**CE-221 Project Proposal**

**A simple solution for tap-water conservation**

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1. **Problem Statement**

When you open your tap for washing hands, face, or performing ablution, did you ever notice the difference between how much water you utilize and how much it leaves the tap? The difference is a lot, and most of the water is being wasted.

Suppose a person turns on the tap and performs ablution. It takes around 3 minutes to do so. Around 2 liters of water leaves the tap in this time, and only 1 liter is used at maximum. It means 50% of the water is wasted. And if a person uses the tap for an average of 6 times a day, using 2 liters each time and wasting half of it, the total water wastage is 6 liters per day or 180 liters per month.

That’s a huge problem. Water is a precious resource. If one person is wasting so much water without even realizing it, then imagine the hundreds of liters being wasted by a community or in university hostels daily. To solve this problem, and to reduce the water wastage down to bare minimum, we propose the following design/project.

1. **Components**

* Servo Motor
* Sensor (LDR, tentatively)
* 7-Segment Display
* Shift Register
* DC Batteries
* Timer / Counter

1. **Working Prototype**

**SENSOR AND MOTOR LOGIC:** The servo motor will be attached to the tap-handle and will be able to rotate it about 80% of its maximum based on the output from LDR sensor. When the hands come closer to the tap, the LDR sensor will send an output (say 1) that will turn the motor in one direction (say Clockwise). The motor will rotate and will turn on the tap and water will start coming. When the hands move away, the LDR sensor will sense this and send an output (say 0) which will turn to motor the other direction (say Anti-clockwise) in a specified degree, thus turning off the tap with minimum delay. This process will be continuous.

**COUNTER LOGIC:** The 7-segment display will show the amount of water, in liters, used per day (or per week). The calculations for this will be done later. We experimentally measured that it takes around 11.3 seconds for 1 liter flow out of the tap, so 7-segment display will increment accordingly. It will reset after a specified number of days, say a week.

1. **Circuit Diagram (Tentative)**

Diagram, schematic

Description automatically generated

1. **Improvement in Design**

Depending on the availability of time and resources, we would like to push our design further with the following improvements:

Two servo motors will be attached, each to one side of the tap. A thermal sensor or thermometer will measure the environment temperature, and based on this, the appropriate motor will turn on. When the temperature of environment falls below, say 20℃, then left sided motor will turn on, otherwise the right one will turn on. All this will be done without user involvement; hence user doesn’t have to worry about it.

The heated water can be helped in charging the DC Batteries. This will make our system self-sufficient in terms of energy requirements. There will be no need to replace the battery after some time because batteries will be kept charging through heat, from hot water.