



Mechanical & Industrial Engineering
UNIVERSITY OF TORONTO

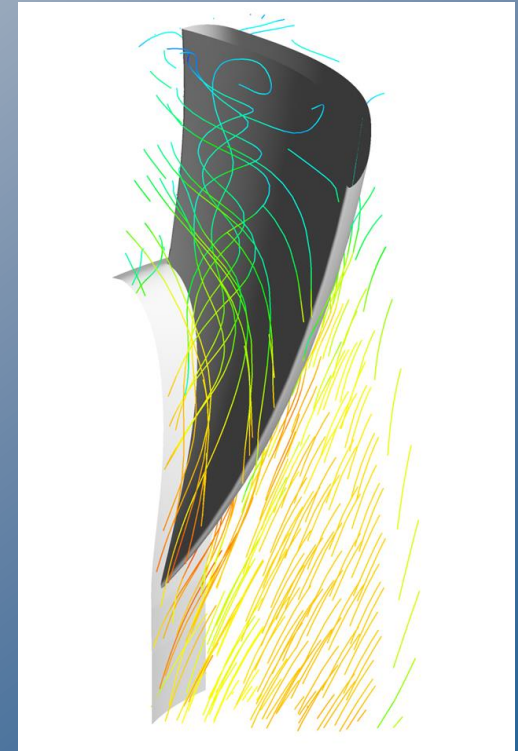
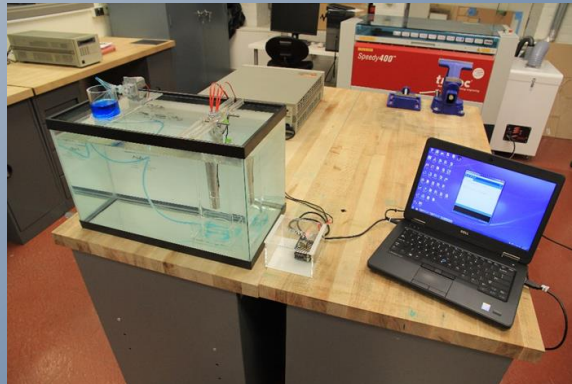


Water & Energy Research lab (WERL)

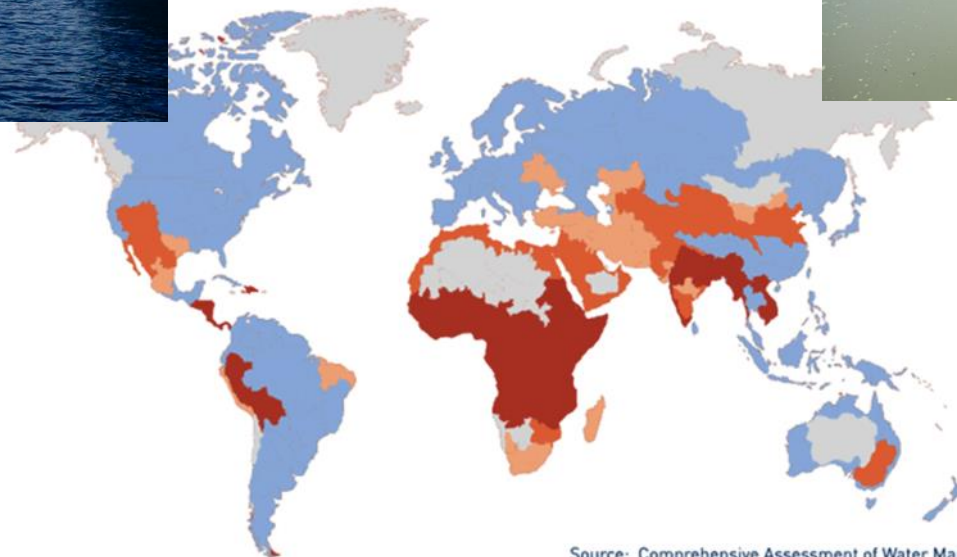


Director: Prof. Amy Bilton

**Presenter: Hossein
Hosseinimanesh
Post-Doctoral-Fellow**



- Most projects focuses to meet the needs of people in developing and developed countries by developing water, energy and food solutions.

