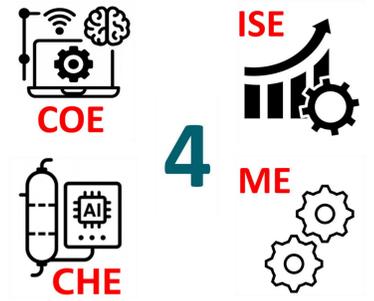


AUTOMATED AMMONIA DETECTION AND NEUTRALIZATION

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Introduction & Background

Problem Statement:

- Industries use slow, lab-based ammonia detection.
- Delays cause Health and environmental risks.

Project Goal:

- Real-time, in-line ammonia detection and neutralization.

Constraints:

- Max Ammonia: 50 mg/L
- Measurement error: $\pm 5\%$
- Tank size: 2 L max.

Specifications:

- Response within 10 seconds.
- Detection interval: 30 sec.
- Neutralization time: 3-5 min.

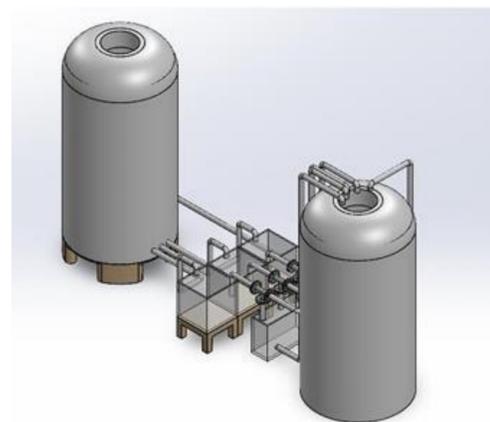
Prototype Design

Design Concept Chosen:

- Physical neutralization (dilution), not chemical.
- Setup: 3 × 2L unit simulation tanks → pH Sensor → Neutralization system → Wastewater collection.

Components:

- Sensors (pH, Level) + Arduino controller
- Water neutralization tank
- Visual alarms (LEDs)
- Pumps, Valves, LCD Screen



“Figure 1: Prototype design schematic”

Testing & Validation

Tests Done:

- High-concentration test:** 69 mg/L ammonia sample successfully neutralized.
- System neutralized within **~1.5 minutes.** ✓
- Response time < 10 sec, ✓
- Detection every 30 sec. ✓

Verification Methods:

- Cross-checked by timers, sensors, manual readings.
- Multidisciplinary testing across CHE, ME, COE, and ISE.

Conclusions

Conclusion:

- Real-time system successfully detects and neutralizes ammonia.
- Faster response saves costs, reduces downtime, and improves environmental compliance.

Future Improvements:

- Add wireless monitoring.
- Use more robust materials (PVDF, Stainless steel).
- Scale up for industrial adoption.
- Implement real-time data logging for performance tracking and analysis.

"Our solution advances industrial wastewater monitoring into the future."