



# Design, Fabrication and Performance of Anti-splashing surface

Presented by

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# Problem statement

- Hospital surgery ward **basin**, Kitchen **sink**, **urinals** etc. surfaces contains germs and microbes.
  - ✓ Microorganisms will **spread** due to the droplet **splashing**.
  - ✓ Increase disease.
- In juice industry, microbes may enter during product **filling** and **packaging**.
  - ✓ Reduce **shelf-life** of the product.



**Bacterial transmission,  
spread disease**



**Reduce shelf life of a product  
containing liquids**

# Objective / Our goal

- Study the formation and **splash effect** of water droplet on a pillar
- Design different **geometric pattern** and compare their splashing
- Check the feasibility of the design with **natural surface** structure
- **Fabricate** the anti-splashing model using **3D printer(SLA)** and evaluate the splashing.
- Differentiate the pattern design with AI powered design

# Literature Review

- ✓ Micro-structure self cleaning plant surface
- ✓ Ink-jet printing
- ✓ Coating manufacture
- ✓ Electrostatic painting
- ✓ Spray cooling

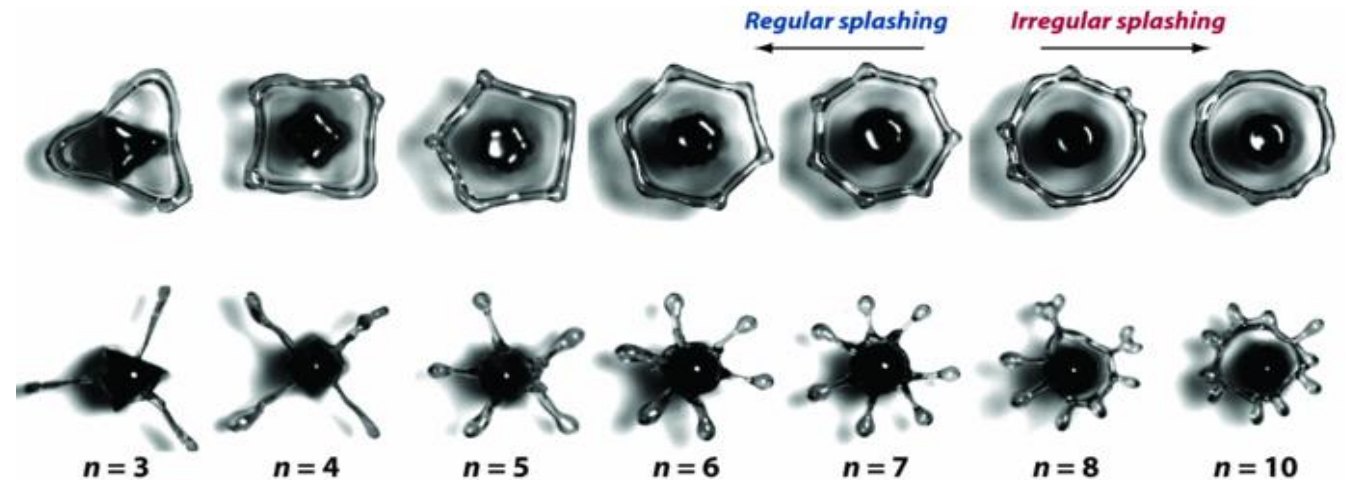


Fig 1: Lamella expansion on various pillar structure [1]

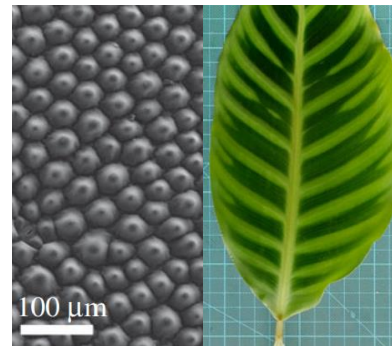


Fig 2: Calathea zebrina leaf and its surface SEM Image [2]

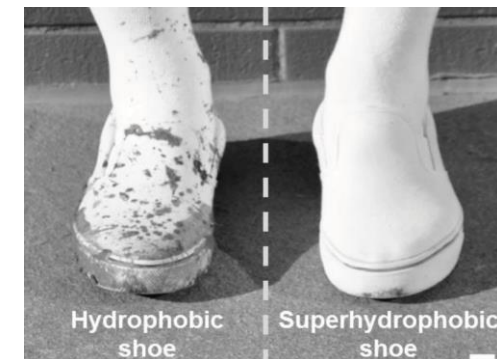


Fig 3: Footwear sole on muddy water [3]

1. Juarez, G., Gastopoulos, T., Zhang, Y., Siegel, M. L., & Arratia, P. E.. Splash control of drop impacts with geometric targets.
2. Koch, K., & Grichnik, R. Influence of surface structure and chemistry on water droplet splashing.
3. Dong, Z., Wu, L., Wang, J., Ma, J., & Jiang, L. Superwettability controlled overflow.

