

MODULAR, SCALABLE AND SUSTAINABLE SOLAR POWERED OUTDOOR LUMINARIES

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ID5 - Product Design



OPPORTUNITY

Outdoor Lighting is needed for....



Aesthetics



Navigation



Safety



Security

Vision

Design and develop modular, scalable and durable sun-powered outdoor luminaries, sustainably manufactured using locally sourced materials that can be scaled and stored in singles and multiples compactly and will provide illumination for multiple outdoor lighting uses.

Challenge

Current solar powered outdoor luminaries are not easily scalable, cheaply made, difficult to store and have a high structural and functional failure rate due to harsh environmental conditions and sub-optimal designs and materials.

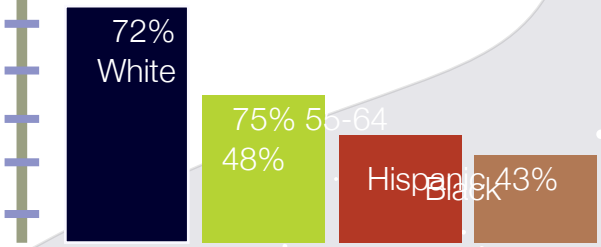
DEMOGRAPHICS

US Homeowners comprise the largest demographic category associated with this product's market.

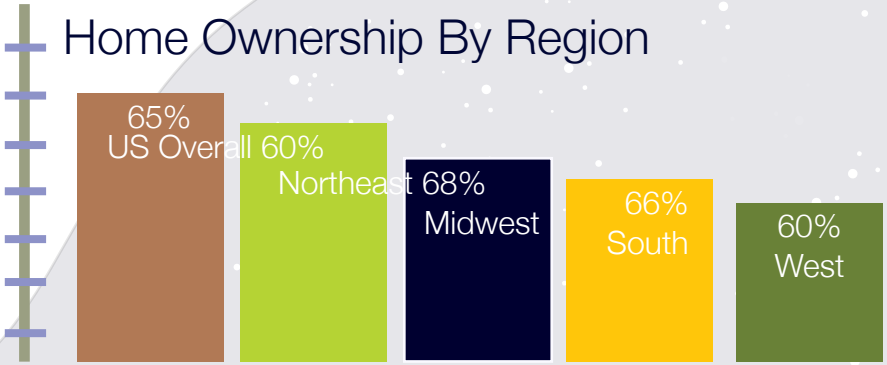
US Population: **328.2 Million**
US Homeowners: **216 Million**

65%
of all US citizens are homeowners!

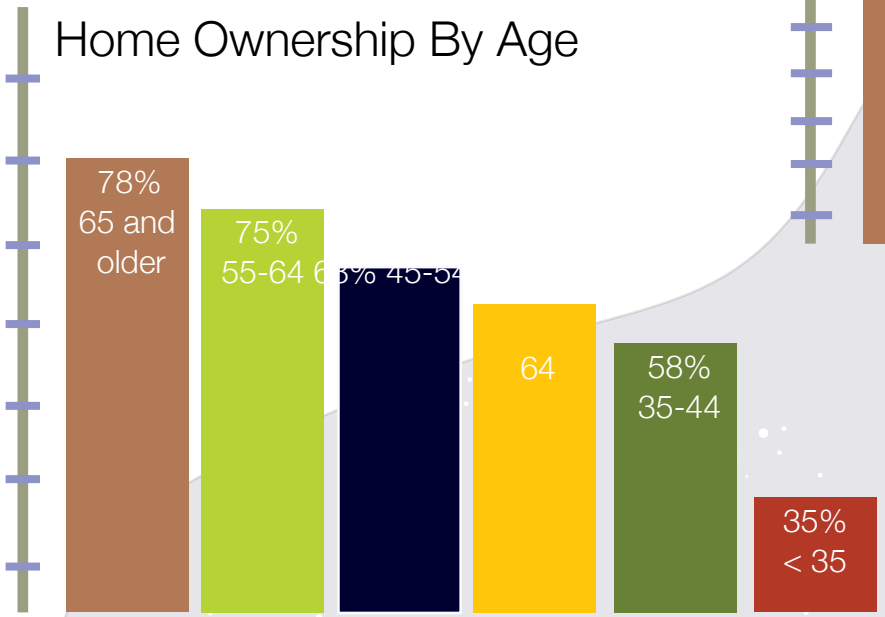
Home Ownership By Race and Ethnic Group



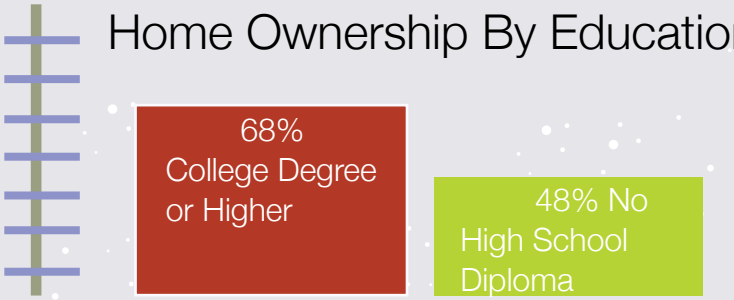
Home Ownership By Region



Home Ownership By Age



Home Ownership By Education



PSYCHOGRAPHICS

Of those 216 million homeowners.....

