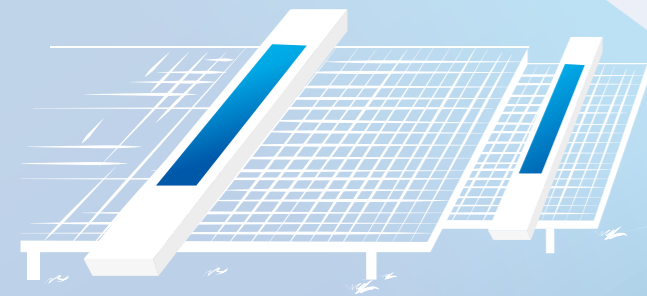


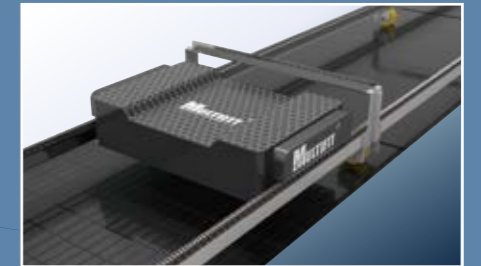
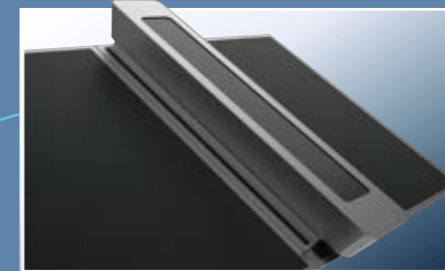


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# Photovoltaic Solutions —Solar Panel Cleaning Equipment



SUNSHINE FOR YOU MULTIFIT TO ALL



## MULTIFIT GROUP

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 [ Stock Exchange No.280768 ]



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# ● COMPANY INTRODUCTION



Multifit Solar is a high-tech manufacturer which is mainly dedicated to research and development, produce, sale and construct of solar power systems and other green energy.



60+ Patents  
20+ CE Certificates  
20+ Software Copyright

**3GWP**  
In Total

Stock Exchange  
**280768**  
2009 Multifit Establish



Our cleaning equipments include solar panel tracking cleaning robots, track-mounted fully automatic walking solar cleaning trolley, the third generation four-wheel drive mode of the solar cleaning robot with stronger cross-barrier ability, crawler-type upper and lower cleaning robot and semi-automatic photovoltaic cleaning brush for civil power stations.

Our cleaning robots realize the remote intelligent control and have many functions: automatic avoidance function to prevent the robot from slipping, automatic rectify correction mechanism and automatic adjustment to prevent the machine from deviation, running tilt, jamming, and good obstacle surmounting performance to surmount certain slopes, steps, and dislocations.

Also, a new intelligent management cloud platform for remote photovoltaic panel cleaning robot has been set up in our robot. And our cleaning robot has our own unique technology in intelligent cleaning of photovoltaic panels by robots, automatic detection, tracking and positioning, group communication and control functions, as well as the establishment of an intelligent management platform with multi-terminal control.

In the future, Multifit will be continually committing to improve the renewable energy industry and develop more efficient and cost-effective solar cleaning solutions.



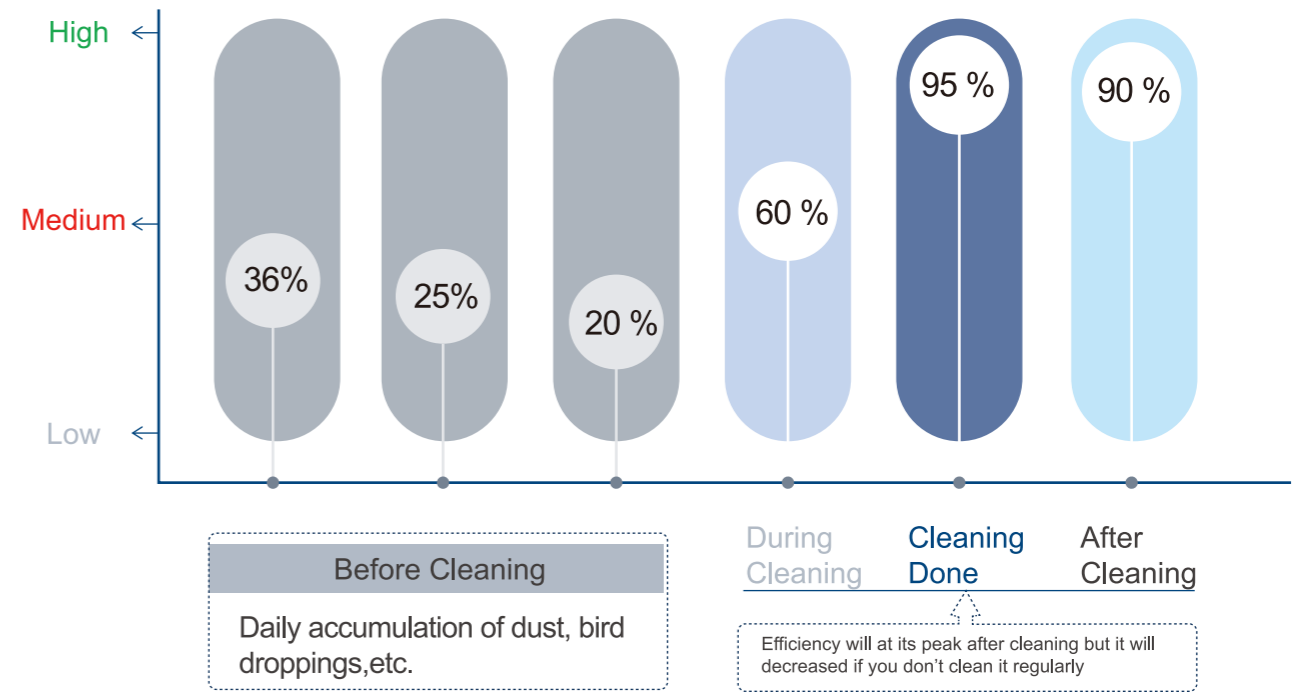


Impact of pollutants, dust, bird droppings, rust, etc. on power generation efficiency.



