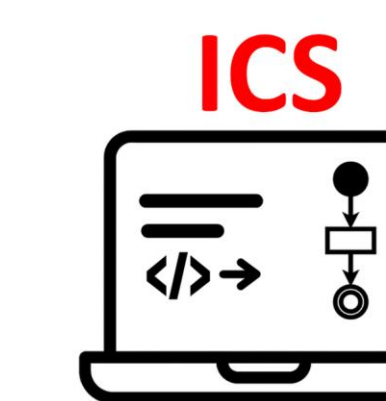


Flood Sense Hybrid – Software-First Flash-Flood Risk with Embedded Assist

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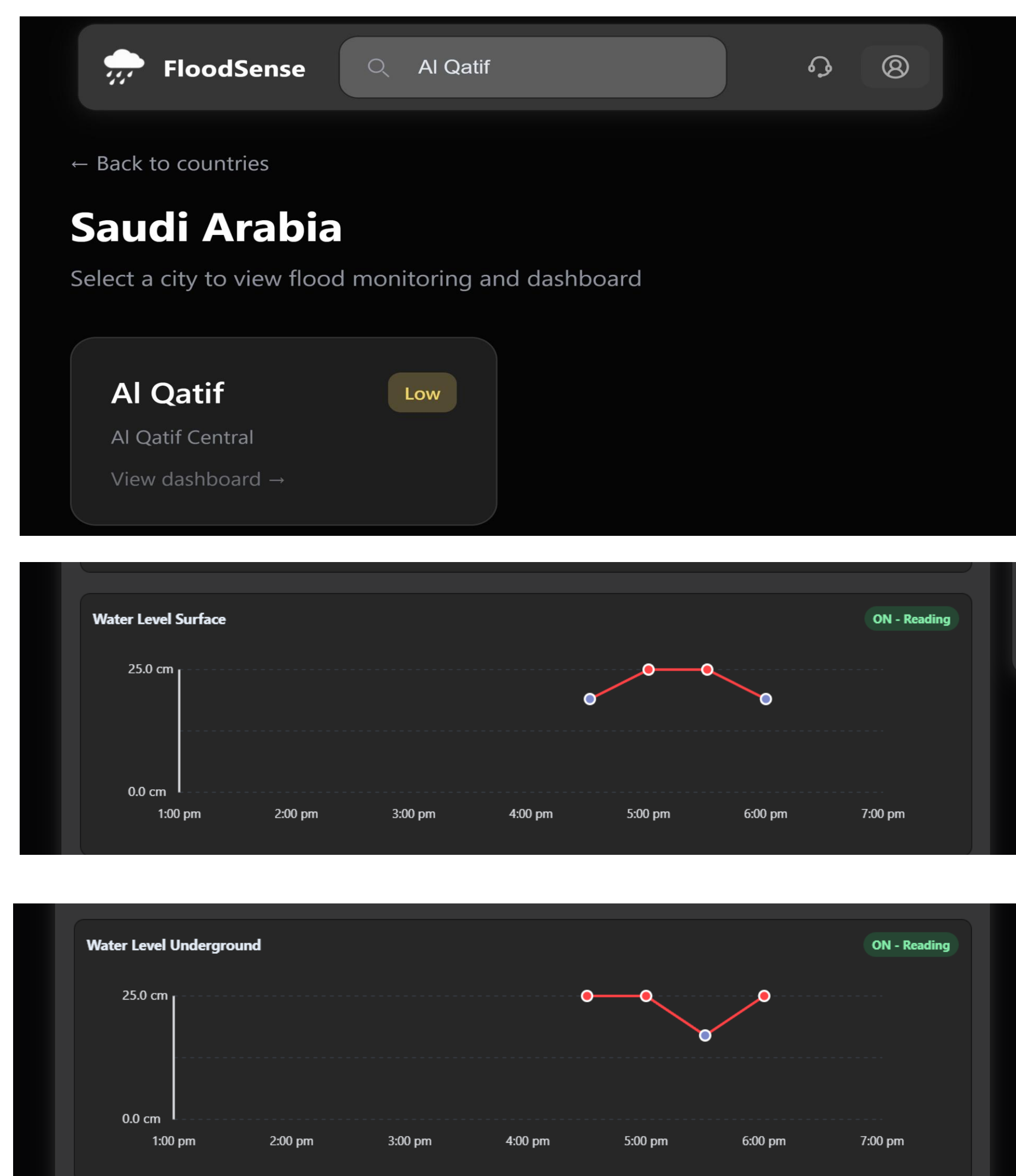
3



