Dust-Busters
A Solar Panel Air-Jet Cleaner for Affordable and Clean Energy

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WARREN TECH

MESA

Solar panels lose efficiency due to debris buildup. Traditional cleaning methods are expensive, water-wasteful, and often inaccessible for residential users.

Objectives

- Design a low-cost, water-free system

- Automatically clear debris from panels

- Boost solar efficiency and reliablility year round

User Requirements

- Affordable
- User friendly control
- Water-free
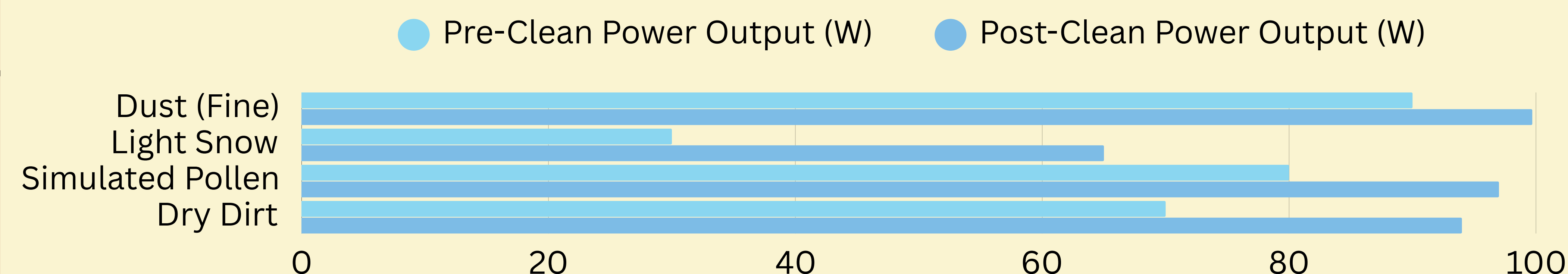- Low maintenance
- Easy to install
- Water/Snow -Resistant

The final system is affordable, efficient, and simple to use. Future improvements will focus on automation and better performance in tough weather.

Tool-Free Solar Panel Mount Clamp

Smooth-Turn Screw for Easy Adjustment

Funnels Directing Airflow
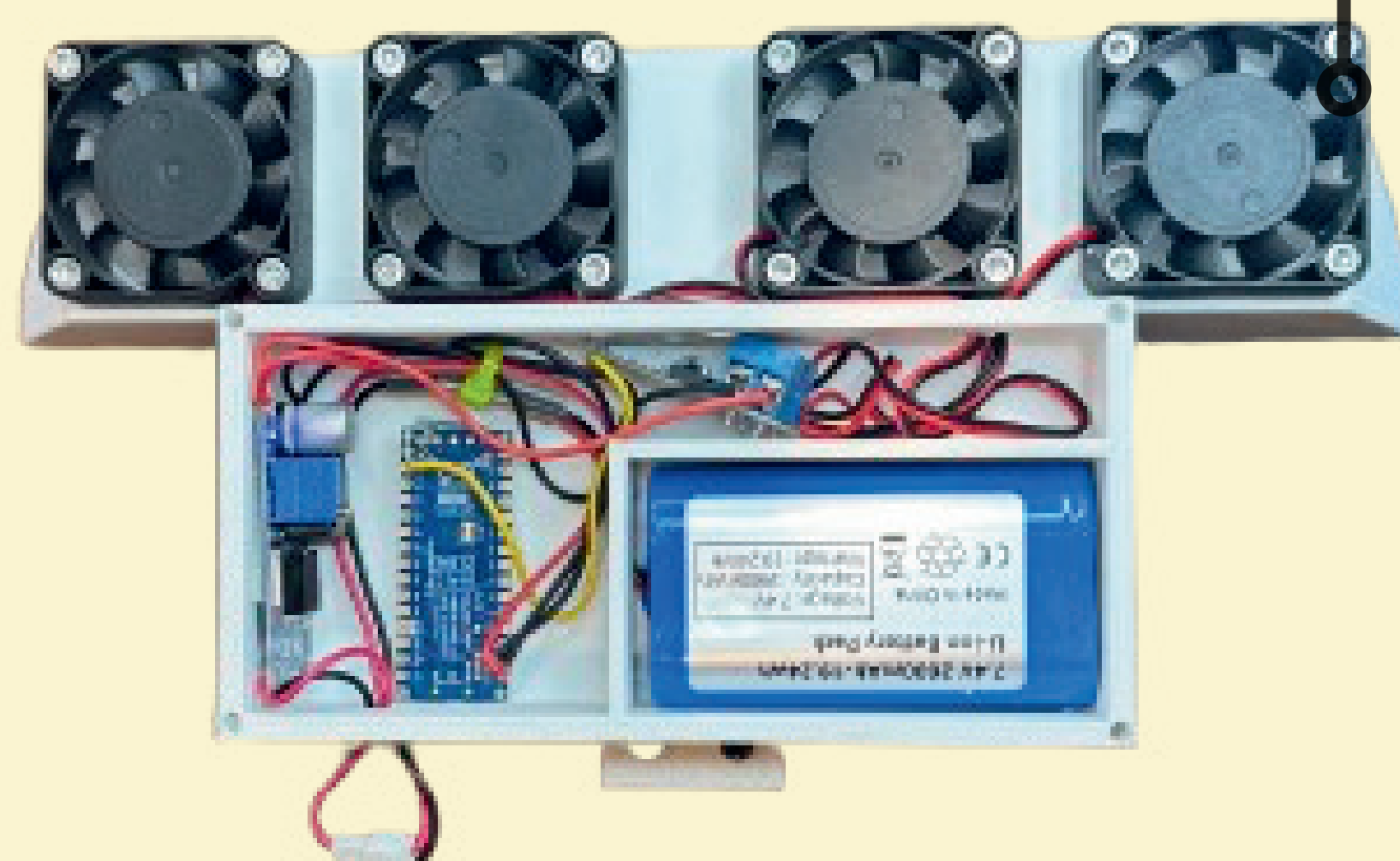
40mm Airflow Source (X4)

