Headquarter · Shanghai
Tel +86 17717537975
info@cotechsolar.com

Cotech · Hong Kong
Tel +852 5791 3679
hk@cotechsolar.com

Europe · Rotterdam
Tel +49 152223110991
eu@cotechsolar.com

PV O&M ROBOTICS

Full-auto Cleaning Robot

Self-powered on-array robot — waterless, AI-navigated, cleans utility arrays 24/7 with zero plant power

99.5 % UP TO DUST REMOVAL

24/7 SELF-POWERED

- **Waterless** — microfiber + airflow
- **Self-powered** — onboard PV + LiFePO4
- **AI navigation** — auto path & obstacle
- **24/7 autonomous** — 99.5% dust removal

Waterless, module-safe cleaning

- Microfiber roller + controlled airflow lifts dust without a drop of water
- Soft contact — verified no module damage after 20 000 cleaning cycles
- Removes up to 99.5% of dust, recovering soiling-related yield losses

Self-powered & autonomous 24/7

- Onboard solar panel + LiFePO4 battery — draws zero power from the plant
- AI vision plans the path, crosses module gaps and detects obstacles
- Daily auto-schedule by soiling / temperature; cloud + app monitoring

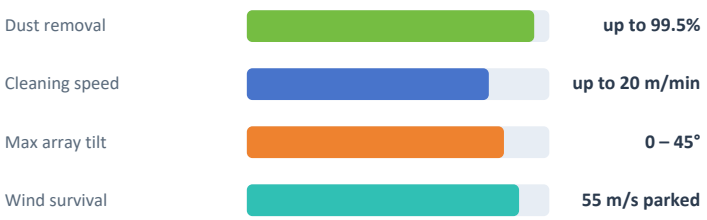
Built for harsh sites

- IP65 dust & water protection with UV anti-corrosion housing
- Anti-skid + windproof clamping; survives 55 m/s gusts when parked
- RS485 / LoRa / LTE / Bluetooth · ModBus · OTA remote upgrade

Key specifications

Type	**Full-auto on-array robot**
Cleaning	**Waterless (dry)**
Dust removal	**up to 99.5%**
Power	**Self-powered PV + LiFePO4**
Operation	**24/7 autonomous**
Max array tilt	**0 – 45°**
Ingress	**IP65**
Design life	**25 years**

PERFORMANCE



WHY COTECH

Field-tested & calibrated
Every robot run-in & cleaning-verified before shipment

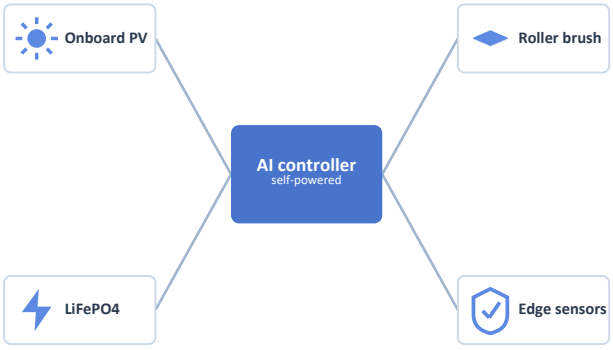
IDEAL FOR

- Utility-scale
- C & I rooftops
- Desert plants
- Ground-mount
- Fixed-tilt
- Tracker rows

APPLICATIONS

Utility · C & I · Rooftop · Desert

SYSTEM TOPOLOGY



CERTIFICATION & QUALIFICATION

CE · RoHS · IEC · IP65 · ISO 9001 · TÜV

Performance at 25 °C; dust-removal vs. heavy-soiling baseline. Specifications subject to change.

Full-auto Cleaning Robot — technical data

Specification	Data
Cleaning	
Cleaning method	Waterless (dry) microfiber
Dust removal rate	up to 99.5%
Cleaning speed	up to 20 m/min
Module durability	no damage after 20 000 cycles
Adaptability	
Adapted module tilt	0 – 45°
Vertical offset tolerance	50 mm (customizable)
Horizontal offset tolerance	50 mm (customizable)
Module gap tolerance	20 mm
Power & control	
Power supply	Self-powered (onboard PV + battery)
Battery	LiFePO4
Operation	24/7 autonomous, auto-schedule
Navigation	AI vision + multi-sensor path planning
Interface / protocol	RS485 / LoRa / LTE / Bluetooth · ModBus
Monitoring	Web / Bluetooth / 4G cloud + OTA
Environment & safety	
Operating temperature	−20 °C ~ +60 °C
Humidity	0 ~ 95% non-condensing
Safe / max wind	15 m/s working · 55 m/s parked
Safety	Anti-skid, windproof clamp, anti-drop
Ingress / life	IP65 · 25 years