140 Million are "Outdoor Enthusiasts"

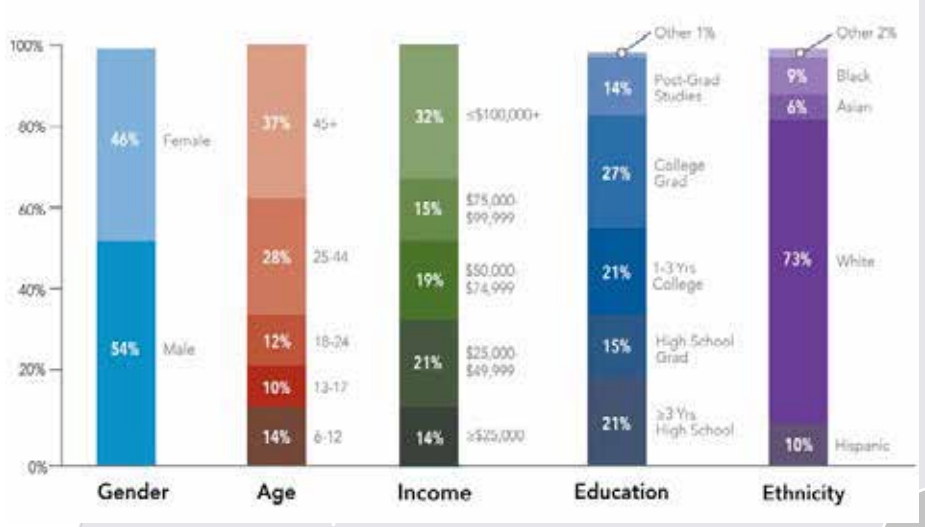
$120.7 Billion

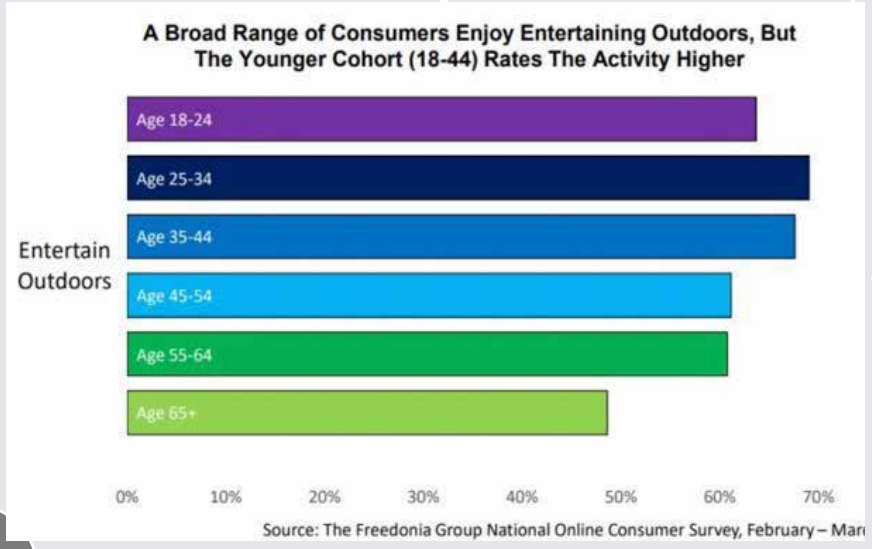
Stakeholder	Activity	Population	% of total Pop.	Annual Spend	Year
Outdoor Enthusiasts	Outdoor recreation product sales	140 Million	41.1%	$120.7 Billion	2019

262 Million are "Landscaping/Lawn and Garden Enthusiasts"

$47.8 Billion

Stakeholder	Activity	Population	% of total Pop.	Annual Spend	Year
Landscaping/ Lawn and Garden Enthusiasts	Landscaping, Lawn and Garden Purchases	252 Million	77%	$47.8 Billion	2018





PERSONAS



Homeowner/Amateur Landscaper

TRAITS

Gender M/F, age range between 25 and 64. Aesthetics, builder/maker, loves nature and nurturing flora/fauna. Environmental.

GOALS

Building materials and landcaping products readily available, tools, accessories, services for some tasks. Work around the seasons and weather.

BARRIERS



Big plan, but only so much time to complete. Ability to add to landscape changes incrementally. Time of the year/season constraints, weather, need/want to build sustainably, but lacks knowledge of products and materials

Outdoor Enthusiasts



TRAITS

Gender M/F, over the age of 18, > $25,000 annual income, any education level, any ethnicity. Loves nature, being active, dreamers, adventurous, competitive, appreciates aesthetics, enjoys solitude, self- sufficiency/reliance

GOALS

Maximize experience with gear. Small environmental footprint. Efficiency and small form factor in equipment. Simple operations. Reliable technology. Serves both individual as well as group needs.