Background

- Urban flash floods cause serious damage, disrupting lives, infrastructure, and transportation
- They develop quickly at underpasses and low-lying areas where water accumulates fast
- FloodSense Hybrid provides real-time, localized monitoring to improve early awareness and response

Validation



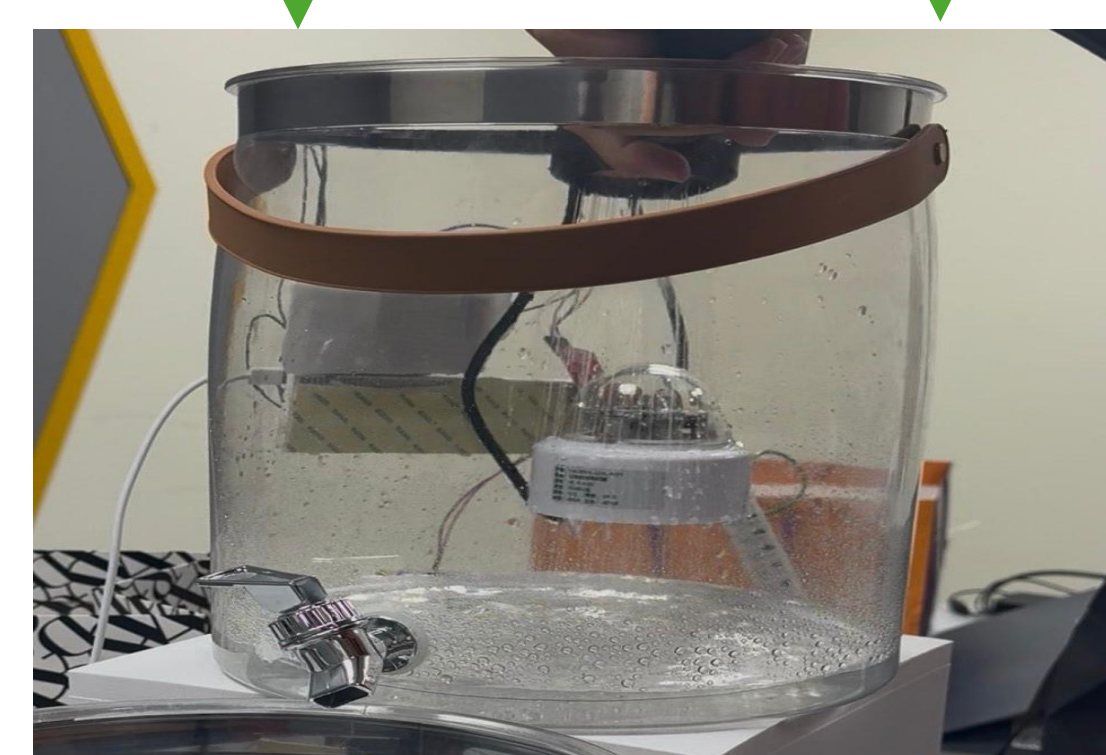
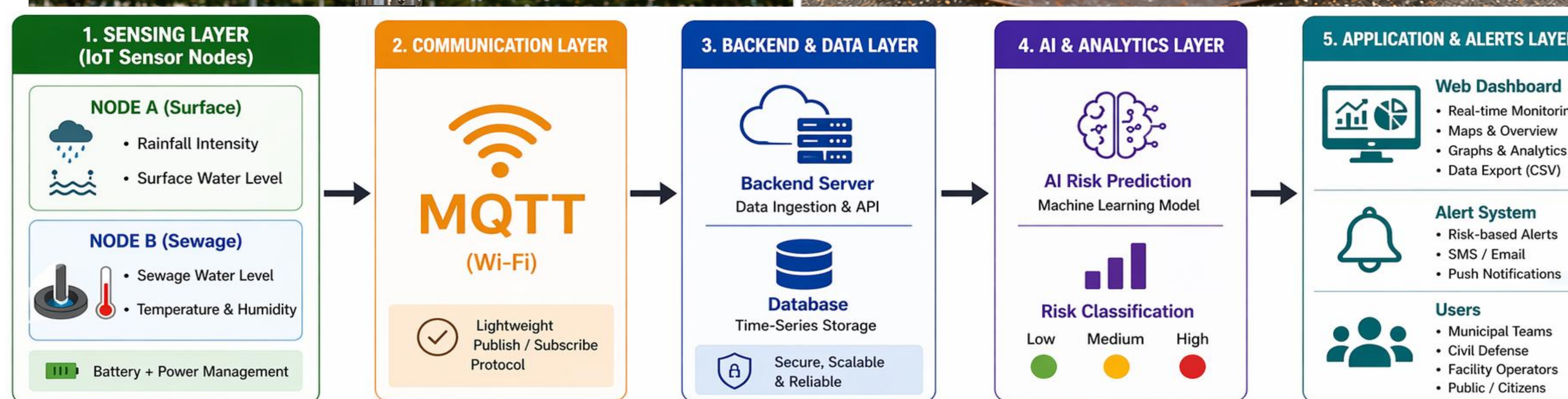
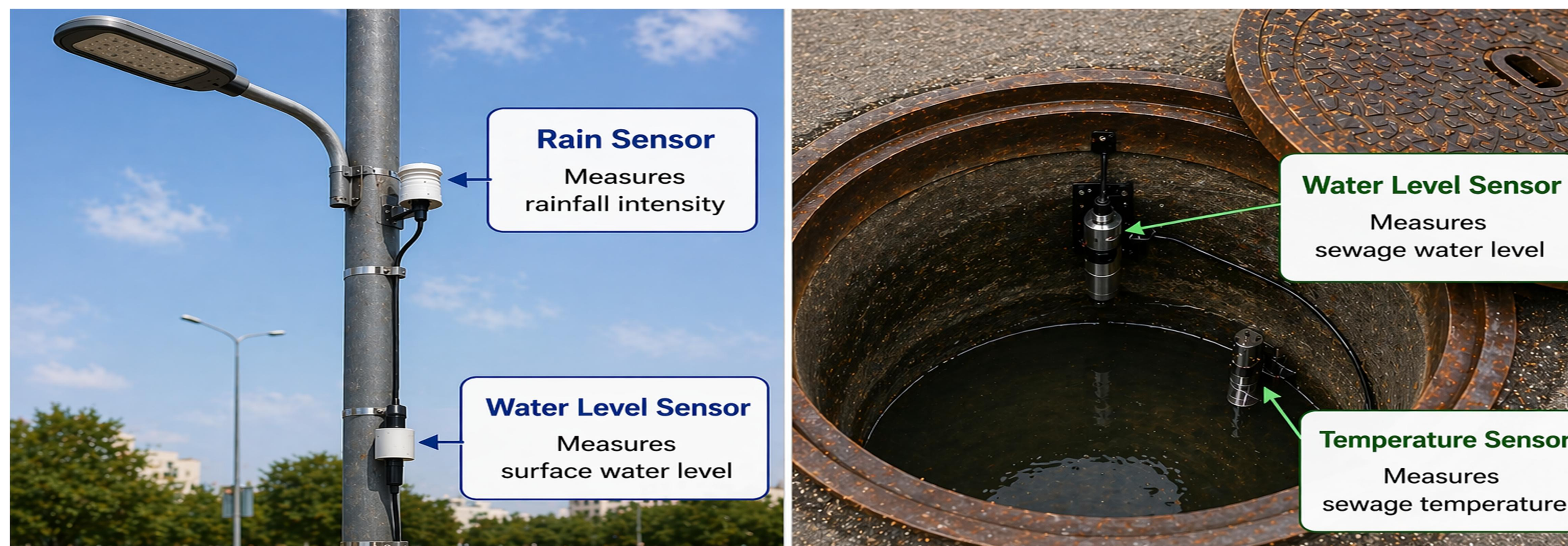
Prototype Design

