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MONNIT KOREA
INVESTOR RELATIONS

Wireless Sensors & Remote Monitoring
Solutions Provider

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Company	Monnit Korea
CEO	Youm Joung Hun
Foundation	August, 2018
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Our **Team**

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Joung Hun, Youm Managing Director

Current Role

CEO at SEAN Technical Service(Global Real-Estate Services Firm)
Researcher at Ministry of Land, Infrastructure and Transport(Korea)

Education

University of Oxford – Diploma in Global Business
Heriot Watt University – Sustainable Urban Management MSC

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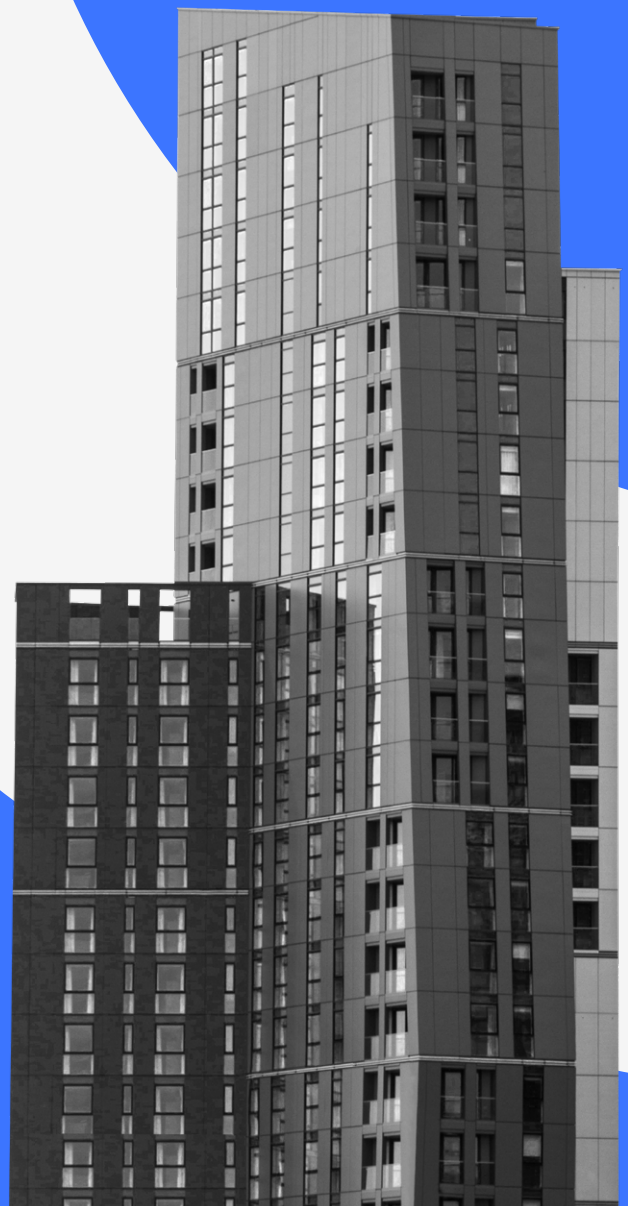
01

Problem Statement



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Why remote monitoring is the solution?

Generally we are trying to achieve 1 of 3 things

Respond to emergencies faster

Reduce the cost of people onsite

Optimize building/equipment performance

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Improve Breakdown Response Time

? Challenge

When critical building systems fail, there is normally a delay between failure and their detection by someone in the building.
The failure then needs to be reported (via a help-desk) who will then route the request to the appropriate vendor to respond onsite. This process can often take days exacerbating the impact of the outage.

! Opportunity

Connect the critical system directly with the person who can fix it removing detection and job processing delays. Systems can be repaired before they have a financial business impact.

Example

All food and beverage outlets have cold storage refrigeration for their goods.
If the cold store breaks down over the weekend staff return to a fridge full of rotten food.

Impact: The restaurant cannot serve customers

Cost: Food replacement and lost sales

Business Case Drivers – Why Clients pay for monitoring

How much would a customer pay to

Minimize Impact of Breakdowns

+

Minimize Impact of Breakdowns

=

???
Per Building
Per year

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Reduce maintenance check–ups and number of people on site

? Challenge

Many buildings have programs of planned maintenance for their equipment. Each maintenance task requires a skilled person to attend the site daily, weekly, monthly etc. whether the equipment requires it or not, thus a % of all work is unnecessary and generates unnecessary administration overhead.

! Opportunity

Use sensors to monitor for equipment failure and to collect key data. Reduce the overall frequency of maintenance but rapidly respond to sensor alerts if equipment fails between visits.

Example

Air conditioning fan coil units have an standard check each month for moisture build up, temperature and vibration. Each unit takes an average of 1 hour and there are thousands of them in a commercial building.
Each unit is then fully serviced each 3 months.

Unnecessary Work: 8 months

Additional Administration: 1 month

Business Case Drivers – Why Clients pay for monitoring

How much would a customer pay to

Remove Unnecessary Maintenance

+

Reduce Administration Overhead

=

???
Per Building
Per year

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Optimize building performance and monitor remote locations

? Challenge

Many buildings have areas that are rarely visited by people or are remote and distributed across the country or international borders. It is extremely difficult to detect if systems are not functioning correctly or if people are using spaces in ways other than for what they were intended.

! Opportunity

Use sensors to monitor activity or usage collate and compare key data across multiple locations to highlight anomalies. Target these locations for investigation and rectify system or behavioral issues.

Example

A corporation has 1500 branches across the country.
The average energy consumption per branch is 350KWh/m2.
10% of these buildings use 30% over the average.
Investigation at these sites uncovered staff activities that overloaded cooling equipment.

Abnormal Usage: 30% more Energy Consumption

Business Case Drivers – Why Clients pay for monitoring

How much would a customer pay to

Gather and Compare Key Building Usage

+

Remove Cost of Abnormal Usage

=

???
Per Building
Per year

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And what is Stopping Customers from Rolling this out...

Capital Cost
(Setup/Admin)

Equipment is expensive

Technicians / Cabling

Installation & commissioning is expensive

Telco Services

Getting the data back is expensive

And then you still have to integrate it into your operations systems?

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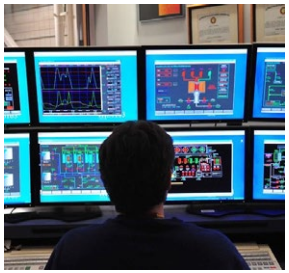
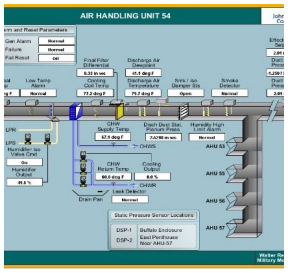
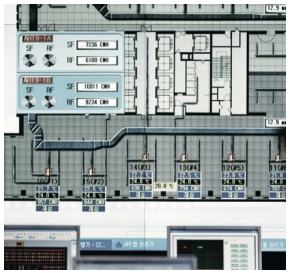
Existing BMS is Complex & Expensive to install

Traditional BMS/BIM / Dashboard Solutions

Field Engineer TASKS	Core Engineer TASKS						
Week 1	**Week 2**	**Week 3**	**Week 4**	**Week 5**	**Week 6**	**Week 7**	**Week 8**
Identify all network addresses	Ingest network data and configure database	Design Dashboard screens	Code the screens&objects &actions	Link the database to objects&actions	Offsite testing (clicking screen) Field testing (visually check)	Collect Exception Data for fixes	Ingest Exception Data then redo all changes then redo all tests







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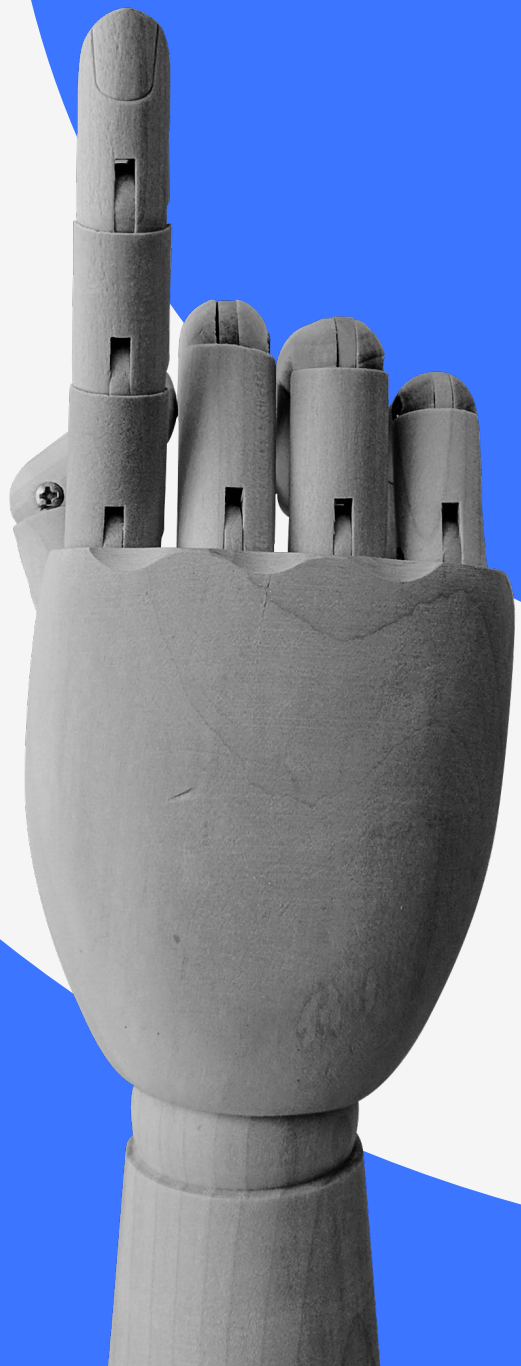
Solution



Predictive Maintenance

No need to babysit the equipment anymore!