BARRIERS

Availability, environmental impact, sizing/weight/space requirements, need for backup equipment, finite power sources, single versus multi-use tools.



DESIGN CRITERIA

Form factor

- Less than 1 pound
- Surface area needed for solar collection
- Hanging (1M above ground for single luminaire/config)
- Single unit form factor can be scaled (and height raised) by multiplying components to get desired LUX
- Weather resistant
- Aesthetically pleasing color options (biomimicry)

Durability - Materials and Components

- Batteries 3-4 years
- LED lights - >10 years
- Housing, solar collection > 10

Schedulable

- Use of occupancy and/or light sensor for nighttime illumination
- Ability to increase in brightness, or dim according to local movement

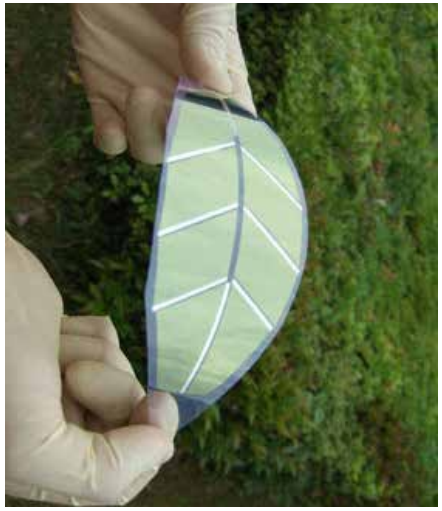
Sustainable - Components are replaceable

- Batteries (replace)
- Blades (damage, weather/wear)
- Stems (damage), LEDs
- Solar collectors (Damage, increased efficiences, etc.)

Designed for Home Consumer and DIY

INSPIRATION

Technology















INSPIRATION -

Lifestyle, culture,
social issues











INSPIRATION -

Context - Living Spaces





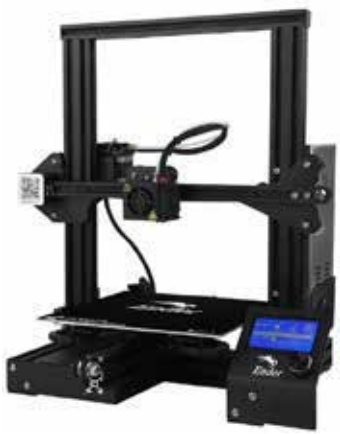




INSPIRATION -

CFM color, finish, material















SUSTAINABILITY

Innovation

- Biomicry of form factor and color
- Local supply chain and/or fabrication
- Technically scalable as new capabilities emerge

Reduced Material Impacts

- At-Home or local materials use and fabrication
- Only recycled or organic materials used - Aluminum, organic plastics and wood

Manufacturing Innovation

- Parts will be 3D printed
- 3D plans are open source digital files for local and at home fabrication

Reduced Distribution Impacts

- Minimal parts needed for assembly from package
- 3D printed parts fabricated at home
- Re-usable/re-cycleable packaging
- Local materials usage

Reduced Behavior and Use Impacts

- Illumination only when needed
- Dark Sky inspired low-impact outdoor lighting delivers only light necessary for activity, and no more
- No vertical or horizontal light pollution or glare

System Longevity

- All components are replaceable and can be fixed by consumer.

Transitional Systems

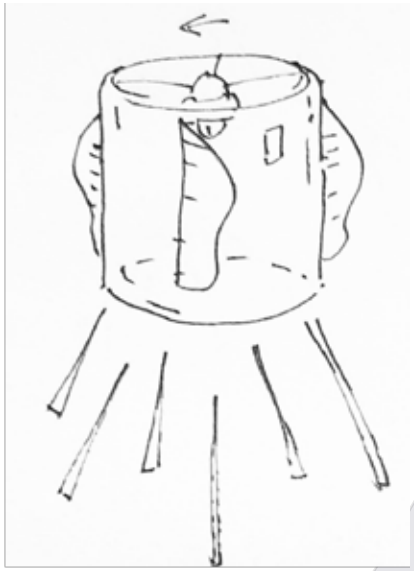
- Timeless, biomimicry aesthetic
- Easy to repair and repurpose
- Customization of color, amount of light fosters emotional connection

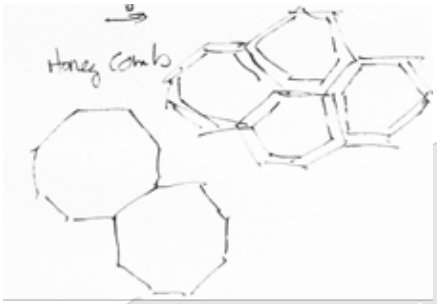
Optimized End-Of-Life

- Easy assembly
- Non-toxic wood, aluminum or biogradable plastics
- All materials, other than electronics, easily recycleable or are bio-degradable.