MECHANICAL & SYSTEM

Mechanical	Data
Brush	**Anti-static microfiber roller**
Drive	**Dual-track / all-wheel**
Body material	**Al alloy + ABS, UV-stable**
Ingress protection	**IP65**
Operating temp.	**−20 ~ +60 °C**
Design life	**25 years**

COTECH SOLAR — vertically-integrated manufacturing

20 GW shipped · **120+** countries · **CE · IEC** certified

IDEAL FOR

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- Desert plants
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- Fixed-tilt
- Tracker rows

Clean panels, peak yield — autonomously.

Robotic PV cleaning that recovers soiling losses with zero water, from a Top-50 solar maker.

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- **Waterless microfiber** — no water, no module damage
- **Self-powered** — onboard PV + LiFePO4
- **Smart & safe** — AI vision, anti-drop, auto-stop
- **High throughput** — fast, autonomous cleaning

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PV O&M ROBOTICS

Semi-auto Cleaning Robot

Lightweight remote-controlled robot — all-wheel drive, dry or wet, one-person handling between rows

18 m/min UP TO CLEAN SPEED

100 m REMOTE CONTROL

- **Lightweight** — one-person handling
- **Wireless remote** — 100 m + Bluetooth APP
- **Dry & wet** — cleaning, customizable
- **All-wheel drive** — obstacle crossing

Flexible all-wheel cleaning

- All-wheel drive with flexible suspension — superb obstacle crossing & climbing
- Dry or wet cleaning, customizable to site soiling
- Ideal for complex, multi-row or irregular layouts

Wireless remote control

- Industrial wireless remote up to 100 m, plus Bluetooth APP
- Active anti-drop edge sensing with automatic stop
- Fault detection & response strategy; remote firmware upgrade

Light, portable, tough

- Lightweight body + auxiliary handling wheel — one-person carry between rows
- Swappable battery keeps cleaning going around the clock
- IP65, −20 ~ +60 °C, 25-year design life

Key specifications

Type	**Semi-auto remote robot**
Cleaning	**Dry & wet (cust.)**
Clean speed	**up to 18 m/min**
Power	**Swappable battery**
Control	**Wireless 100 m + APP**
Max array tilt	**0 – 45°**
Ingress	**IP65**
Design life	**25 years**

PERFORMANCE

Cleaning speed	**up to 18 m/min**
Dust removal	**up to 99.5%**
Max array tilt	**0 – 45°**
Wind survival	**55 m/s parked**

WHY COTECH

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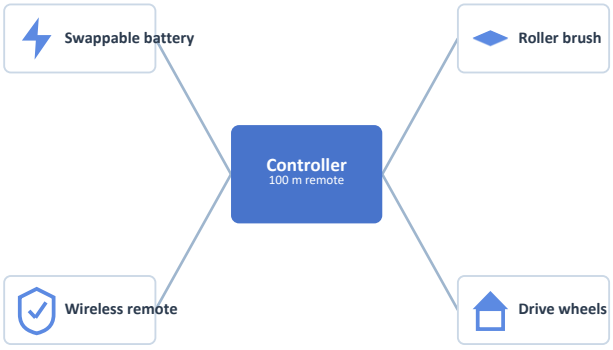
IDEAL FOR

- Complex layouts
- C & I rooftops
- Multi-row arrays
- Ground-mount
- Hard-to-reach
- Fixed-tilt

APPLICATIONS

Utility · C & I · Rooftop · Desert

SYSTEM TOPOLOGY



CERTIFICATION & QUALIFICATION

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Performance at 25 °C; dust-removal vs. heavy-soiling baseline. Specifications subject to change.

