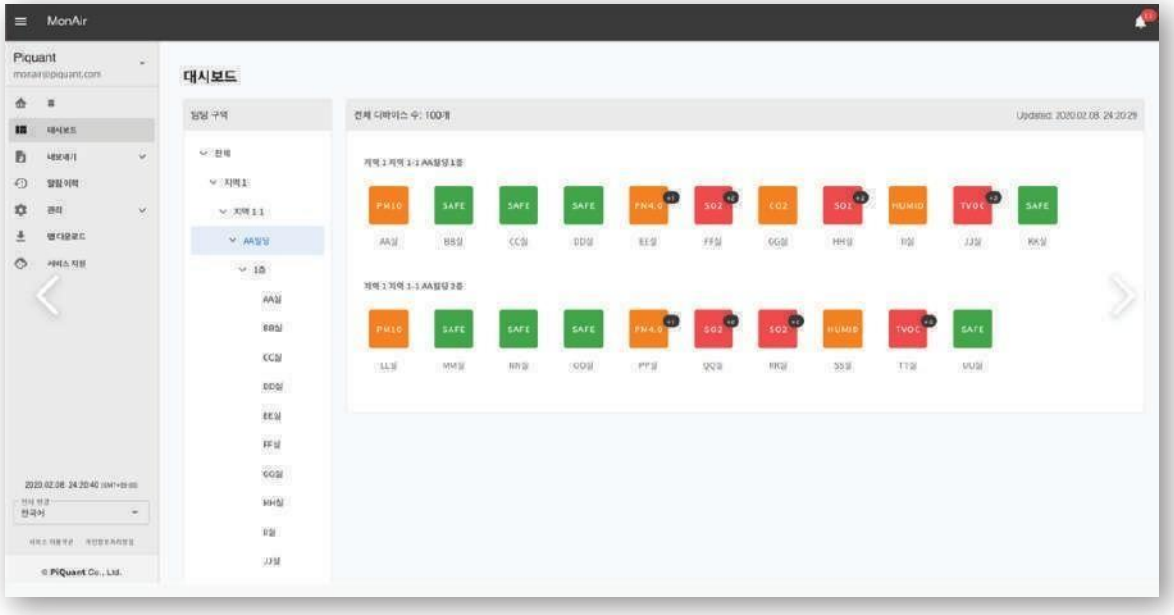
Pollution detection/control

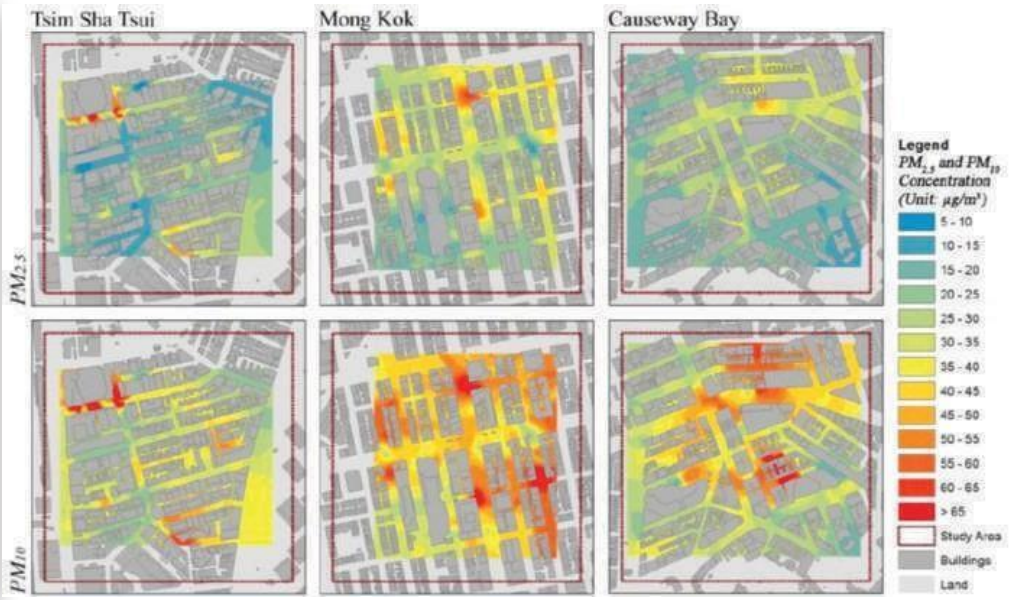


- Monitor indoor air quality
- Measurement basis for improvement
- Provide alarms when abnormality is detected
- Big data analysis
- Safe and secure data storage