Prototype Details

This design features a ...

- Clamp System for **easy and quick installation**

- Four 40 mm 3-d printer fans for **maximum dust removal**

- Funnels for **targeted airflow** onto the solar panel surface.

- Mobile website for easy-to-use and **beginner friendly interface**

● Pre-Clean Power Output (W)   ● Post-Clean Power Output (W)

Dust (Fine) / Light Snow / Simulated Pollen / Dry Dirt — scale 0 20 40 60 80 100

Electronics
Arduino Nano ESP32
7.4V battery
four 40mm fans,
Blynk Interface phone app

App interface

- Remotely control your solar panel cleaner

- Simple On/Off toggles

- Set Timer feature.

- Timer auto resets + countdown

Dust-Busters Control
Offline

0

Set timer

ON
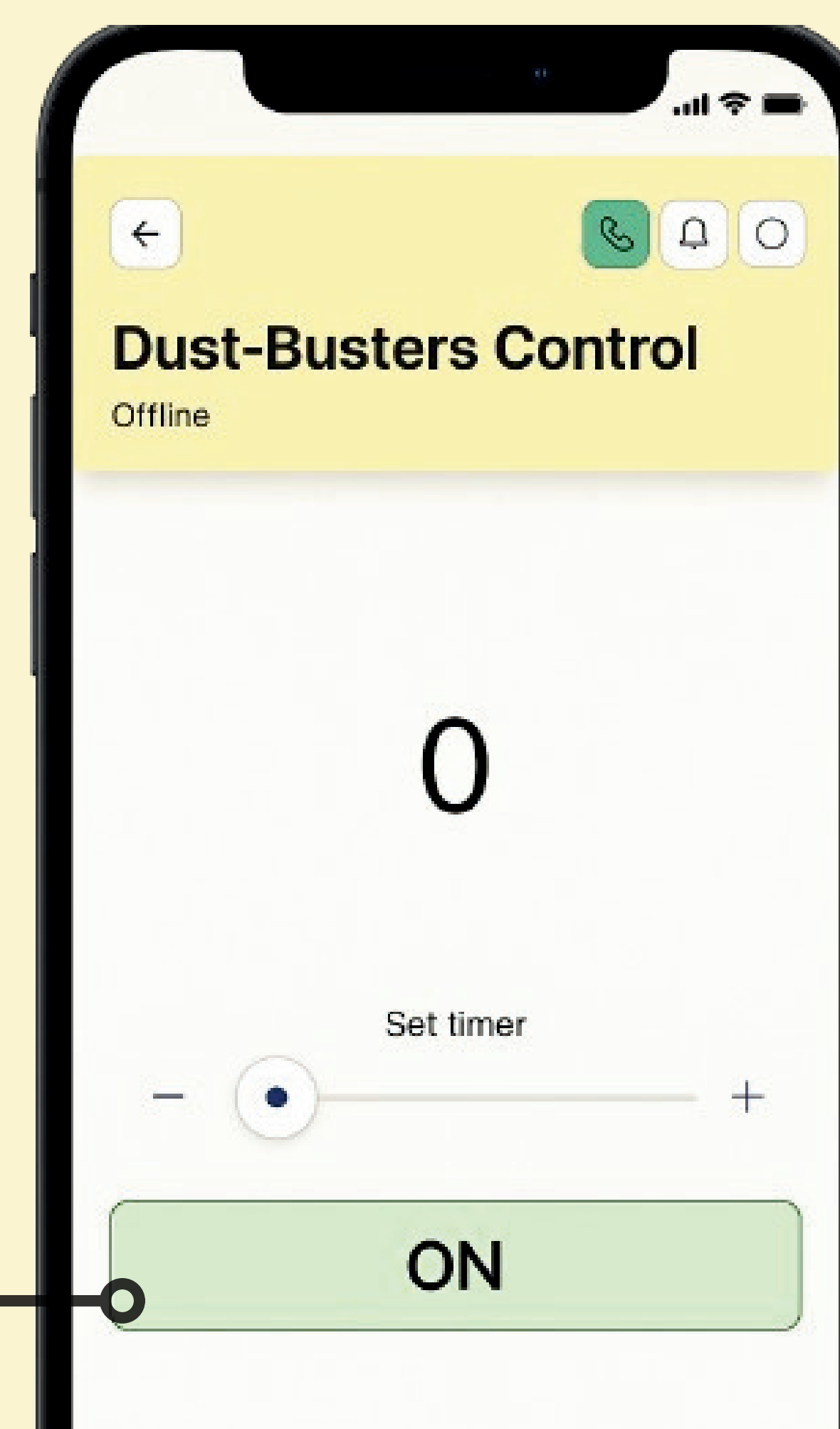
Design Process

Identify / Research
Identified inequity under UN Goal #7. Researched inequity faced by the community to identify user needs.
01

Ideate
