

Design of a Hands-free Face Washing Mechanism

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Introduction

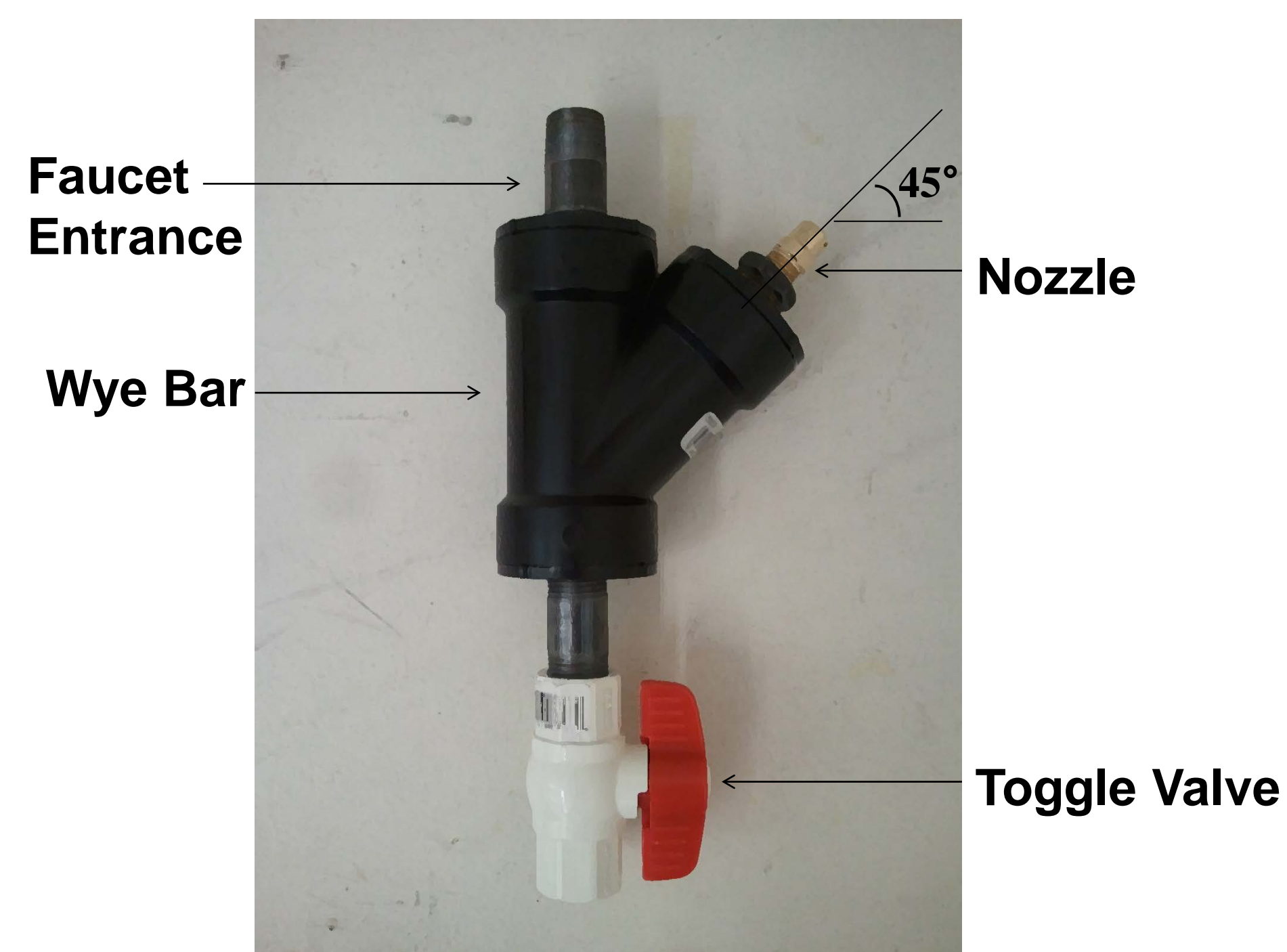
The objective is to provide a face washing mechanism attachable to residential faucets. The mechanism must be:

- **Hands-free**
- **Easy to implement**
- **Low cost**

Comprehensive knowledge of the following disciplines was utilized for this project:

- **Fluid Mechanics**
- **Solid Mechanics**
- **Design Optimization**

Initial Prototype



- A Wye-bar pipe with upwardly 45° face wash outlet
- Projectile stream for uniform face washing
- Template for testing various Nozzle performances
- Composed of pre-manufactured parts

Nozzle Testing

- A variety of nozzles were tested for the right “feel”



- The nozzles ranged from :
 - High momentum to low momentum
 - Wide angle to narrow span
 - Coarse to fine atomization droplet distribution