SKETCHES

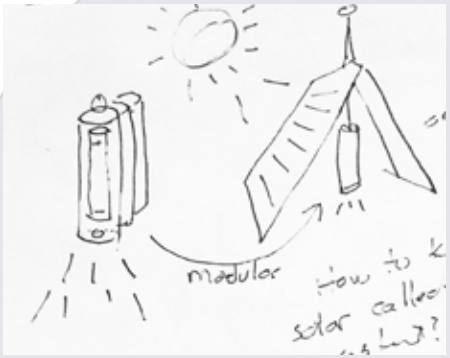






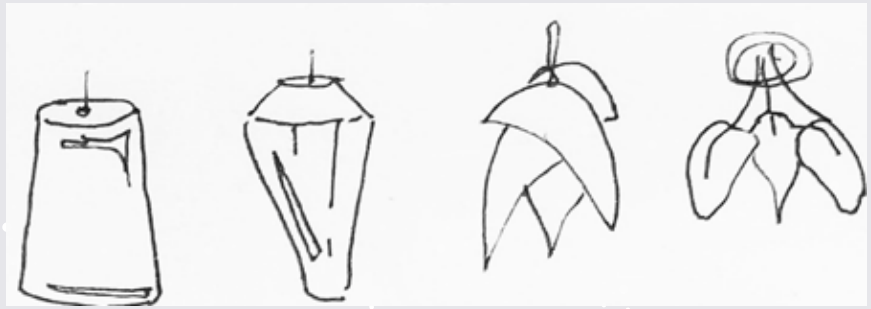






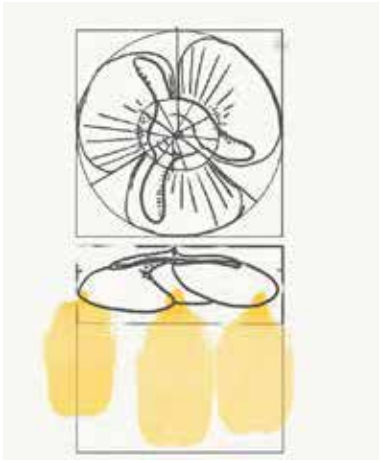


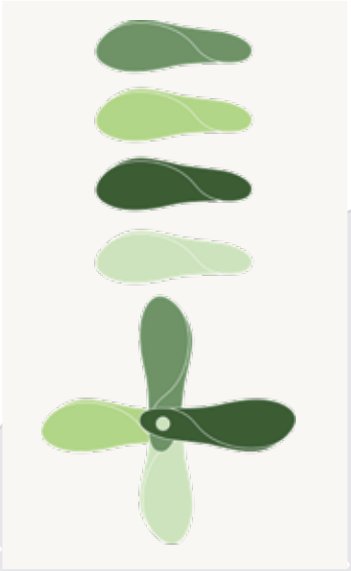




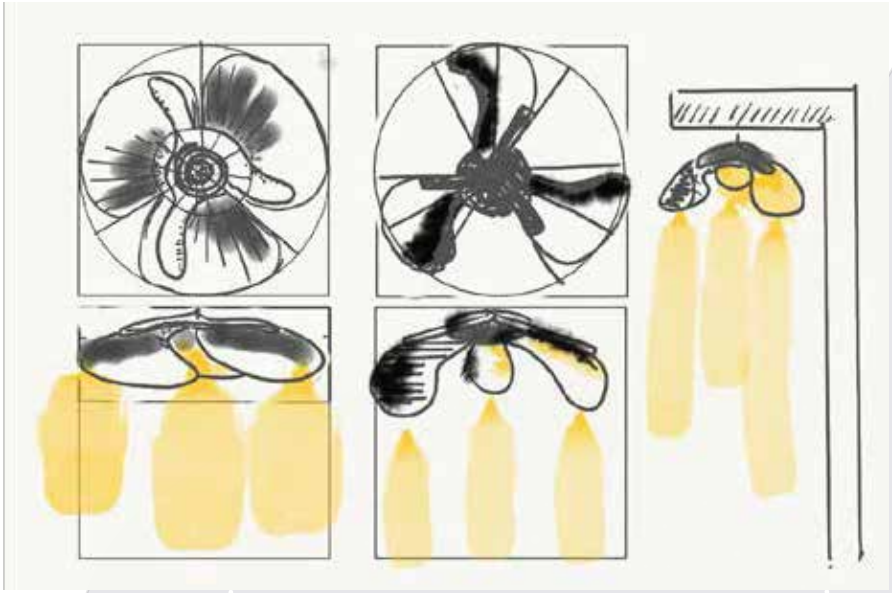


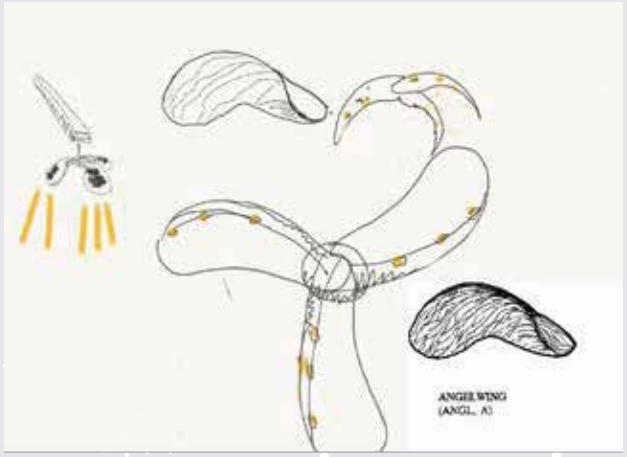


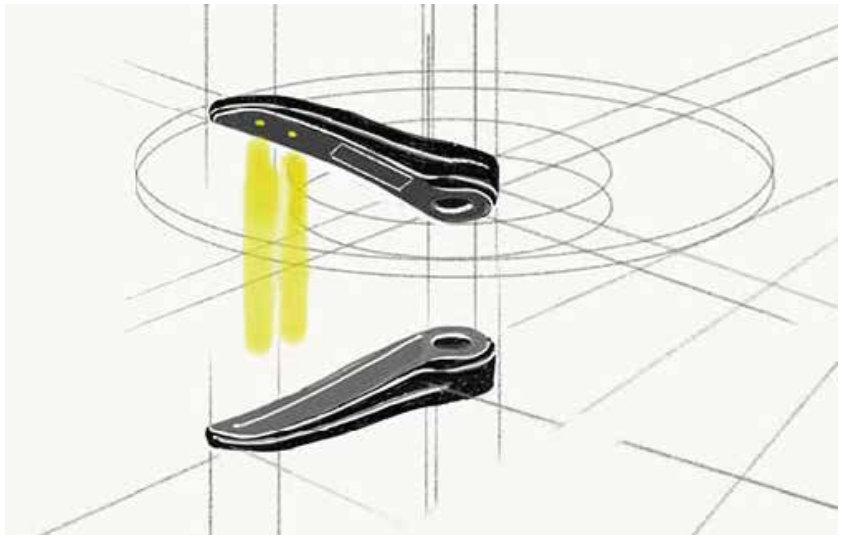


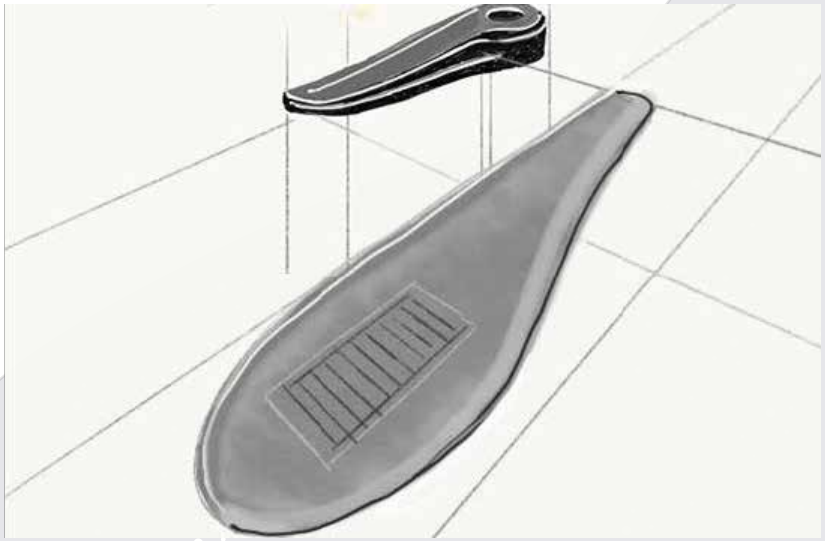







ANGEL WING
(ANGL. A)









MARKET MAP

Luminaire Lighting Types:

- Decorative
- Accent
- Ambient
- Task

A market map focused on accent lighting shows the relative experience and value delivered in existing solar lights.
For the purposes of an initial minimium viable functional (“MVF), the market map (to the right) is focused on only **accent** and **task** lighting