Developed an idea: an air-powered fan system to help clean off solar panels.
02

Initial Prototype
Built and tested a 2-fan prototype to check airflow strength and overall design fit.
03

Final Prototype
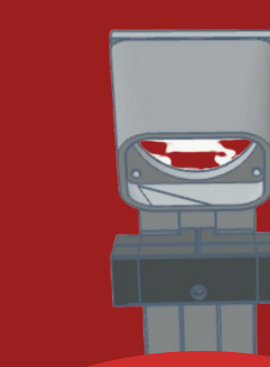Upgraded to a 4-fan layout for wider coverage and stronger airflow.
04

App Integration
Developed a phone app with an app building interface and AI model to enhance control of our product.
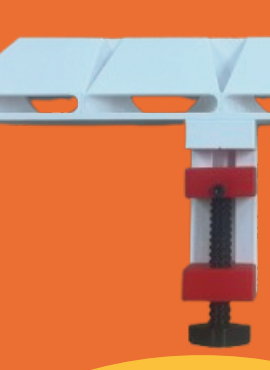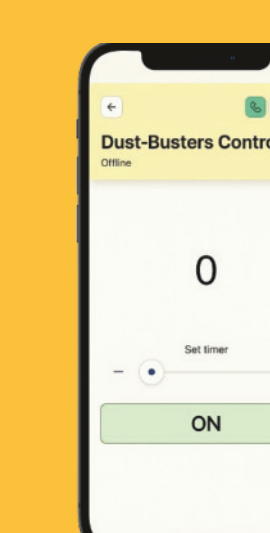**05**

Testing Process

Test	What We Did	Results
Fan Airflow	Powered Fans with 5 volts	Effective for dust and pollen; light snow removal limited.
Screw Movement	Turned screw to simulate motion	Smooth motion, but early versions lacked stability.
App Controls	Used phone app to toggle and set timer	Reliable, easy to use.
User Feedback	Showed Users	Liked simplicity, suggested app over buttons.