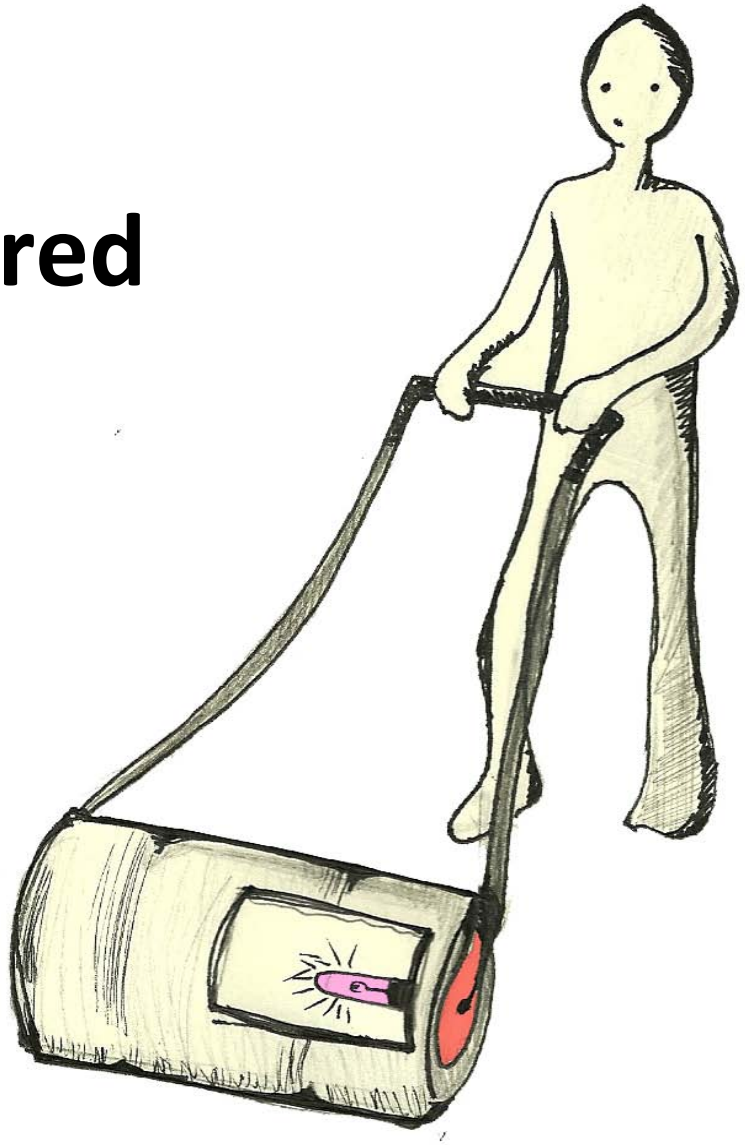
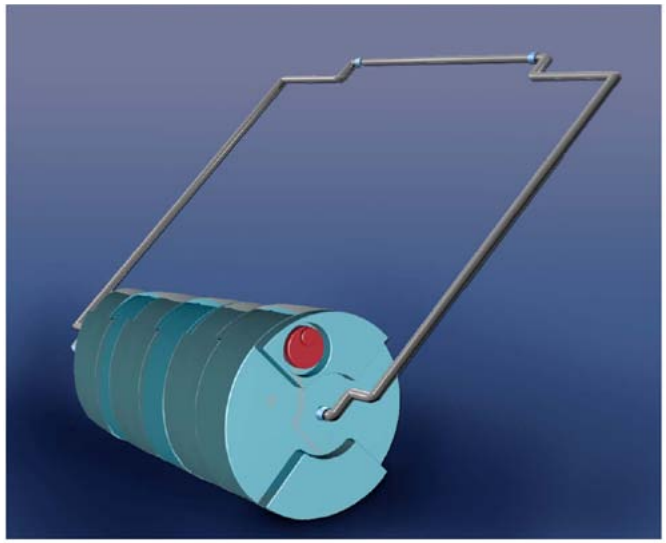
Mechanically Powered UV Water Purifier



