



AIWIN
AIWIN Co.,Ltd.



Table of contents

- 01 • Introduction and Career of Key Members
- 02 • Our Vision
- 03 • Major R&D fields
 - Reuse of batteries (waste batteries) after using electric vehicles
- 04 • Major Sales and Revenue Business Areas
 - AIoT
- 05 • Conduct national R&D
 - Ministry of SMEs and Startups

Composed of engineers with more than 15 to 25 years of experience (apparatus/circuit/AI(S/W)/electrical electronics)



15 to 25 years of professional engineers

All development personnel, including the CEO, are professional engineers with more than 20 years of experience.

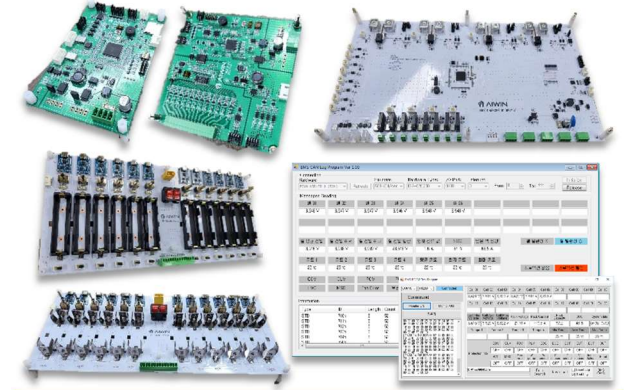
- Mechanism engineer: 25+ years
- Circuit Engineer: 20+ years
- AI (S/W) engineer: more than 20 years
- Electrical and Electronic Engineer: 15+ years



Various automation module / system project experience

Securing a lot of experience in developing and installing automation module/system products

- Development of domestic/overseas railway transportation automation module/system, financial automation module/system development, special system development
- Development of mold/injection equipment
- **Development of engine/electronic/battery system for electric propulsion ship**



Mechanism / Circuit / AI-Software / BMS professional development

Possession of various module/system development capabilities through the composition of experts in each field

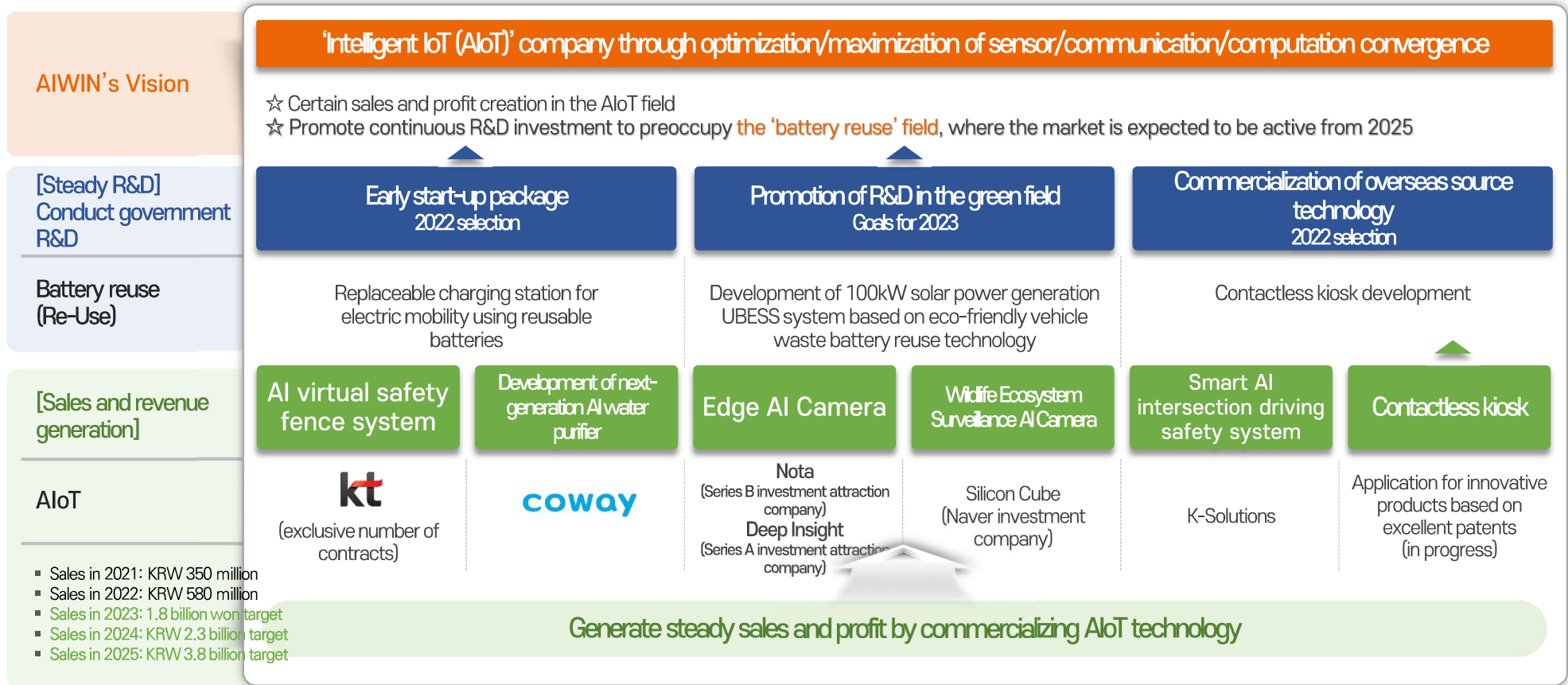
- Mold Design Major/Mechanism Major
Specialized Mechanism Design and Engineering
- Specialized in precision control system (robot major)
- Software specialist for control
- **Battery BMS (Battery Management System) / module / pack development specialist**

