



Wireless IoT Communication & Applications

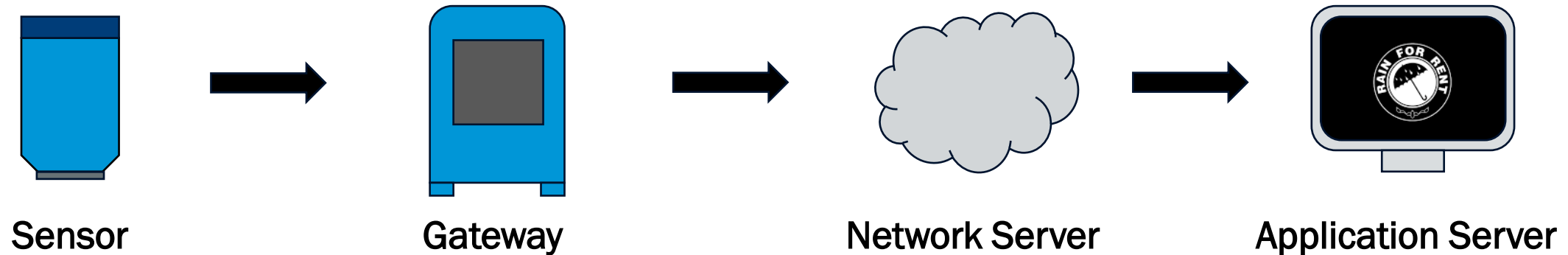
Audrey Wiebe - R&D Engineering Intern

Onboarding Process

- Completion of IoT Training:
 - Ranger Gateway
 - Tank Level Gauge (TLG)
 - Co-Pilot
- Learned about device configuration, wiring, including how to daisy chain sensors, and 4-20mA outputs



Wireless Communication



LoRaWAN

- Smaller amounts of data over long ranges (up to 62 miles)

Bluetooth Low Energy (BLE)

- Larger data packets over shorter distances (160-1600 feet max.)
- Supports mesh networking



Research Process

- Conducted research on several IoT device companies
- Personally reached out to coordinate meetings with over 10 companies
 - Including LoRaWAN, BLE, Wirepas, and Direct-to-Satellite connectivity
- Evaluated product offerings & costs
- Contributed to the R4R R&D team by exposing different communication methods and sensing devices



LoRaWAN Communication

IoT Demo Site Installation

- Solar Powered Gateway
- Radar Level Sensor
 - 1 min reporting interval
- Submersible Level Sensor