Purpose

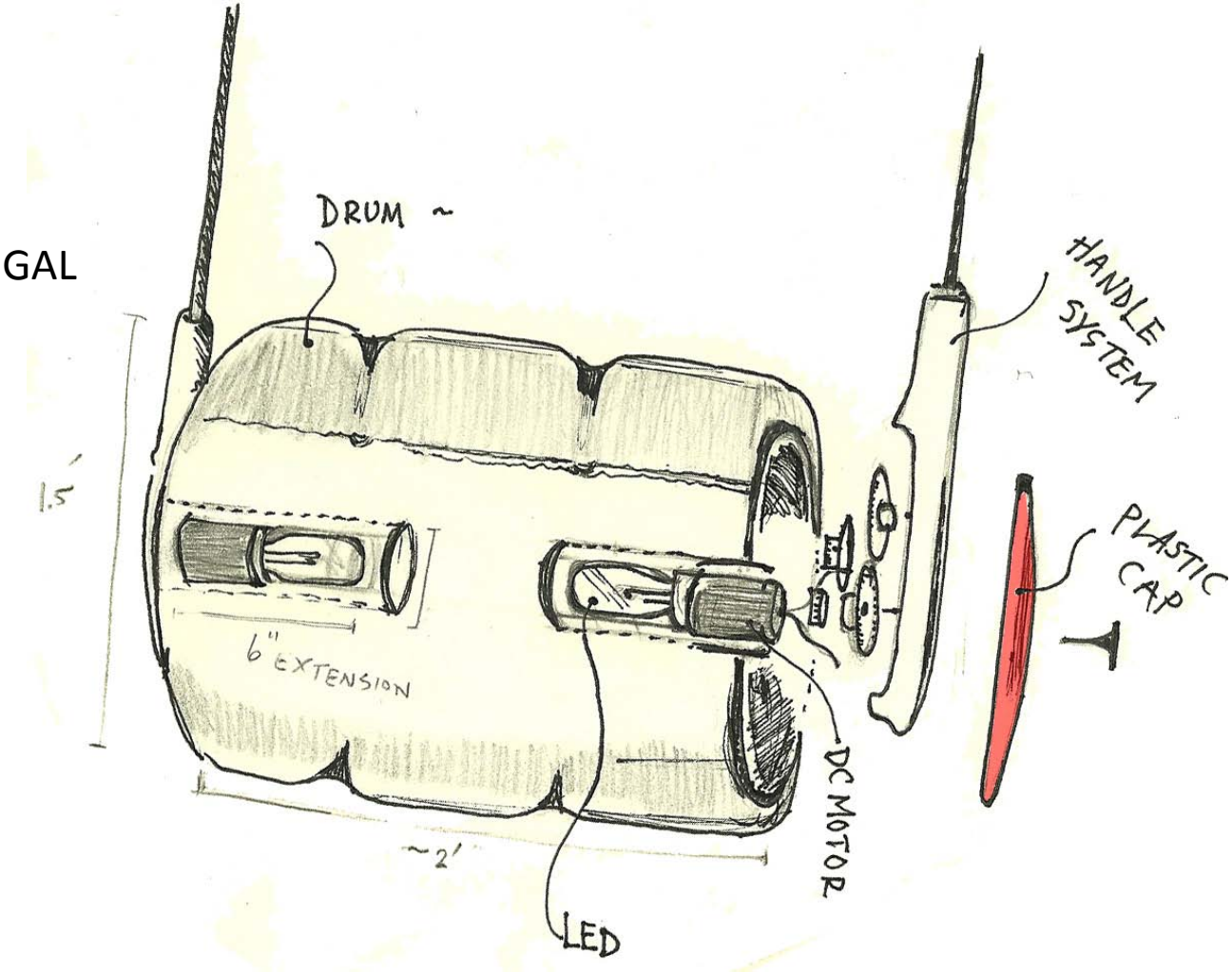
- Integrate with the Aqua Port

- UV water purification
  - UV radiation inactivates and kills microbes



Design

~25 GAL



Need

- Limited access to clean water in developing nations
- Microbiological contaminants

Market Research - Ghana

- Inadequate water supply and sanitation contributes to 70% of diseases[1]
- 58% sanitation coverage, but varies widely by region[2]
- Over 15 million in rural areas without access to clean water[3]
- 77% of filtered underground water contain infective stages of pathogenic parasites[4]

[1]wateraid.org
[2]World Development and Human Development Reports
[3]World Bank
[4]National Center for Biotechnology Information

Benchmarking

- Chlorine
- SteriPen, AquaStar
- MIT Radiant Flux

Sketch Model Lessons

- Lessons
  - Modified hand cranked flashlight, attached to ¼ scale wheel
  - 2.5 Watts required

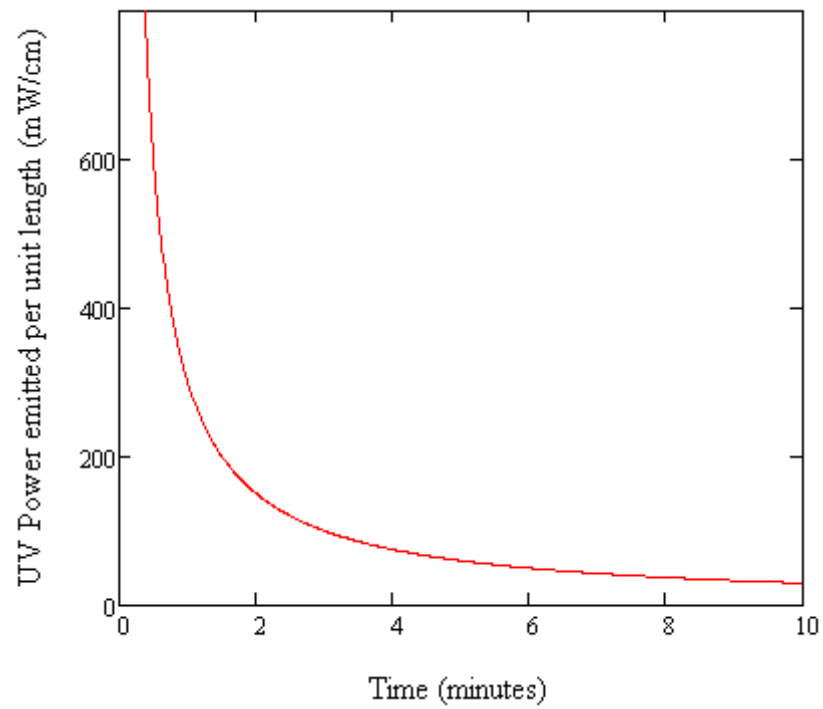
- Enough Energy to kill Microbes?

Research

UV power emitted per length as a function of:

- Time
- Distance from the light
- Intensity needed to kill microbes
- Absorption coefficient of the water

$$P_l(t,r) = \frac{I(t) \cdot 2\pi r}{e^{-2.303A}}$$



Research

t= 10 min
r=30cm

P=3 Watts

Mechanical Force
7N (about 1.5 lb)