# ● THE IMPORTANCE OF CLEANING THE SOLAR PANEL

## Solar Panel Power Generation



## Solar Panel Cleaning Robot Testing Result

MULTIFIT Cleaning Robot Application Testing Result (FENGXI Project in China)

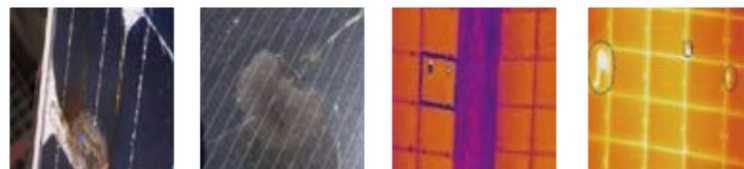
Cleaned array: array 1, array 2  
Uncleaned array: array 3  
Cleaning date: Feb 3

Data Sheet

Solar Array	Feb 3	Feb 4	Feb 5	Feb 6	Power Increase
array 1	275.1	303.2	303	300.6	10%
array 2	232.2	264.8	261	259	14%
array 3	243.1	247.9	248.82	249	7



The solar panels covered by pollutant may cause **hot spots**, which will damage the panel and even make the panel burned.



# ● CHOOSE THE CLEANING EQUIPMENT YOU NEED

## ●● Cleaning efficiency of cleaning brush and robot

Module	Reference value	MW	Area(m <sup>2</sup> )	Efficiency (m <sup>2</sup> /H)	Cleaningarea (m <sup>2</sup> /8h)	Required time (d)
MULR-C	1 person with 1 set of cleaning brush	1	2000	75	600	4
G1 (single-board)	Robotwalking speed 12m/min,550W solar panel	10	46907	1638	13104	4
G1 (double-board)				3277	26208	2
T1				600	4800	10
XY				6553	52424	1

## ●● Cleaning efficiency of cleaning brush and robot

Multifit manufacture cleaning robot MR-G series, MR-T1 series, MR-XY series and cleaning brush

### ● MR-G Series



Single-board robot



Double-board



Double-board

MR-G Series can be applied in common single-board and double-board panels, single-board robot can be suited in panels angle under 40°

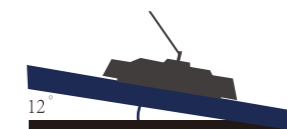
Double-board robot can be applied in panels size under 2384mm, angle under 30°

It also can be applied in four-board transverse arrangement solar arrays. If there are pressing block, the robot should be customized.

### ● MR-T1 Series

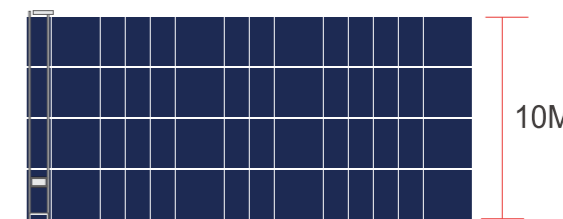
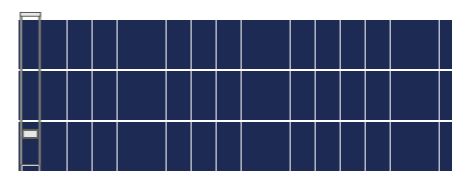


The gap is 99mm small



T1 robot can be applied in large tile array, and angle under 12°

### ● MR-XY Series



XY robot can be applied in three-board and four-board solar array, the width of panels can up to 10m

### ● MULR Series



Cleaning brush can be applied in scattered solar arrays

## HIGH-QUALITY PRODUCTS FOR EFFICIENT CLEANING

## ● APPLICATION SCENARIO



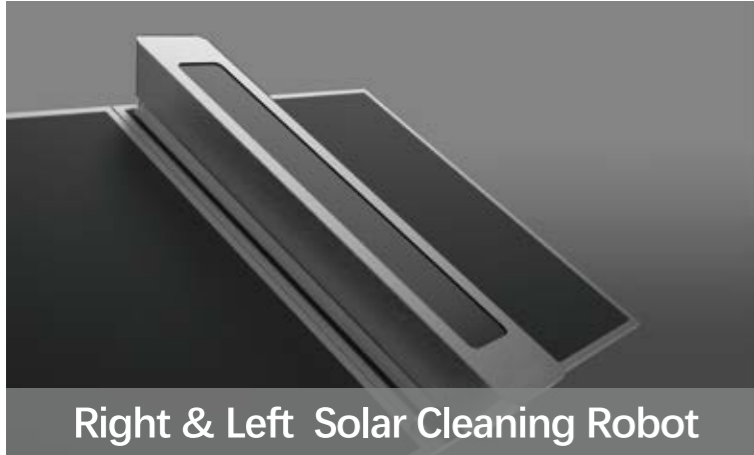
- Single/dual panel photovoltaic array
- Three-plate photovoltaic array
- Large area photovoltaic power station
- Flat roof photovoltaic systems



Customize the cleaning solution and maintain the photovoltaic system to ensure normal daily power supply.