Measure

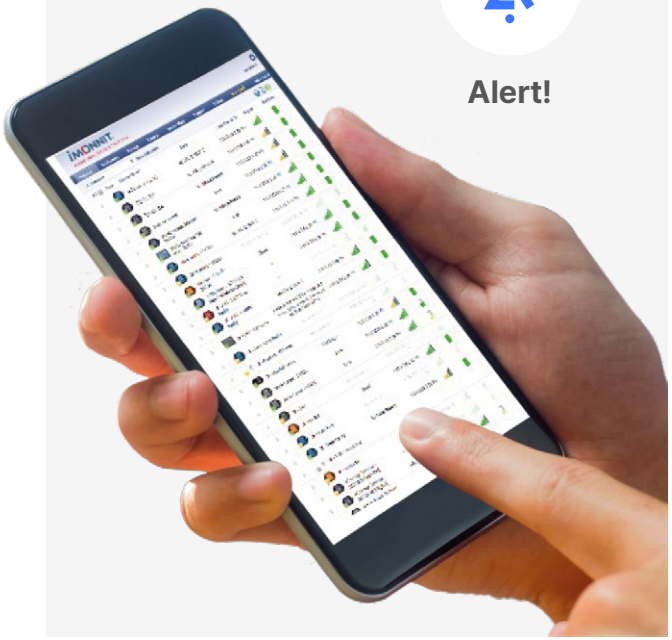
Collect

Cloud Server

Mobile / Web

Check and Respond

Alert!



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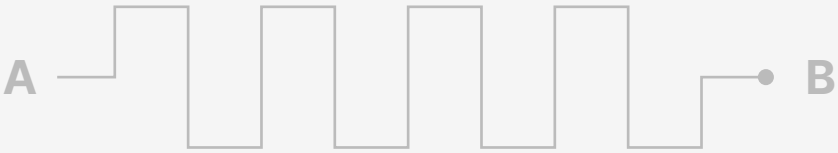
Completely Flexible Wireless Deployments

Traditional Onsite Asset Maintenance

- Difficult to maintain cohesive security
- Time-consuming to stand up
- Incompatible with current infrastructure
- Hard to scale

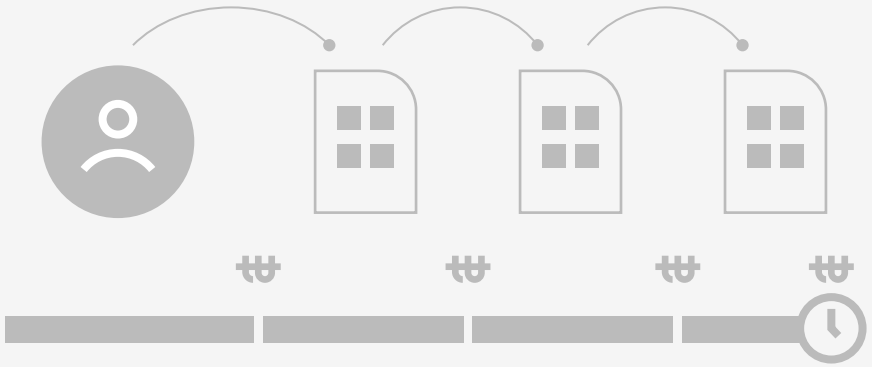


Monnit IoT Solutions

- Encrypted Security
- Easy set up & Install within few minutes
- Add-on existing infrastructure
- One touch commissioning

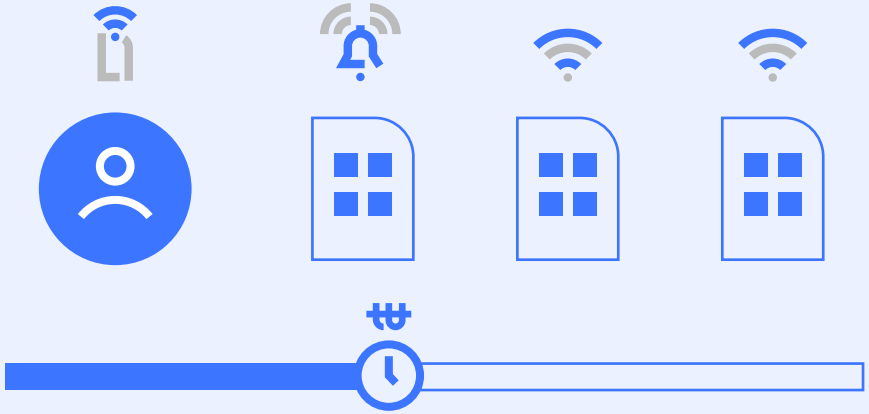
Game Changer in Facility Management

Traditional Onsite Asset Maintenance



Maintenance teams routinely go onsite to check whether the assets are broken or not - costing time and money

MONNIT Remote Asset Monitoring



Teams are alerted by smart sensors before there is an asset failure, preventing a system breakdown and saving time and money.

40% Less on-site presence

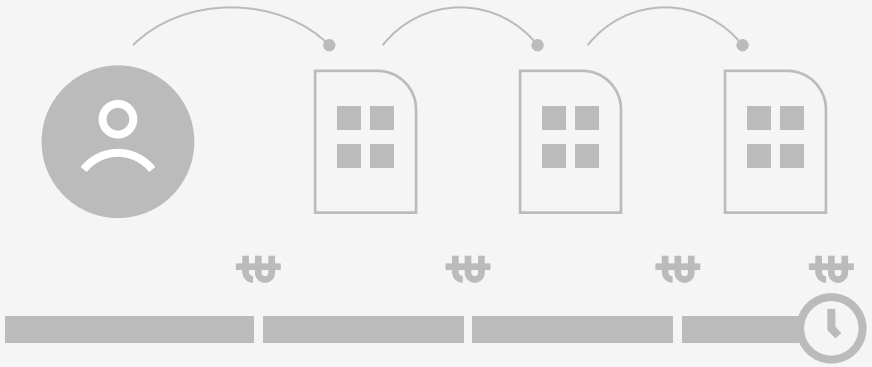
30% Reduced labor costs

10-15% Energy cost reduction

1/10 Cost comparable solution

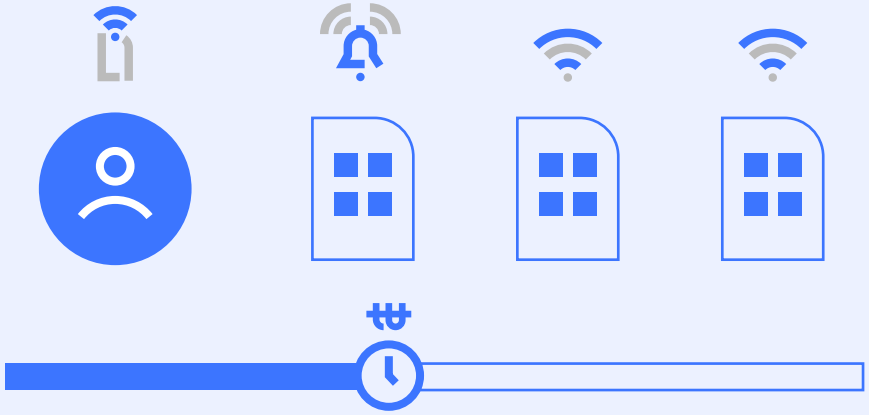
Transition from Manual Monitoring to RMS

Traditional Onsite Asset Maintenance



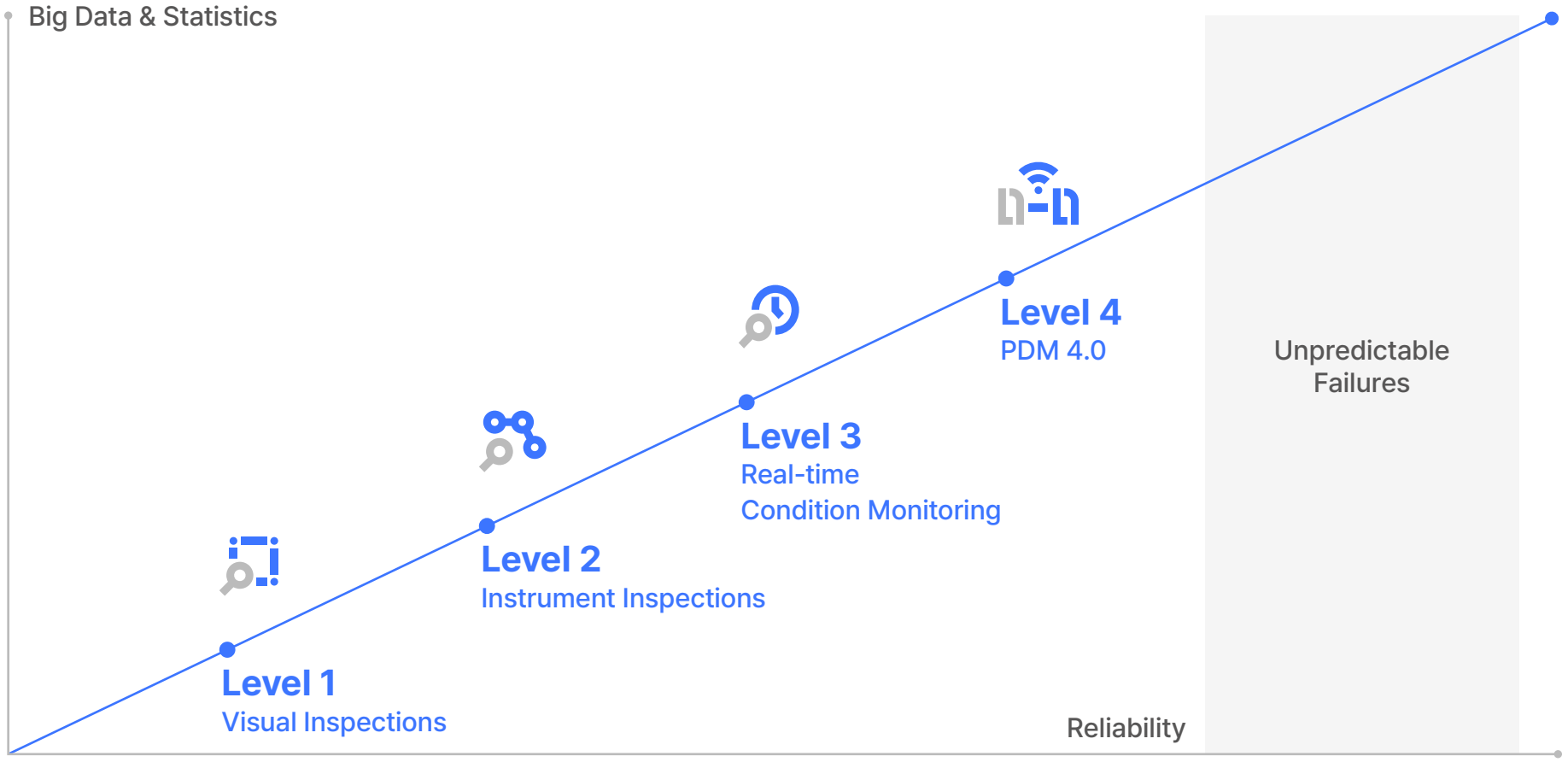
Average annual cost of manual monitoring	$ 110,000
Annual salary of technicians	$ 52,000
Total	**$ 162,000**