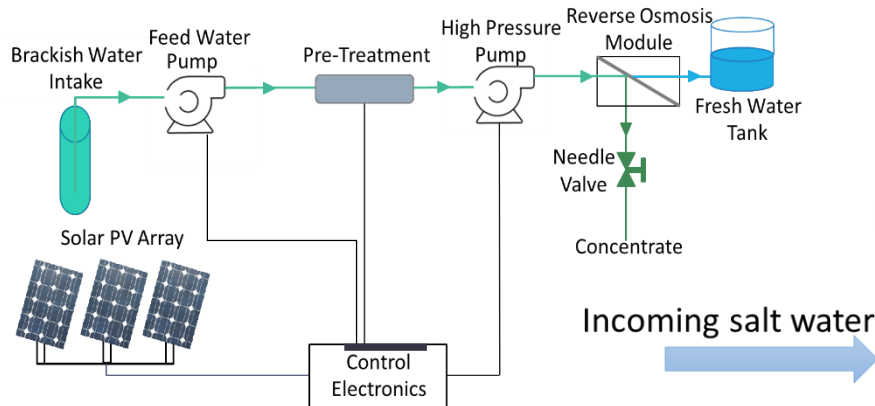
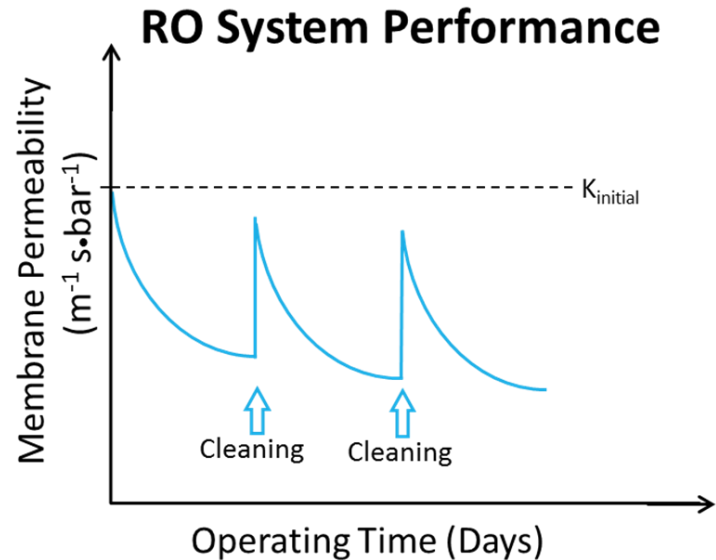


Source: Comprehensive Assessment of Water Man

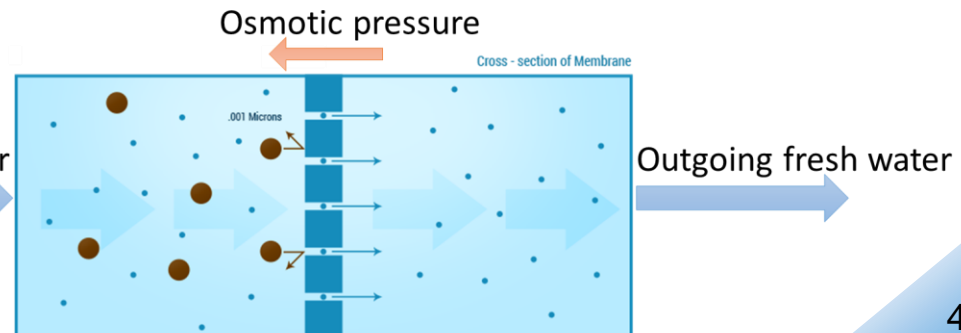
1. Water purification systems (Reverse Osmosis)
2. Passive aeration systems for improving water quality for fish aquaculture
3. Smart drip irrigation systems
4. Design and optimization of a turbine for water disinfection system
5. Designing a new foam technology to treat wastewater