## MULTIPLE CLEANING EQUIPMENTS, FOR VARIOUS SCENARIOS



Right & Left Solar Cleaning Robot

### MR-G Series

- MR-G1
- MR-G2
- MR-G-D (Double Brush)

Working mode: Through automatic walking right and left in the aluminum frame to achieve intelligent cleaning of the solar panels .



Tracking Solar Cleaning Robot

### MR-T1 Series

Working mode: through AI algorithm and visual detection to achieve full automatic cleaning of solar panels, cleaning the scene, without missing any dead corners.

### MR-P1 Series

Photothermal glass cleaning robot

## ● SOLAR PANEL CLEANING ROBOT

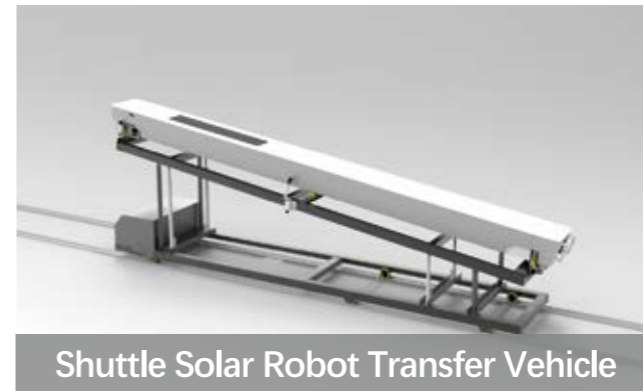


Up&Down Solar Cleaning Robot

### ● MR-XY Series

Working mode:

Through automatic up and down cleaning to achieve intelligent cleaning of the solar panels



Shuttle Solar Robot Transfer Vehicle

### ● MR-AR Series

Bridging, Robot-parking Spot, return space

Full-automatic rail-type transfer vehicle

Working mode: by laying the track on the side of the solar array, the transport vehicle walks on the track automatically, and the automatic transport cleaning robot performs the cleaning task in different solar arrays

### MULR Series ■ ■ ■

- Scrape brush MULR-A
- Single head brush MULR-B
- Double head brush MULR-C
- Rolling brush MULR-D



Semi-Automatic Solar Cleaning Brush

## SOLAR PANEL CLEANING EQUIPMENT

## ● Right & Left Solar Cleaning Robot



### ● Solar Panel Cleaning Robot MR-G :

Light-weight equipment below 30 kgs.

Applicable to various arrangement arrays and various power stations.

It has the automatic edge sensing technology to prevent itself from sliding down.

During running, it can automatically correct and adjust itself, in order to prevent machine deviation and jamming.

Intelligent opening and cleaning mode in rainy days.

You can adjust the brush downward to increase the cleaning ability and double the service life of the brush.

Include slope, step and misalignment.

It can clean 1.2MWp per day.

It can automatically run and stop. And remotely controlled by the controller.



### Solar Panel Cleaning Robot MR-G-D ( Double Brush ) :

The double-brush cleaning robot MR-G-D: Better cleaning effect with double roller brush, overcome the disadvantage that the single-roller brush cannot clean the edge of the photovoltaic array, and can adapt to the photovoltaic system assembled by multiple rows of solar panels in an array.

## RIGHT & LEFT SOLAR CLEANING ROBOT MR-G

# ● Tracking Solar Cleaning Robot

## Tracking route solar cleaning robot MR-T1



The visual positioning accuracy is less than 1 cm, and the accidental falling design is prevented. Global power planning and intelligent alarm function.

Falling Protection, one person can move it , more convenient transportation and loading, easy to replace consumable parts, eco-friendly economy and mutiple material consumption can be reused .

The path planning passes 100% coverage at one time, and only needs one key operation. The new sensing system and the algorithm accomplish the fully autonomous operation.

A single machine can replace 10 labours, and one single person can monitor over 100 robots. For large-scale photovoltaic power plants, they can realize large-scale manual replacement.

### Cleaning Ability

- Sink-float dust (adhesion  $\leq 10-6N$ ) cleaning result  $\geq 99\%$
- Dust accumulation (adhesion  $\leq 10-4N$ ) cleaning result  $\geq 99\%$
- Dry bird droppings (adhesion  $\leq 10-2N$ ) cleaning result  $\geq 99\%$
- Heavy metal contamination (adhesion  $\leq 20-10N$ ) cleaning result  $\geq 99\%$
- Cleaning efficiency (square meter/hour)  $\geq 600$

- Fully automatic operation
- autonomous cross-barrier program
- array spacing bridging scheme



### Security Capability

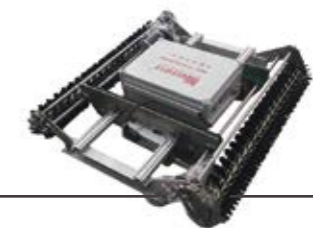
- Working mode: autonomous operation (pre-planned path); remote control;
- Positioning method: AI vision
- Positioning accuracy:  $\leq 10mm$
- Steering mode: crawler-type maneuvering
- Anti-falling protection: AI vision + gravity sensing
- Anti-slip protection: crawler-type resistance + sucker
- Anti-tilting protection: AI self-correcting algorithm
- IP Level: IP65

### Recommended Working Conditions

- Ambient temperature:  $-10\sim 50^{\circ}C$
- Component Humidity: 5%~95% (No condensation)
- Component splicing gap: 20~90mm

### Photothermal glass cleaning robot

MR-P1 (Customized)



