

Introduction / Background

Problem Statement:

Water leakage and excessive consumption in Saudi Arabia cause water waste, infrastructure damage, high costs, and environmental issues. Many areas lack real-time monitoring systems, making leaks hard to detect. Our project introduces a reliable solution to detect leaks, track usage to optimize it, and send alerts, encouraging efficient water use and supporting the 2030 Vision with a daily target of 200 liters per person.

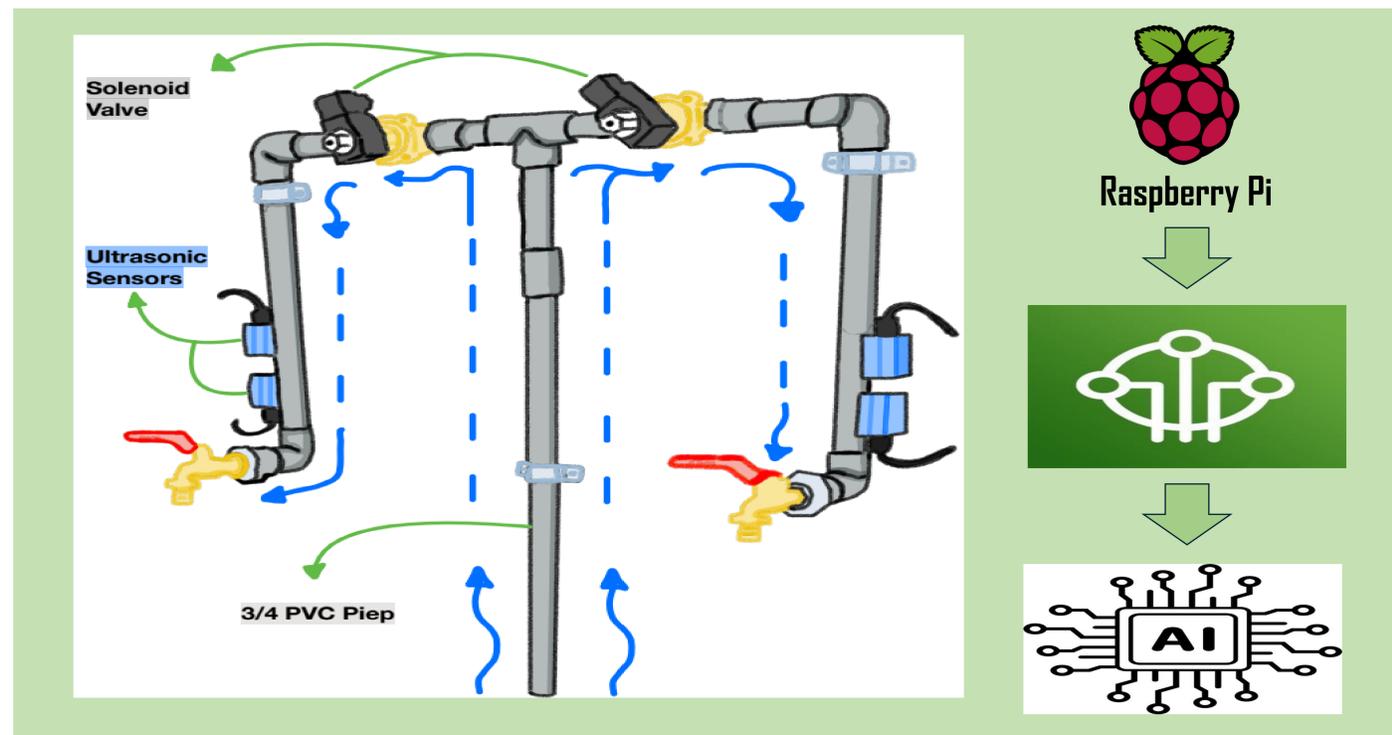
Constraints:

- Fit in 3/4-inch CPVC pipe.
- Maximum power supply of 220 volts.
- Cost < 6000 SAR.
- Safety compliance.
- Developing time of 16 weeks.
- Can be installed on an existing facility without the need for major modifications.

Specifications:

- Water usage tracking accuracy $\pm 2\%$
- Data Transmission Rate every 30 s.
- Power Consumption 2 – 5 watts
- Operating temperature range between $-10\text{ }^{\circ}\text{C}$ and $50\text{ }^{\circ}\text{C}$.

Prototype Design



Testing / Validation

- The system was tested on 3/4 inch pipes and operated successfully.
- Total cost was 4500 SAR (< 6000 SAR).
- The project was finished on 1st of May.
- The system was installed on an existing water network.
- The system demonstrated an accuracy of $\pm 2\%$ during testing, consistent with the manufacturer's specifications and verified through calibrated measurement instruments.
- All used devices works between $-10\text{ }^{\circ}\text{C}$ and $50\text{ }^{\circ}\text{C}$.

Conclusion

Our proposed system addresses the critical issues of water leakage and excessive consumption by providing real-time detection and monitoring using ultrasonic flowmeters. By alerting users to leaks and high usage, the system helps conserve water, reduce costs, and prevent property damage. Despite certain constraints such as cost and pipe size and material, this solution offers a practical and effective way to promote responsible water usage and protect valuable resources.