Composed of core developers who have been involved in research and development for 20 years at Puloon Technology Co., Ltd. and Electrinc Co., Ltd.



Division	Name	Education	Main View
CEO	Jayce LEE	M.A of Control and Instrumentation Engineering, Kangwon National University (2001)	<p>Electrinc Co., Ltd. (2017~2020)</p> <ul style="list-style-type: none"> Engine for Electric Propulsion Ship / Battery Pack / BMS (Battery Management System) / Cluster / Electrical System)
Research director	Yongseong KIM	B.A of Computer Information and Communication, Hongik University (2001)	<p>Puloon Technology Co., Ltd. (2004~2017)</p> <ul style="list-style-type: none"> Development of financial automation KIOSK system Bankbook printer / bill exchange machine / counting machine Security system development (access control, fingerprint recognition/face recognition system) Systems for rail traffic (ticket issuance /refund, gate/sliding door system)
Senior Researcher	Hopyang RYU	B.A of Mold Design, Seoul National University of Science and Technology (1997)	<ul style="list-style-type: none"> Graduated from Sunrin Internet High School, Department of Information and Communication
Senior Researcher	Sangsu PARK	B.A of Electronic Engineering, Dongguk University (2007)	
Researcher	Jeonghyun SEONG	Artificial Intelligence, Gachon University	<p>Samsung C&T Finance Team (1997~2004)</p> <ul style="list-style-type: none"> 37th Samsung Group public bond <p>Beagle Company CEO (2015~2020)</p>
CFO	Seungyong SEONG	B.A of Economics, Soongsil University (1997)	
To Join	Planning to join a researcher in industrial engineering (S/W) / electronic engineering (H/W) / mechanical engineering (H/W) (currently participating as a shareholder)		

» Aim to preoccupy the field of 'battery reuse', where the market is expected to be activated from 2025 with steady sales and R&D



» Major patent status

No	Application /registration date	Registration /Application Number	Title of Invention
Patent registration (8 cases)	2021.09.30	No. 10-2309983	Electric vehicle charging system for rescue vehicles
	2022.08.08	No. 10-2431550	Connection device between a plurality of battery cells and a battery management system
	2022.08.18	No. 10-2435323	Impact path derivation device of electric vehicle battery pack
	2022.01.13	No. 10-2400820	Device for setting non-contact activation area of non-contact screen
	2022.07.21	No. 10-2425456	User access detection device for contactless kiosk
	2022.08.23	No. 10-2436795	User approach detection device for non-contact elevator button
	2023.02.07	No. 10-2498561	Non-contact door lock user access detection device
	2023.02.07	No. 10-2498560	Contactless kiosk customized for wheelchair users
Application completed (11 cases)	2021.02.09	10-2021-0018714	A low-power, low-capacity face recognition model that can be implemented on Arm Cortex M4 by applying a convolutional neural network (CNN) and a recurrent neural network (RNN) in combination.
	2021.09.10	10-2021-0121206	Lithium-based battery system for forklifts using forklift weights as energy dampers for thermal management of lithium-based batteries
	2022.10.27	10-2022-0140145	Customizable Contactless Kiosk
	2022.11.08	10-2022-0148043	Contactless kiosks customized for blind people
	2022.11.17	10-2022-0154216	Severe deformation location derivation device of electric vehicle battery transport container
	2022.11.24	10-2022-0158970	Severe deformation alarm system for transporting electric vehicle batteries
	2022.12.07	10-2022-0170944	Upright stability judgment device for multi-layer electric car battery transport container
	2022.12.12	10-2022-0172878	Upright instability alarm device for transporting multi-layer electric vehicle batteries
	2022.12.13	[registration decision]	Gobo light remote control device capable of adjusting control direction
	2023.01.31	10-2023-0013303	Battery pack charging management system mounted on a trailer
	2023.02.22	10-2023-0023387	Impeller driving device for cooling pump of electric outboard motor



Major R&D fields

- Reuse of batteries (waste batteries) after using electric vehicles



Prospects of the battery industry after the use of electric vehicles

- Pay attention to the used battery (waste battery) industry of electric vehicles due to the activation of the global electric vehicle market
- Electric car sales worldwide are projected to grow rapidly from 3.03 million units in 2020 to 21.87 million units in 2030, growing at an average annual rate of more than 22%.

