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FOUNTAIN OF LIGHT – CONSTRUCTAL CASCADES

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Constructal law governs how all flow systems, whether natural or man-made, exhibit a universal tendency to acquire configuration by facilitating easier and greater flow access over time and available space(Bejan). Applied to the dynamics of pedestrian flow, constructal law can facilitate urban designs for sustainability, accessibility, and efficiency. Inspired by these ideas, the sculpture is shaped like a fountain to symbolize the movement of people like a flowing fluid. The LED lights display the movement of people from a larger area through a bottleneck at the entrance to stairs or an escalator in the sculpture inspired by the dendritic structures anticipated with the constructal law. The sculpture visualizes the constant flux of people through urban environments where each individual contributes to the collective rhythm of society.

Though art and science may seem like distinct disciplines, interdisciplinary collaboration has significant value. For instance, visualization of scientific concepts and engineering designs can help create visual representations of scientific theories or communicate ideas to different audiences. Art can show beauty, efficiency, access, and freedom through constructal law.

Keywords: Pedestrian; Interdisciplinary; Sculpture; Urban; Constructal Law.

1. INTRODUCTION

Constructal law governs how all flow systems, whether natural or man-made, exhibit a universal tendency to acquire configuration by facilitating easier and greater flow access over time and available space(Bejan). Applied to the dynamics of pedestrian flow, constructal law can facilitate urban designs for sustainability, accessibility, and efficiency. My art installation seeks to show how constructal law can help envision innovative approaches towards the design of public places and invite contemplation onto the built environment and crowd movement.

2. RESULTS

I began the process of creating my installation with researching pedestrian flows in public spaces and visualizing crowd dynamics in large venues through sketches (Fig. 1). Through this research, I focused the scope of my project on showing the large-scale flows of crowds through physical space and wanted to create a sculpture that could demonstrate the power of crowd movement.

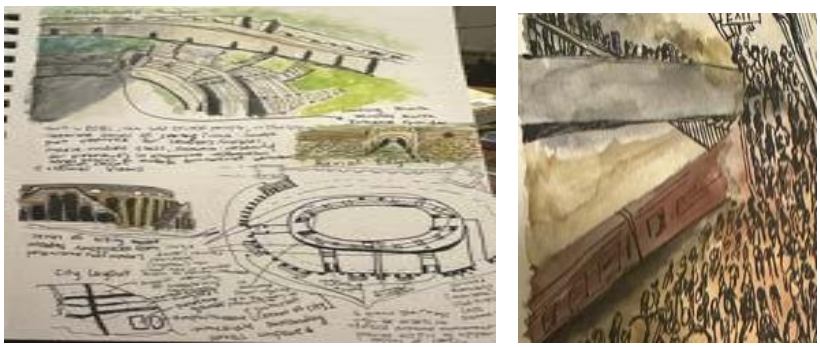

Fig. 1 – Illustrations/watercolors of the Pompeii Stadium and crowded subway stations.

My interest in the flux of people through urban environments led me to create a sculpture that could "move" through programmed LED lights using my engineering knowledge. I developed the concept of a fountain shape to symbolize the flow of people as "fluid" moving through the space of the physical sculpture. In addition, the shape of a fountain includes bottlenecks, which could be used to illustrate the bottlenecks at entrances to stairs or escalators, which I had observed in videos of large crowds moving through public spaces.

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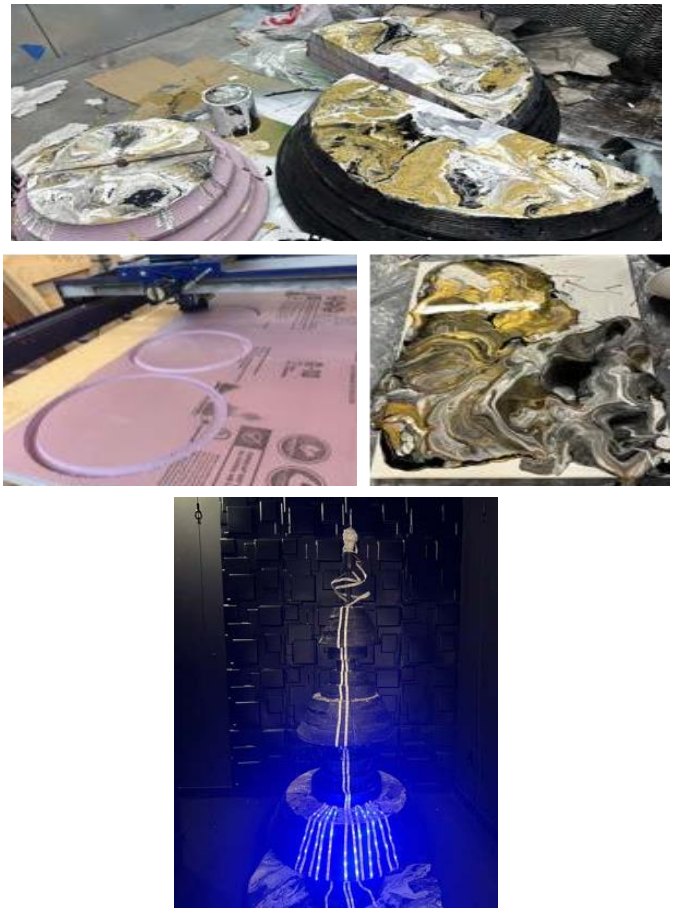

Fig. 2 – A CNC machine to carve foam into bowl shapes and used paint-pouring techniques to create marbling textures. The final sculpture displays LED lights that repeat continuously in the Wilkinson building at Duke University.

The creation of the sculpture involved several processes and integration of physical sculpting and electrical engineering. First, I used a CNC machine to carve foam into large bowls and adhere them to a structural fountain centered around a metal lamp post. Then, using paint pouring techniques, I created a marbling effect on the sculpture to hide the texture/material of the foam. Then, using an Arduino microcontroller, I coded the dendritic shapes anticipated with constructal law into the LED lights placed on the structure. With consecutive lights flashing, the sculpture appears to flow upwards, creating an upward surge imagery that evokes power.

Through this process, I aim to help others visualize the flow of people through urban environments and spark conversation around the collective rhythms of society and the design of spaces where people live and move.

3. **CONCLUSION**

Art and science may seem like distinct disciplines, but interdisciplinary collaboration has significant value. For instance, visualization of scientific concepts and engineering designs can help create visual representations of scientific theories or communicate ideas to different audiences. Art can show beauty, efficiency, access, and freedom through the constructal law.

REFERENCES

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