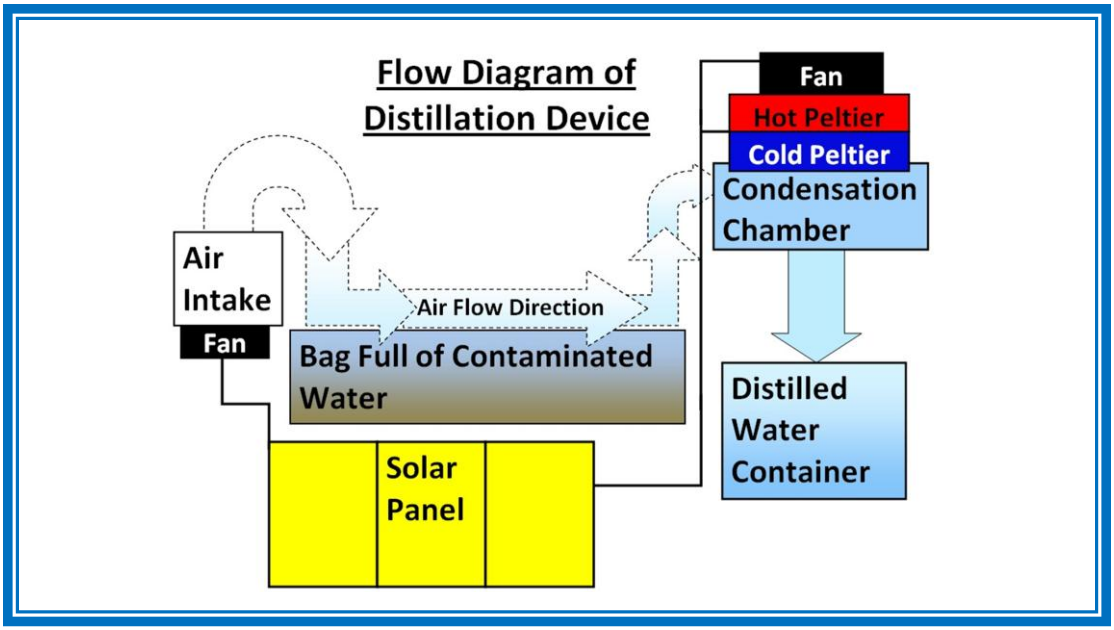
1 Sun + 8 Bits = H_20:

Digitally Optimizing "Smart" Photovoltaics for a Water Distillation Application

Nicholas M. Christensen worked with electrical engineer **John H. Jacobs** of **JouleNet LLC** to design a customized circuit board and program a real-time microprocessor in assembly to **optimize the power of a solar panel by tracking the maximum power point** and using switches to control the peak performance. Additionally, the board has a **radio link to transmit real-time data** on light and temperature fluctuations as well as power levels.

The specific application is a solar-powered Peltier device in a **water distillation system** that distills clean, potable water from contaminated water. While the basic distillation device worked occasionally, yielding over a liter several times and up to 2.2 liters in one day, the results were inconsistent. The unoptimized solar energy has proven to be unreliable, with minimal voltage readings, even in midday, and no voltage readings over 7.2 even though it is rated 12 volts. The circuit board is apparently working, but comparative studies with the optimized system are still in progress. If results prove promising, the immediate application would be the production of inexpensive point-of-use devices that could be used in developing countries or emergency scenarios. More importantly, the **microprocessor-enhanced solar panels have 1000s of applications and are now networked for solar farms by JouleNet LLC.**



This technology could be also be **applied to covered irrigation canals in order to reclaim evaporation and distill potable water while also providing energy** that might be added the electric grid or used to power water pumps.

(This project placed 3rd in Engineering in the national Junior Science and Humanities Symposium, 2010, and 3rd in the International Armed Forces Communications and Electronic Association high school science competition, 2010.)