Dual-node sensing

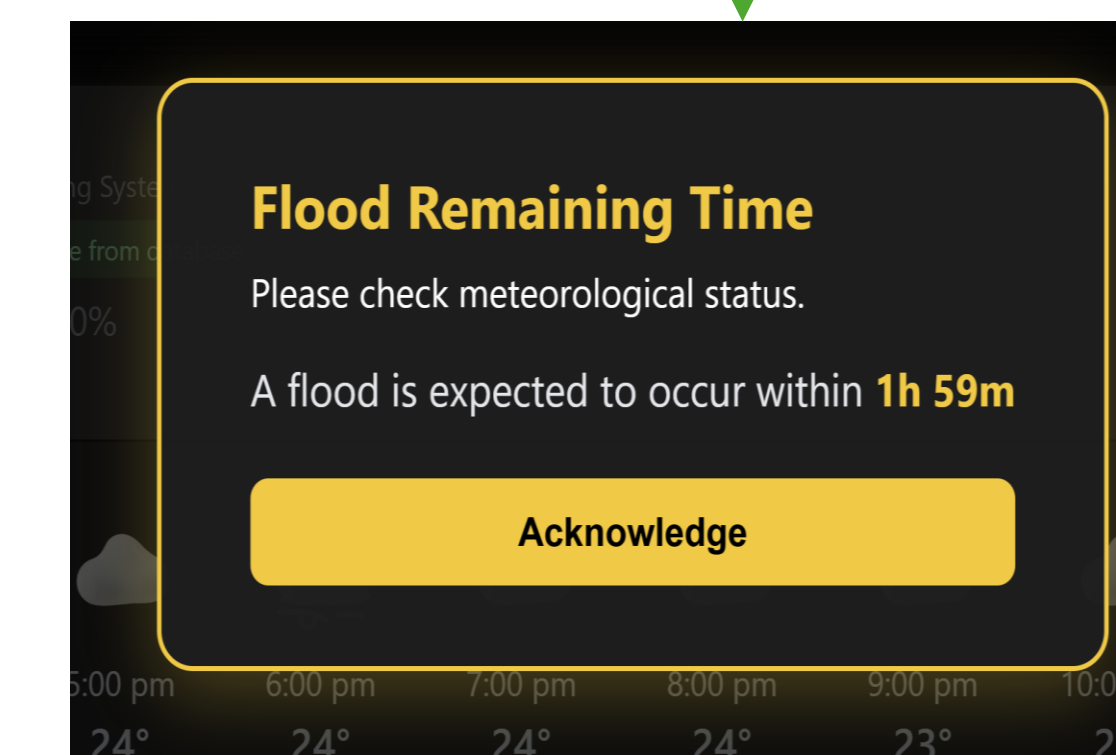
- Surface: rain + water level
- Underground: sewage + environment

Cloud-to-alert pipeline

- Buffer → Backend → AI
- Weather + sensors → risk
- Dashboard + alerts



location_id	time_stamp	risk_score	risk_level
4	2026-04-23 15:53:10.794+00	0.9	high
4	2026-04-19 15:41:20+00	0.05	High
4	2026-04-19 15:40:50+00	0.05	Low
4	2026-04-19 15:40:13+00	0.95	High
4	2026-04-19 15:39:26+00	0.95	High



Specifications

Constraints:

- HTTPS (TLS1.2+) + MFA
- ≤200 SAR/node
- 0–60°C & IP67 resistant
- NCM/MEWA regulations

Key Specs:

- ≥10 min buffer data when offline
- ≤30s updates
- ≤5% false alarms
- ≥99% uptime
- ±1 cm level / ±5% rain accuracy
- ≤5s API export
- Up to 5000 concurrent users
- 100% Tier-1
- Std ≤3 (5 min)
- Multi-platform.

Integrated:

- ≥90% accuracy
- ≥100 nodes
- ≥6h early alerts

Conclusion

- System met targets, enabling faster response and reduced impact
- Result: real-time awareness improves safety and response