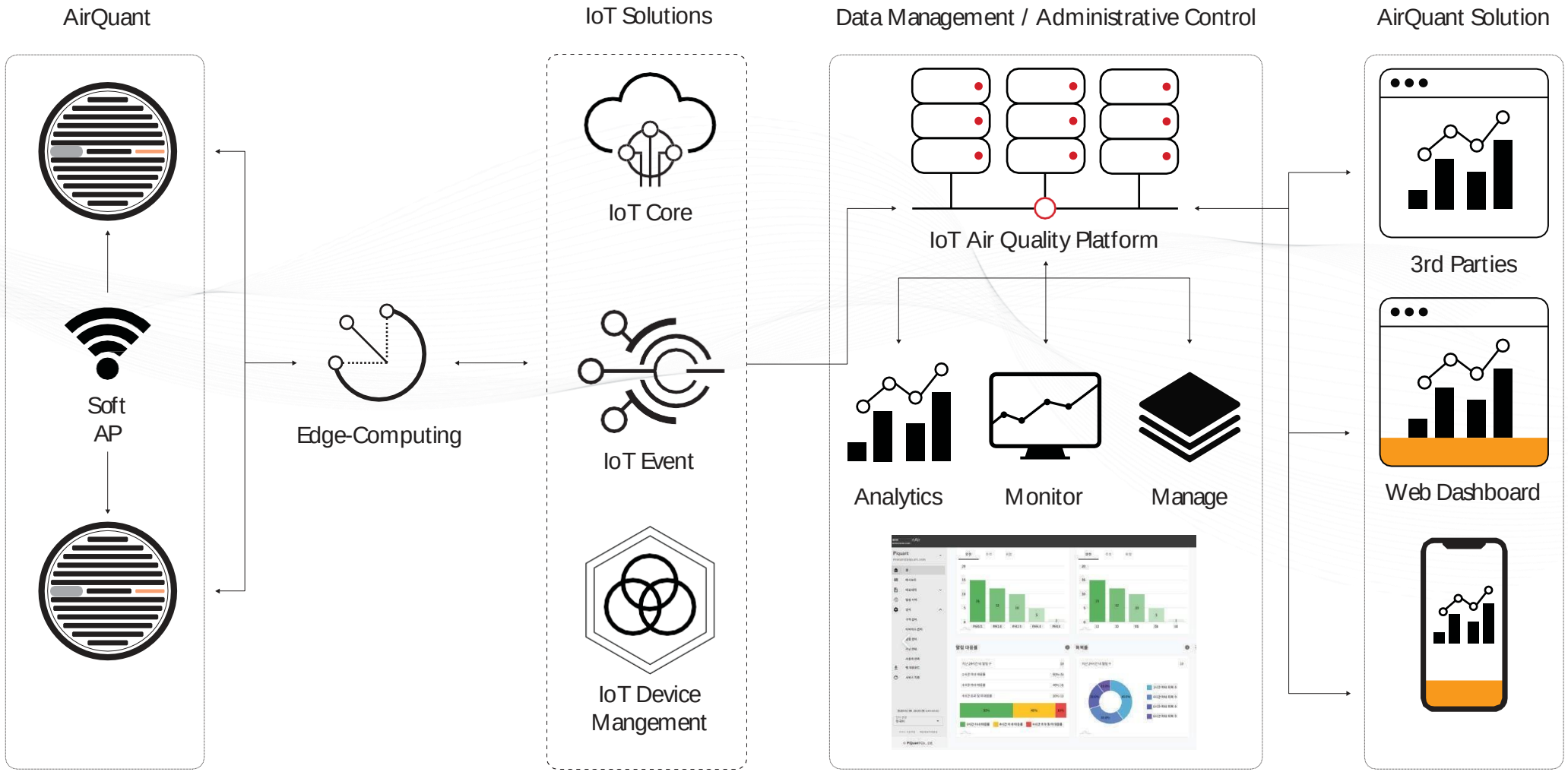
AirQuant Monitoring Map

Users can monitor the fluctuation in air quality in different regions. Abnormal changes are rapidly detected and the possible causes can be provided through data analysis. Alerts are sent to the users to take necessary measures and prevent further problems.