## TRACKING SOLAR CLEANING ROBOT MR-T1



## ● Up&Down Solar Cleaning Robot



### ● Solar Panel Cleaning Robot MR-XY

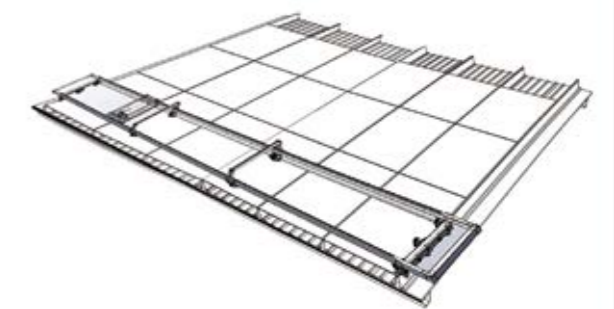
The cleaning robot can adapt to the photovoltaic system assembled by multiple rows of solar panels in an array. The aluminum alloy support. The frame part adopts multi segment splicing structure, which is convenient for transportation.

Without manual cleaning, integrated dry cleaning and water cleaning model .

It adopts lithium battery and brushless motor, which is durable.

Automatic edge sensing technology to prevent the robot from sliding. Autistic danger. The length of the equipment can be adjusted according to the size of solar panel

Convenient to use in different photovoltaic power stations. Remote control with independent power supply.



### Smart Management Control System

#### Track the status of the MR-XY Cleaning Robot

1. Improve the transmission efficiency of solar panels.
2. Extend the service life of the panel.

Turn on the intelligently managing control system according to your needs, follow up in real time, and keep your solar panels as clean as new.

## UP & DOWN SOLAR CLEANING ROBOT MR-XY

# ● Shuttle Solar Robot Transfer Vehicle

## Overview of Bridge, Robot-Parking Spot and Returning Space ●●

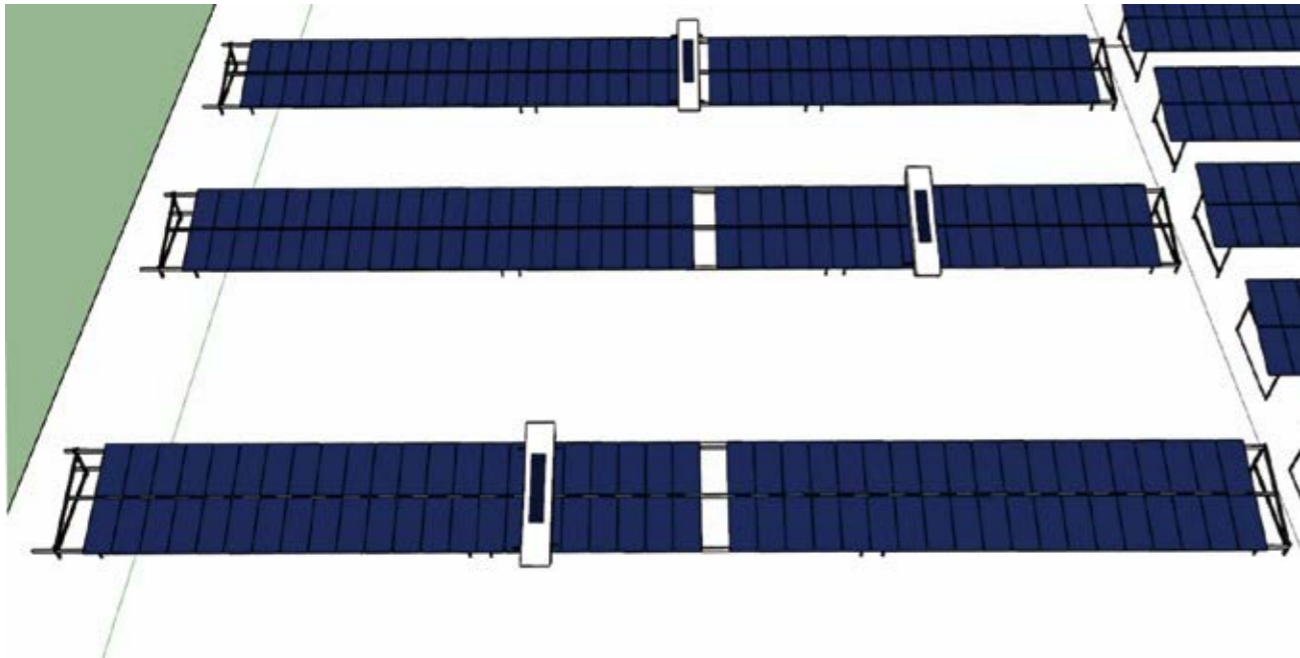
Bridging, apron and parking space are reserved facilities planned before the construction of photovoltaic system. If the power station does not have relevant supporting equipment, it can be built according to the rolling photovoltaic array.

The purpose of the construction is to make the cleaning robot work faster, start and stop smoothly and reduce the frequency of personnel handling cleaning machines.

Bridging: according to the ups and downs of the array, establish a link track to allow the cleaning robot to walk smoothly into the next PV panel cleaning range.

Apron: the harbor where the solar cleaning robot is parked. According to your needs, the cleaning work will be carried out at fixed time and fixed point. The solar cleaning robot will return to the apron and wait for the next cleaning service. The parking will not affect the power generation rate of the photovoltaic power station.

Return position: this is a position that is easy to be ignored. If there is no return position, there will always be an invisible position at the edge of the photovoltaic panel, which not only affects the power generation efficiency, but also affects the life of the photovoltaic panel. The return position is to allow the cleaning robot to extend the cleaning range and make each solar panel of the photovoltaic array clean in place, in addition, it can protect the cleaning robot from falling when the sensing wheel is out of control.



