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Industry Defined Problems- GE

Problem Statement 2 : Intelligent water distribution

A high-tension transmission cable snaps, and immediately the substation shuts off power in that line. A cable fault locator soon gives the location of snap. A small electrical current leak from a device in our homes will trigger the circuit breaker (MCB) that shuts down power, though it doesn't show the location of the fault. Then why is it that a leaky faucet, or a leaking distribution water pipe goes unnoticed until an alert citizen or the personnel on duty spot it and repair it?

The leakage and breakage of water pipes (both in supply and distribution) results in a lot of water being wasted, that too in the age where every drop of water needs to be saved wherever possible. A large amount of water leakage happens in the last mile of distribution in our cities. Moreover, the problem of finding a leak is harder in underground and hidden-from-view distribution pipes, which is mostly the case. With growing Indian cities, expansion of infrastructure and many construction projects inevitably damage water distribution pipes.

So the problem is to conceptualize, design and validate an efficient fault detection system for water distribution in cities or large fluid carrying systems. The idea could also be extended to systems that need a large network of piping to carry fluids. The faults could be in the form of leaks or breaks in main or sub-distribution pipes. A faulty break in flow is defined as that which is not at the user end devices such as taps.



The system needs to have the following features:

1. Shut off flow and sound an alarm when there is a faulty break in the flow.
2. Indicate the location of a faulty break in flow so that it is easier for the personnel to handle the fault.
3. Centralized or distributed control of valves to regulate leaks and shut off supply when a faulty break in flow is detected.
4. A real time response system for a consumer/user to report faults for immediate action.
5. A system for regulation and analytics of water/fluid wastage, so that more controls can be put into place where required.
6. The system should be cost effective with very less intrusion into the existing infrastructure.
7. Bonus points if you can scale down the problem to domestic household level, which can detect leaks and wastage within a house or an apartment at a very nominal cost. This can be implemented in each house to prevent water wastage at the grass-root level.