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)