Semi-auto Cleaning Robot — technical data

Specification	Data
Cleaning	
Cleaning method	Dry & wet (customizable)
Dust removal rate	up to 99.5%
Cleaning speed	up to 18 m/min
Module durability	soft roller, module-safe
Adaptability	
Adapted module tilt	0 – 45°
Vertical offset tolerance	50 mm (customizable)
Horizontal offset tolerance	50 mm (customizable)
Module gap tolerance	20 mm
Power & control	
Power supply	Swappable rechargeable battery
Battery	LiFePO4
Control mode	Wireless remote (100 m) + Bluetooth APP
Interface / protocol	Bluetooth · ModBus
Handling	Auxiliary wheel, one-person carry
Safety	Anti-drop edge sensing, auto-stop
Environment	
Operating temperature	−20 °C ~ +60 °C
Humidity	0 ~ 95% non-condensing
Safe / max wind	15 m/s working · 55 m/s parked
Ingress / life	IP65 · 25 years

MECHANICAL & SYSTEM

Mechanical	Data
Brush	**Anti-static microfiber roller**
Drive	**Dual-track / all-wheel**
Body material	**Al alloy + ABS, UV-stable**
Ingress protection	**IP65**
Operating temp.	**−20 ~ +60 °C**
Design life	**25 years**

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IDEAL FOR

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PV O&M ROBOTICS

Trackless Cleaning Robot

Rail-free mobile robot — centimeter-precision path planning, 1200 m²/h, shared across multiple plants

1200 m²/h UP TO CLEAN RATE

±1 cm RTK POSITIONING

- **Trackless** — no rails, no dead angle
- **±1 cm RTK** — precision path
- **1200 m²/h** — high throughput
- **Multi-site** — fleet sharing

Rail-free precision cleaning

- Centimeter-level positioning plans the optimal path — full coverage, no dead angle
- No rails or guides to install — deploy on any large ground array
- Up to 1200 m²/h throughput for utility-scale plants

Autonomous & shareable

- Fully automatic operation; dry or wet cleaning, customizable
- Lightweight & easy to relocate — one fleet shared across multiple sites
- 3-hour endurance per charge with auto-return & recharge

Smart & connected

- RS485 / Bluetooth / 4G · ModBus · Web + APP cloud platform
- Edge & obstacle detection with anti-drop safety
- IP65, UV-resistant, 25-year design life

Key specifications

Type	**Trackless mobile robot**
Cleaning	**Dry & wet (cust.)**
Throughput	**up to 1200 m²/h**
Positioning	**±1 cm (RTK)**
Endurance	**3 h / charge**
Max array tilt	**0 – 10°**
Ingress	**IP65**
Design life	**25 years**

PERFORMANCE

Throughput	**up to 1200 m²/h**
Positioning	**±1 cm RTK**
Endurance	**3 h / charge**
Working wind	**15 m/s**

WHY COTECH

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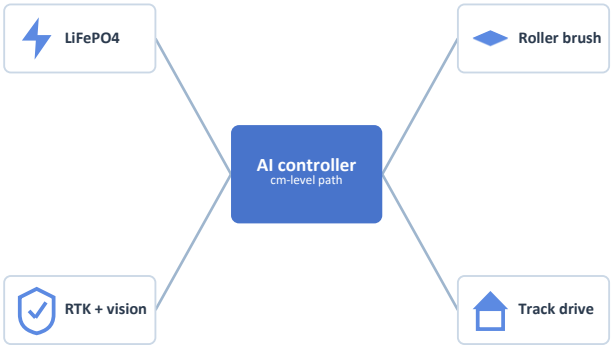
IDEAL FOR

- Large ground plants
- Low-tilt arrays
- Desert / sandy
- Agri-PV
- Multi-site fleets
- Fixed-tilt

APPLICATIONS

Utility · Desert · Agri-PV · C & I

SYSTEM TOPOLOGY



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Trackless Cleaning Robot — technical data

Specification	Data
Cleaning	
Operation mode	Fully automatic
Cleaning method	Dry & wet (customizable)
Cleaning capacity	up to 1200 m²/h
Dust removal rate	up to 99.5%
Adaptability	
Adapted module tilt	0 – 10° (ground arrays)
Vertical offset tolerance	50 mm
Horizontal offset tolerance	300 mm
Module gap tolerance	25 mm
Power & control	
Power supply	Rechargeable battery
Battery / endurance	LiFePO4 · 3 h per charge
Positioning	RTK + vision, ±1 cm, optimal-path planning
Interface / protocol	RS485 / Bluetooth / 4G · ModBus
Monitoring	Web + APP cloud platform
Control mode	Auto / Local / Remote
Environment	
Operating temperature	−20 °C ~ +60 °C
Humidity	0 ~ 95% non-condensing
Safe operating wind	15 m/s
Ingress / life	IP65 · 25 years

MECHANICAL & SYSTEM

Mechanical	Data
Brush	**Anti-static microfiber roller**
Drive	**Dual-track / all-wheel**
Body material	**Al alloy + ABS, UV-stable**
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