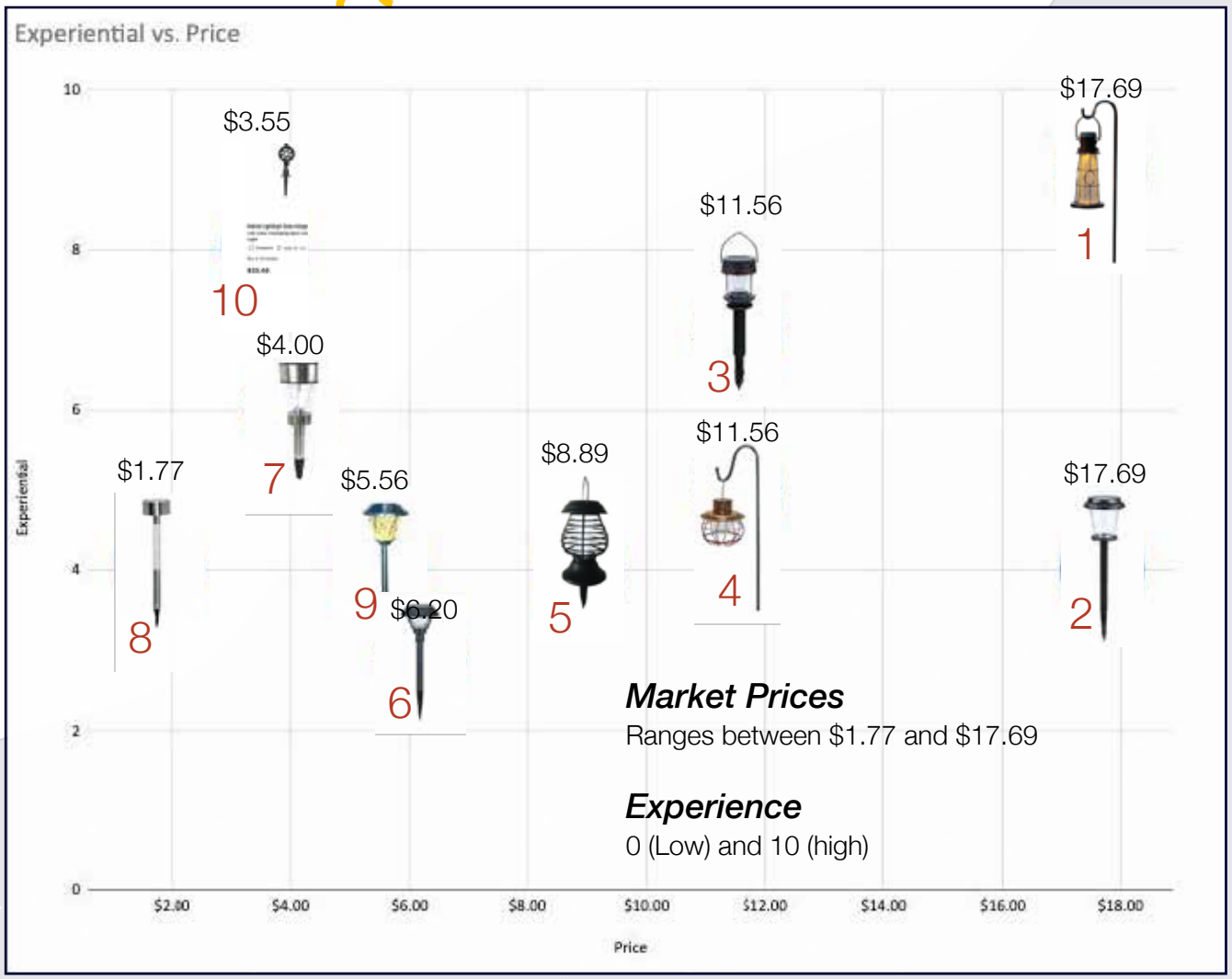
Recommended Multi-Tiered Solar Luminaire Pricing

Component Price:

$4.99

Four piece Luminaire:

$30.00



OUTOOR ENTHUSIASTS

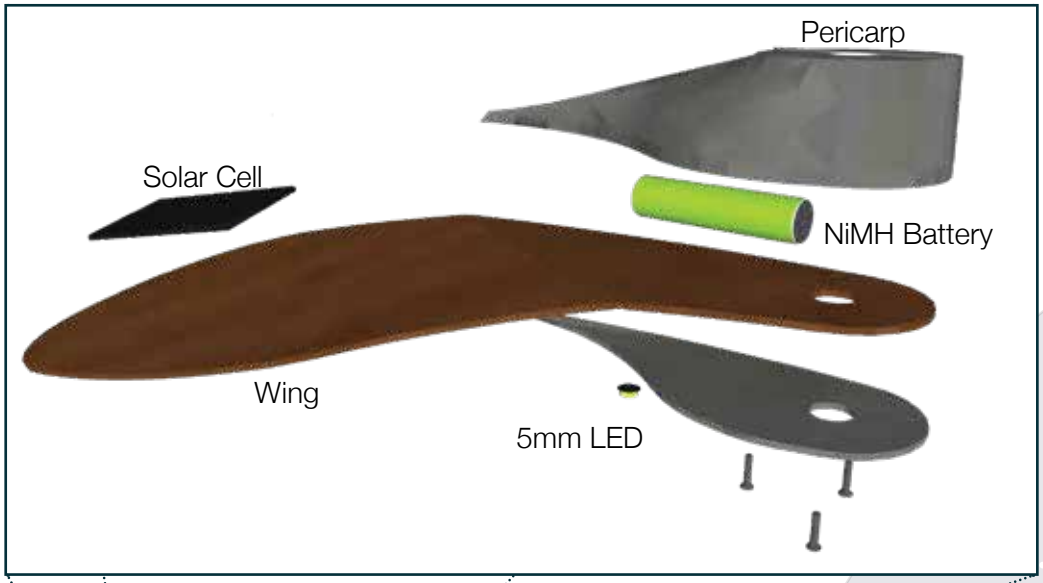
Nighttime garden/path stroll....