LoRaWAN Communication



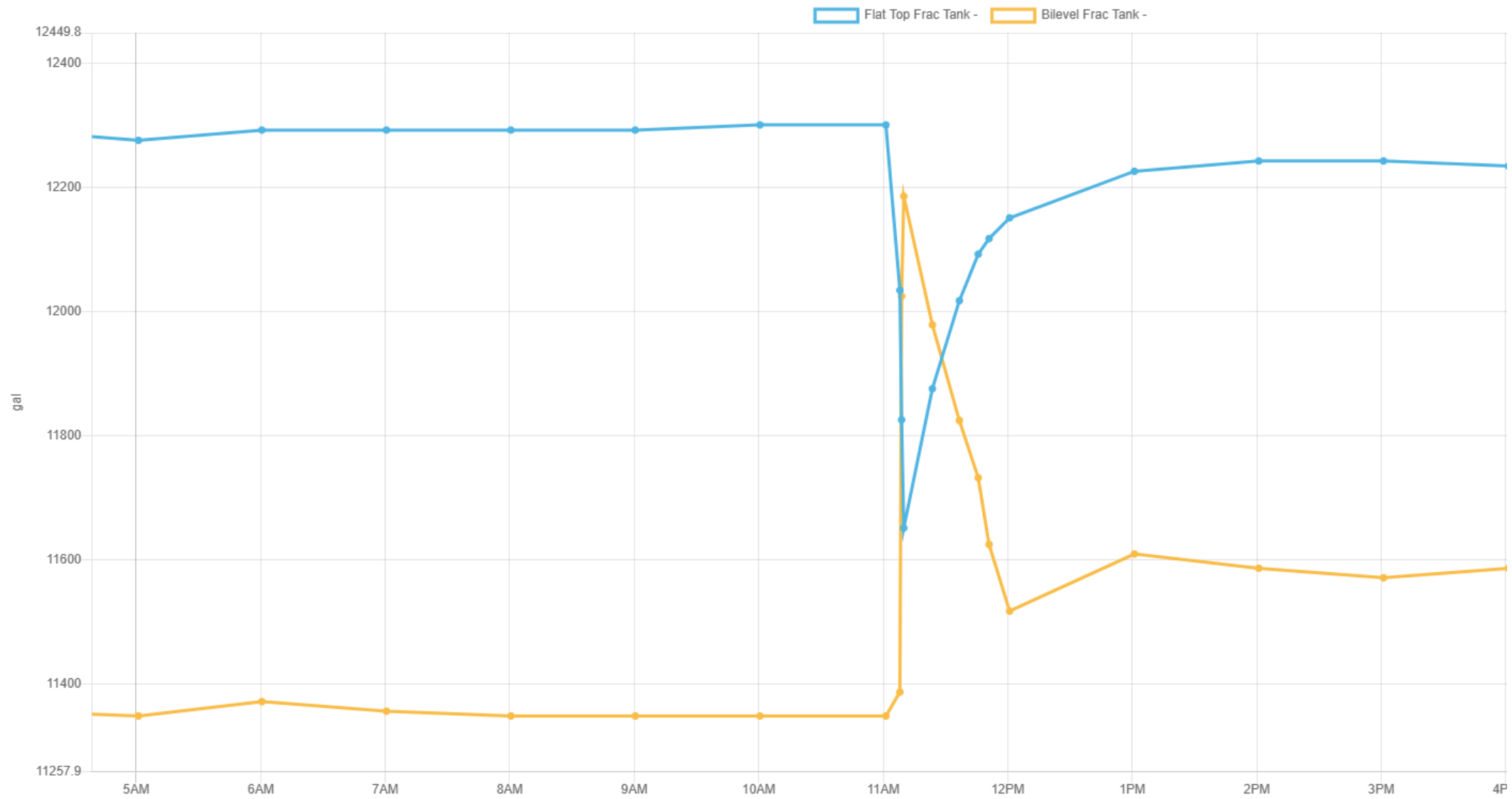
BLE Sensing

IoT Demo Site Installation

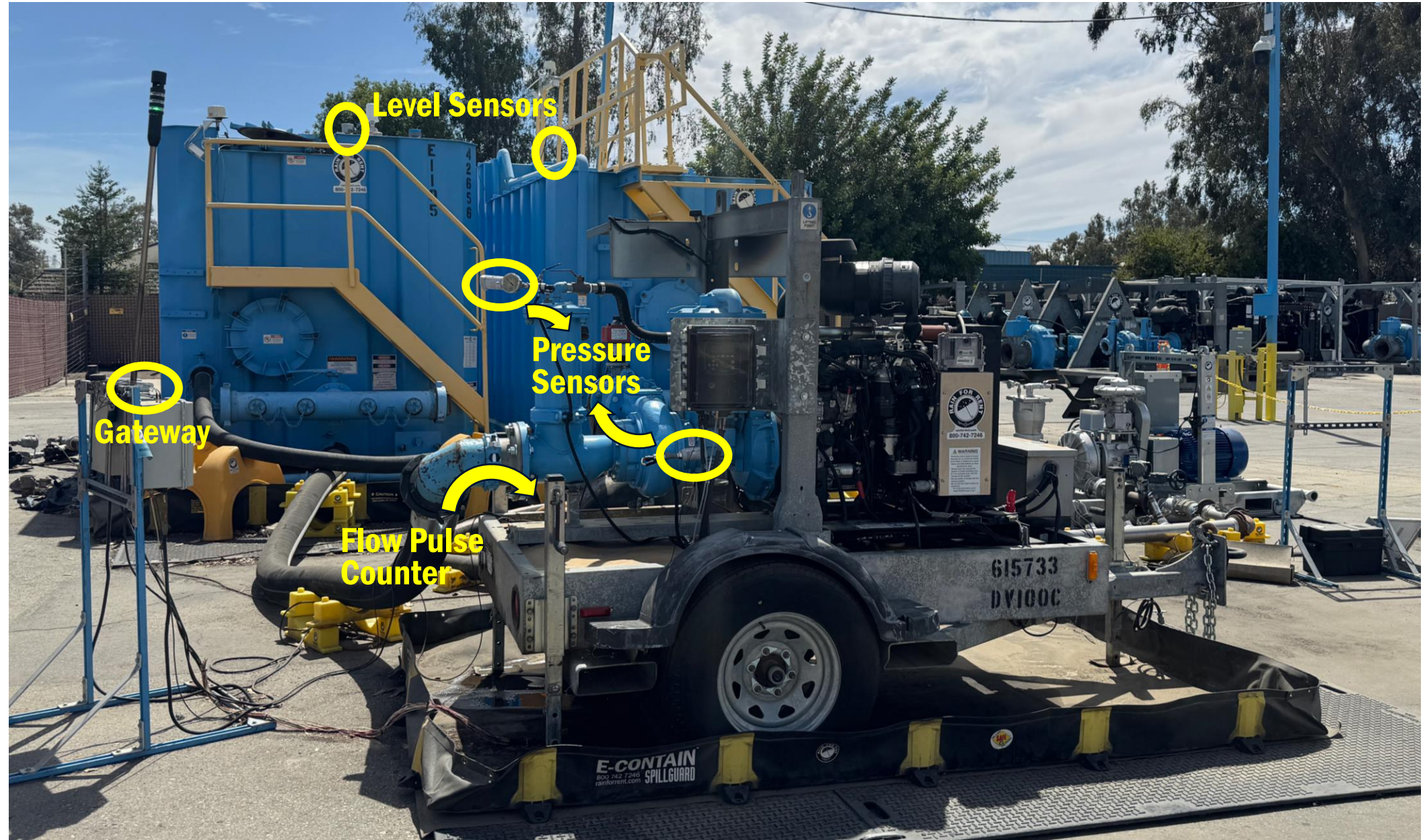
- Solar-Powered Gateway
- Radar Sensor
 - 10 min reporting interval
 - 3 in Delta Threshold setting



Immediate Reporting with Level Change



IoT Demo Site



HFH5000 Filter Installation



**Discharge
Pressure**

**Discharge
Pressure**



Water Well Level Monitoring



Measurement Range Settings of Rainwater Well Mode

* Measurement Range(mm)

6000

range 1000-12000

Measurement Range Settings of Wastewater Well Mode

* Measurement Range(mm)

6000

range 1000-12000



Cloud Network - CloudforRent

- REST and RPC API Integration
- Immediate reporting from vendor's portal

Device Details:

Latest Reported Data

depth	1.59
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Device Info

sn	
rpsStatus	DISABLED
name	
model	
hardwareVersion	v2.1
firmwareVersion	v1.10
electricity	100
lastUpdateTime	1754337768495
application.applicationId	1943747223617863681
application.applicationName	Demo App
project	R&D Test 1
licenseStatus	VALID



Next Steps

- Further portal customization and visualization
- Testing the LoRa communication capabilities on BLE Gateway
- Further research pulse counters that can read our flow meter's output
- Test longevity of LoRaWAN products
- Calculating Differential Pressure

