

# Integrating art and engineering essay samples

[Family](#), [Children](#)



This proposal suggests the integration of domed shapes and sensor fabrics to construct multi-domed mazes with sensor fabrics for children. Mazes are often a part of playground equipment for children but they are conventionally built as closed spaces with 90° angles. Each space within the maze consists therefore is square or rectangular. A maze laid out with all corners the same angle can be boring as well as claustrophobic. Another disadvantage is that the person caring for the child may not fit in the maze but does not know what is happening inside the maze with the child.

This proposal suggests the use of domes as the structure. A dome is an arch that has been extended by rotating the arch around the vertical axis located at the center of the arch. (Domen 2013) Three S's and Three E's are the guidelines used to determine if a structure meets the definition for structural art.

The three S's are scientific, social and symbolic. The scientific refers to the ability of the structure to handle the necessary amount of loading, the type of materials that best suit the desired use of the structure and the amount used. Social takes into account the costs to society; so building the structure may be very expensive but society may appreciate/use the place for hundreds of years. How society uses the structure, what its function is, must be positive and important. Symbolism has to do with the feelings people have when viewing the structure like a beautiful dome in a church or mosque inspires the worshippers praying there.

The three E's are efficiency, economy and elegance. (D. Billington 1983 as cited in Structural, 2013) The least amount of material to build a structure that can function optimally defines efficiency. The economy is calculated by

taking into account the life cycle of the structure from the design to the decommissioning costs. Elegance is where art is the most important because the style of the structure must please the senses of people. All of these factors summed together are the measurement for structural art. Structural art includes bridges, toys, living environments and community sites (like churches and mosques) as well as other types of structures.

A new design for children's playgrounds is being proposed. An advantage of the proposed design is that it will make the maze more interesting by offering varying shapes of domed and geodesic units. The units can be built separately so the maze can be built with different pathways. The units can be built with sensor fabrics can be used so that the fabric responds to touch or sound. The temperature of the maze can be controlled by the sensors. Children can also interact with the membrane of the structure when it has been embedded with computer keyboards. The artistic range of design is limitless because it relies on the imagination of the creator. The domes have been proved over the centuries to be engineering successes; their construction is adaptable to many materials including brick, cement, metals and fabric as a foundation. An appendix is attached with images of the domed shapes with descriptions.

The structural portion of the maze can built using the following style of domes. One of the oldest engineering shapes for building domes: the shape has been called polygonal domes, coved vault, domical vault or gored domes. (See fig. 1) The dome is made from four equal pieces which are held into place by two horizontal cross sections so that the polygonal shape remains intact. President Thomas Jefferson built one into his home at

Monticello. (Domen 2013) A sail dome, sail vault (also known as a handkerchief dome or Byzantine dome) can add sunlight and spaciousness to the maze. (See fig. 2) The sail dome features 'pendentives' which is the use of a foundation of four meta-shaped pieces each the same formed into two semi-circles held together by a straight crosspiece. Compound domes are also formed with pendentives. Figure 3 in the Appendix represents the dome as the red colored portion; the yellow represents the pendentives. The pendentives in a compound dome are shaped from a sphere with a radius greater than the dome on the top. "Tensegrity domes, patented by Buckminster Fuller in 1962, are membrane structures consisting of radial trusses made from steel cables under tension with vertical steel pipes spreading the cables into the truss form; they have been made circular, elliptical, and other shapes" (Domen 2013) (See fig. 4)

The fabric or membrane covering the frames of the mazes structure offers an opportunity to introduce a variety of artistic media. A large number of fabric types have been embedded with sensors. (See fig. 5) Figure 5 in the Appendix depicts seven different types that could be integrated into the multi-dome structure of the maze for beauty, comfort and education. The seven types are (a) Wearable computing, (b) Dress from firefly fabric, (c) Pom-pom light switch, (d) Textile capacitors that can sense motion, (e) A "laminated elastic circuit," (f) A textile keyboard, and (g) A thin film woven temperature sensor on a fibre. (See fig. 5) (Cherenack & van Pieterse, 2012, p. 091301-3) Fabrics can now be made from conductive fibres or yarns. (See fig. 6) Three examples are (a) Silver-plated copper wire that is 100 percent metal, (b) "A silver-coated polyamide multifilament yarn," and

(c) “ Kevlar wrapped multifilament yarn wrapped with metal foil.” (See fig. 6) (Cherenack & van Pieteron, 2012, p. 091301-5) Sensors can be embedded into beautiful fabrics such as lightweight linen or heavily embroidered brocade. (Cherenack & van Pieteron, 2012)

Engineering and art meet under the category of structural art is an object or building which has included the use of structural engineering in its design and construction.

Dan Humphrey, Dean of the School of Engineering, University of Maine has noted that “ The profession of engineering is very creative. Engineering was created by artists like Leonardo Da Vinci” (Kernan, 2008). Art and engineering can be integrated in a wonderful variety of ways in order to meet the needs of people from structural and electronic engineering in artistic ways that enhance the imagination of users. This proposal suggests the integration of domed shapes and sensor fabrics to construct multi-domed mazes with sensor fabrics for children.

## **Appendix of Figures and Photos**

Figure 1 Gored Dome

Figure 2. Sail Dome (left) and one of the four supporting structures (right)

Figure 3 Compound Dome

Figure 4 Geodesic domes of the Eden Project, United Kingdom

Figure 5 Variety of fabrics with sensors embedded (Cherenack & van Pieteron, 2012, p. 091301-3)

Figure 6 Conductive fibres or yarns. (Cherenack & van Pieteron, 2012, p. 091301-5)

Figure 7 Examples of sensors embedded into fabrics. (Cherenack & van

Pieterse, 2012 : p. 091301-5)

#### Works Cited

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