전기차폐배터리재활용 'OK'...환경부, 폐기물아닌순환 자원지정 추진

기사입력 : 2022년08월04일 09:34 | 최종수정 : 2022년08월04일 09:34

재활용 발목잡던 폐기물 5종 규제 대폭 완화
관련 법령 손질해 재활용 촉진방안 연내 발표

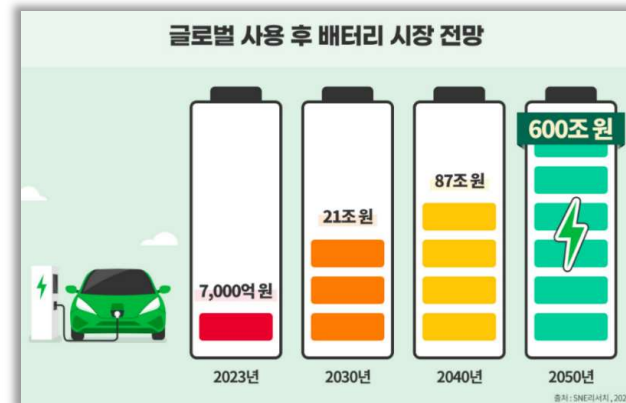
[세종=뉴스핌] 성소의 기자 = 환경부가 수명이 다한 전기차 배터리를 순환자원으로 인정해 폐기물 규제에서 제외하는 방안을 검토하고 있다. 환경부는 이 같은 내용의 규제완화 방안을 연내 발표할 방침이다.

3일 관계부처에 따르면 환경부는 이러한 내용의 규제개혁 방안을 적극 검토하고 있다.

As early as 2025, the “large replacement cycle” of electric vehicle batteries is expected to come, and the industry points to the waste battery market as the next-generation growth business.

▶▶ Global Post-Use Battery Market Outlook

- The lifespan of EV batteries released so far is at least 5 years and at most 10 years.
- As the usage period increases, the battery charge capacity decreases to less than 70% of the initial capacity.
- As a result, battery replacement is necessary due to reduced mileage and reduced safety in charging and discharging.
- The global used battery market, which was worth KRW 1.65 trillion in 2019, is expected to grow to about KRW 20 trillion by 2030 (SNE Research, 2021)



After using an electric vehicle, the battery treatment method is classified into **Reuse and Recycling**.

❖ Reuse industry :

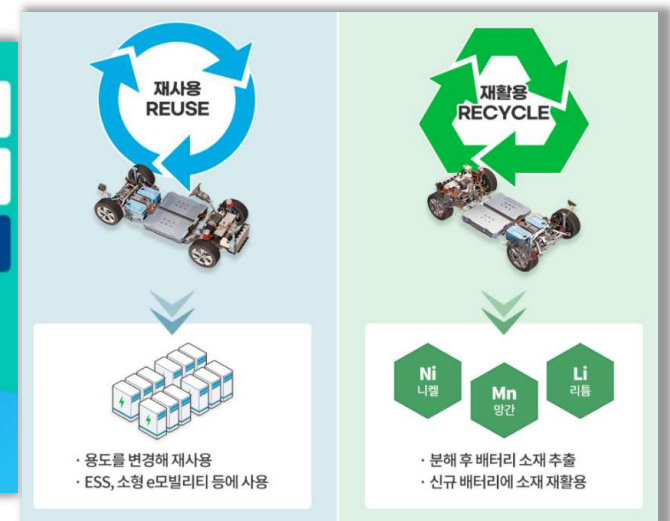
- Batteries whose remaining capacity is **less than 70% to 80% of the initial capacity** are **not suitable for electric vehicles** that require high output such as sudden braking and rapid acceleration. However, it can be used for applications such as **ESS, UPS, and E-Mobility** that do not require high output.
- It can be used for as short as 3 years and as long as 10 years until the remaining capacity drops to 50%.

❖ Recycling industry :

- For electric vehicle batteries with **less than 50% remaining capacity after use**, disassemble (ALL) and extract battery materials (**nickel, manganese, lithium**) and reuse them as new battery materials.

▶▶ Reuse of batteries after using electric vehicles

- A method for handling battery packs whose remaining capacity is less than 80%
- Reuse** refers to an industry in which battery packs and modules are disassembled/removed after use, and then repurposed and reused **according to the purpose of application fields such as ESS (Energy Storage System) and small electric vehicles (E-Mobility)**.