AirQuant Monitoring System Diagram



Applications

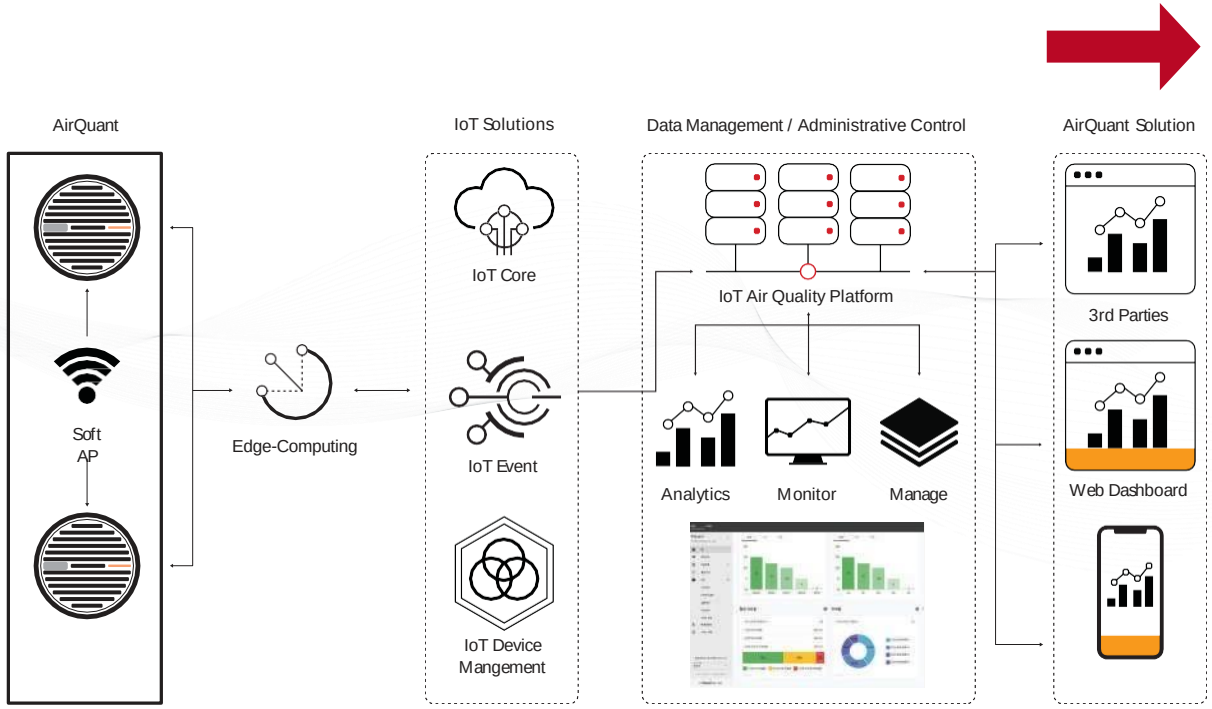
Analyze Cause of Pollution

Expect spread of contamination

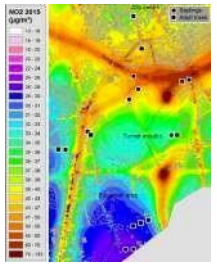
Save Energy

Operate HVAC effectively

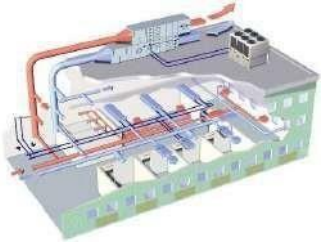
Connect HVAC, Securityplatform



AirQuant Solution



Smart city



Smart building

Smart farm

Certification

ATTESTATION OF CONFORMITY

According to

Low Voltage Directive 2014/35/EU

No.	KBW-2021-SC-241
Product	Indoor Air-quality Monitoring Device
Model /Trade ref.	AQ-001, AirQuant
Holder of Certificate	PiQuant. Co., Ltd. 203, 46, Cheongpa-ro, Yongsan-gu, Seoul, Republic of Korea
Manufacturer	PiQuant. Co., Ltd. 203, 46, Cheongpa-ro, Yongsan-gu, Seoul, Republic of Korea
Trade Mark	PiQuant
Electrical Rating	PoE (DC 48V⎓, 1.2 A),DC 5V⎓, 1.5 A
Additional Information	N/A

This attestation is only valid for products submitted to KBW Inc. for verification, which are identical to the tested and certified product(s). It is confirmed that a sample of the product has been tested and found in conformity with the following standard(s):

Standard(s): IEC 61010-1:2010, AMD1:2016 and EN 61010-1:2010/A1:2019

Detailed specification of the tested product is shown in the following Test Report:

Test Report Ref. No.: KBW-2021-SC-241

The Member States of the EU shall presume compliance with the provisions of Low Voltage Directive 2014/35/EC of 20 April 2016, when the product is carrying the CE-mark of conformity, a Declaration of Conformity with the Low Voltage Directive has been completed and signed by the manufacturer or his authorized representative established within the Community, and the relevant documentation is available.
This document contains 1 page(s).

