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Project Title

A Novel Shower Usage Monitoring System that Promotes Water Conservation

Abstract

Objectives/Goals

California experienced a historic drought between 2011 and early 2017. To comply with water usage restrictions, different costly water saving methods have been available for households which include low flush-dual flush toilets, smart shower heads, rain-water harvesting, automatic shutoff valves, etc. Showers are frequently mentioned as a potential area for reducing water wastage, since the average shower head uses about 2.5 gallons per minute and much more water is wasted during showers than any other household activities. The objective of my project is to design a user-friendly, inexpensive, easy-to-install, electronic device that can be used for consistent shower water usage monitoring. The device will be able to provide automatic feedback to the user based on his or her shower usage habits over a period of time. This feedback will allow users to take notice of their shower habits and then instead of forcing water conservation, it will motivate the user to use less water.

Methods/Materials

An Arduino microcontroller was used as the programming platform for my device to which three sensors were connected, namely, water flow meter, temperature and humidity sensors. The data from the sensors were sent to the Thingspeak website through a Wi-Fi module on my device. Also an app was developed on the smart phone that displays different statistics on the use of water over different period of time. The device also displays visual warning when shower usage exceeds a set time.

Results

The device functionality was tested multiple times near bathroom shower. The water flow sensor was tested for accuracy by running the water for a fixed period of time and comparing the water flow reported by the sensor with the measurement made manually with beaker. The humidity sensor was tested by observing the humidity reading from the sensor as it increased or decreased as shower water in the bathroom was turned on and off. Several readings were recorded for different size bathrooms. The graphs plotted on Thingspeak were checked against the actual data. If the shower duration exceeded a certain threshold (10 mins) the LED light would begin flashing red.

Conclusions/Discussion

My shower water-usage monitoring device was able to perform accurately and reliably in a real world setting and according to the design goal of the project.

Summary Statement

I developed an inexpensive, easy to install shower water usage monitoring system with a user friendly interface which has the potential to motivate the user to conserve water.

Help Received

Father explained how to make circuits.