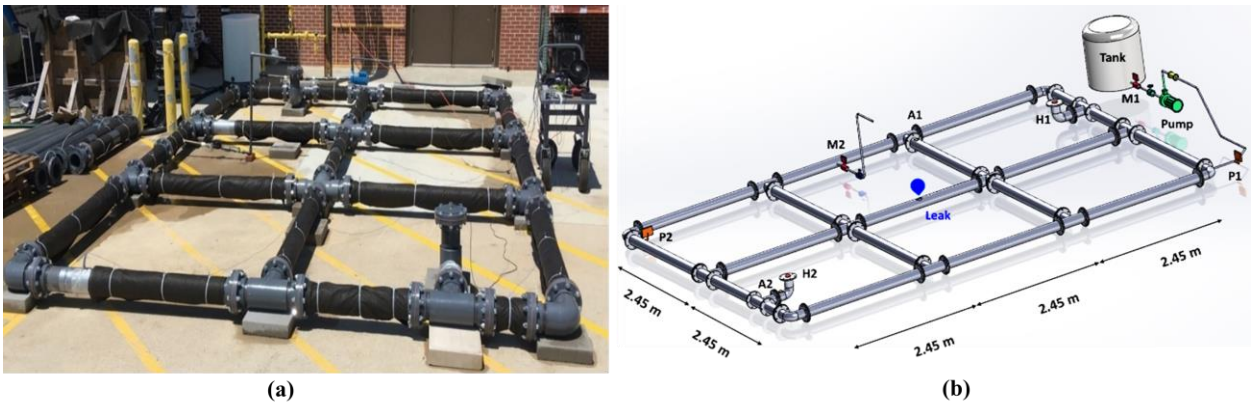
Summary of Dataset for Leak Detection and Localization in Water Distribution Systems

This dataset includes two hundred and eighty signals acquired from a laboratory-scaled water distribution testbed with four types of induced leaks. Leaks were induced in a laboratory-scaled water distribution system with 152.4 mm (6 in.) diameter PVC pipes. Three sensor types_accelerometer, hydrophone, and dynamic pressure transducer_two sensors of each kind were employed to measure acceleration, acoustic, and dynamic pressure data. The sensor data were recorded through controlled experiments where the following were changed: network architecture, leak type, water demand flow, background sound, and sensor locations. Each sensor signal was recorded for 30 seconds. Network architectures were Looped (LO) and Branched (BR). Leak types were Longitidinal Crask (LC), Circumferential Crack (CC), Gasket Leak (GL), Orifice Leak (OL), and Nonleak (NL). Water demands were 0.18 and 0.47 L/s, and Transient (the flow rate abruptly changed from 0.47 L/s to 0 L/s). Background sound (S vs. NS) determines if there was ambient sound during acoustic data measurements. Finally, sensor location represents variations of sensor locations throughout the testbed. Accelerometer and dynamic pressure transducer data are in .CSV format. Also, hydrophone data are in .RAW format with 8000 Hz frequency and can be converted to other formats via Audacity software.

Figures 1 to 3 show the looped network, branched network, and scenario. Looped architecture and branched architecture demonstrate the looped and branched topologies with sensor locations and network components. Scenario shows how two hundred and eighty signals were generated through controlled experiments.



(a) (b)

Figure 1. (a) An overview of the looped network; and (b) a schematic of the looped network.

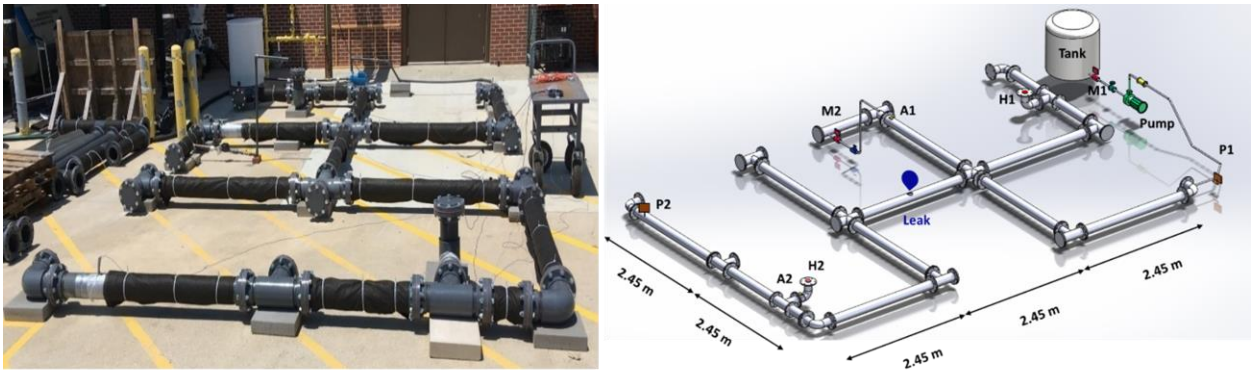


Figure 2. (a) An overview of the branched network; and (b) a schematic of the branched network.

Architecture	**Leak Type**	**Background Condition** (BC)	**Measurement** (M)
• Looped • Branched	• Non-leak • Orifice • Longitudinal Crack • Circumferential Crack • Gasket Leak	• BC1: D(0.18) & S [M1] • BC2: D(0.47) & S [M1] • BC3: D(0) & NS [M1] • BC4: D(0) & S [M2] • BC5: T & S [M1] • BC6: T & NS [M2]	• M1: A_1, A_2, H_1, H_2, P_1, P_2 • M2: H_1, H_2

Figure 3. Simulated scenarios, leading to two hundred and eighty signals, with demand, sound, and sensor variations (D(x): demand flows where x = 0, 0.18, and 0.47 L/s; S: ambient sound present; NS: no ambient sound; T: transient; [M]: combination of sensors).