Issued Date: July-29-2021

HyunGuk Woo / Manager
(Dep. of ITAV&MEAS)

KBW Inc.
42, Dongyeondaero1-ro, Uiwang-si, Gyeonggi-do, Republic of Korea
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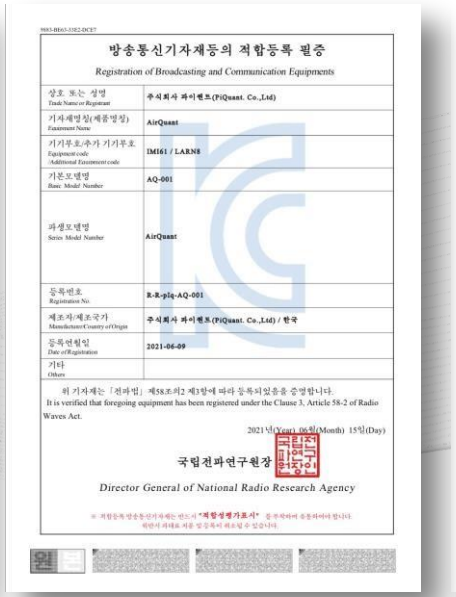


방송통신기자재등의 적합등록 필증

Registration of Broadcasting and Communication Equipments

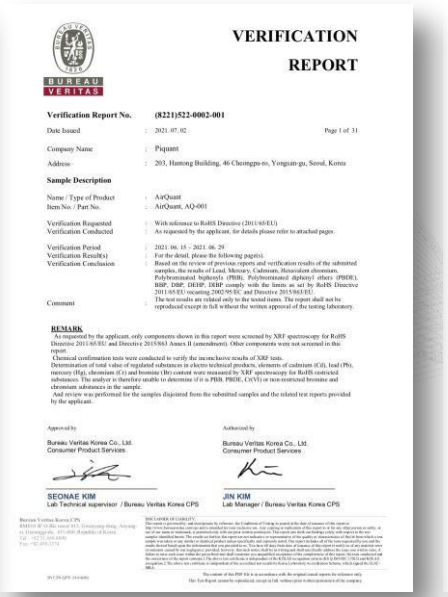
상호 또는 성명 Trade Name or Registrant	주식회사 파이퀀트(PiQuant. Co.,Ltd)
기자재명칭(제품명칭) Equipment Name	AirQuant
기기부호/추가 기기부호 Equipment code Additional Equipment code	IM161 / LARN8
기본모델명 Basic Model Number	AQ-001
파생모델명 Series Model Number	AirQuant
등록번호 Registration No.	R-R-plq-AQ-001
제조자/제조국가 Manufacturer/Country of Origin	주식회사 파이퀀트(PiQuant. Co.,Ltd) / 한국
등록연월일 Date of Registration	2021-06-09
기타 Others	

위 기자재는 「전파법」 제58조의2 제1항에 따라 등록되었음을 증명합니다.
It is verified that foregoing equipment has been registered under the Clause 3, Article 58-2 of Radio Waves Act.

2021년(Year) 06월(Month) 15일(Day)

국립전파연구원장

Director General of National Radio Research Agency



VERIFICATION REPORT

Verification Report No. (8221)522-0002-001

Date Issued : 2021. 07. 02. Page 1 of 31

Company Name : Piquant

Address : 203, Hamong Building, 46 Cheongpa-ro, Yongsan-gu, Seoul, Korea

Sample Description

Name / Type of Product : AirQuant
Item No. / Part No. : AirQuant, AQ-001

Verification Requested : With reference to RoHS Directive (2011/65/EU)
Verification Conducted : As requested by the applicant, for details please refer to attached pages.

Verification Period : 2021. 06. 15 ~ 2021. 06. 29
Verification Result(s) : For the detail, please the following page(s).
Verification Conclusion : Based on the review of previous reports and verification results of the submitted samples, the results of Lead, Mercury, Cadmium, Hexavalent chromium, Polybrominated biphenyls (PBB), Polybrominated diphenyl ethers (PBDE), BBP, DBP, DEHP, DIBP comply with the limits as set by RoHS Directive 2011/65/EU recasting 2002/95/EC and Directive 2015/863/EU.

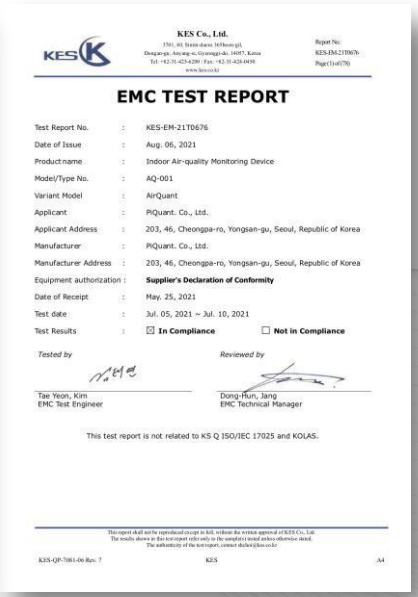
Comment : The test results are related only to the tested items. The report shall not be reproduced except in full without the written approval of the testing laboratory.

