Solar Powered Nanotech Water Filtration Device with Personal Robotic Transport System

Shah, Smiti (School: Bethpage High School)

With clean water being a requirement for human life, it’s appalling 660 million people lack access to it. Those without access must travel an average of 3.7 miles carrying 20 L of water on their head, placing stress on the lower-back, causing generational spinal problems. Ironically, it’s been shown 1 of every 7 people have access to a Bluetooth-enabled smartphone, though. This study combined the recent technological explosions of nanotechnology (with their unique photosensitivity, catalytic and antimicrobial activity) with smartphones to create a cheap, self-transporting, self-cleaning water filtration device. The filter incorporated silver nanoparticles derived from Coriandrum sativum, a solar powered energy source, and coconut shell activated carbon in a tubular filter. This was then mounted on a robust navigational robot meant to follow around a Bluetooth-enabled smartphone. Results demonstrated the solar-powered, nanotech water filter significantly reduced the amount of E. coli present in spring water ($p<0.05$). Furthermore, in terms of chemical components in the water, Nitrates, Copper, Iron, and overall TDS (total dissolved solids) decreased noticeably ($p<0.10$). Finally, when mounted to the navigational robot, it was found to travel at 15 feet/sec, have a turning radius of 5.45 inches, and last for 50 minutes on a single charge. Remarkably, the navigational robot and highly antimicrobial, coriander-based solar filtration device proved to be 1000 times and 1500 times cheaper than current comparable solutions, respectively. In the future, this study hopes to bring clean water to areas in a low-cost, low-infrastructure, renewable, and environmentally-friendly method.

Awards Won:
Third Award of $1,000