redB Lumenbrella
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stores daylight + redelivers it when you need it most
who?

customers who like to spend their time outside but who are limited by daylight hours

(they have to leave once it’s dark!)
how?

embed solar panels on patio umbrella

harness power to generate **flexible** lighting for users

light temperature varying colour portable light arrangement
challenge?

1. what light possible with solar panels on the market + optimal panel configuration for portability

2. what LED configurations provide functional lighting
(1) results

conservative estimate
need 10W to charge battery
for 6hr of light at a 5W output
(losses due to battery, solar cell configuration)

easy to fold and transport!
(1) solar configurations

(a) 96 solar cells
    0.1W ea
    9.6W total

(b) 32 solar cells
    0.3W ea
    9.6W total

(c) 12 solar cells
    0.9W ea
    1.1W total

(d) 8 solar cells
    1.5W ea
    12.0W total
(2) LED configurations

(a) LEDs around rim dim lighting

(b) inner reflective surface spotlight LEDs aimed up bright lighting
market?

Sintai patio umbrella manufacturing firm
1M umbrellas/year
$45M revenue

LED lighting
$1.2B (2011)
$0.5B (2010)  
\} \text{doubled!}
benchmarking

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<th>Strong Camel Umbrella</th>
<th>Solar Sidewalk Lights</th>
<th>Archipelago Umbrella Light</th>
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<td><strong>Power</strong></td>
<td>Solar panel on stem</td>
<td>Panel staked into ground</td>
<td>Battery powered</td>
<td>Cell array on canvas</td>
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<tr>
<td><strong>LEDs</strong></td>
<td>Umbrella ribs</td>
<td>Strip</td>
<td>Like a lamp</td>
<td>Reflected</td>
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future development?

ambiance
light temperature
colour change
solar tracker