Developed a reuse battery exchange station that improved the problems of existing electric two-wheeled vehicles

Development of a replaceable battery pack and BSS (Battery Swapping System)

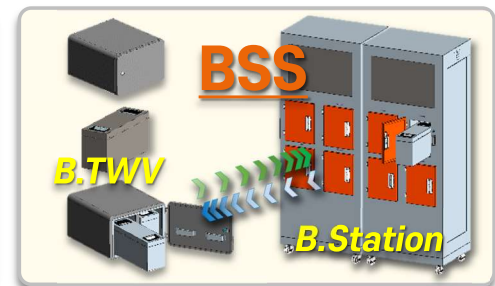
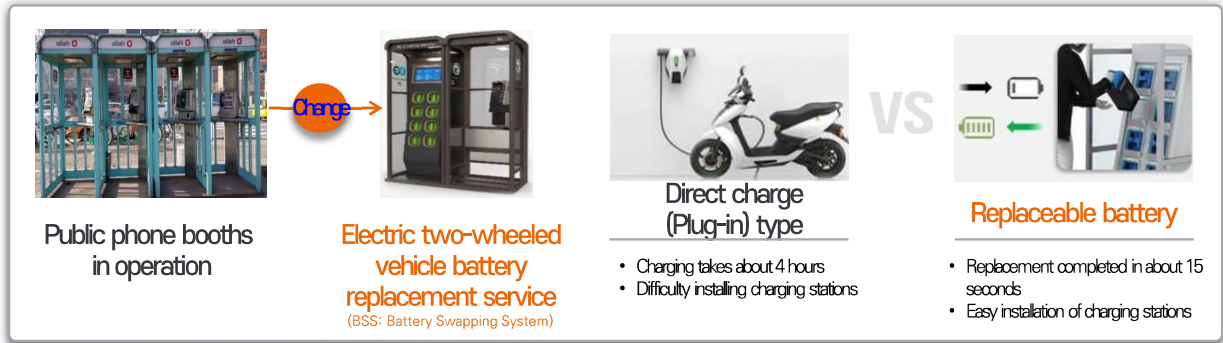
» Supply price reduction target by developing a replaceable battery pack and BSS (Battery Swapping System) using 'reusable batteries' for delivery riders' electric two-wheeled vehicles

Reuse of batteries (waste batteries) after using electric vehicles

Battery-Reuse



VISION >>>



Developed a reuse battery exchange station that improved the problems of existing electric two-wheeled vehicles

Development of a replaceable battery pack and BSS (Battery Swapping System)

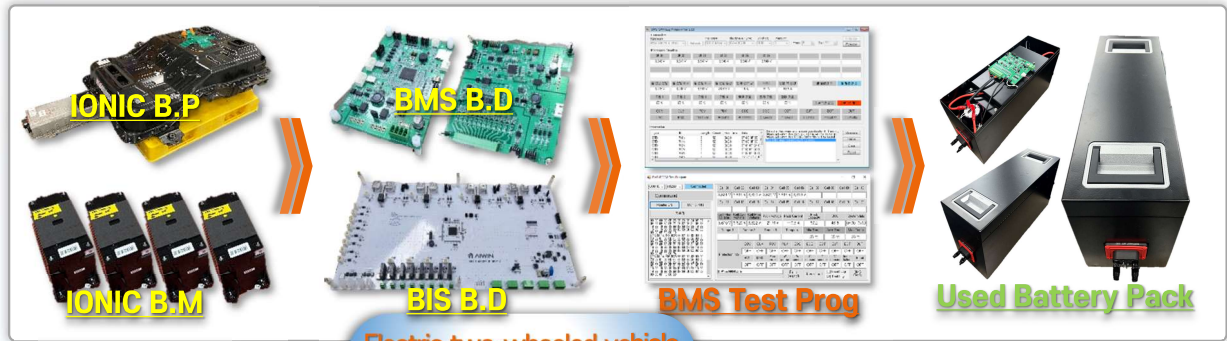
» Supply price reduction target by developing a replaceable battery pack and BSS (Battery Swapping System) using 'reusable batteries' for delivery riders' electric two-wheeled vehicles