# Methodology

## Device preparation process

### Simulation Process

CAD design

Mesh generation

Specify parameter

Optimization

Result analysis

1. Pillar optimization
2. Morphology of the shape
3. Topography of the tip
4. Analyzed with different fluid
5. Array structure
6. Pillar young's modulus

**Multiphase Flow VOF method**

### Fabrication

1. SLA 3D printing the desired structure
2. Compare the experimental and numerical data
3. Analyzes water retention rate

### Field Report

1. Placement the coating in surgery ward basin.
2. Apply on kitchen sink and industry floor

Preparation for journal paper

# Time Frame

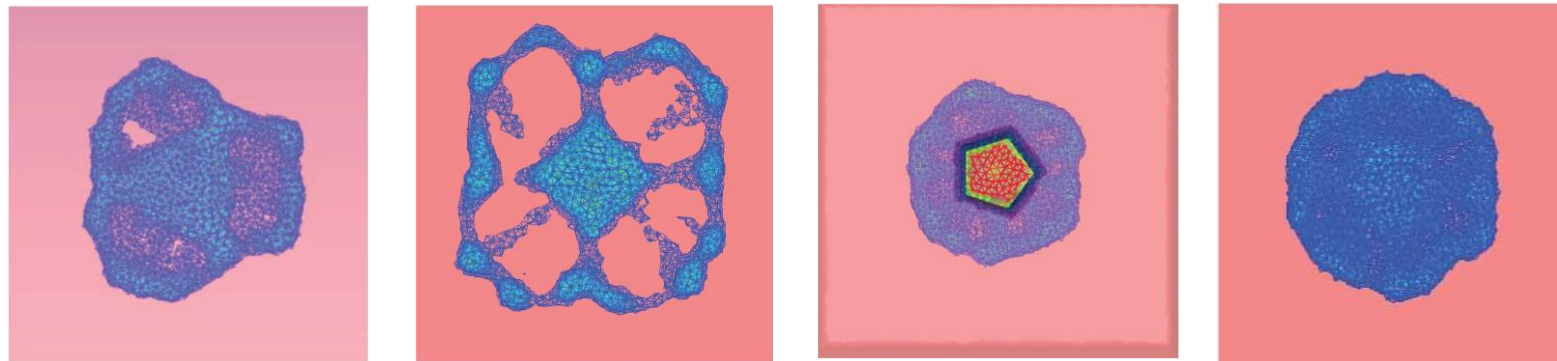
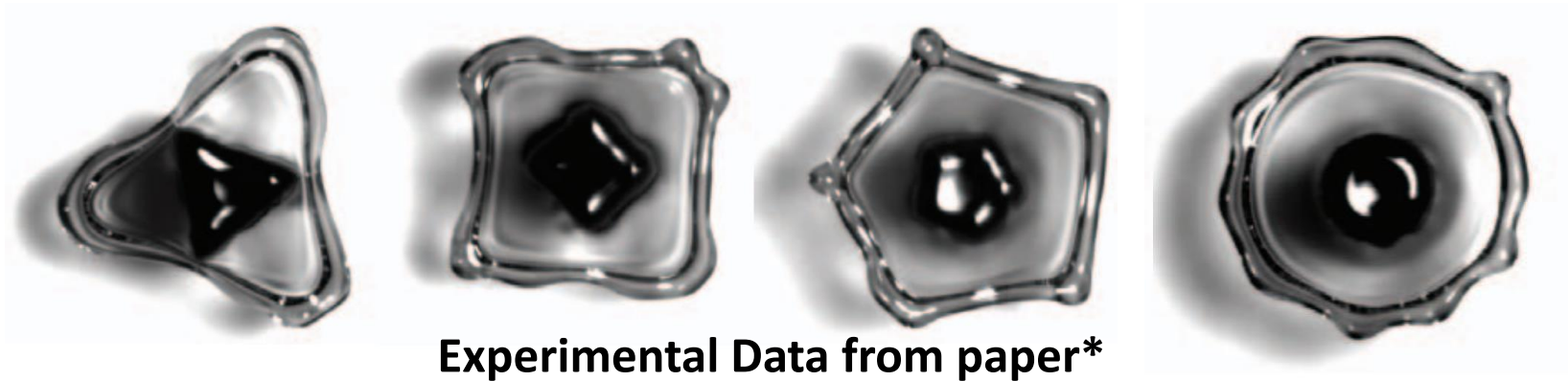
		Month											
		1	2	3	4	5	6	7	8	9	10	11	12
Continuous review of current research													
Setup required tools and tech													
Optimization	Pillar optimization												
	Morphology of the pillar												
	Topography of the tip												
	Array Structure												
	Droplet with different velocity												
	Analyzes with different fluid												
Multiple array structure													
Fabrication of the model													
Experimental performance analysis													
Documentation													



*Estimate of progress*

# Research State

- Lamella expansion of water droplet (validation)