1. Water purification systems (Reverse Osmosis)

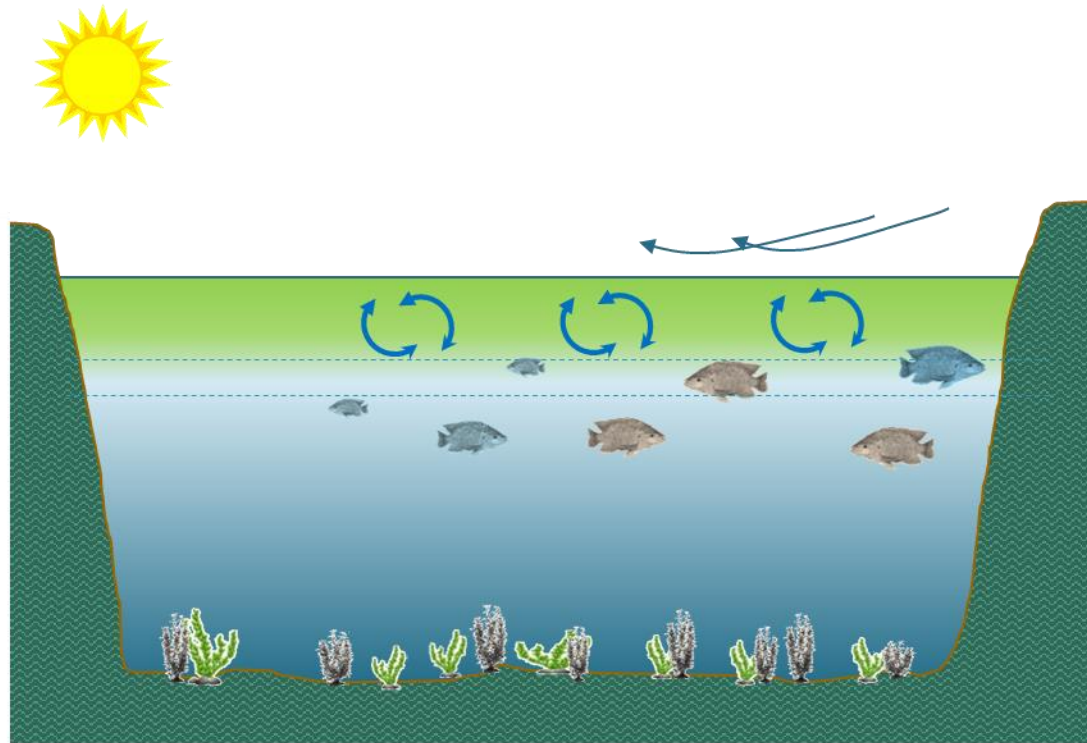
Developing Photovoltaic Reverse Osmosis System (PVRO)



- PVRO systems operate intermittently leading to higher rates of mineral scaling
- Scaling rates of membranes have not been characterized
- Optimal pre-treatment selection and its effects has not been studied