Reuse of batteries (waste batteries) after using electric vehicles

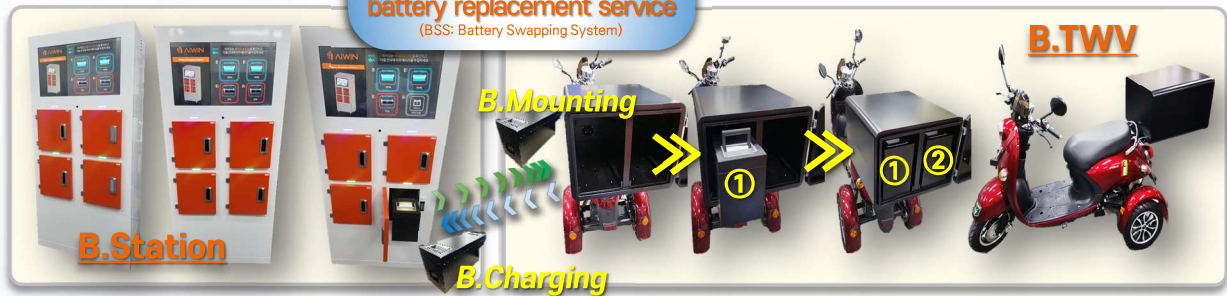
Battery-Reuse



PROGRESS >>>

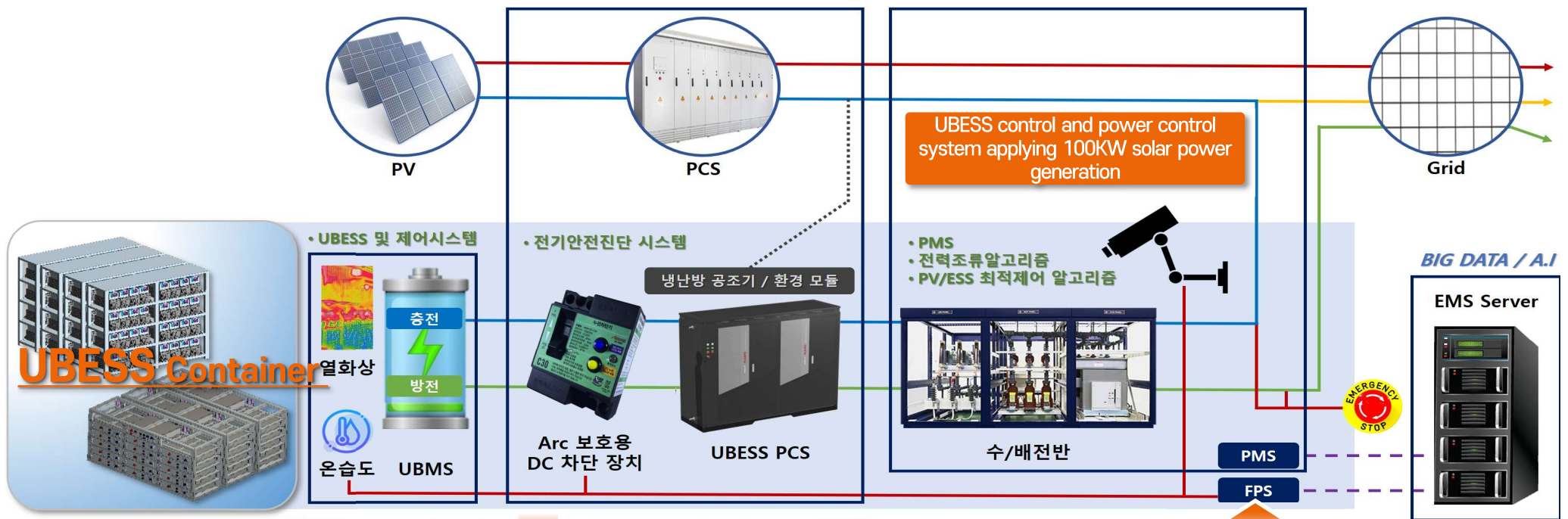


Electric two-wheeled vehicle battery replacement service
(BSS: Battery Swapping System)



Development of Used Battery Energy Storage System(UBESS)

» By reusing waste batteries from electric vehicles, surplus power control and power leveling of photovoltaic devices are performed, carbon reduction and stabilization of power grids are targeted



Solar power generation device and UBESS integrated monitoring environment establishment

Development of Used Battery Energy Storage System

- The global photovoltaic system market is projected to grow from \$795.74 billion in 2018 to \$2.39 trillion in 2024 with an average annual growth rate of 20.7%
- Domestic solar power installations hit a record high, recording 2.0 GW in 2018

1. 태양광 발전소 신규 설치 개소 및 용량

2020년 국내에 신규 설치된 태양광 발전소는 11월 말 기준 21,819개, 용량은 총 3,650,119kW(3.65GW)입니다. 지난 1, 2분기와 동일하게 개수 기준으로는 100kW 미만 발전소가, 용량으로는 100kW 이상 1MW 미만 발전소가 가장 큰 비중을 차지합니다.

2019년 한 해 동안 신규 설치된 태양광 발전소가 총 18,265개소, 용량은 2,985,427kW였는데요. 11월 말 용량을 기준으로 작년 대비 약 122%의 신규 태양광 발전소가 설치된 것을 보아 코로나 19로 인한 경기 침체가 장기화되고 있음에도 태양광 산업은 유의미한 성장을 이루고 있다는 사실을 알 수 있었습니다. 다만 이 추세가 이어진다면 지난 계절에서 전망했던 연간 신규 태양광 발전소 용량인 4,000,000kW(4GW)에는 조금 미치지 못할 것으로 예상됩니다.

