

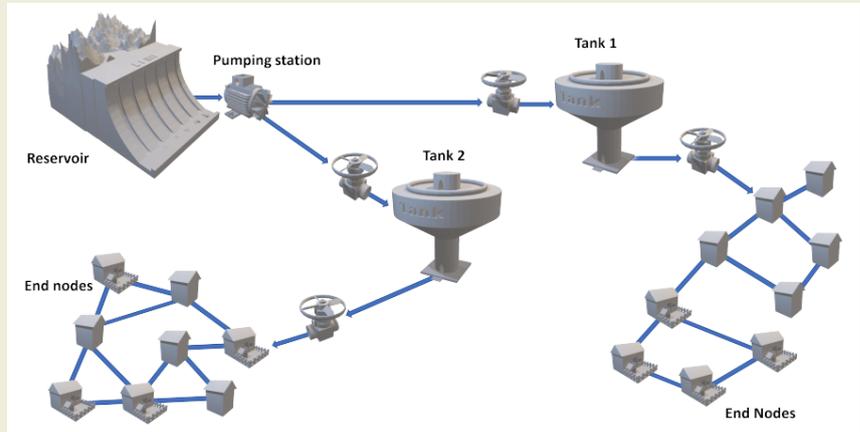


Network Mapping

PID: 2021\DSAI\003

Water distribution networks (WDNs) are important infrastructural assets for human settlements. Piped water distribution networks (WDNs) supply water from sources such as dams, lakes, ponds to the consumers through a network of pipes, valves, pumps and intermediate storage tanks. A schematic of a typical WDN is provided below.

Significant portion of pipes in a WDN are located underground and hence detailed and accurate information on their location, topology etc. is not directly accessible to stakeholders or the available information may be outdated or erroneous. Reconstructing the network is a relatively unexplored area.



A recently proposed alternative is to reconstruct the network using street layouts and it has been reported average, 50% of the street network length correlates with 80%–85% of the total water supply/sewer network*. In this project, we wish to use street layout to reconstruct (partially) a typical WDN.

Task to be assigned to the intern: Openstreetmap data of a typical Indian town or city available on Openstreetmaps will be used to extract the network and connectivity structure of the road/street along with additional useful and relevant information (e.g., type of structure-residential/commercial etc.) Appropriate graph algorithms (e.g., shortest path tree/Steiner tree) will be used to generate candidate network structures for the WDN. Subsequently, these can be verified with ground truth where available.

Learning outcome: The intern will be exposed to inter-disciplinary research arising out of real-world problems. Specifically, the intern will get an opportunity to work with geospatial data, graph algorithms and networks.

Duration: 3-6 months

Skills required: Python(mandatory). EPANET (free to use network modelling software), osmnx and other networks packages in python (desirable, but not mandatory as the candidate should be able to work with them during the internship).

Pre-requisite courses: Interest and flair for mathematics mandatory. Graph theory, optimization (preferred, but not mandatory)

Number of interns: 1-2

*Mair, M. Zischg, J. Rauch, W. and Stitzenfrei, R. 2017, "Where to Find Water Pipes and Sewers? - On the Correlation of Infrastructure Networks in the Urban Environment", Water, 9(2), 146