MONNIT Remote Asset Monitoring



Average annual cost of ‘Must Have’ building	$ 10,000
RMS	**$ 10,000**

PDM Maturity Matrix



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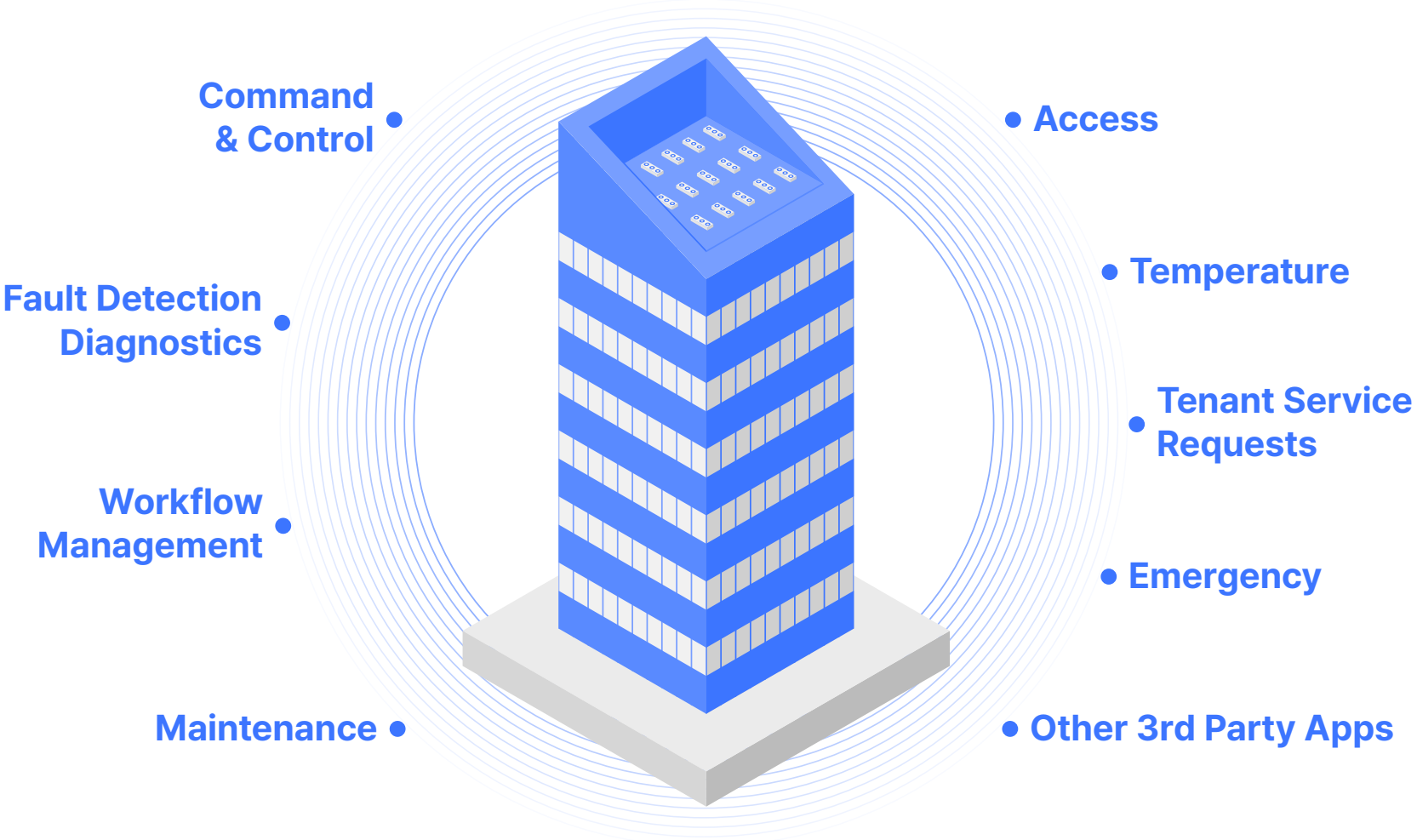
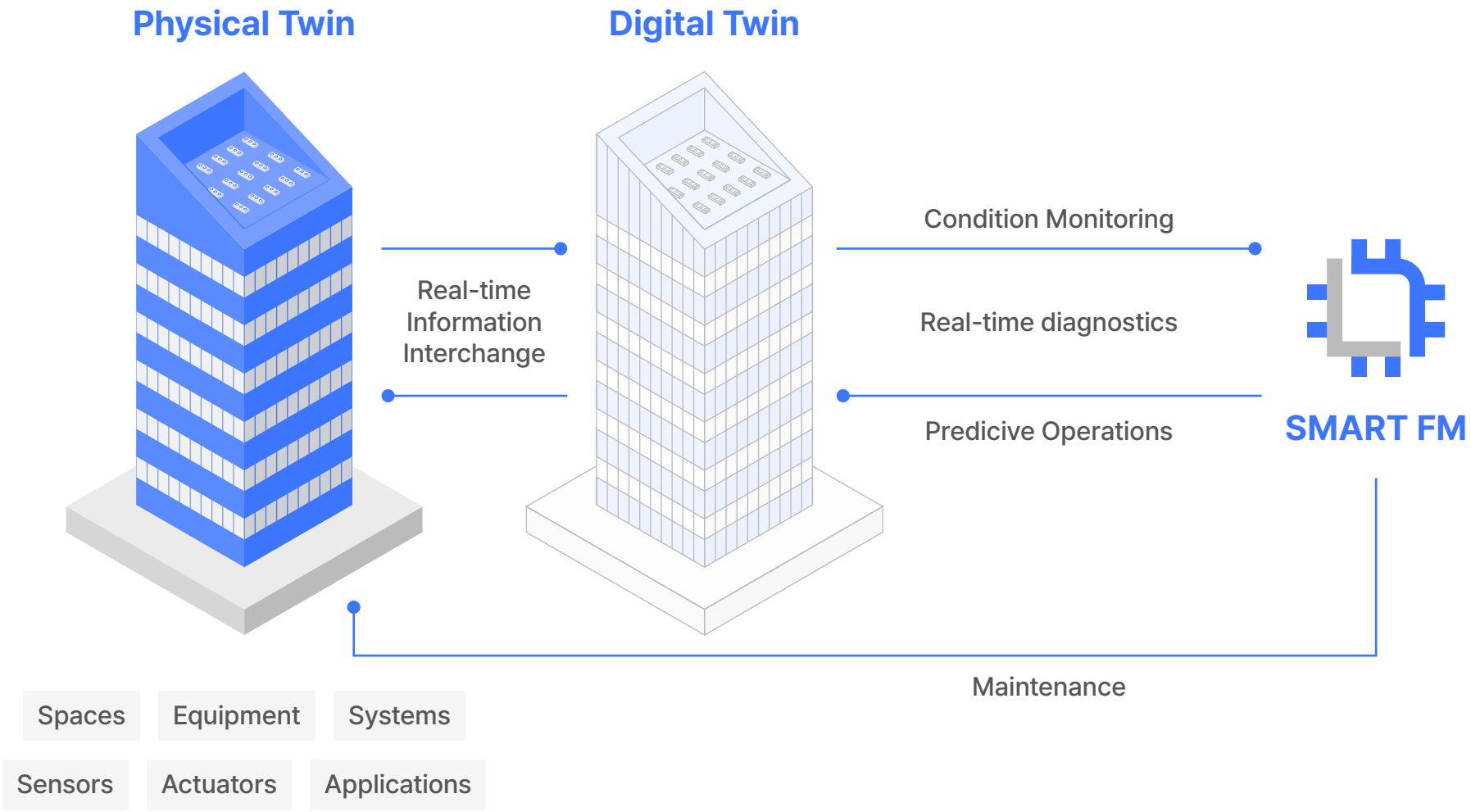
One touch commissioning