	2019년	2020년(-11월 말)
100kW 미만 발전소 수	14,295 개소	17,899 개소
100kW 미만 발전소 용량	1,008,382 kW	1,182,228 kW
100kW 이상 1MW 미만 발전소 수	3,846 개소	3,755 개소
100kW 이상 1MW 미만 발전소 용량	1,655,312 kW	1,746,731 kW
1MW 이상 발전소 수	124 개소	165 개소
1MW 이상 발전소 용량	321,733 kW	721,160 kW
발전소 총 개수	18,265 개소	21,819 개소
발전소 총 용량	2,985,427 kW	3,650,119 kW

- According to the announcement of the Korea Energy Agency, the cumulative number of solar power plants installed in Korea by 2019 is 53,054 (9.29GW).
- As of the end of November 2020, the cumulative number of solar power plants in Korea is 74,873 (12.9GW).

Global/domestic solar power system market size

- Global solar market expected to reach 140 GW by 2020
- The domestic photovoltaic market broke 2.0 GW in 2018 and reached 3.65 GW as of the end of November 2020 (ranked 9th in the world)

Global solar power generation system market size

(Unit: million dollars, %)

Division	'18	'19	'20	'21	'22	'23	'24	CAGR
world market	795,740	954,890	1,145,900	1,375,000	1,650,000	1,980,000	2,389,960	20.7

* Source : TechNavio, Global Solar PV System Market, 2017

Domestic solar power generation system market size

(Unit: KRW 100 million, %)

Division	'18	'19	'20	'21	'22	'23	'24	CAGR
world market	30,300	34,900	40,100	46,100	53,000	60,900	73,500	15.0

* Source : TechNavio, Global Solar PV System Market, 2017

Solar market size by region

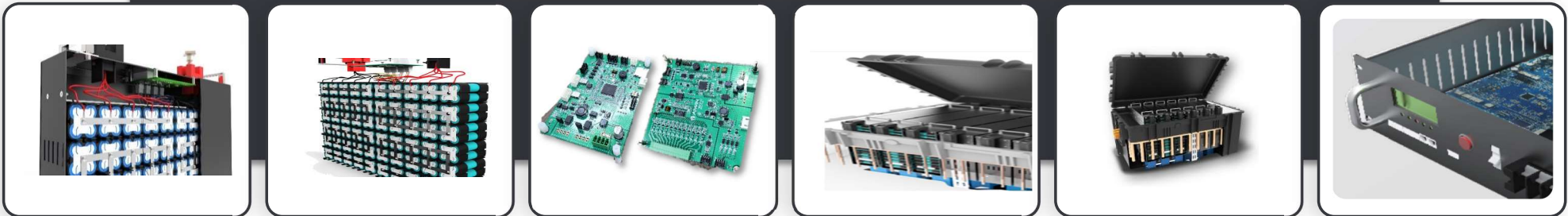
(Unit: million dollars)

Division	2015	2020	2025
ASIA	4,169	10,220	16,870
EUROPE	148	563	1,073
North America	88	261	537
ETC	2,052	6,033	15,088
SUM	6,457	17,077	33,568

* Source : Navigant Research(2013~2022)

- **BMS(Battery Management System)** development and manufacturing experience
- Experience in developing and manufacturing **high-capacity, high-performance, and high-efficiency battery packs**
- Realization of **cooling system** for efficiency increase (heat-pipe / PCB layer structure applied)

BMS Technology & Battery Packaging



01

Battery Block Assembly
(Spot Welding)

02

Development of BMS

03

Battery performance test
/ shipment inspection

04

Battery Module
Packaging

05

Battery Pack
Packaging

» Possession of module/pack system integration technology [new/reusable battery]