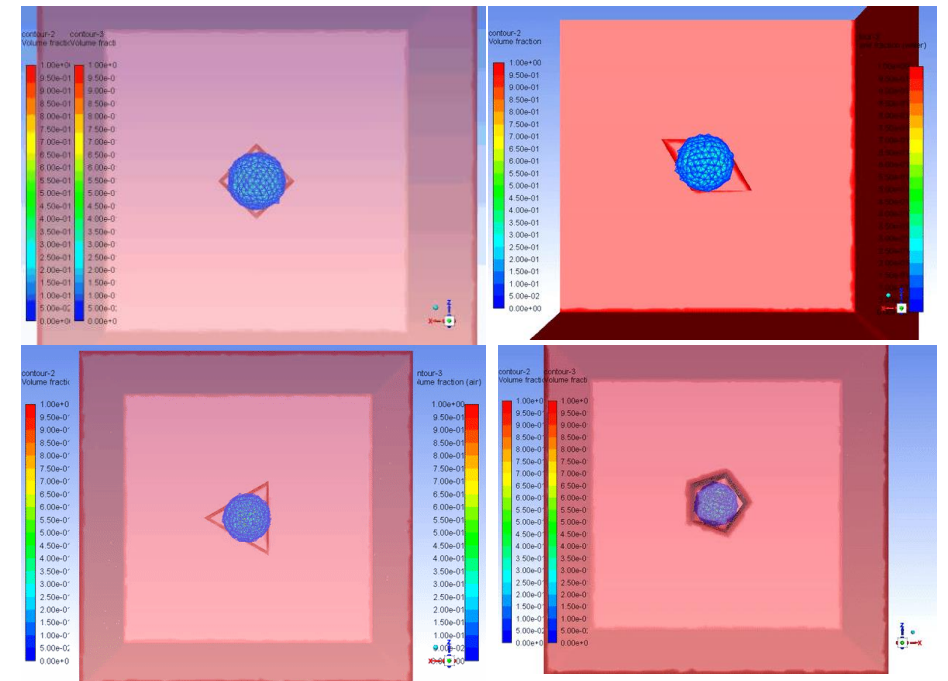
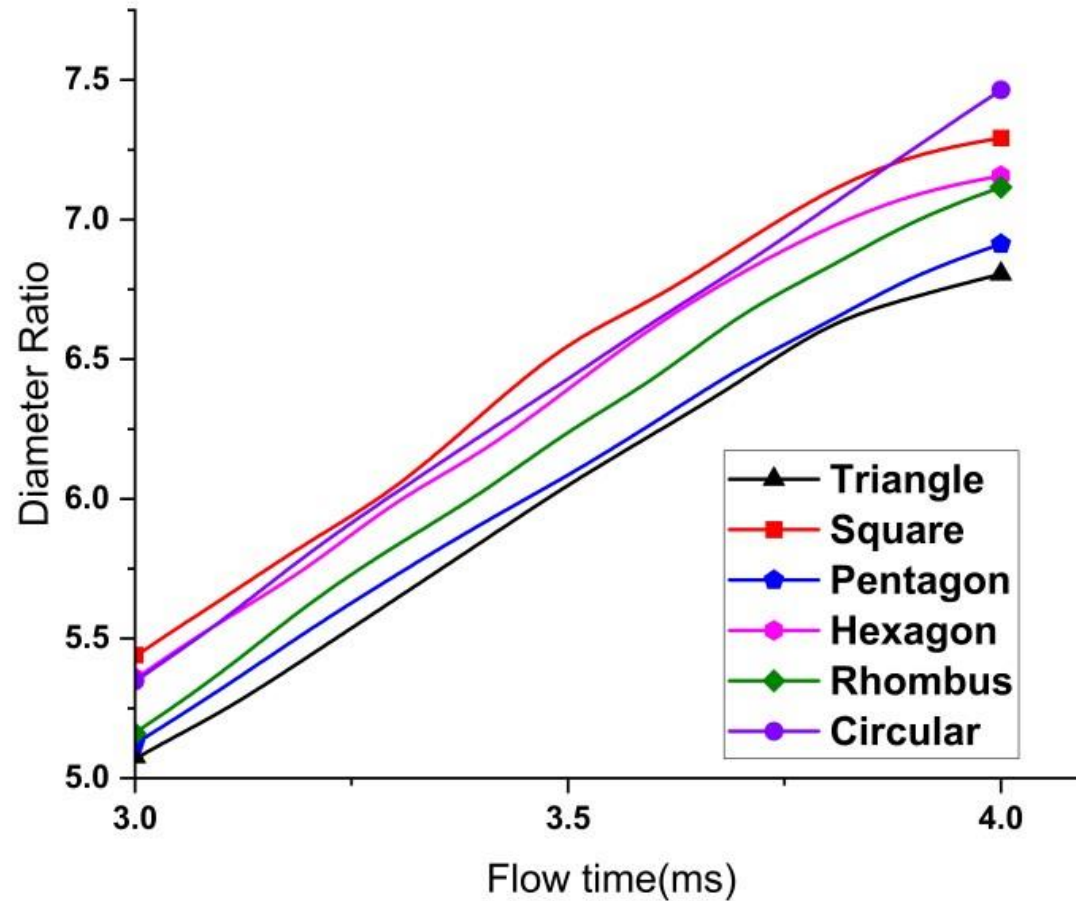


\* Juarez, G., Gastopoulos, T., Zhang, Y., Siegel, M. L., & Arratia, P. E. Splash control of drop impacts with geometric targets.



# Research State

- Droplet diameter ratio





**Thank You !**