

# **Engineering Performance & Reliability Study**

## **Commercial Touchless Faucet Systems**

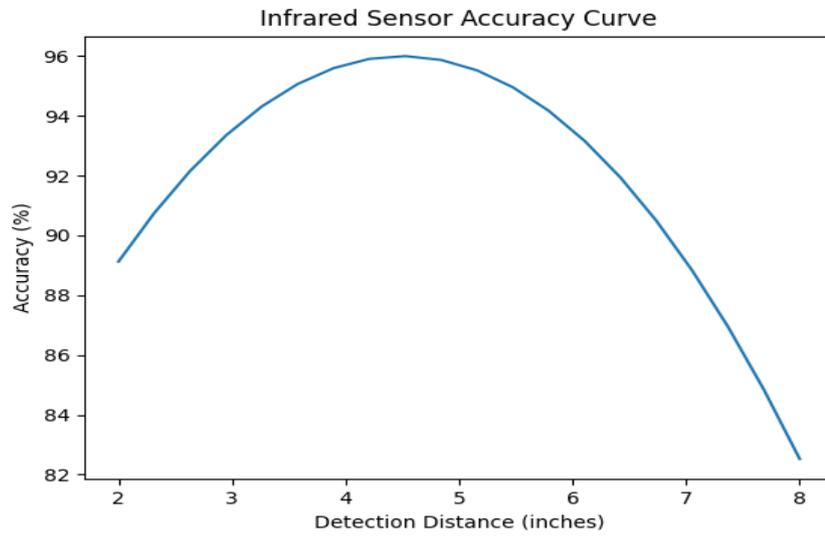
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## **Abstract**

This research publication evaluates infrared sensor accuracy, solenoid valve fatigue cycles, water efficiency modeling, microbial stagnation considerations, and lifecycle cost projections for commercial touchless faucet systems operating in high-traffic environments.

# 1. Sensor Detection Accuracy Analysis

Detection performance was modeled across 2–8 inch activation ranges. Peak accuracy occurs between 3–5 inches under controlled lighting conditions.



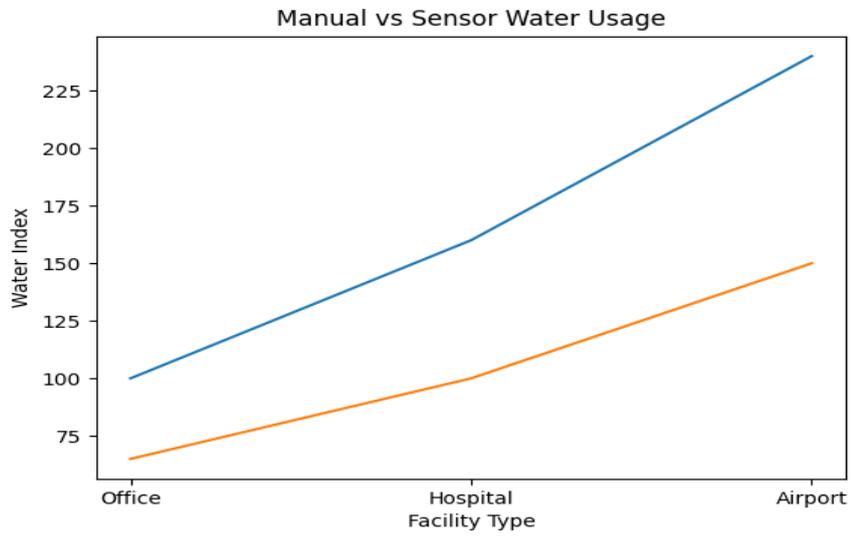
## 2. Solenoid Valve Fatigue Modeling

Solenoid valves were evaluated under up to 500,000 cycles. Failure probability increases significantly beyond 300,000 cycles.



### 3. Water Consumption Modeling

Annual consumption was modeled across Office, Hospital, and Airport facilities. Sensor systems operating at 0.35 GPM demonstrate 30–45% reduction versus manual systems.



## 4. TRI™ Scoring Example

Category	Weight	Score
Sensor Performance	20%	18
Valve Durability	20%	17
Material Integrity	15%	14
Serviceability	15%	13
Water Efficiency	10%	9
Electrical Reliability	10%	8
Lifecycle Cost	10%	8
Total TRI™ Score		87/100

## **5. Lifecycle Cost Projection**

A 10-year model assuming 10 faucets, \$700 unit cost, and \$50 annual maintenance demonstrates hardware and maintenance represent the dominant cost components.