**Project Definition:**Increasing water consumption and wastage is leading to water scarcity. While a large population has no safe drinking water, some people use a lot of water on daily basis and waste it. This project is of a smart water meter that measures our daily water usage and feeds live data on our phone that is connected to a database, which can be accessed by the concerned authorities through a web browser.

**Design Thinking:**

1. **Project Objective:**

**Real-Time Water Consumption Monitoring:**

Develop a system capable of real-time monitoring and tracking of water consumption in homes and public places through smart water meters and sensors.

**Public Awareness and Education:**

Raise public awareness about water conservation and responsible water usage by providing access to real-time water consumption data via a user-friendly mobile application and web platform.

**Water Conservation Promotion:**

Encourage water conservation behaviour’s among individuals and communities by providing insights into their water usage patterns and offering tips and recommendations for reducing water wastage.

**Sustainable Resource Management:**

Assist concerned authorities and organizations in the sustainable management of water resources by providing access to aggregated water consumption data and trends. This data-driven approach will aid in optimizing water distribution and identifying areas of potential water savings.

1. IoT Sensor Design:

Some components required for the project are:

* Water flow sensor:

A water flow sensor, also known as a flow meter, is a device used to measure the flow rate of water or any liquid passing through a pipe or conduit. It is a crucial component in various applications, including water monitoring systems, irrigation systems, industrial processes, and more.

* Arduino Pro Mini:

The Arduino Pro Mini is a microcontroller board based on the ATmega328P.

It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, an on-board resonator, a reset button, and holes for mounting pin headers. A six pin header can be connected to an FTDI cable or Sparkfun breakout board to provide USB power and communication to the board.

The Arduino Pro Mini is intended for semi-permanent installation in objects or exhibitions. The board comes without pre-mounted headers, allowing the use of various types of connectors or direct soldering of wires. The pin layout is compatible with the Arduino Mini.

There are two version of the Pro Mini. One runs at 3.3V and 8 MHz, the other at 5V and 16 MHz.

The Arduino Pro Mini was designed and is manufactured by SparkFun Electronics.

* Bluetooth HC-05:

HC-05 is a Bluetooth module which is designed for wireless communication. This module can be used in a master or slave configuration.

* OLED :

HC-05 is a Bluetooth module which is designed for wireless communication. This module can be used in a master or slave configuration.

* Water pipe, Water tap connector :

These connect out tap adapter. Then you can connect your hose. Turn on your tap.

1. Real-Time Transit Information Platform:

Open MIT App Inventor, make a layout and add the components, Main components added in the layout are:

* 1 x Button for database
* 5 x Text views for Bluetooth connection status, inlet water flow rate, the total volume of water consumed, wastewater flow rate, and total volume of water waste.
* TinyWebDB
* List picker for Bluetooth
* Bluetooth client
* Timer clock

1. Integration Approach:

Removing ATmega328 IC from the board, Connect Arduino Pro Mini with Arduino Uno. Now, go to Tools and select Board as Arduino Pro Mini and upload the code to Arduino then Selecting the Board in Arduino IDE Next, we need to connect all the components to make the final smart water meter project.

The Arduino pin connections with the components. The actual wiring diagram of the Arduino Pro Mini pins with the components Wiring diagram of smart water meter

Now, cross-check all the connections. If all the connections are correct, then power the Arduino with a 5V DC power supply.

Connect the water sensor pipe to the water tap or water inlet of your water tank. You can see the total volume of water and water flow rate on the OLED display. Next, install the smartmeter.apk file on your Android device. Then, open smart meter app and press on the Bluetooth icon.

You will get a list of Bluetooth devices available near your Android phone. Select HC-05 from the list to pair it. The default code for pairing is 1234 (or could be 0000 or 1111).

After connecting/pairing it, you will get the water flow rate and water volume consumed in the app on your phone as shown in Fig. 13. If there is a display problem or the data is incorrect, disconnect Bluetooth and connect it again.

You can tap on the DB icon to upload your water usage data to the Web server so that it can be seen from anywhere through the Internet. Internet Wi-Fi connection needs to be turned on in order to upload the data to the server.

Now, to fetch the data, click on the link. Then type your house tag name as home 1, which is already mentioned in the app. Click on Get Value button to get the details of water usage.

Fetching data:

You can add an extra flow sensor to pin 2 of Arduino for water wastage data from the sewer pipe outlet. It will work with the same code and app. So, use two sensors (one for water usage and another for waste water) and enjoy your project.

**Conclusion:**

the project to implement IoT sensors for monitoring water consumption in public places and sharing real-time data through a mobile application connected to a database accessible by concerned authorities is a significant step toward addressing water scarcity and promoting responsible water usage. The project's objectives include real-time monitoring