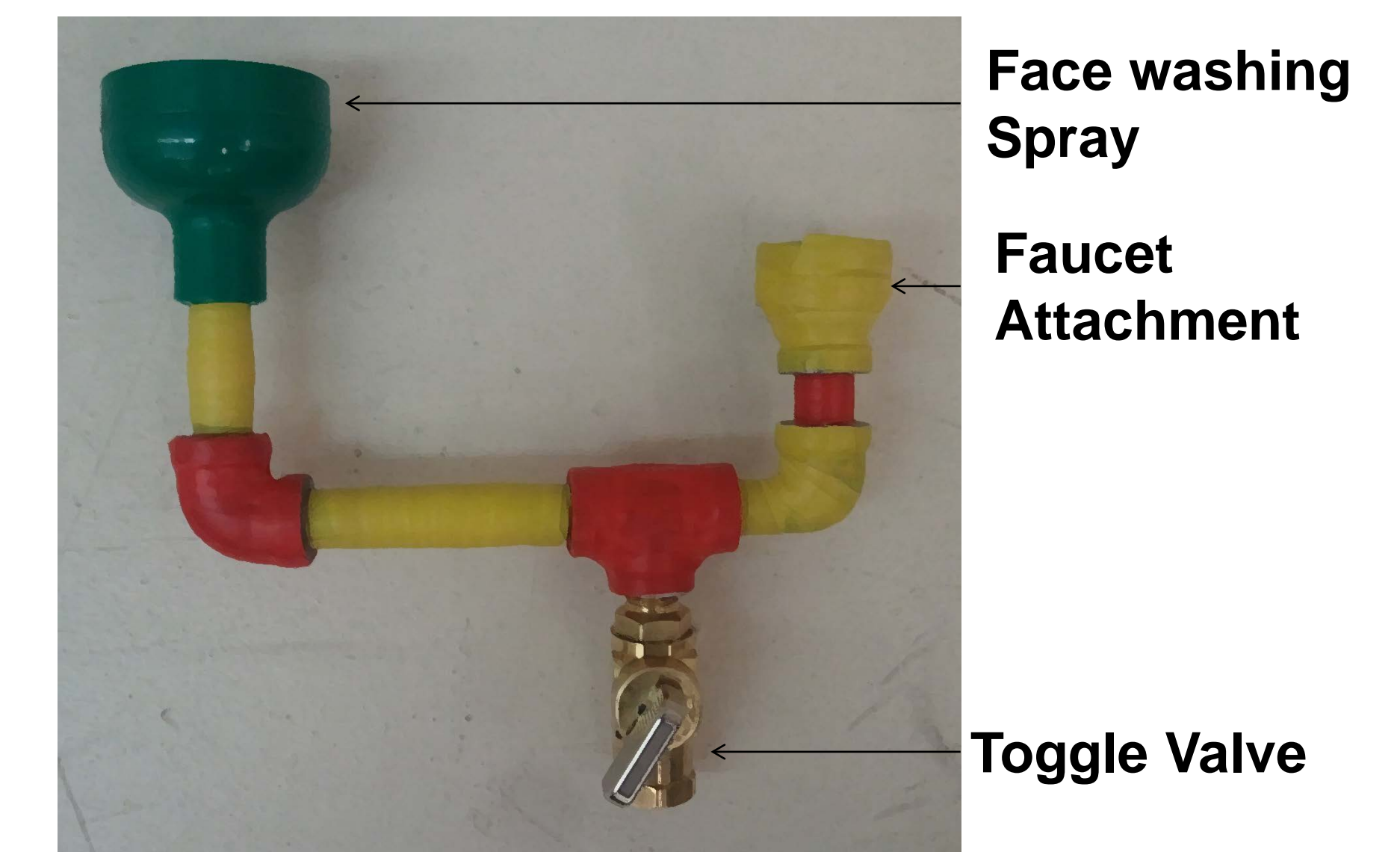
	Shower Head	Variable Nozzle	Flat Fan	Deflected Flat	Flat Jet	Fine Spray
Face Sensation	9	6	4	7	6	7
Minimize Splashing	6	8	7	4	4	3
Angular width	7	6	5	5	4	7
Droplet Distribution	9	5	5	7	6	6
Total Score	31	25	21	23	20	23

Table 1. Nozzle Comparison Matrix

- Nozzles were rated out of 10 for each criteria
- Each nozzle was rated by a sample of 10 people
- The values in each box represents averaged rating

Final Prototype

- **Initial design had the following disadvantages:**
 - Horizontal velocity component too large
 - Aesthetics and geometric inconsistencies



- **Final prototype design improved by implementing:**
 - Vertical spray with nozzle for face washing comfort
 - Minimize splashing and flow momentum
 - Aesthetics and minimizing geometrical scale
 - Low cost components

Future Work

- **Marketing of prototype**
- **Improve aesthetics for commercial use**
- **Adjustable geometrical / flow parameters**
- **Adjustable atomization parameters**