MSc project student - mechanical engineering

Hydropneumatics Engineering and Devices for Sustainable Processes and Engineering

In developed nations, high-quality drinking water is provided through centralized water treatment and distribution systems. In the developing world, 2–3 billion people do not receive reliable, high-quality water delivered to their households. Instead, they must collect and store household water, often in open containers without any residual disinfectant. The World Health Organization has indicated that one possible solution to this problem is to decentralize water treatment so that people treat their water right before they consume it in their homes. Designing sustainable “point-of-use” water treatment technologies is a challenging problem, as they must be low-cost, technologically effective, simple to use, and socially acceptable.

Hydropneumatics principles and engineering for large scale operations are commonly used. Scaling down these operations to centimeter to millimeter scale requires a relook at the science, technology and manufacturing of hydropneumatics. The scale down of these devices offers some very interesting applications. Some of the interesting applications would include: Developing differential pressure sensors to actuate pressure difference-based cleaning and backwash procedures for "point of use" filtration systems, level sensing and regulation, regulating constant flow of water for varying inlet pressure conditions, developing small scale Tesla valves and actuating and operating multiport valves for directing water flows in small scale water softening procedures. The project would involve understanding principles of hydraulics and developing devices at a small scale through novel techniques such as 3D printing, Chemical Etching and Chemical Deposition and intensifying multiple operations in a single device.

In a collaboration with an Industrial partner in India

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