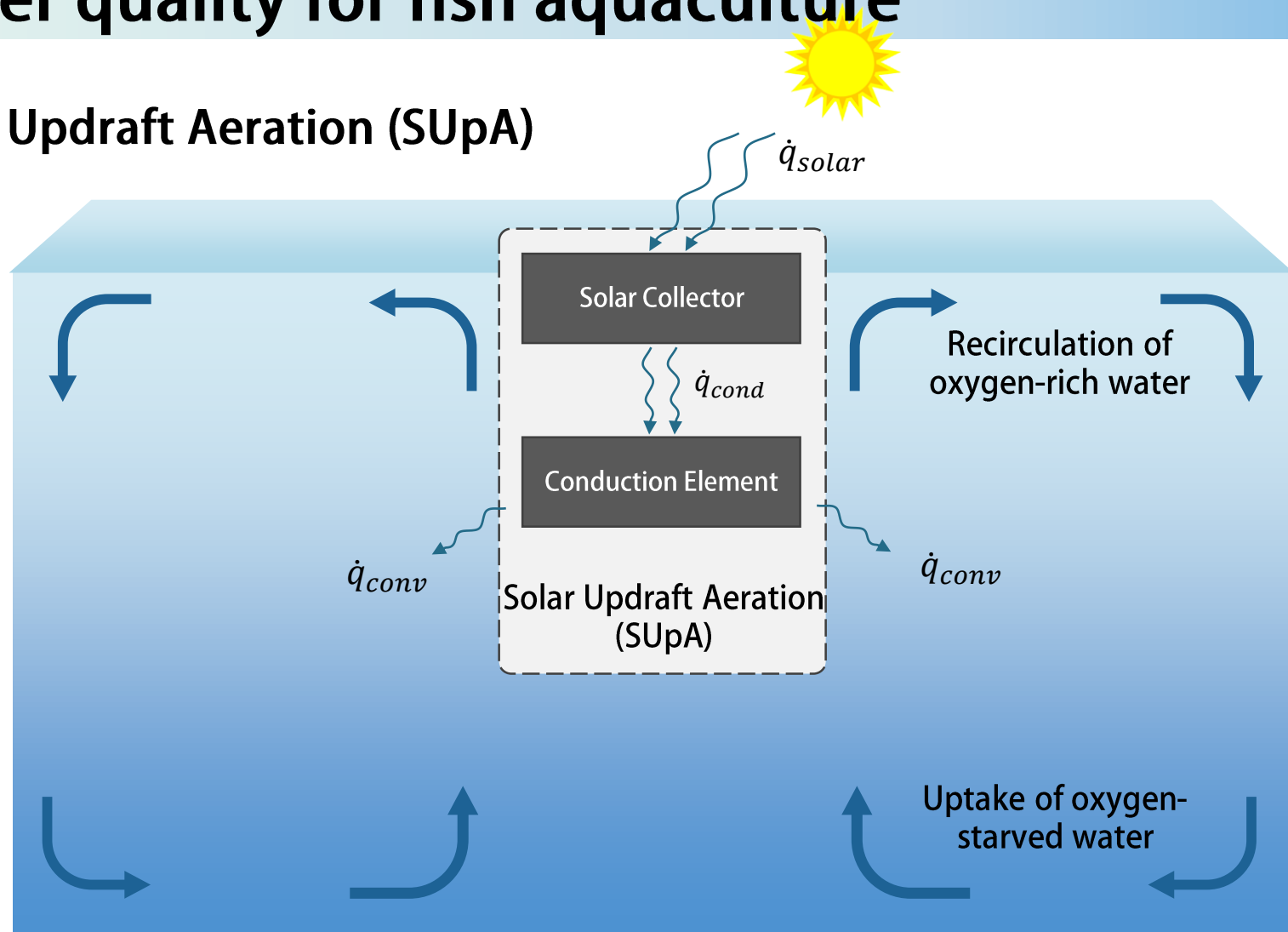


2. Passive aeration systems for improving water quality for fish aquaculture