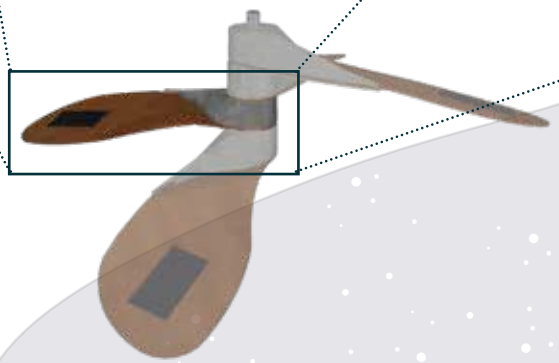
PLAN	PREP	DO	RESTORE	REFLECT

Decide	Plan	Gear	Travel	Nature Time	Collect	Pack Up	Travel Home	Unpack	Reflect
Let's get outside for a garden walk. Maybe catch some fireflies. What time of year is it? It's nighttime and dark. When to go?	How long to outside? clothes to for fireflies. Headlamp has lights? maybe? Need jar for firefly luminaires	Get dressed, shoes, building. stroll. wear Yes! Solar light collection.	Leave home/ be Walk Consider the garden/path to Route. the way.	Stop at garden/path Solar lights cast just enough light to make walking in jar. in safe, but not disturb critters. Walk quietly, purposefully. Stop, enjoy the silence. Listen to nature.	Gently look for fireflies. Walk slowly, and stars. let them land. Keep with care, and place	Pack up jar(s), look at the	Follow path back to start of nighttime journey.	Observe fireflies in jar(s). Do they all look the same? Different fireflies have different rates of light emittance. Are they not a beautiful feat of nature. Let them all go.	The garden and path should be a path to experience nature. Was the experience free of anxiety? Well lit and safe?

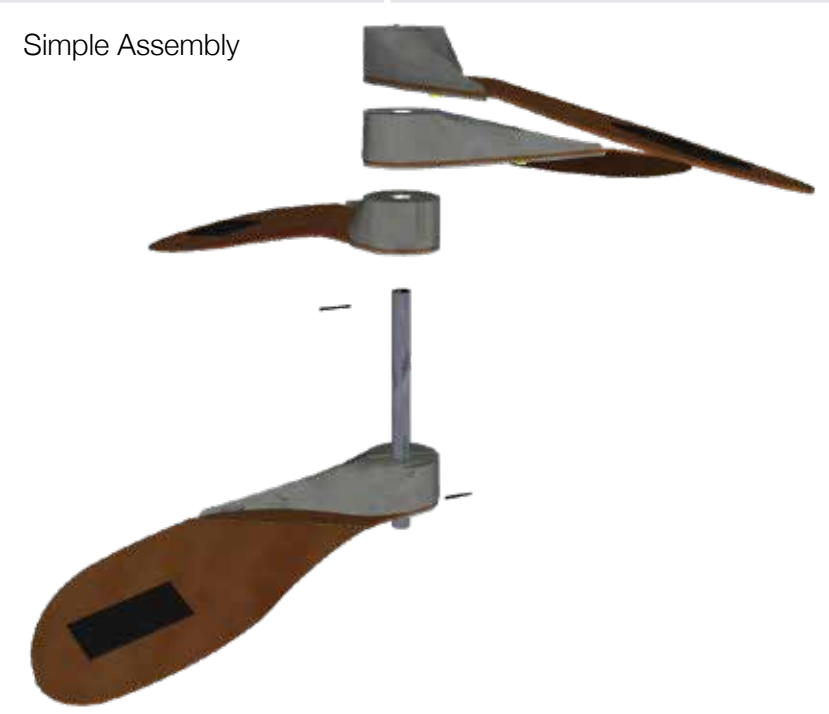
SAMARA

Assembly....