## Overview of Transfer Vehicle ●●

It is used for the maintenance of large photovoltaic power station system, reducing the manual handling process, and can clean photovoltaic panels in time.

It is time-consuming and laborious to carry the cleaning robot manually. If the photovoltaic power station is built on a flat ground and roof, it is recommended that you equip a transfer vehicle that can walk automatically when purchasing the cleaning robot. Press the start switch, the transfer vehicle moves forward, the sensor on the transfer vehicle senses the photovoltaic array and aligns with the array, the transfer vehicle stops moving forward, at this time, the front and rear rods are adjusted and lifted to the level of the photovoltaic array, and the G1 solar cleaning robot senses and starts the equipment to start cleaning. After cleaning, the G1 solar cleaning robot moves to the transfer vehicle, and the transfer vehicle moves to the next array to continue cleaning.

## Customization of Transfer Vehicle

According to the array data of your photovoltaic power station, the technical department will provide you with the design scheme.

The data required are:

1. Width of solar panel array;
2. The height (maximum and minimum dimensions) of the solar panel array and the angle of the photovoltaic panel;
3. Array drawings and panoramic photos of the photovoltaic power station.

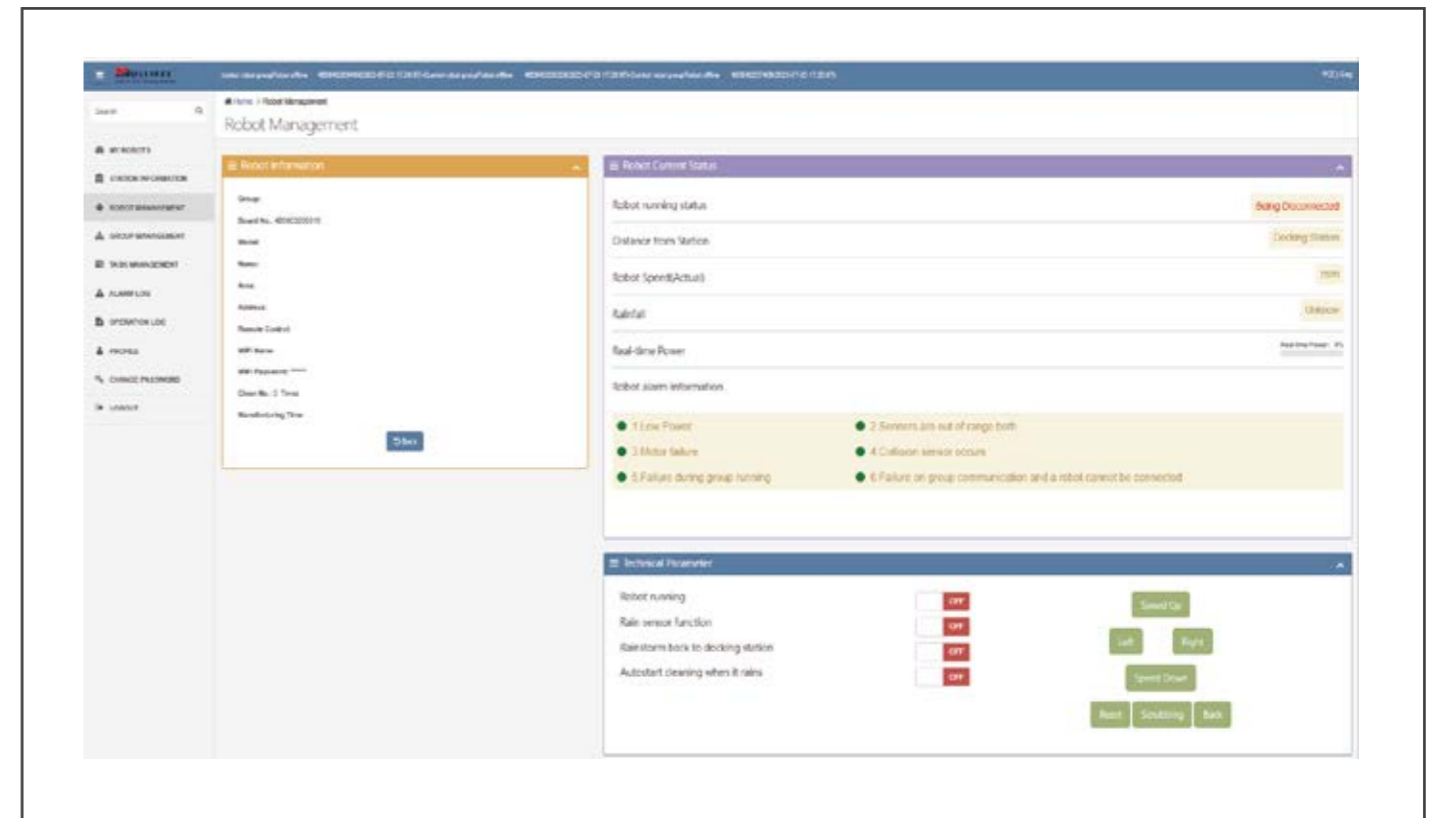
# SHUTTLE SOLAR ROBOT TRANSFER VEHICLE MR-AR

# ● Controller/Remote Smart Management Control System

## Controller

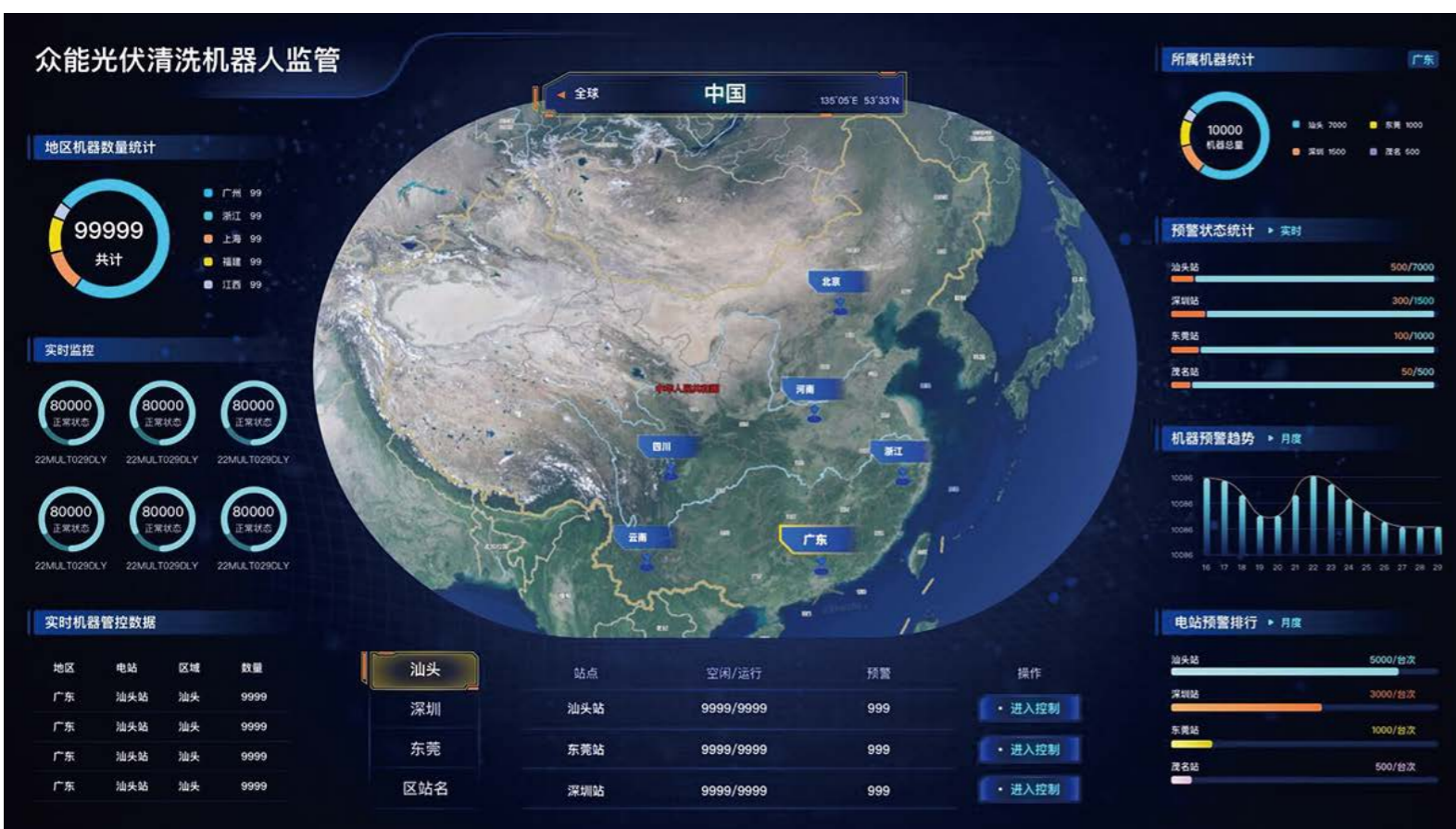
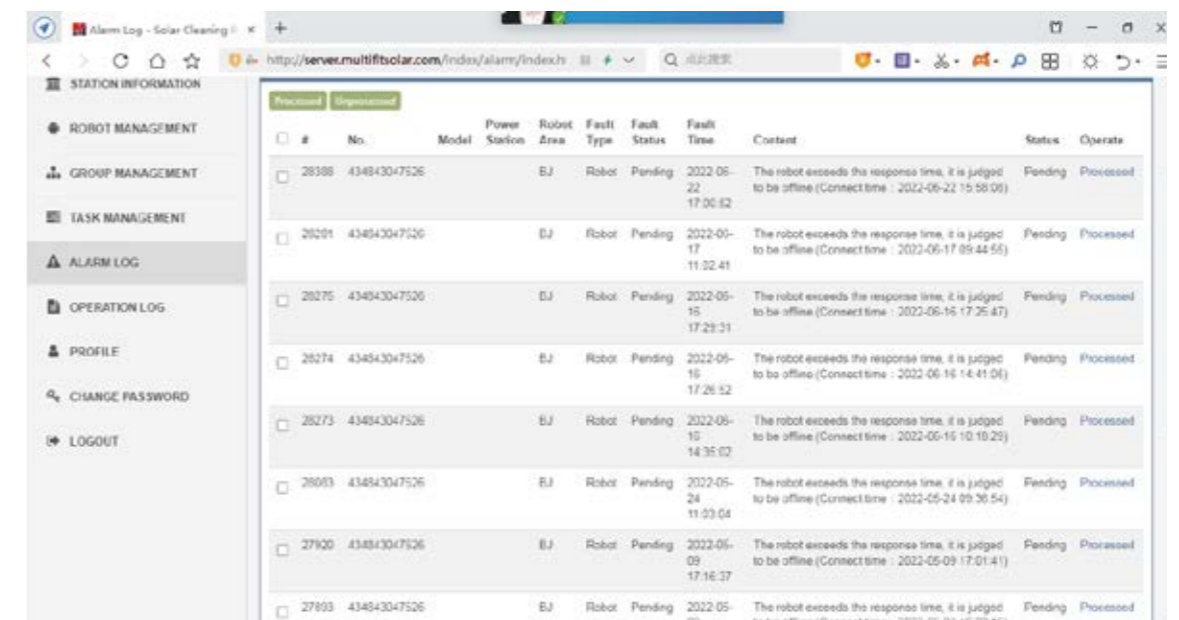
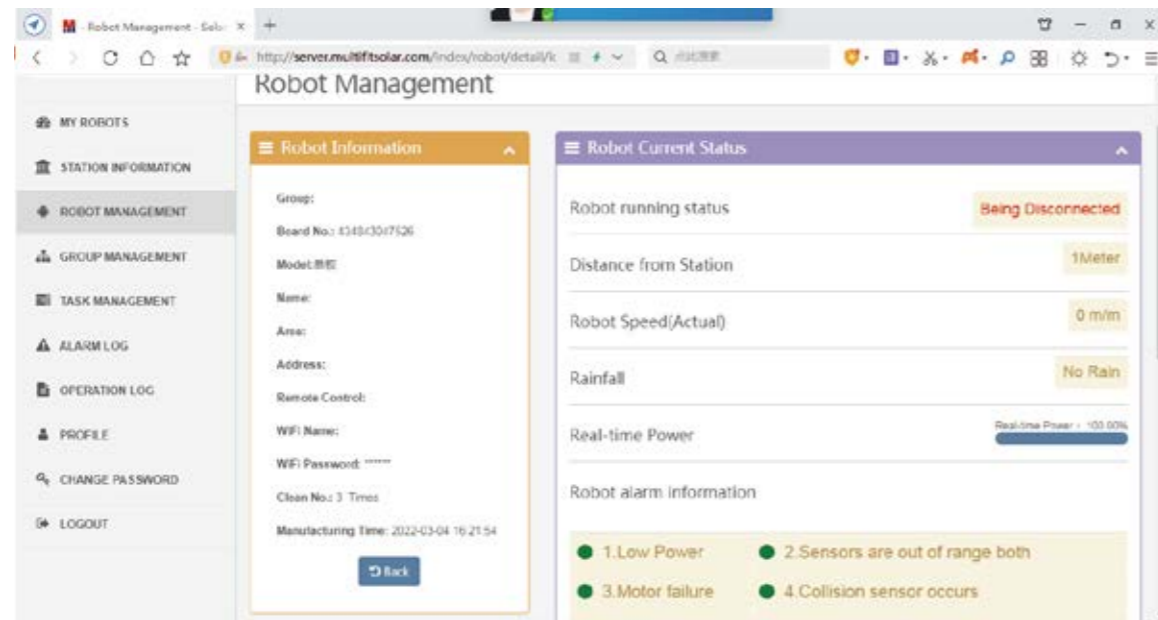