NEW BATTERY

Battery Power Pack



43.2V / 3.6kWh

86.4V / 8.467kWh

Potable Battery Pack

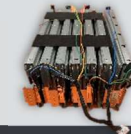


36V
1.008kWh

1MWh Battery System



REUSABLE BATTERY



Battery cells



Battery Module



Master / Slave BMS



BIS



Overcharge protection



Overdischarge protection



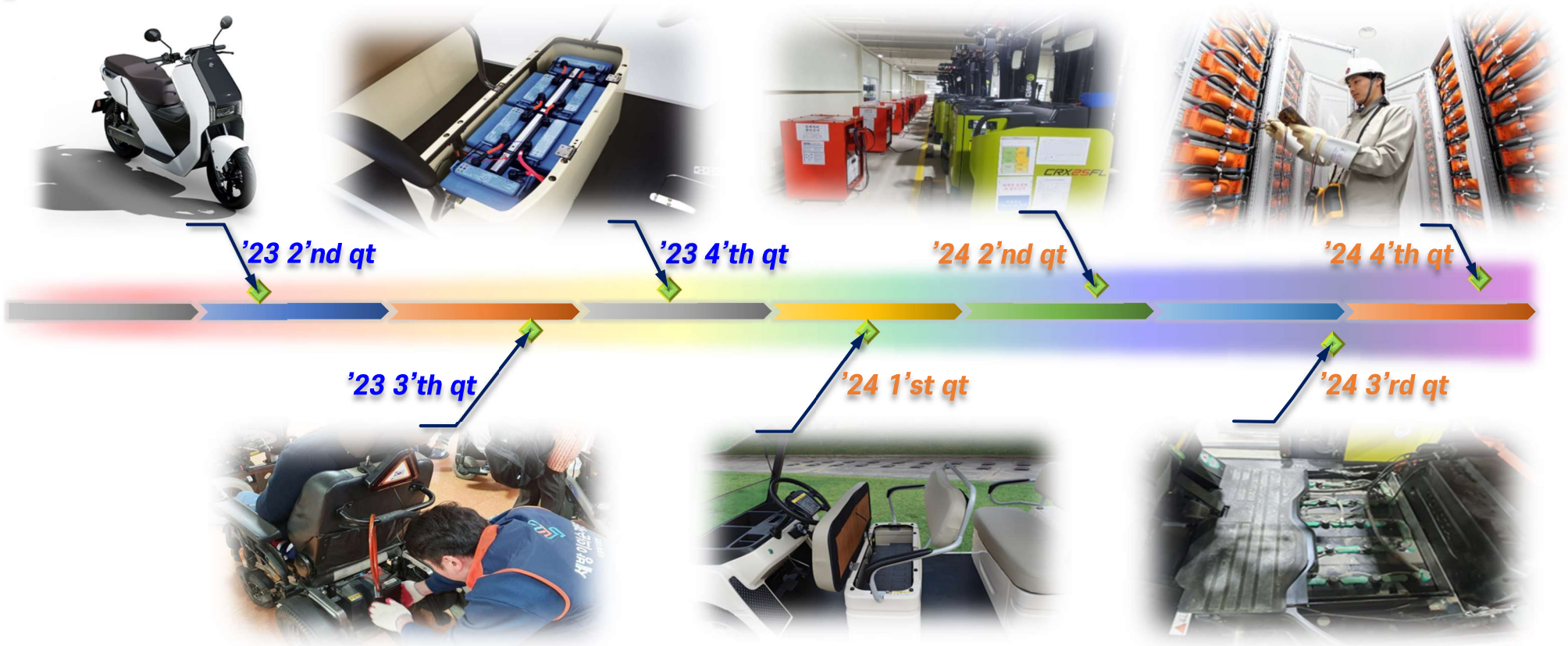
Battery monitoring



Battery life management

Aim to develop mobile electric mobility products and promote commercialization in the ESS field

- Development and commercialization of mobile application products such as **electric two-wheeled vehicles, golf carts, electric wheelchairs, and electric forklifts using reusable batteries**
- MWh-class ESS can be commercialized when stability is secured by considering the variation between batteries of reusable batteries





Major Sales/Profit Business Areas

- AIoT



'AI Virtual Safety Fence' system to strengthen industrial safety management ('Severe Accident Punishment Act' effective from January 27, 2022)

AI Virtual Fence System

- **LIDAR sensor** is used to check the entry and exit of workers in the work area in **real time** and generate an alarm



3D Mapped sensor image

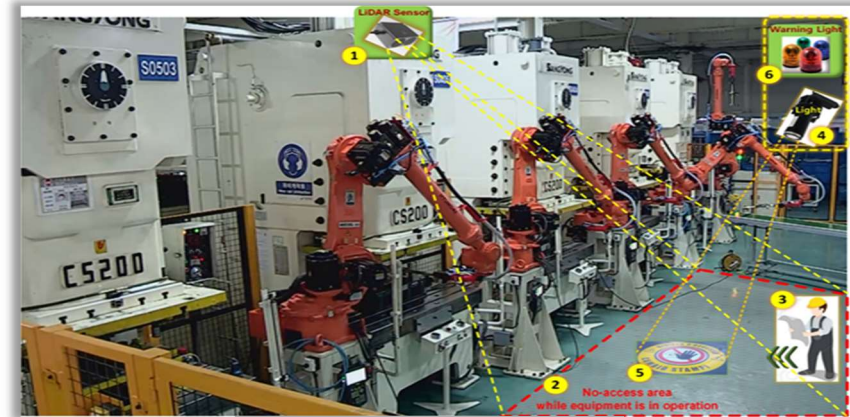
- It is a safety management system that displays the operation of safety devices and the situation **to workers where safety accidents can occur under situations where safety accidents can occur.**
- **Applicable to various working environments**



Example of field installation (Kia Motors Gwangju Autoland)

Key Delivery Performance

- **Registered as a KT partner (October 2021)**, supplying and installing to major domestic business sites (exclusive private contract)
- **Kia Motors** (established domestic business sites from December 2021) / expand overseas business sites from 2023
- **Doosan Heavy Industries & Construction** (established domestic business sites from January 2022)