REMARK

As requested by the applicant, only components shown in this report were screened by XRF spectroscopy for RoHS Directive 2011/65/EU and Directive 2015/863 Annex II (amendment). Other components were not screened in this report.
Chemical confirmation tests were conducted to verify the inconclusive results of XRF tests.
Determination of total value of regulated substances in electro technical products, elements of cadmium (Cd), lead (Pb), mercury (Hg), chromium (Cr) and bromine (Br) content were measured by XRF spectroscopy for RoHS restricted substances. The analyser is therefore unable to determine if it is PBB, PBDE, Cr(VI) or non-restricted bromine and chromium substances in the sample.
And review was performed for the samples disjointed from the submitted samples and the related test reports provided by the applicant.

Approved by
Bureau Veritas Korea Co., Ltd.
Consumer Product Services
SEONAE KIM
Lab Technical supervisor / Bureau Veritas Korea CPS

Authorized by
Bureau Veritas Korea Co., Ltd.
Consumer Product Services
JIN KIM
Lab Manager / Bureau Veritas Korea CPS



KES Co., Ltd.

EMC TEST REPORT

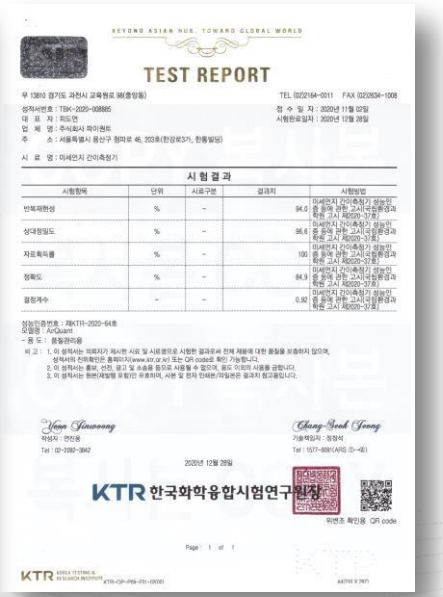
Test Report No.	:	KES-EM-21TD676
Date of Issue	:	Aug. 06, 2021
Product name	:	Indoor Air-quality Monitoring Device
Model/Type No.	:	AQ-001
Variant Model	:	AirQuant
Applicant	:	PiQuant. Co., Ltd.
Applicant Address	:	203, 46, Cheongpa-ro, Yongsan-gu, Seoul, Republic of Korea
Manufacturer	:	PiQuant. Co., Ltd.
Manufacturer Address	:	203, 46, Cheongpa-ro, Yongsan-gu, Seoul, Republic of Korea
Equipment authorization	:	Supplier's Declaration of Conformity
Date of Receipt	:	May. 25, 2021
Test date	:	Jul. 05, 2021 ~ Jul. 10, 2021
Test Results	:	☒ In Compliance ☐ Not in Compliance

Tested by
Tae Yeon, Kim
EMC Test Engineer

Reviewed by
Dong-Hun, Jang
EMC Technical Manager

This test report is not related to KS Q ISO/IEC 17025 and KOLAS.

KES-QP-7081-06 Rev. 7 KES A4



KEYDNG ASIAN HUB, TOWARD GLOBAL WORLD

TEST REPORT

TEL (02)2164-0011 FAX (02)2634-1008

시 험 결 과

시험항목	단위	시료구분	결과치	시험방법
반복재현성	%	-	94.2	미세먼지 간이측정기 성능인증 등 운용 규정 고시(국립환경과학원 고시 제2020-37호)
상대정밀도	%	-	96.6	미세먼지 간이측정기 성능인증 등 운용 규정 고시(국립환경과학원 고시 제2020-37호)
자료획득률	%	-	100	미세먼지 간이측정기 성능인증 등 운용 규정 고시(국립환경과학원 고시 제2020-37호)
정확도	%	-	84.9	미세먼지 간이측정기 성능인증 등 운용 규정 고시(국립환경과학원 고시 제2020-37호)
결정계수	-	-	0.92	미세먼지 간이측정기 성능인증 등 운용 규정 고시(국립환경과학원 고시 제2020-37호)

성능인증번호 : 제KTH-2020-64호
모델명 : AirQuant
- 용 도 : 환경관리용

비 고 : 1. 이 성적서는 의뢰자가 제시한 시료 및 시료명으로 시험한 결과로써 전체 제품에 대한 품질을 보증하지 않으며,
성적서의 진위확인은 홈페이지(www.ktr.or.kr) 또는 QR code로 확인 가능합니다.
2. 이 성적서는 홍보, 선전, 광고 및 소송을 목적으로 사용할 수 없으며, 필요 이외의 사용을 금합니다.
3. 이 성적서는 한번시험만을 의뢰한 부품이며, 사본 및 원자 인쇄본/재발본은 결과치 참고용입니다.