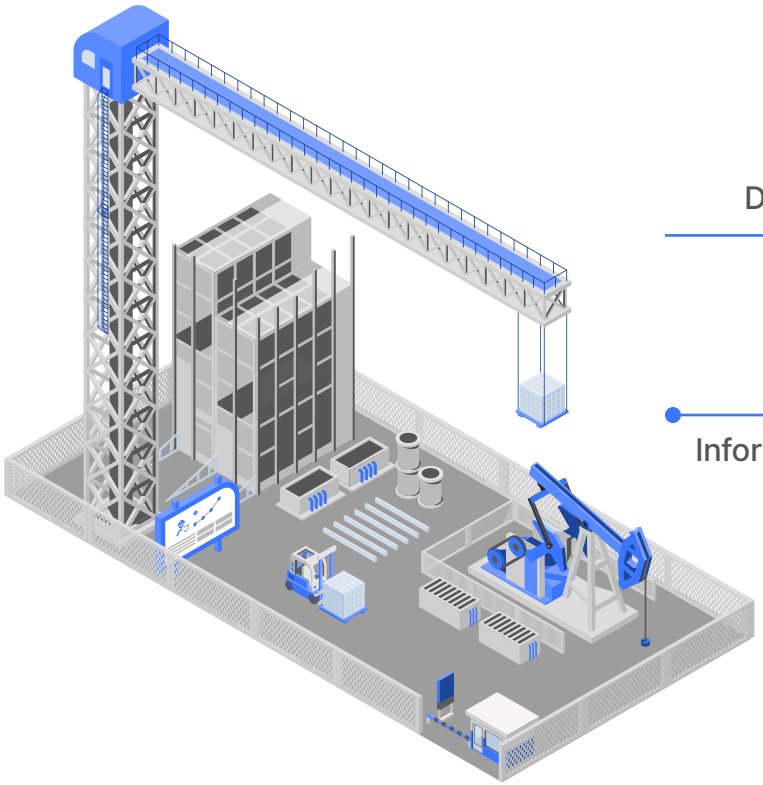
Live Data | Asset Register | Geo Spatial

Digital Twin



Digital Twin in Construction

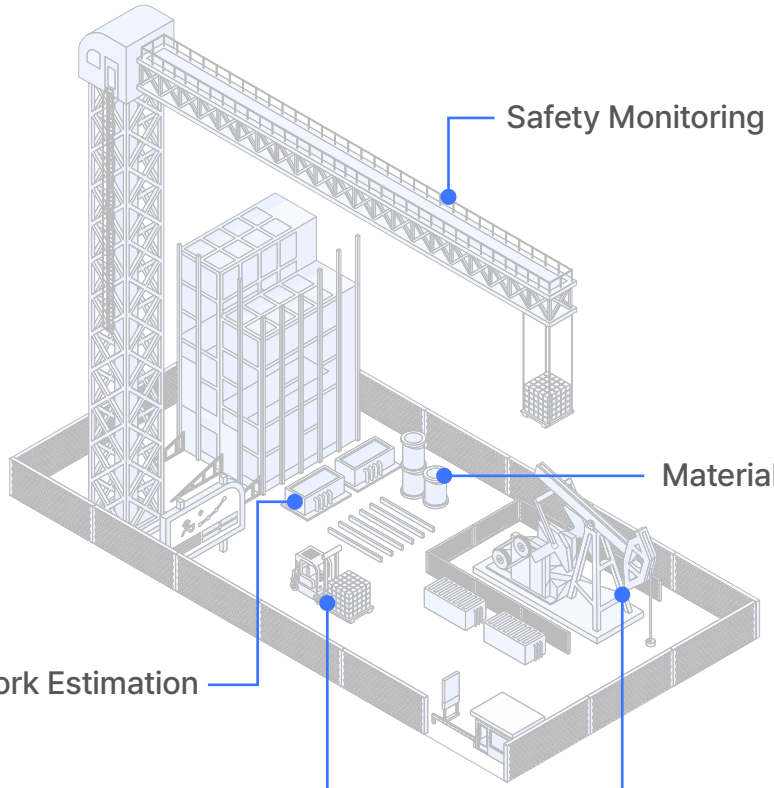
Physical Space



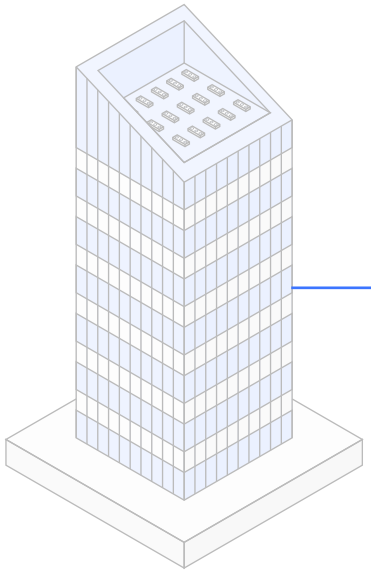
Data

Information

Virtual Space



Benefits of a Digital Twin



Overarching Benefits

- Single Source of Truth
- Control Your Business Information

Handover & Commissioning

- Control of Supply Chain Data Delivery
- Empowered Handover & Commissioning Tool
- Improved Approval Management
- Performance Tracking Defects Liability Perild(DLP)

Operations

- Benefit From Improved Performance Analytics
- Improved Compliance Management During Operations
- Simplify Your Warranty Tracking, Depreciation Schedules, CAPEX & OPEX Planning
- Further Enhance Envilonmental Efficiencies
- Unlock New Revenue Opportunities
- Reduce Risk, Time and Cost by Integrating Wour Systems
- Implement the Latest in Smart Maintenance
- Immediate Access to the Latest in Smart Building Technology

Monnit Smart Solution

Perfectly managed with the IoT system quick response

RICS TECH AFFILIATE

Technical Solution Certification of
The Royal Institution of Chartered Surveyors

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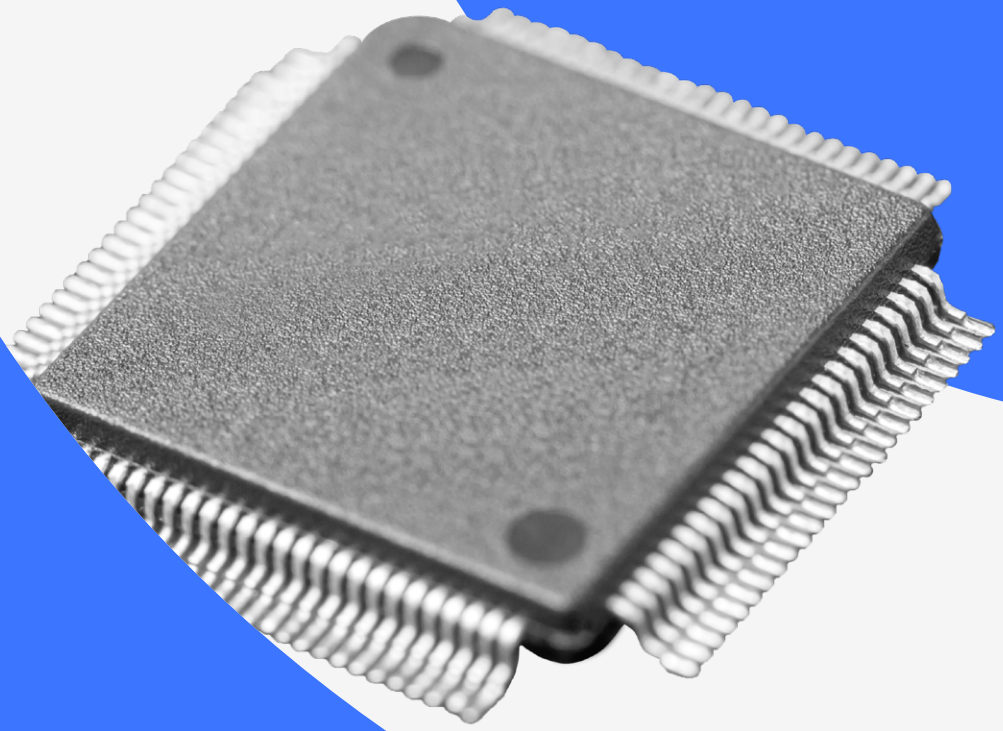
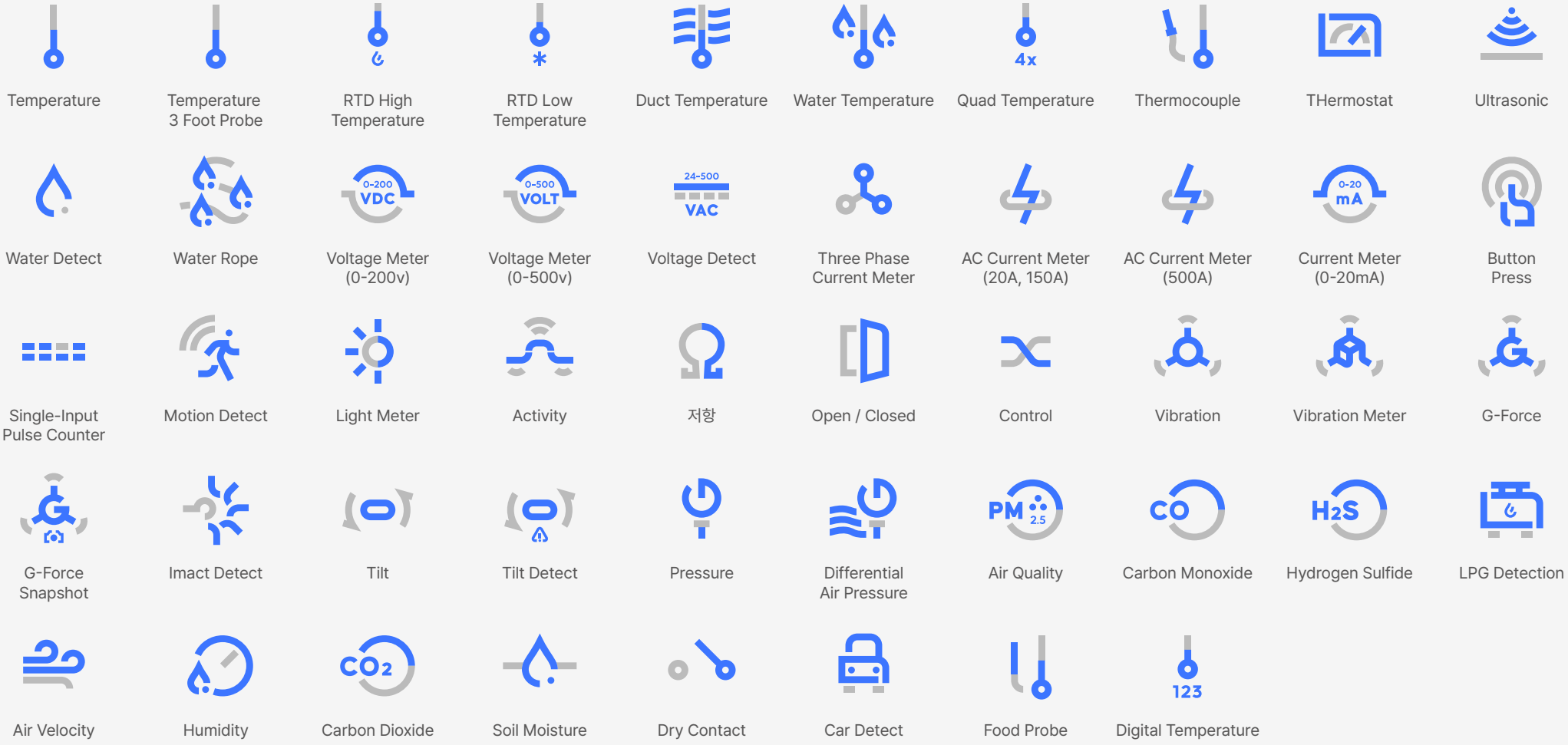