## Remote Smart Management Control System



# REMOTE SMART MANAGEMENT CONTROL SYSTEM

# Remote Smart Management Control System



## REMOTE SMART MANAGEMENT CONTROL SYSTEM

● **Semi-Automatic Solar Cleaning Brush**



**SCRAPE BRUSH MULR-A**



No ladder or stool is needed, just standing on the ground, you can easily finish.Cleaning, which is safe and convenient. The back of the brush head can be used to scrape snow and water without leaving dust. A brush and mop can be applied to one rod.



**SINGLE HEAD BRUSH MULR-B (Single-head)**



Single-head cleaning brush can be used to clean small area solar panels. The bristles are moderately soft and hard, and do not harm the photovoltaic panel. The angle of the brush head fits the solar panel, which can be adjusted with the angle of the solar panel.



**DOUBLE HEAD BRUSH MULR-C (double-head)**



Cleaning brush can be used for double-speed and convenient cleaning. The design of dual motors can maximally offset the centrifugal force which originated from the running of the motor, because of that the brush can runs smoothly, as the operation become easier with higher efficiency for cleaning. Lithium battery is carried in a backpack, no need to carry batteries, easy to carry. The length of the water supply pipe can be customized, please call for consultation. The angle of the brush head fits the solar panel, which can be adjusted with the angle of the solar panel.



**ROLLING BRUSH MULR-D**



It can be used for both washing and drying, which can adapt to various complex terrains and environments. The lithium battery pack can last about 8-10 hours, it is more convenient to clean. For water supply, this washing machine does not have its own water supply device, but provides a variety of water supply pump schemes for everyone to choose freely.