Yoon Sinwoong
작성자 : 윤신웅
Tel : 02-2282-3942

Chang-Seok Seong
기술책임자 : 성창석
Tel : 1577-0081(ARS ①-④)

2020년 12월 28일

KTR 한국화학융합시험연구원장

위변조 확인용 QR code

Page 1 of 1

KTR

CE

KC

RoHS

FC

PM-2.5 1

PiQuant

Expected Results

SAFETY

Early fire detection system to prevent damage from fire

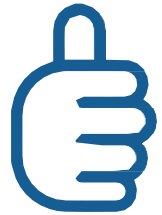
CLEANER AIR

Enabling an environment with no particular matter and hazardous gases

ENERGY SAVINGS

Energy-use reduction with management of temperature, humidity and illuminance

CONVENIENCE



IoT device and connected application for data monitoring of daily, weekly and monthly basis. Analysis of pollution causes

PiQuant

Use Case

YK Dongrami Postpartum Care Center

SK Infosec Collaboration Project, Korea's leading security/healthcare company.
Connect AirQuant on SK Infosec IoT Platform.

SeoulCity Smartcity Exhibition & HiSeoul, Green New Deal Certification

In recognition of AirQuant'shigh technology completion and smart city applicability, it is displayed in the Seoul Smart City Exhibition Hall. It is selected as Korea's representative company through Green NewDeal Project and High Seoul Certification.

Changwon SmartCity Project

Large air purifiers are linked to the AirQuant monitoring platform to monitor urban air quality, remote control, and automatic urban air quality improvement.

Seoul Metropolitan Office of Education Muhag Elementary School

Air quality improvement project for active students. Imp roving children's health and study concentration. The s olution will be expanded to elementary, middle and high schools in Seoul.

Busan Metro Seomyeon Station

AirQuant is mounted on astation kiosk to measure air quality and show safe indoor air conditions to citizens
A dusty subway air quality improvement platform will be provided in conjunction with air purifiers.

Gwanak District Office

Participate in the Gwanak-gu Smart City Test Bed Project Air quality monitoring solutions will be expanded to public facilities in 4 districts this year

2. WATER SCANNER

WORLD POPULATION : 7.7 billion

2.1 billion

a population without safe drinking water

(World Vision, 2018)

3.4 million

Number of people dead by waterborne disease

(UNEP, 2018)

1/120sec

Number of children under the age of 5 who die from waterborne di seases

(World Vision, 2018)

Problems with current components analysis method

PCR (Polymerase Chain Reaction)

- Very expensive, ranging from US$10,000 ~ 100,000.
- A few hours are needed to duplicate DNA.
- Need professional manpower, difficulty to use on field.

Portable laboratory kit

- US$1,000 ~ US$3,000 per kit
- Training is required
- Sample needs incubation

Test based on Cell Culture (Compartment Bag Test, Compact Dry Plates)

- 24 ~ 48 hours to get test results
- Temperature must be optimum and does not work if below 25℃
- Less precise due to possible human error

Water Scanner

Portable Water Quality Analyzer

- Target Substances : Bacteria, Heavy Metals, Chemicals
- Limit of Detection : 100 nano mol / L & 10^3 CFU/mL
- Reliability : 99.7 % (1,000,000 tests, 0.3% failure due to user mistake)

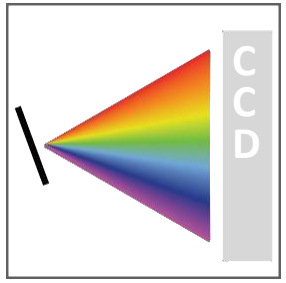
*The mole (symbol: mol) is the unit of measurement for amount of substance. It is defined as 6.022× 10^{23} particles, which may be atoms, molecules, ions, or electrons. 1nmol ("nanomole") = 1x 10^{-9} mol

- Affordable Price - Portable Size - Quick Test Results - Simple to Use

How to use

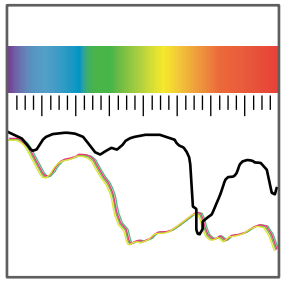
1

Put water into the device



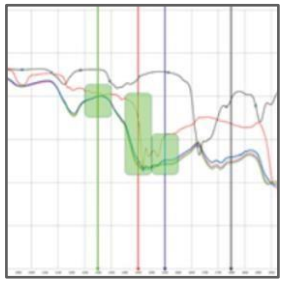
2

Use light source and photodiode sensor to measure water



3

Use PiQuant's technology to cancel noise and amplify signal



4

Compare data from device to the database in PiQuant's server using unique matching algorithms