03

Product Description

More than 80 different types of sensors



Here’s How It Works

Remote monitoring solutions keep track of everything from anywhere in the world, while securely logging data and providing immediate alerts whenever conditions exceed predefined thresholds.

80+ Wireless Sensors

Monitor & Detect conditions you want to know about.

Wireless Gateway

Relay Sensor information to monitoring software.

Software

Get Alerts&View dashboards. Access data from anyware.

No Wires – No Worries

Easy installation , set up & use

Real-time Data & Notifications

Measure → Collect the Data → Check & Respond

A water leak was detected in the warehouse building#52!

01/06/20 @ 09.22 PM
Battery: 82%

Temperatury level in laboratory #6 is too high.
Ventilation automatically turned on.

01/05/20 @ 12.30 PM
Battery: 94%

Why Monnit

Low Power / Long Life

Our sensors take common batteries,
and get uncommon battery life.

These can last 12+ years!

Exceptional Wireless Range

300m

Through 12+ walls

Why Monnit

MONNIT Platform uses cloud technology to completely reimagine service delivery with a dynamic online experience and a scalable business model.
Our business grows with that of our clients and our software supports their vision and success.

Unique Platform
That produces substantial revenue generation

Cloud Technology
That is easy to deploy and flexible

Scalable Cost Model
That produces substantial revenue generation

Real Time Visibility
and centralised control of building portfolio

Reduced Costs
Costs with automated processes

경쟁사 현황 비교

경쟁사 솔루션	Monnit Korea 솔루션
대부분 유선 시공(상시전원인가 필수) 또는 최대 2년 배터리 교체	완전무선으로 손쉽게 시공 가능하며 최대 10년 이상 배터리 교체없이 사용가능
센싱 모듈을 저가형으로 사용하여 내구성이 떨어지고, 끊김 없는 데이터 축적이 어려움	고가 상용 아날로그 센서를 기반으로 제작하여 내구성이 우수하며, 데이터 유실 방지기술 탑재
센싱 모듈을 여러 업체 제품으로 섞어 구성하기 때문에 솔루션으로 적용 시 시스템 오류 변수가 큼	80여 종 이상 자체제작 센서를 활용하기 때문에 타제품 혼용으로 인한 안정성 문제 없음
빅데이터(AI) 분석을 통하여 임계차를 정한다고 하지만, 실제 설비 전문가가 분석한 데이터가 아님	설비 전문가 활용을 통한 실제 빅데이터 분석

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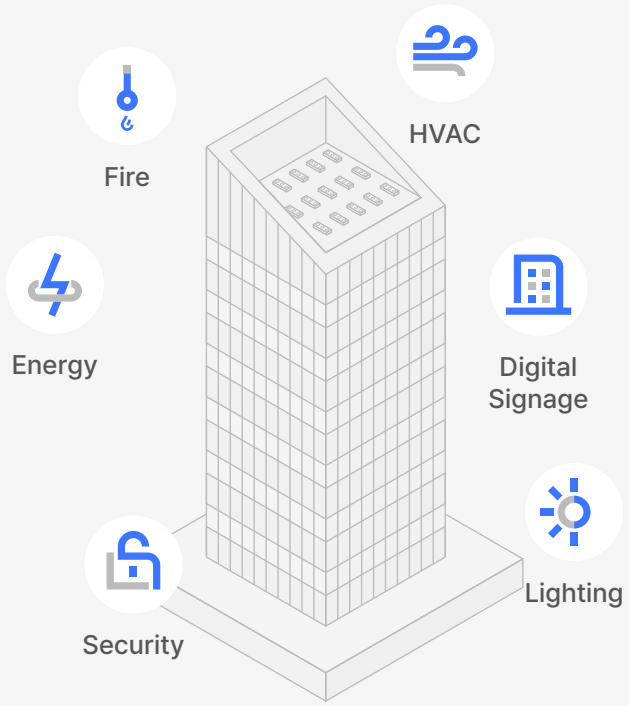
04

Business Model

Remote Facility Monitoring

Old

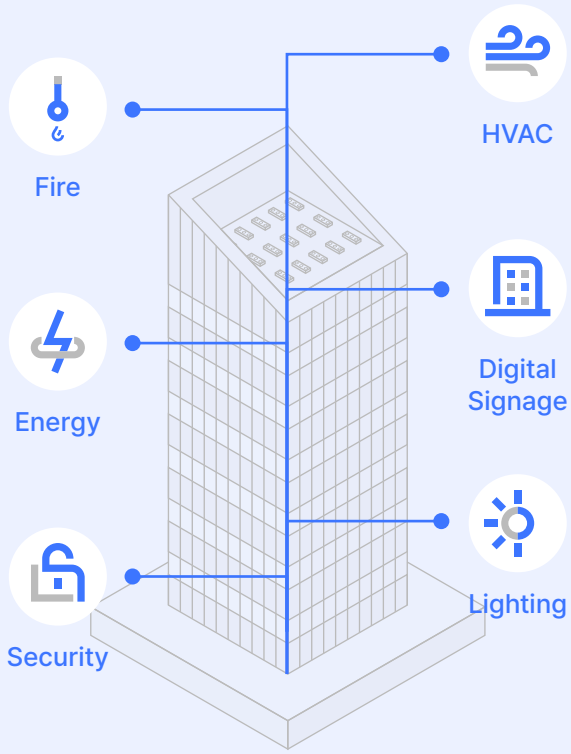
Legacy systems, Separate systems and controls.



New

Integrated systems, Sommon building network, Shared data.

- Intergrated building network
- System optimization
- Data and analytics
- Web-based access and control
- Open protocol



Basic Services

All Monnit wireless sensors com with free basic online monitoring,
allowing you to view sensor information anytime from anywhere.
Receive instant notifications via text of email if a user-defined condition is met or exceeded.

Additional Services

Installation

The Monnit services team offers help when it comes to installing our sensor and monitoring systems.
We can arrange for complete installation and/or consultation when installing and setting up a Monnit wireless sensor and remote monitoring system.

Product Customization

While we provide over 80 different types of unique wireless sensors, we understand that our products may not meet your specific requirement. Monnit provides product customization services to ensure our products will work for you.

Product Development

Do you need different features or functionality in your sensor monitoring system.
We offer custom wireless sensing hardware and software development to help your company meet its needs!

