Smart Water Distribution Model

Team Mango Tango

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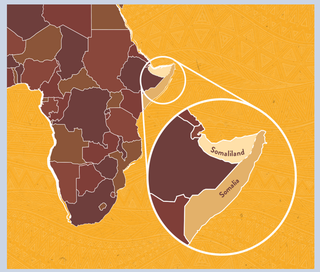
Background & Problem Statement

In 2009, the Abaarso School for Science and Technology was founded as a not-for-profit private school in Abaarso, Somaliland. The school currently relies on trucks to deliver water to tanks inside the campus. Further, they have no pump to increase water pressure; they rely on gravity for water flow.

The Abaarso school requires a digitized and automated water distribution system to ensure students and faculty have direct and easy access to water.



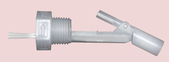
Customer Requirements

- ✓ Automatically refill tanks when low
- ❑ Durable and reliable; able to run 10+ years
- ❑ Detect water loss due to leaks
- ✓ User-friendly manual overrides

Future Work

- ➢ Integrate flow meter hardware and software to detect leaks in the system.
- ➢ Determine the cost of the full-scale water system to be constructed at the Abaarso School.
- ➢ Begin preliminary designs for the full-scale water distribution system. Start discussions with experts.

Hardware: Sensors & Devices



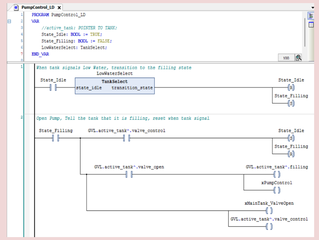
Level switch (Input): detects high and low tank water levels

Flow meter (Input): measures flow rate of water in mL/s

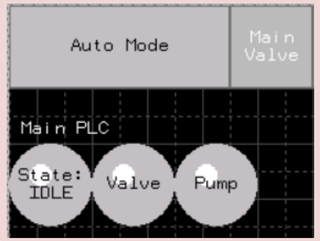
Valve (Output): opens and closes to allow water flow

Pump (Output): Initiates flow of water

Software: PLCs & User Interface

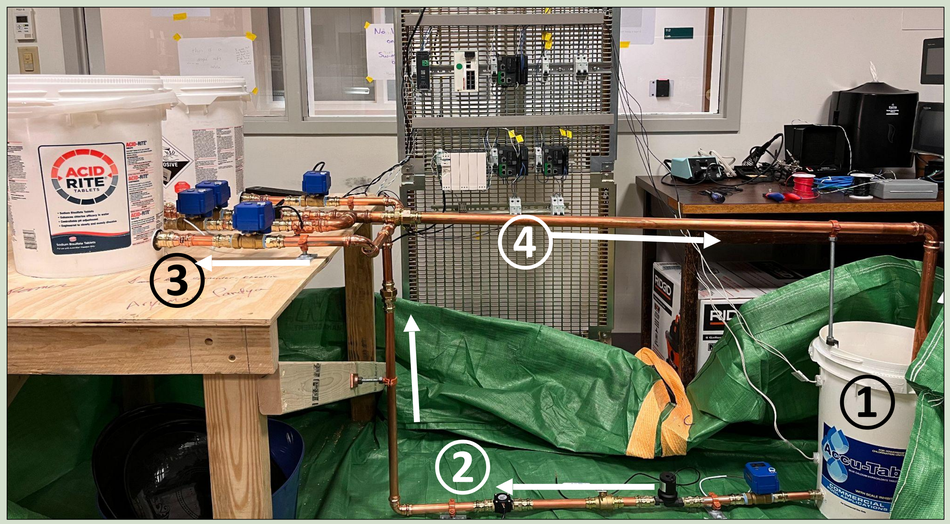


Programmable Logic Controller: PLC programs communicate with each other and control water distribution. Programmed in Ladder Logic.



User Interface: Displays status of sensors & devices, and allows manual control of the hardware if necessary.

The Lab Model



1. Water starts in the grounded bucket.
1. If elevated buckets are low on water, pump turns on, entry valves open, and elevated buckets begin filling. Water flows left and vertically upwards.
1. Once the elevated buckets are filled, the pump turns off and entry valves close.
1. Finally, exit valves open and water drains back into the grounded bucket. Perpetual motion of water is achieved.

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