Developing a Device to Assist with the Field Application of Solar Water Disinfection

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SODIS, the process of solar water disinfection using PET plastic bottles to reduce transmission of waterborne pathogens in areas lacking access to clean drinking water, is a popular water disinfection technique in developing countries. However, recent studies on SODIS application in the field show user error is common and dramatically reduces efficiency. The commonly accepted solution to the issue of misapplication of SODIS technique is repeated SODIS instructional workshops for users taught by educators. Here, a new solution is proposed, in which the user is guided in the disinfection process not by an educator but by a small electronic microprocessor device equipped with sensors that measure ambient conditions in order to model the disinfection process and alert the user when the water being disinfected is safe to drink. This device would provide a highly accurate and extremely low-cost solution to the issue of SODIS misapplication. The device was prototyped using an ATTiny84 microcontroller, various aspects of device performance were measured and a cost estimate for bulk production of the device was created. Additionally, basic calibration of the device disinfection model was performed using a SODIS disinfection of wild-type fecal coliforms. It was found to be producible for the bulk-price of $1.196 USD, have a battery life of 300 days, and be able to measure temperature and UV levels to the degree of accuracy necessary for water disinfection, indicating the device to be ideal in many respects for application as a guide for SODIS disinfection.

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