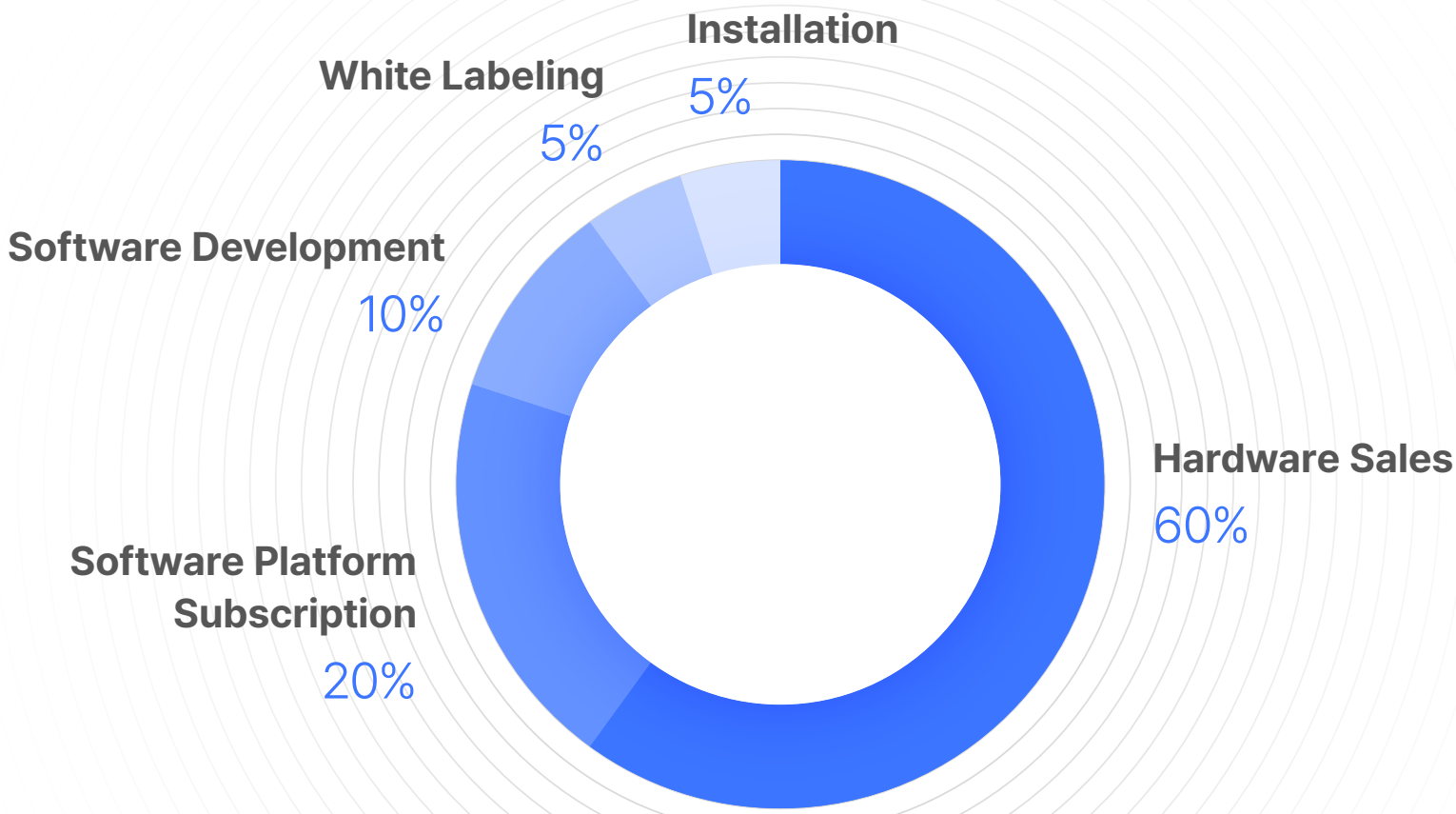
Open API

Install Monnit sensors & own your data.

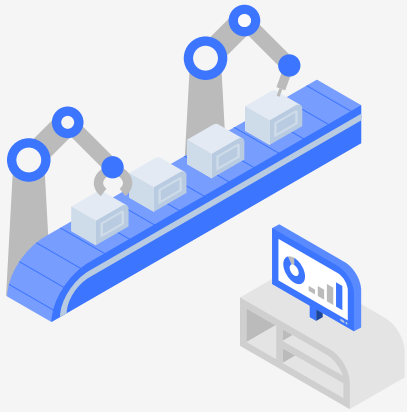
Use your data wherever you need it

iMonnit dashboards work well for most customers,
but exporting data to any program is possible.
Web hooks and an API are provided to automate data flow.
With unlimited data potential, it's easy to get valuable insights
for scheduling maintenance and identifying opportunities to
decrease operational inefficiencies.

Revenue Model



Monnit Korea 구축비용

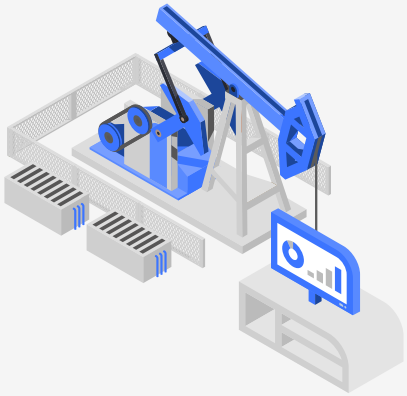


생산관리

설비 및 센서데이터를 수집하여
실시간 생산량을 추적하고,
타 시스템과의 연동을 통해
생산계획 및 비교가능

₩ 8,000,000 ~

실제 설치된 현장 기준으로, 현장에 따라 가격 변동 있음.

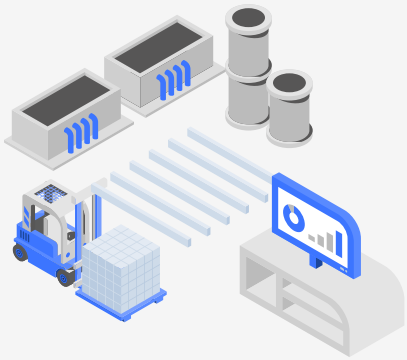


설비관리

생산설비에 센서를 설치해 설비의
작동상태를 실시간 모니터링,
이상 반응 시 즉시 알림 및 축적
데이터로 **설비 수명 연장**

₩ 3,000,000 ~

실제 설치된 현장 기준으로, 현장에 따라 가격 변동 있음.



환경관리

현장의 환경이나 설비, 자재,
완제품 상태에 영향을 주는
유해요소를 측정 및 모니터링해
위험 요소 차단

₩ 2,000,000 ~

실제 설치된 현장 기준으로, 현장에 따라 가격 변동 있음.

에너지관리

현장을 라인, 단위별로
전력소모량을 측정하고,
가동률을 분석해
효율적인 운영가능

₩ 17,000,000 ~

실제 설치된 현장 기준으로, 현장에 따라 가격 변동 있음.

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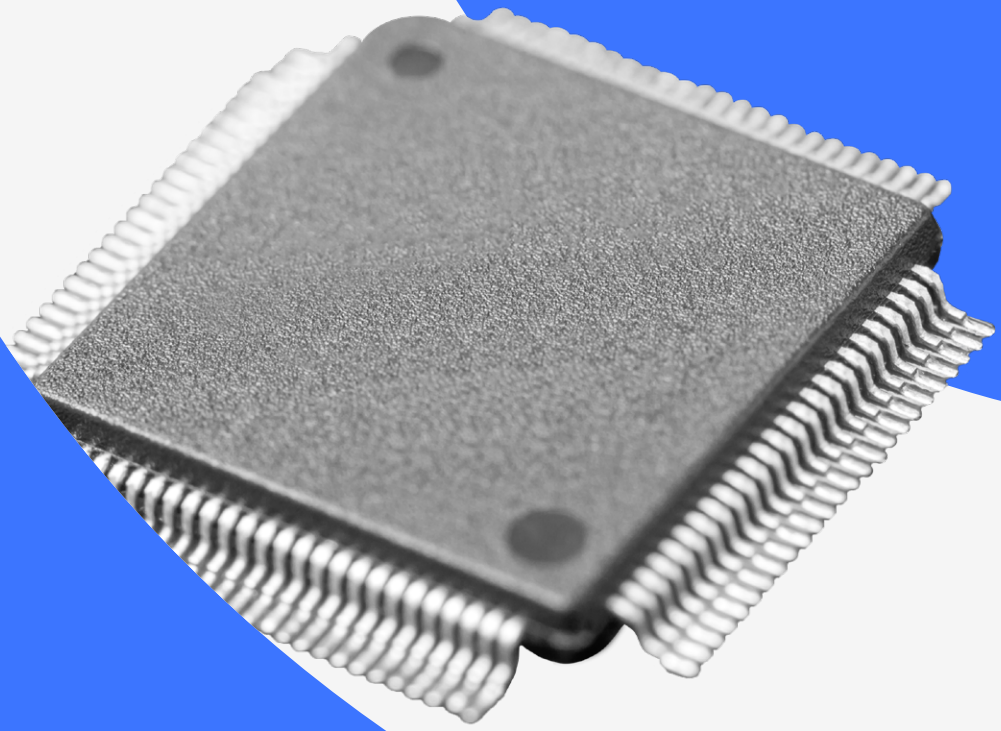


05

Solution Cases

Smart Factory

1. Warehouse Monitoring

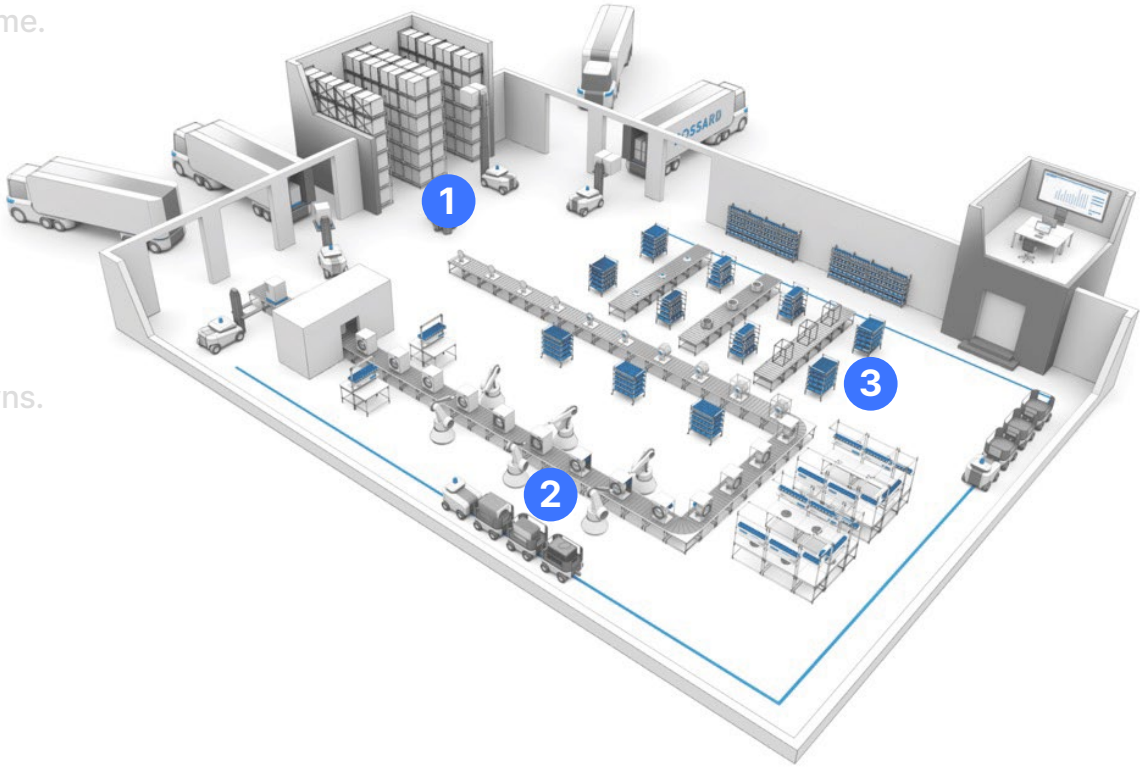
- Proper lighting, temperature and humidity maintenance.
- Alerts in case of shipping bay doors opening at abnormal time.
- Prevention of mold, mildew and water damage.
- Tracking of personnel and assets around warehouse.

