

# Multiplexor System to Expand Continuous Water Quality Monitoring to Multiple Sources

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## THE PROBLEM

- ❖ Next breakthroughs in water quality research will come from better understanding of contaminant dynamics in the environment
- ❖ The key is access to continuous water quality data
- ❖ Continuous water quality data is currently available but only with very expensive equipment
- ❖ Current continuous monitoring of pollutants are limited to very few stations
- ❖ Our understanding of pollutant fate in the environment and solution depend on spatial and temporal data at high resolution

## TARGET ISSUES

- ❖ The dynamics and fate of contaminants moving in groundwater and wetlands is still poorly understood

### Potential Targets:

- In the field: contaminant dynamics in riparian buffer zones along transects and at different depths (Figure 1)
- In the lab: mesocosm assays (Figure 2)

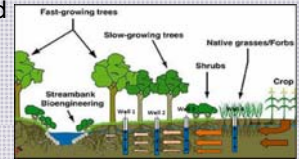


Figure 1. Potential field target for solution

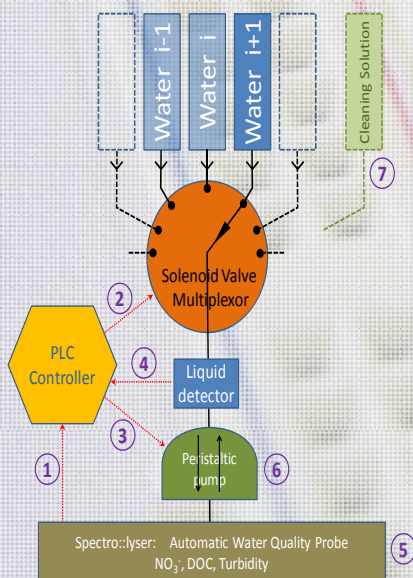


Figure 2. Potential lab setting target for solution

## SOLUTION APPROACH

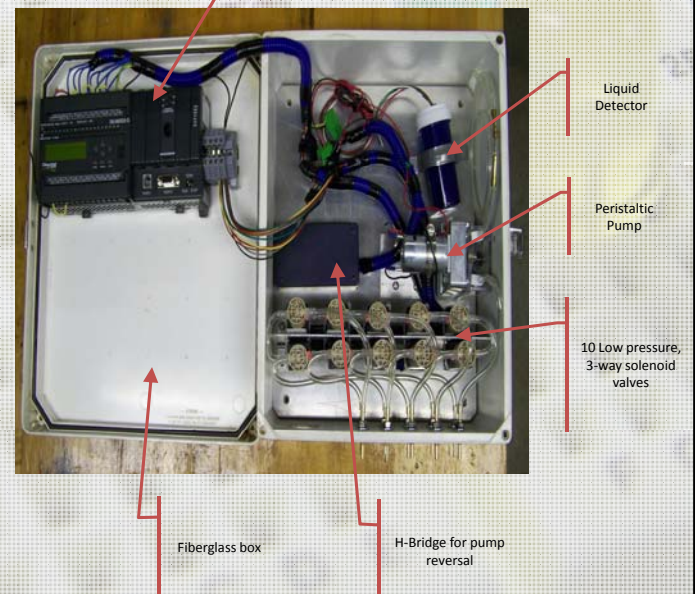
1. Build a multiplexor system that pumps water from multiple sources to one automatic water quality probe
2. Fully automated system with main components being a controller, solenoid valves, and a peristaltic pump
3. Up to 10 different water sources, up to 12 m away from instrument
4. Can overcome at least 3 m water head
5. Sampling cycle: 30 min; Each water source designed to be measured at most at that time interval
6. Portable and designed to work both in the field and in the lab
7. Can be solar powered

### Schematics



### Sequence

1. Probe signals PLC a WQ measurement to be taken in 1 min
2. PLC triggers the correct solenoid valve
3. PLC triggers the peristaltic pump
4. Liquid detector signals PLC for optimum pumping time
5. Spectro::lyser takes a reading at fixed intervals
6. Pump inverted thanks to H-bridge to purge manifold/lines
7. Cleaning at the end of each cycle (10 measurements per cycle)



## IMPLICATIONS

- Contribute to better BMPs and regulations that could improve environmental quality.
- Improved understanding for industrial and agricultural application
- Better understanding of groundwater processes
- Short lived contaminants can be followed more closely

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