**SEMI-AUTOMATIC SOLAR CLEANING BRUSH MULR**

● **PROJECT CASES**



50KW rooftop PV project in Jakarta, Indonesia



5MW ground PV power station in Maltese



2MW industrial and commercial PV power station in Malaysia



200KW PV poverty alleviation power station in Zhengzhou, Henan province



1MW rooftop PV power station in Jinguo Xingjun, Shantou



200KW rooftop PV power station bridge in Guangao, Shantou



6MW rooftop PV power station in Pakistan



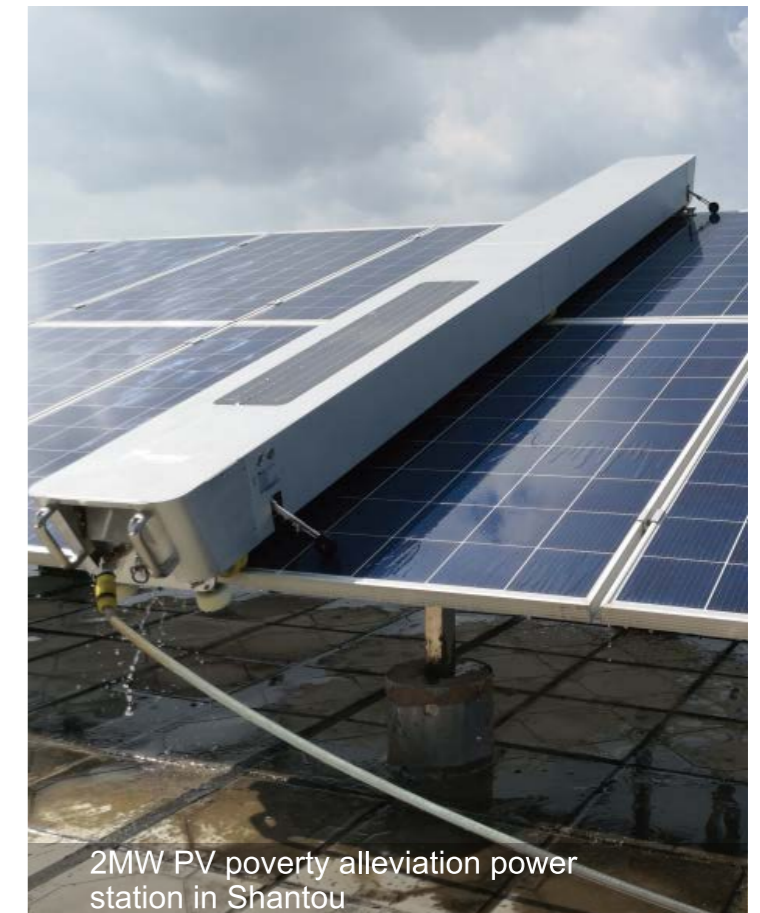
10MW ground-based PV power station in Pakistan



1.5MW rooftop PV power station in Turkey



20MW ground-based PV power station in the United States



2MW PV poverty alleviation power station in Shantou

● **PROJECT CASES**



1MW rooftop PV power station in Longhu Shantou



6.3MW Qatar World Cup-Transportation photovoltaic power station



20MW ground-based PV power station in the United States



1.134MW ground-based PV power station in the Guang Dong



6.3MW Qatar World Cup-Transportation photovoltaic power station



30 MW Solar Panels Cleaning Solutions in Hainan, China

● **PROJECT CASES**



1.134MW Factory Roof in Guangdong



100KW Roof in La feiyi Company



1.134MW Factory Roof in Guangdong



5KW Roof in Puerto Rico



10KW Roof in Bulgaria

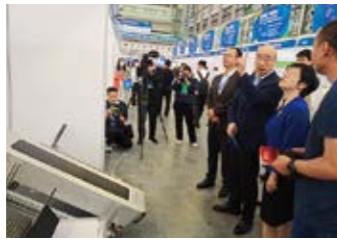


3KW Roof in Thailand





Won the "Scientific Innovation China Innovative Enterprises" National Top 100



Become the "Governing Unit" of Aodong Enterprise Development Promotion Center



Strategic Partners with CIDC Shantou University



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Photovoltaic System



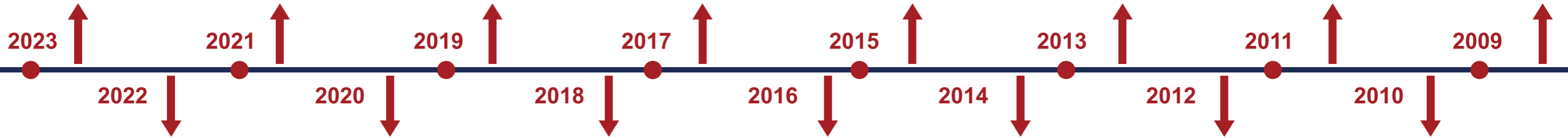
Exporting Countries 50<sup>+</sup>



Enter the Italian Market



Multifit Formally Established in Beijing



Shenzhen Branch was Established in 2022



The Solar Panel Cleaning Robot G1 was Born



Overseas Chinese Board Listing Success  
Stock Code: 280768



High-Tech Enterprise Certification



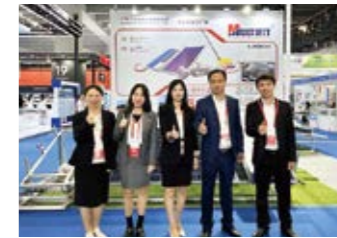
First Time to Participate in Munich Solar Exhibition



The 1st Combiner box



The 1st Inverter Successful Development





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Beijing Headquarters / Guangdong Plant / Shenzhen Branch Wechat Publish Number:Multifit

# ● PHOTOVOLTAIC OPERATION AND MAINTENANCE

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Hot blue ocean projects in emerging industry market.

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The heart-level service of the headquarters saves you the trouble to start.

### AUTHORIZED DISTRIBUTION

Franchised dealers sell products in authorized areas or channels.

### FREE TRAINING

Provide marketing and technical training for franchised dealers.

### REBATE REWARD

Complete the sales task and reward according to the incentive policy.

### TECHNICAL SUPPORT

Assist in the design of schemes and comprehensive technical consulting services during the support period.

### PRODUCT SUPPORT

Provide copies of relevant certificates and letters of authorization.