2.Production Line

- Indoor environment and safety monitoring.
- Unit/Line/Factory total power consumption reduction.
- Immediate alarms in case of accidents.
- Increase of equipment lifespan by preventing the breakdowns.

3.M2M Communication

- Remote monitoring and control of HVAC System.
- Collection and analysis of data on facility operation status.
- Comparison of data on performance of production lines.



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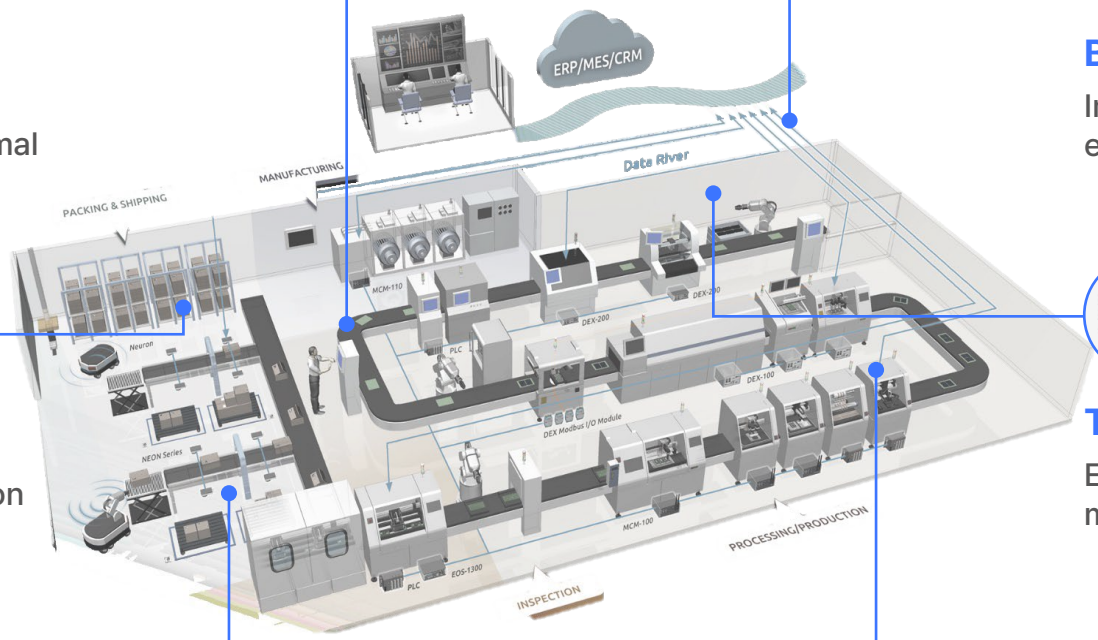
Production Line Monitoring



Vibration Meter

Efficient operation and failure prevention by analyzing abnormal vibrations of conveyor motors

AC Current Meter

Check conveyor motor operation status and power consumption

G-force Max AVG

Immediate notification when out of normal vibration range

Button Sensor

Immediate response in case of employee emergency call

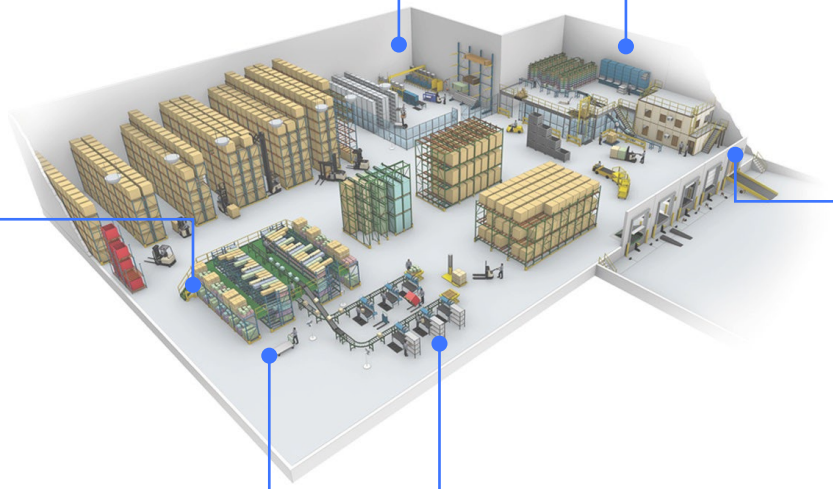
Temperature Sensor

Equipment and environmental monitoring

Pressure Meter

Hydraulic pressure measurement for machine and operator safety

Smart Warehouse Management



Humidity Sensor

Notifies of humidity fluctuations

Temperature Sensor

Sends notification if the temperature is not at optimal conditions

AC Current Meter Sensor

Notifies when there is a overcharge or undercharge of current

Open/Close Door Sensor

Feel secure knowing if the door has been left opened

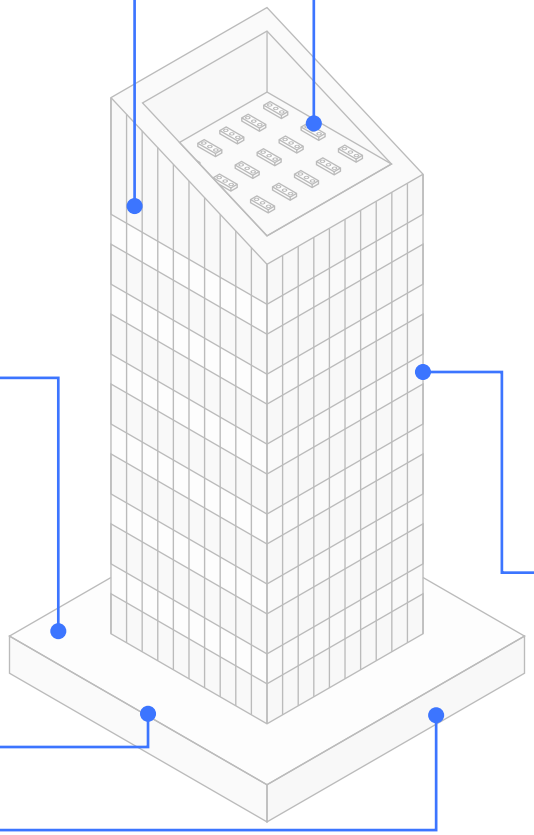
Water Detection Sensor

Sends an immediate notification when there is any sign of water leakage or flooding

Vibration Meter Sensor

Find any irregularities to determine if there needs for repair

Monnit Smart Solutions for Building Management



Elevators

Vibration Meter
Prevention of accidents caused by abnormal vibration detection. Extend facility life and improve efficiency.

Dry Contact Sensor
Alert when switch is triggered by connecting to contact plate.

Boiler

Water Detection Sensor
Provides notifications when overflow or drain pipe leak happen

Pressure Sensor
Immediate notification when pressure is outside normal range

Electrical Room

Voltage Meter Sensor
Determine whether power outage and generator are on, and notify alarm when power outage occurs

AC Detection Sensor
Monitor voltage supply and notify alarm when a situation occurs

Machine Room

Water Rope Sensor
Reduces accident damage by providing alarm immediately when pipe leakage occurs

HVAC

AC Current Meter
Effective operation by collection of data on energy usage

Duct Temperature
Monitor HVAC efficiency by checking air temperature

Air Quality Sensor
Provision of good environmental conditions through air quality monitoring

Fire Control

Temperature Sensor
Optimal power consumption by tracking temperature abnormalities caused by excess heating or cooling

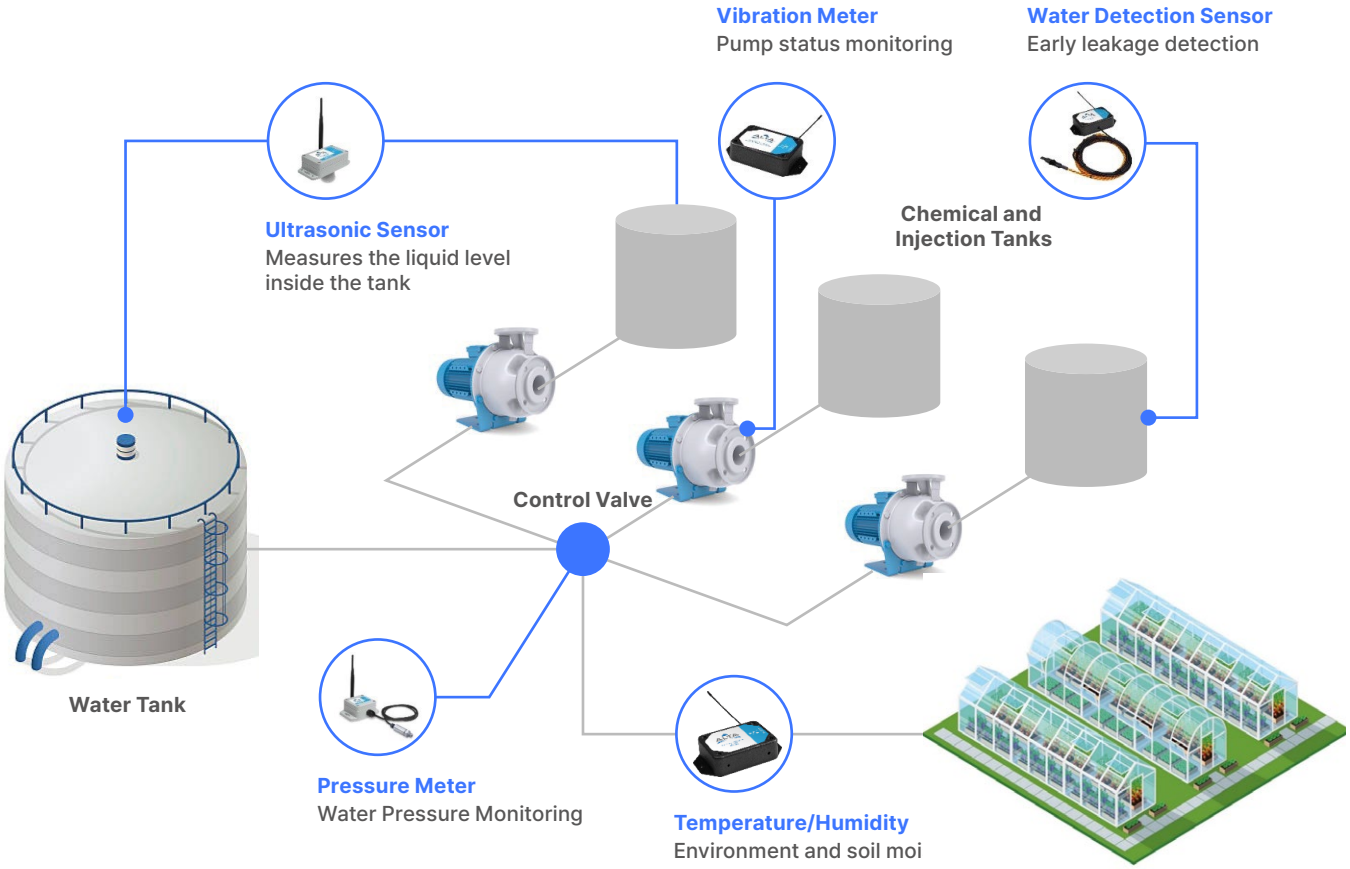
CO Gas Sensor
Identify and notify about CO concentration increase caused by fire