5

Check test results with mobile application

Water Scanner - Partners

BILL & MELINDA GATES foundation

K water

unicef

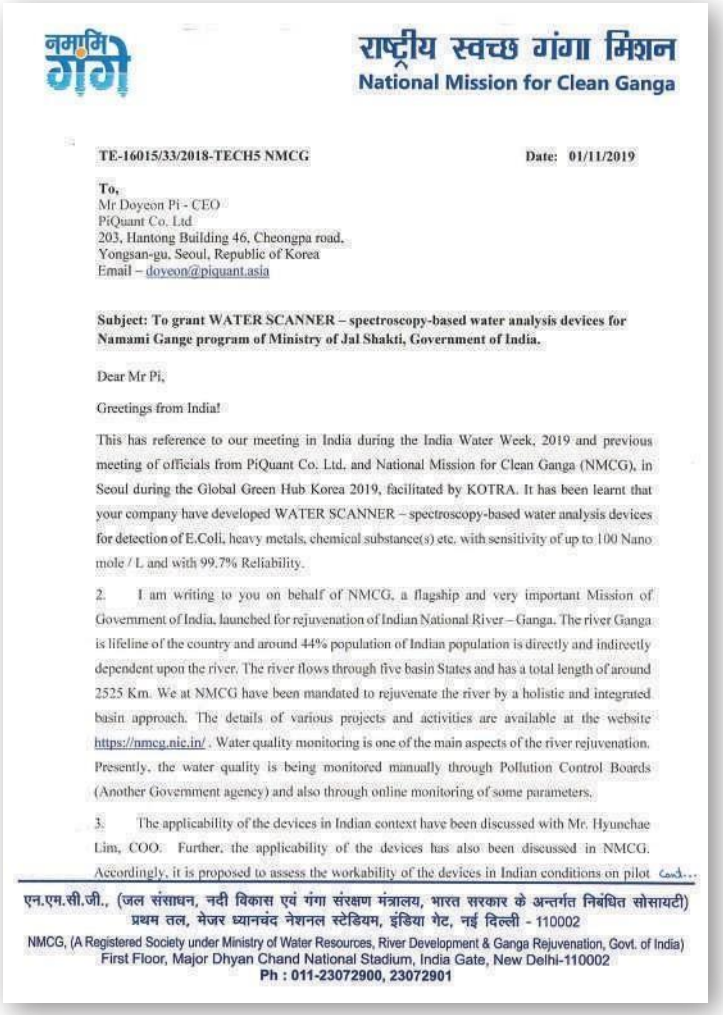
NAMAMI GANGE

Sida

NEC

arm

WFP World Food Programme



नमामि गंगे

राष्ट्रीय स्वच्छ गंगा मिशन
National Mission for Clean Ganga

TE-16015/33/2018-TECH5 NMCG Date: 01/11/2019

To,
Mr Doyeon Pi - CEO
PiQuant Co. Ltd
203, Hantong Building 46, Cheongpa road,
Yongsan-gu, Seoul, Republic of Korea
Email – doyeon@piquant.asia

Subject: To grant WATER SCANNER – spectroscopy-based water analysis devices for Namami Gange program of Ministry of Jal Shakti, Government of India.

Dear Mr Pi,

Greetings from India!

This has reference to our meeting in India during the India Water Week, 2019 and previous meeting of officials from PiQuant Co. Ltd. and National Mission for Clean Ganga (NMCG), in Seoul during the Global Green Hub Korea 2019, facilitated by KOTRA. It has been learnt that your company have developed WATER SCANNER – spectroscopy-based water analysis devices for detection of E.Coli, heavy metals, chemical substance(s) etc. with sensitivity of up to 100 Nano mole / L and with 99.7% Reliability.

2. I am writing to you on behalf of NMCG, a flagship and very important Mission of Government of India, launched for rejuvenation of Indian National River – Ganga. The river Ganga is lifeline of the country and around 44% population of Indian population is directly and indirectly dependent upon the river. The river flows through five basin States and has a total length of around 2525 Km. We at NMCG have been mandated to rejuvenate the river by a holistic and integrated basin approach. The details of various projects and activities are available at the website https://nmcg.nic.in/ . Water quality monitoring is one of the main aspects of the river rejuvenation. Presently, the water quality is being monitored manually through Pollution Control Boards (Another Government agency) and also through online monitoring of some parameters.