2. Passive aeration systems for improving water quality for fish aquaculture

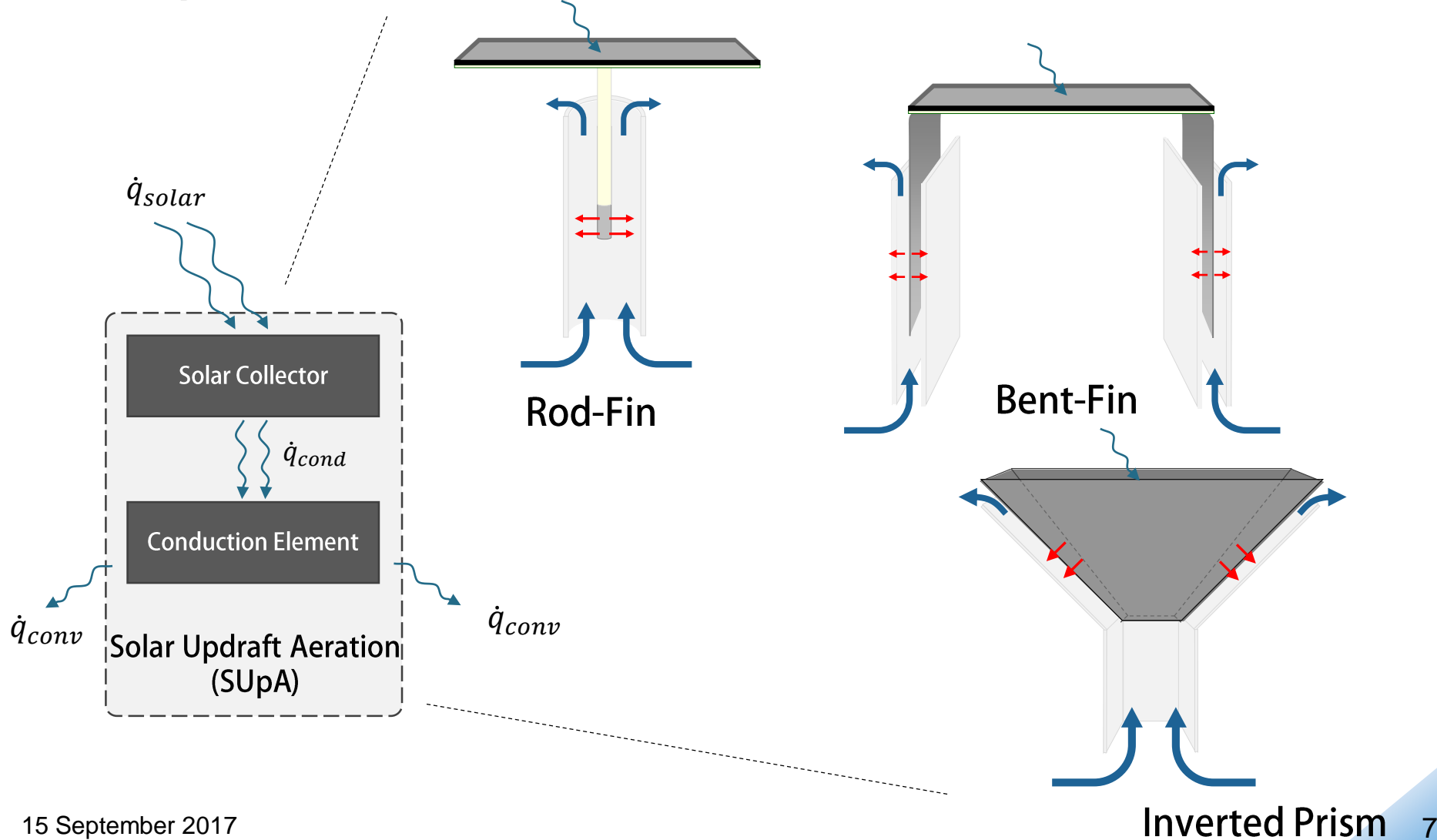
Solar Updraft Aeration (SU_PA)