Voltage Detection Sensor
Establish emergency communication system by providing alarm in case of fire

Smart Farm

Crop sprayer remote monitoring

- Collect the data on irrigation system status.
- Prevent high-cost damage by knowing about small leakages instantly.
- Receive notifications in case of abnormal pressure levels.
- Real time measurement of water, chemical and injection tanks liquid levels



Smart Construction

건설 현장에 환경영향 측정기와 안전관리 센서를 설치하고, 측정 데이터를 무선으로 자동 수집, 분석하여
스마트폰 또는 PC 화면으로 실시간 알림·모니터링 제공

IoT 환경 및 안전 관리 측정기·센서

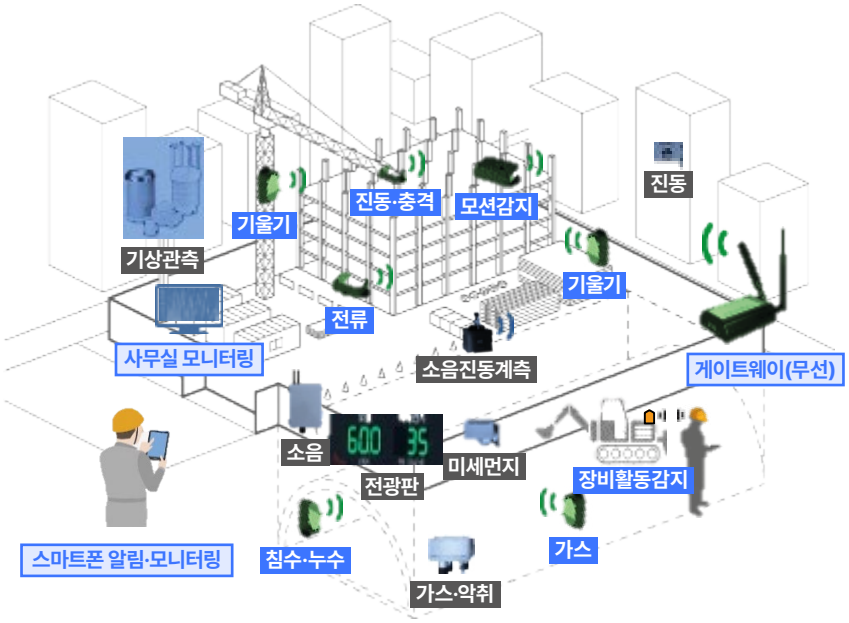
- 환경 센서 : 소음, 미세먼지, 전광판, 기상관측(풍향·풍속강우량·대기압·온습도), 악취(암모니아·황화수소), 소음진동계측
- 가스·압력 센서 : CO, CO2, H2S, 기체·액체·증기 압력
- 가속도 센서 : 기울기, 진동, 충격(Activity)
- 활동 감지 센서 : 움직임, 모션, 빛,
- 초음파·습기 센서 : 침수, 누수, 습기
- 온도 센서 : 고온·저온, 열전대, 덕트·물 온도
- 전기 센서 : AC·DC 전압·전류 메타 등

인공지능 딥러닝 기반 데이터 수집· 분석·표출 플랫폼

- 다양한 센서로부터 측정 데이터를 무선 통신 전송을 통해 자동적으로 수집
- 인공지능 딥러닝 기술을 통한 현장 센서 데이터 분석
- 다양한 센서 데이터를 통합해서 스마트폰 또는 PC 화면의 대시보드로 실시간 표출, 설정된 기준에 따른 알림 기능 등

무선 통신 기능

- 모든 센서는 무선 통신을 통해 측정값 자동 전송·수집
- 통신 방식 : RF·3G·LTE, 자체 게이트웨이
- 외부 시스템·플랫폼 또는 관제센서에 연동 API 제공 가능



용역 개요

데이터 분석 3년간	2018년 무선 IoT 센서를 활용한 데이터 분석 적용, 산업용 센서, 설비 및 머신 비전, 스마트 시티 등으로 영역 확대
산업분야 5개	건물 시설 관리 , 스마트 팩토리, 건설/건축물 유지 관리, 기타 기반 시설
기 구축 어플리케이션 50여종 이상	• 화재 예방/소방 무선 통합 모니터링, 알람 시스템 • 스마트 화장실 모니터링 시스템 (시간대별 사용 예측) • 보일러 이상 작동 감지 • HVAC 모니터링 • 배관 압력 모니터링 • 전력 계측 스마트 미터 (기간별, 시간대별 사용량 누적으로 에너지 효율 개선) • 정화조 침수 관리 • PLC/MCC 판넬 주요 알람 디지털 트윈 구축 • 이상진동/ 기울어짐 알람 구축 • 침입/보안구역 모니터링 • 배관 누수 및 동파 알림 시스템 구축 • UPS 설비 모니터링 (배터리 출력 모니터링 포함) • 급탕 설비/ 급탕 및 온수, 정수 폐수 펌프 모니터링) • 정전 모니터링 (발전기 작동, 한전 공급 감시 등) • 사무실 환경 모니터링 • 컨베이어 벨트 시스템 모니터링 (전류량, 진동 등) • 생산 설비 모니터링 (이상 진동, 온도 등) • 온/습도 모니터링 (식품 제조 공정 등) • 각종 유량 모니터링 • 기존설비의 IoT화 및 상태 모니터링 구축 • 발전소 시설 관리 • 건설 현장 타워크레인 모니터링 • 건설현장 위험지역 침입 모니터링 • 건설현장 진동 모니터링 • 건설현장 유해가스 모니터링 • 건설 현장 건설장비 모니터링 (지게차, 포크레인 등) • 건설 현장 작업자 안전 환경 모니터링 • 교량 유지 관리 • 도시가스 배관 모니터링 • 스마트 승차대 (버스 정류소) 모니터링 • 스마트 축사 관리 (사료 잔량 , 축사 온습도 등) • 스마트 양어장 관리 (조명 자동제어, 온도에 따른 식사량 변화 등) • 스마트팜 관리 외

프로젝트 개요

사업영역	상용화 현황	
화재예방 소방 무선통합 알람 시스템	• 세종대학교 소방 통합 관제시스템 구축 • 창동 19단지 부선 소방 솔루션 구축 • 인천 송도라이크홈 무선 화재예방 솔루션 구축	
HVAC 공조시스템	• 송현초 HVAC 공조시스템 모니터링 무선 솔루션 • 코오롱 본관 및 마곡사업소 마곡 미술관 공조시스템 구축	
전력계측 스마트 미터	• 베올리아 한양대 구리병원 IoT 스마트시티 구축사업 • 대동도어 IoT 스마트 미터 구축사업	
건물 관리 IoT	• 한화 Sthffntus 건물 관리 IoT 300개수 – 네이버, 서울역, 한화손보 외 • 코오롱 경주호텔 무선 건물 관리 원격시스템 구축 • HDC 아이콘트롤스 건물관리 IoT 센서 5,000개 납품계약 • 강원 인재 3821 부대 정화조 IoT 관리 솔루션 남품	• 삼성SDS㈜ 건물 관리 IoT 센서 5,000개 납품계약 • CNS 성동안심상가 및 경기도친환경 농산물 유통 센터 스마트 빌딩 구축 • 카카오 본사 사무실 내부 환경 모니터링 구축 • 프로에스콤 롯데월드 어드벤처 보안관리 IoT 센서 1000개 납품 계약
스마트팩토리& 기반시설 외	• 대동도어 모터 예지 보전 IoT 솔루션 • 도레이첨단소재 통합관제시스템 구축 • CJ군산공장 모터 예지 보전 솔루션 구축 • 주식회사 카스 공장 설비예지보존 솔루션 구축	• 삼천리가스 안천동춘교 가스배관 예비 보전 솔루션 구축 • CJ대한통운 곤지암 허브 설비예지보전 솔루션 구축 • SK건설 하이닉스 전력인프라 흙막이 무선 솔루션 구축 • 동원인터프라이즈 스마트팜 원격모니터링 시스템 구죽