Kia Motors Gwangju 1st and 2nd factories

Doosan Heavy Industries & Construction Changwon Plant

Kia Motors Gwangmyeong Plant

Kia Motors Gwangju Plants 1 and 2, Gwangmyeong Plant

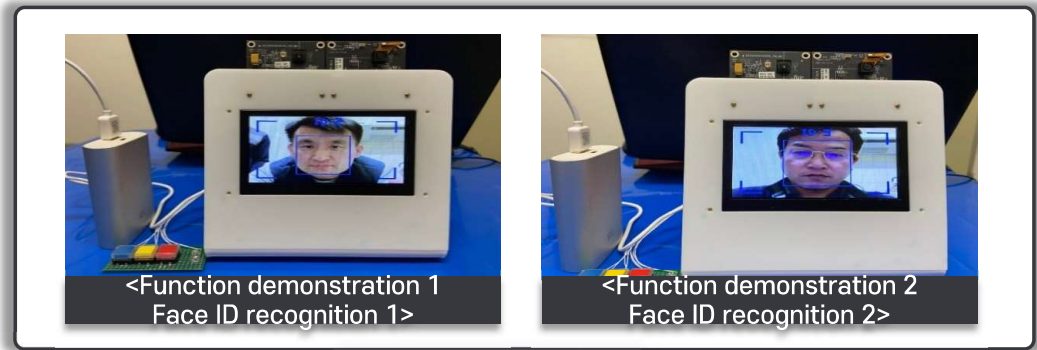
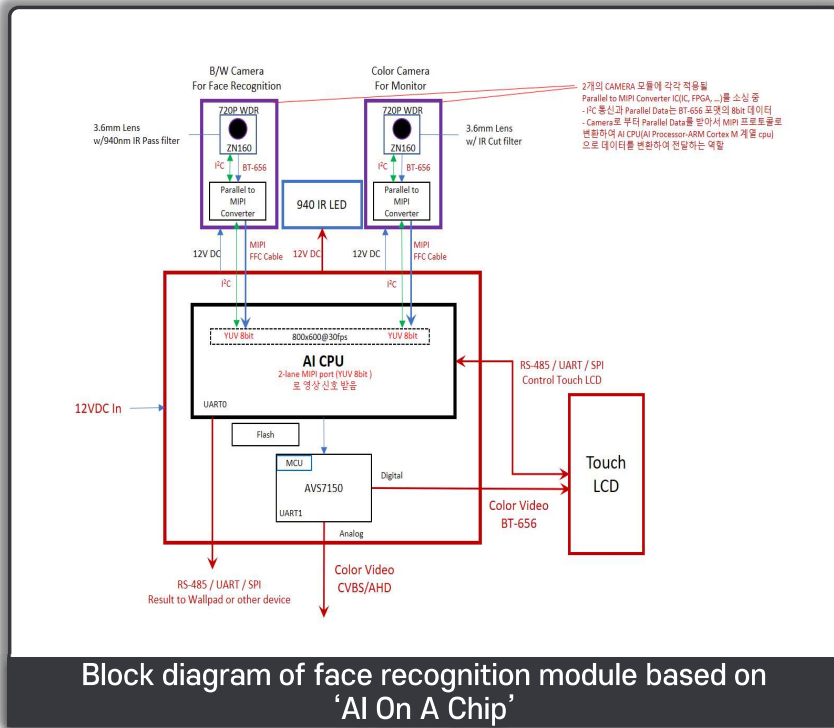
'21 4'th qt '22 1'st qt

'22 4'th qt '23 1'st qt

Research and development for next-generation face recognition device development

Development of a low-power, low-capacity face recognition module equipped with a lightweight AI algorithm on a chip (AI on A Chip)


- It is possible to perform necessary functions through face recognition within the device without the need to send biometric data such as face to a server or cloud-based storage device.
- Realization of 'on-device AI' that enables artificial intelligence services to be implemented in a single microprocessor through lightweight AI



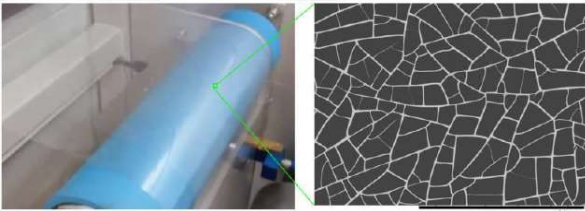
Development of non-contact kiosk and non-contact elevator button using transparent touch foil for capacitive touch screen - Journal of the Korea Convergence Society Korea Science

- Technical partnership with Touchscreen Technology Co., Ltd. (In Russia), which has original non-contact touch screen technology.

**Developed touch screen CSNF®
(film on glass)**



95
8..11
85..90



< 20 mm **multi-touch**
-45..+80
No ITO and micro-wires

불필요한 접촉은 가라!
'터치리스 기술'로 안전하게



이모출 투얼앤디스루트
(동 판안대학교 이계용합학과 저문교수)



A-Touch
23
화면에 손이 닿지 않아도
일정한 거리에 접근이 되면
터치가 작동됩니다.
CLEAN TOUCH SYSTEM



**Non-contact kiosk products
of AIWIN Co., Ltd.**

AIR TOUCH





Thank you!