Passive, low-cost, clean, no moving parts

2. Passive aeration systems for improving water quality for fish aquaculture

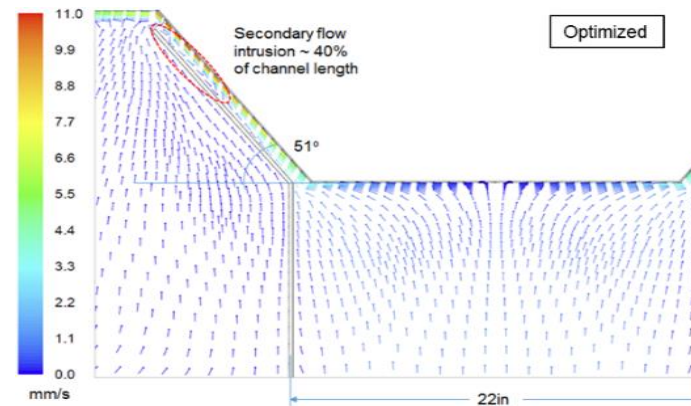
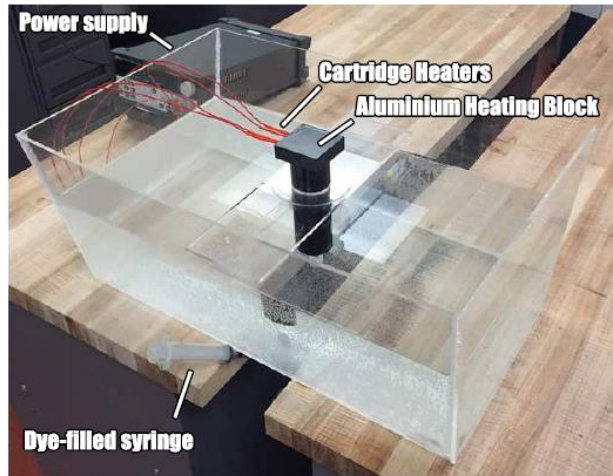
Solar Updraft Aeration (SU_PA)



2. Passive aeration systems for improving water quality for fish aquaculture

Solar Updraft Aeration (SUaA)

- ✓ Looking for an MEng student for validation of CFD simulations

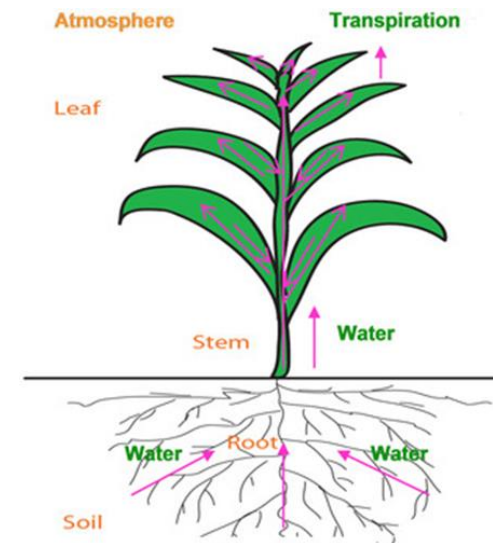


3. Smart drip irrigation system for remote areas

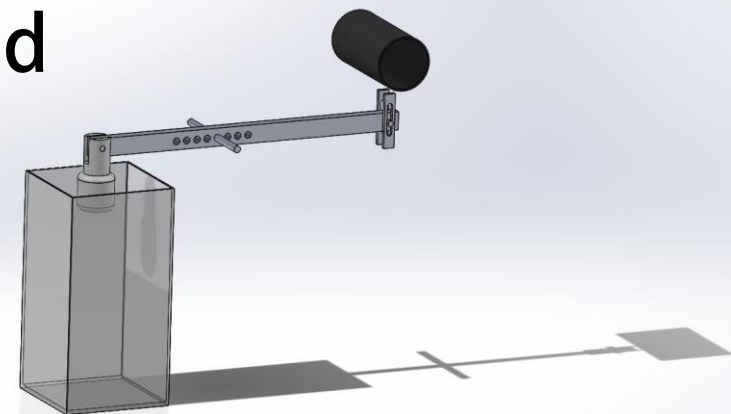
Sufficient and timely irrigation is key to agricultural productivity

Design requirements for remote areas:

- Efficient on water usage
- No electricity requirement
- Low cost

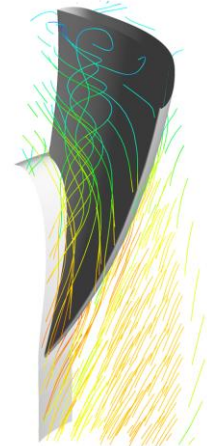
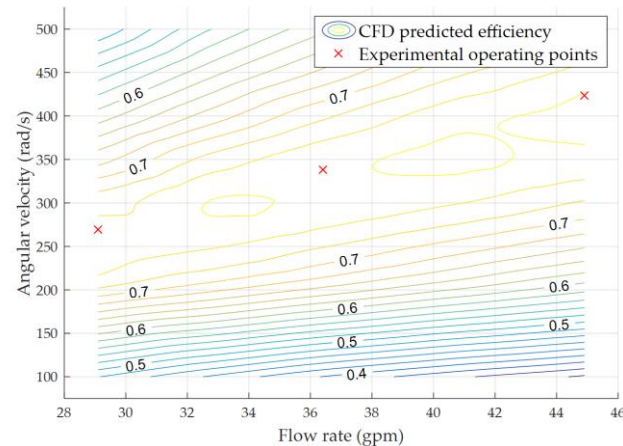
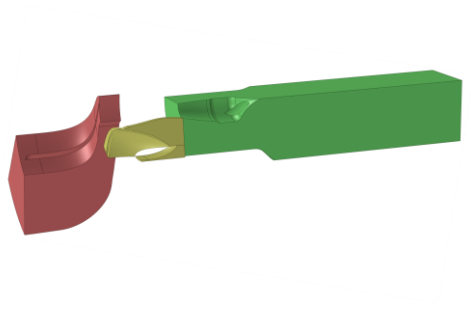
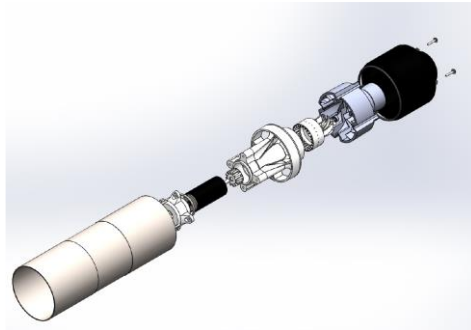


- ✓ Looking for an M. Eng. student for the optimization design and for conducting the field study

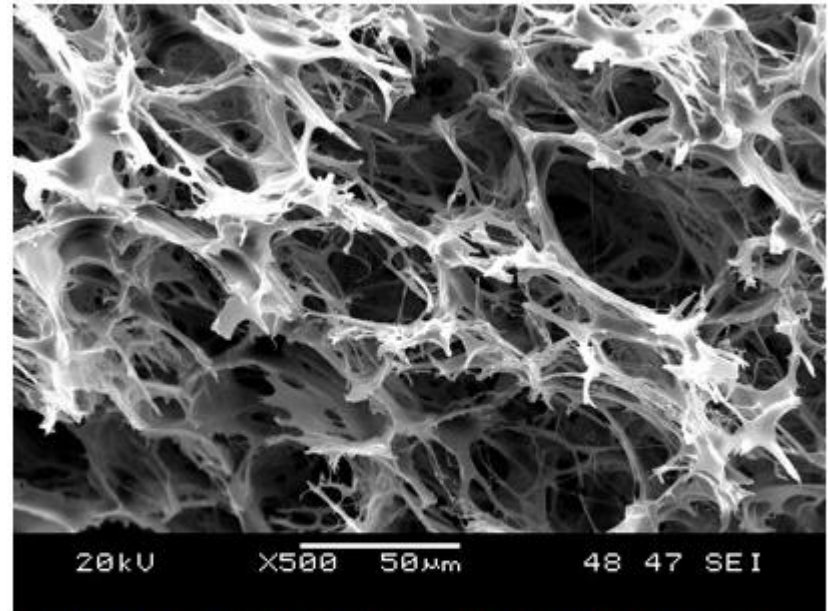


4.Design and optimization of a turbine for water disinfection system

Automatic water disinfection system for recreational water bodies



5. Designing a new foam technology to treat wastewater



An image of the polymer foam taken with a scanning electron microscope. The large surface area is ideal for absorbing oil droplets from oil sands wastewater. (Image: Park et al., 2014)

- ✓ Looking for an M. Eng. student for developing the CFD modeling of multiphase flow inside porous media