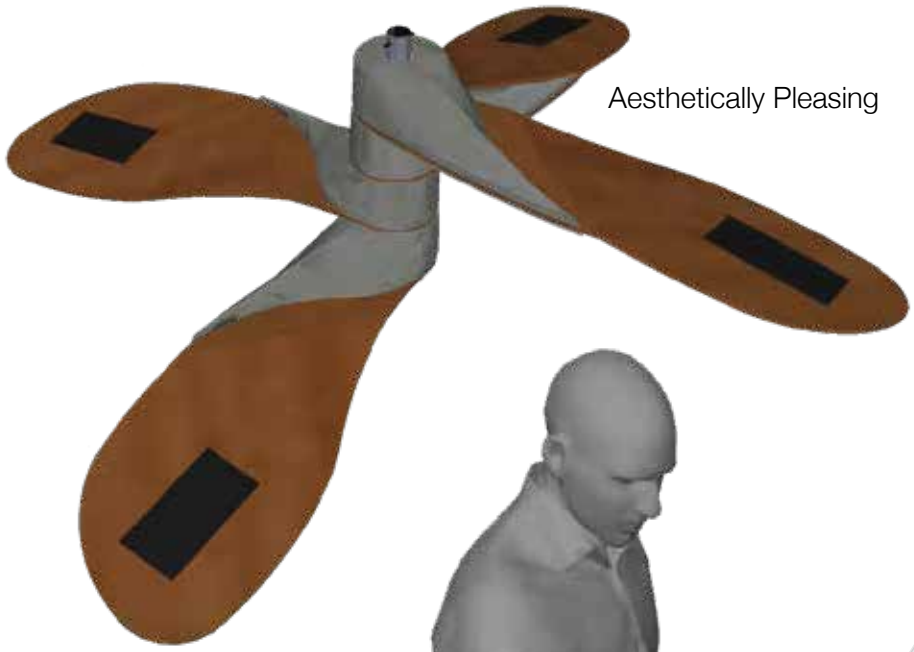


Simple Assembly

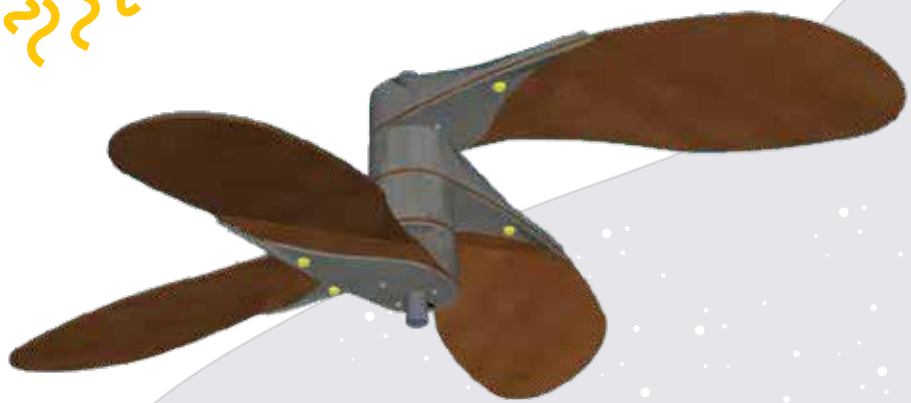


SAMARA

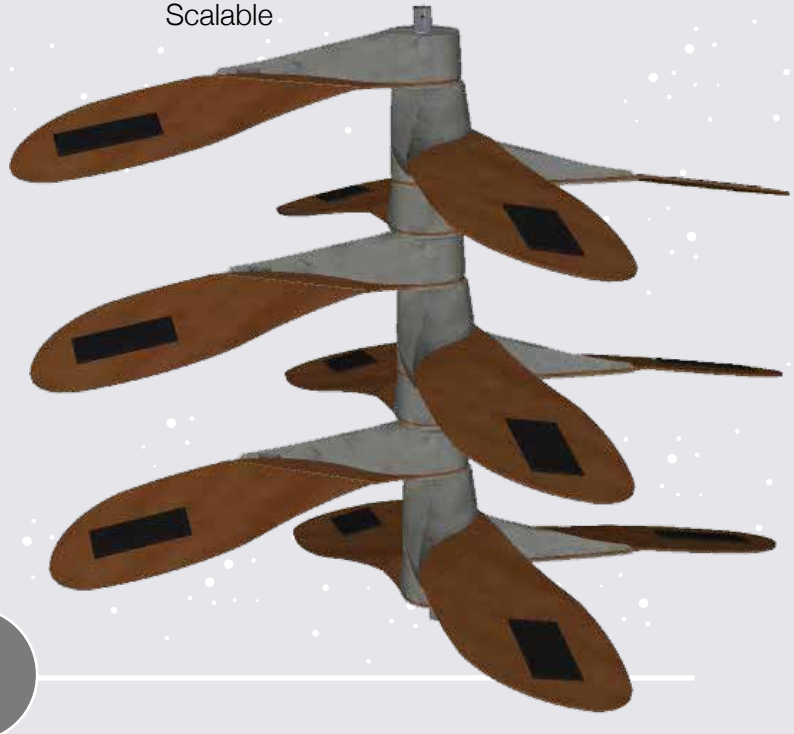
Complete....



Aesthetically Pleasing







Scalable

Small Form Factor