Division of Engineering Science
UNIVERSITY OF TORONTO

Automated Solar Panel Cleaning System

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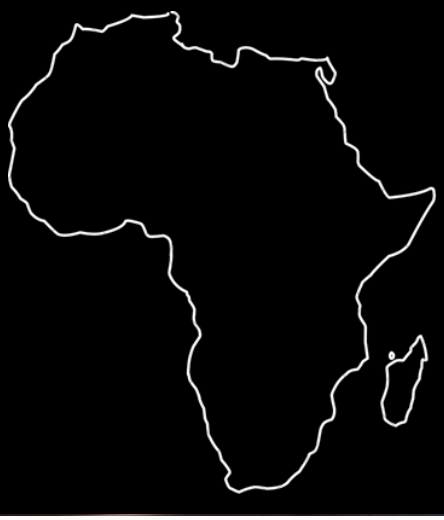


Background

The RFP identifies solar power as a promising sustainable energy source for Africa, but highlights dust accumulation as a major factor reducing panel performance. Affected stakeholders include both individual users and electricity providers, who require safe, energy-efficient, low-maintenance, and quiet dust removal solutions.

Our Solution

Our mechatronic system uses rotating brushes to remove dust from solar panels, improving efficiency and cleanliness. It is safe, quiet, easily maintained, automated and could fit existing solar panels with different sizes.

AUTOMATION

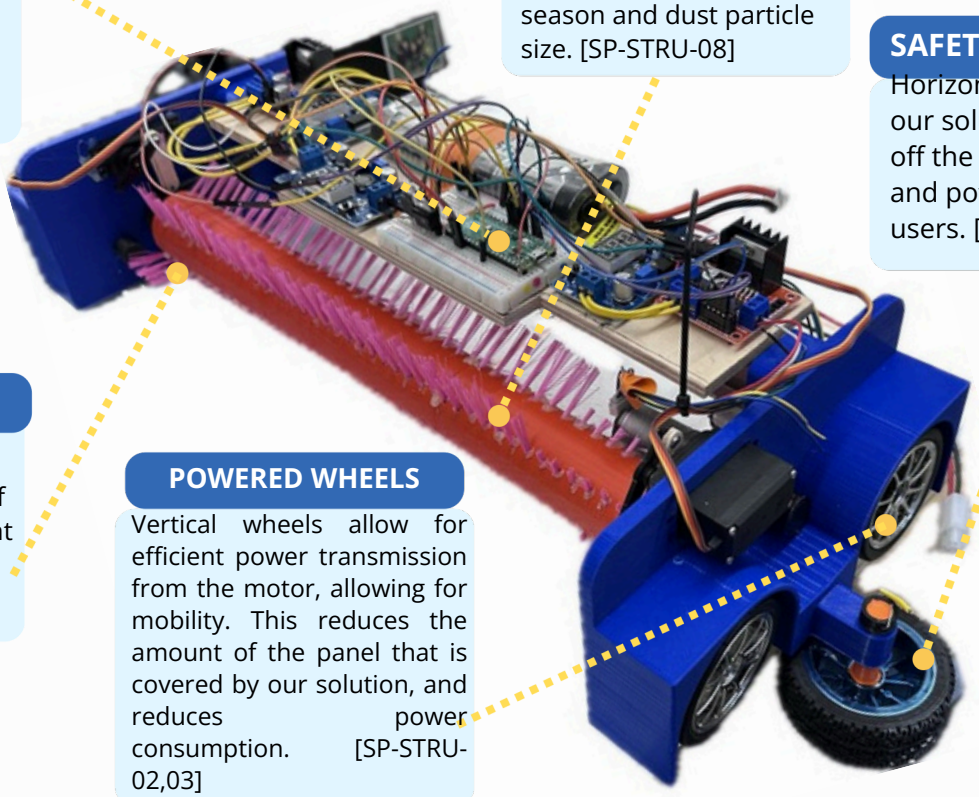
Our solution is controlled by a Raspberry Pi Pico microcontroller, which automatically determines when to clean the panel by reading the voltage output of the cells. [SP-SOFT]

REPLACEABLE BRUSHES

The brush head can be replaced based on local conditions including season and dust particle size. [SP-STRU-08]

SAFETY WHEELS

Horizontal wheels prevent our solution from slipping off the side of solar panels and potentially hurting users. [SP-STRU-05]



BRUSH LIFTING

The brush will ilft after reaching the right edge of the solar panel, to prevent the dust form the solar panel. [SP-STRU-01]

POWERED WHEELS

Vertical wheels allow for efficient power transmission from the motor, allowing for mobility. This reduces the amount of the panel that is covered by our solution, and reduces power consumption. [SP-STRU-02,03]