3. The applicability of the devices in Indian context have been discussed with Mr. Hyunchae Lim, COO. Further, the applicability of the devices has also been discussed in NMCG. Accordingly, it is proposed to assess the workability of the devices in Indian conditions on pilot basis...

एन.एम.सी.जी., (जल संसाधन, नदी विकास एवं गंगा संरक्षण मंत्रालय, भारत सरकार के अन्तर्गत निबंधित सोसायटी)
प्रथम तल, मेजर ध्यानचंद नेशनल स्टेडियम, इंडिया गेट, नई दिल्ली - 110002
NMCG, (A Registered Society under Ministry of Water Resources, River Development & Ganga Rejuvenation, Govt. of India)
First Floor, Major Dhyan Chand National Stadium, India Gate, New Delhi-110002
Ph : 011-23072900, 23072901

Water Scanner Media Coverage

PIQUANT

Water Scanner + Monitor

For founder and engineer Doyeon Pi, it all began at home.

"Since childhood, I've suffered from food issues, and I couldn't know what kind of food exactly would make me sick. I decided to look in numerous places, food fairs, online research... there was no solution. So, I built a product myself: equipment to detect the existence of harmful ingredients," he shared.

He applied what he built first on water, then he saw how helpful it would be for people with the same concerns as him... but for a bigger cause.

Waterborne diseases are linked to significant disease burdens worldwide. **In Vietnam, up to 80% of diseases are caused by polluted water,** including by many different pathogens such as Salmonella and E. Coli. Despite its vast river networks, its industrial water management has been exploited, leaving 4.5 million people lacking clean water. Spectroscoping devices can monitor water quality, but they require expensive, time-consuming procedures to improve accuracy.

"In 2017, our team discovered an effective way to detect bacteria in water, but using affordable and accessible sensors," Doyeon explained. PiQuant's Water Scanner, built with a noise-cancelling algorithm to improve accuracy, can detect pathogens in water at a level identical to detecting a drop of ink in 2.7 million liters of water.

"We have developed a device that can detect bacteria in water in less than 10 minutes," announced the team. *"We can prevent a lot of waterborne diseases with this solution."*

They will be further testing their prototypes in Vietnam and India through the year, while continuing to increase its speed so results come out real-time. With partners from government, municipalities, and water treatment companies, they hope to distribute the devices more broadly so their accompanying Monitoring System can secure data to produce a real-time regional water quality map — encouraging rapid response for effective water purification.

"The Water Scanner will test water quality real-time, and the (Monitoring System) device will let users know about the contamination," Doyeon expressed.

"In other words, the data collected can be used to identify the main contaminant, cause immediate action, and ultimately, prevent waterborne diseases and improve accessibility to clean drinking water for people worldwide."

PiQuant's vision is to "Expose Light, Analyze Right," effectively using tech and devices to improve WASH in urban environments throughout the world. Read more about PiQuant here.

A girl drinks water from a hand pump in West Bengal, India. *With PiQuant's Water Scanner, users can check water conditions, anytime, anywhere — and their Monitoring System alerts where action is needed.*

Article from UNICEF

https://innovationsforwash.com/piquant

Global Grand Challenges

BILL & MELINDA GATES foundation

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Low-Cost Water Pollution Spectrometer for Monitoring Map

GRAND CHALLENGES EXPLORATIONS | WATER SANITATION HYGIENE | 1 MAY 2019

Do-yeon Pi of PiQuant in the Republic of Korea will develop a small, low-cost, water quality test equipment and a GIS-based monitoring system to continuously map water quality in real-time across Vietnam. Despite the extensive river network running through the country, many Vietnamese, especially in rural areas, remain short of clean water. Drinking water can be polluted by many different pathogenic microorganisms such as *Salmonella* and *E. coli* that cause waterborne diseases. Spectroscopic devices are used to monitor water quality but they require expensive time-consuming procedures to remove background noise and improve accuracy. They have built a small spectroscopic device incorporating a noise-canceling algorithm that can quickly and accurately measure water quality at a much lower cost than traditional devices. They have identified the major water pollutants in each region and have developed a prototype water scanner. This will be distributed in a pilot area to demonstrate preliminary proof of performance for measuring water quality. They will also set up a GIS-based monitoring system that maps the water quality data and allow users to analyze the potential causes of water pollution and react quickly.

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PRINCIPAL INVESTIGATOR

Doyeon Pi

ORGANIZATION

PiQuant Co.,Ltd.

Article from Bill & Melinda Gates Foundation

https://gcgh.grandchallenges.org/grant/low-cost-water- pollution-spectrometer-monitoring-map

Thank You