

Concept Note

Attempted Challenge:

Smart Water Metering

Challenge Description:

AI-ML enabled Smart water metering to monitor water usage across areas and raise alarm in case of excessive and/or continuous water usage in a particular area.

Proposed Solution Name:

Smart Water Usage Monitor

Brief Background of Proposed Solution:

It has been observed that, in households huge amount of water is wasted through devices (i.e. Taps) daily which are a threat to the ground water source. Also, leakages in Distribution lines go unnoticed which results in wastage of significant amount of water. The focus of our solution is to monitor the water usage of devices (i.e. Taps) in households, detecting any leakages in distribution line and raising alarm in case of excessive water usage or leaks in distribution lines.

Objective:

- Using a machine learning model to record and learn the trend of water usage in a certain area.
- Based on the above trained model, deciding whether there is excessive water usage in that area on daily basis.
- Detecting leakages in distribution lines if any.
- If excessive use or leakages is observed, an alarm is raised.

Brief Description about the Concept:

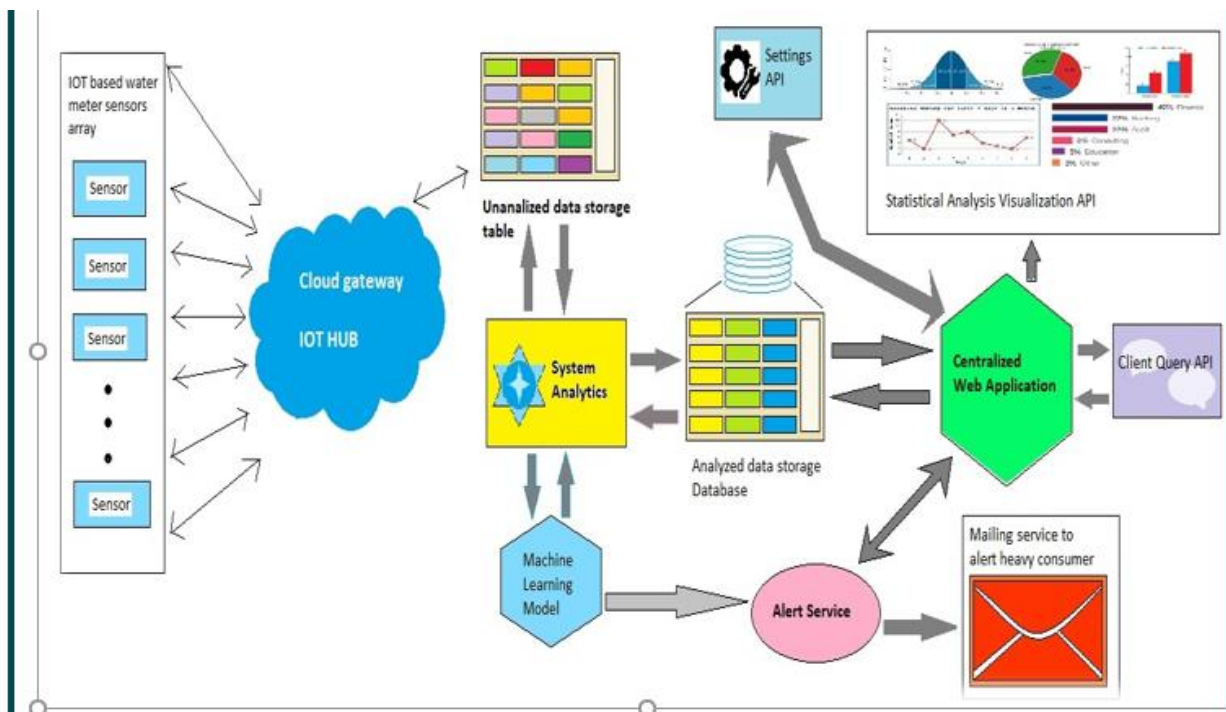
First, sample amount of data (i.e. for few years) are to be collected from the respective authority for learning the trend of water usage in a particular area and train the Machine learning model for the first time so that it can decide on the usage if it exceeds normal water usage.

An IoT based flow meter will be placed at the inlet line of households to measure the water flow in the households in a particular area on daily basis and send data to the respective server node. These data will be stored in a database (in our project it is cloud) for both decision and further training the Machine Learning model. After deciding if the water usage is abnormally high, alarm will be raised on authority end and also to the consumer (i.e. household owner) end that abnormal water usage is observed and based on that authority can take necessary actions.

For detecting the leaks in distribution lines, the IoT based flow meters can be placed after regular distances in distribution lines and flow can be monitored at each point. If there is a significant difference of flow at two different points, alarm will be raised signifying a leak at the location between the two respective flow meters identifiable by their unique ID's (As they are IoT based, each device has an unique ID associated with it). The authority can take required actions to repair the distribution lines.

The flow meters will be connected and supervised through a Web application which will contain the database, the machine learning model and the detailed heuristics of water usage over different areas based on the learning of the model. The cost of the devices (IoT based flow meters) will be about Rs. 500 per device which is quite feasible to be implemented by the Government Authorities for conserving our precious water resources.

BLOCK DIAGRAM OF IDEA:



Expected Outcomes:

- Authority can monitor the water usage over a particular area under one roof.
- Leakages in distribution pipes can be identified earlier and required actions can be taken to conserve water resources.

Risk and Mitigation Plan:

A risk associated with the proposed solution is that during initial span after implementation, there can be incorrect decision regarding water usage as the data on which the machine learning model is trained is few years old and in this span of time there can be increase in household or number of members in a household.

This can be mitigated by considering the measured data from households also for continuous training of the machine learning model. By this way, the error can be minimized.

Revenue Model:

Our solution follows the “Free-for-service” Revenue model as the authority may charge the households for using excess water which will result in considerable revenue generation. Moreover, huge indirect revenue is earned by conserving the water resources for future.

