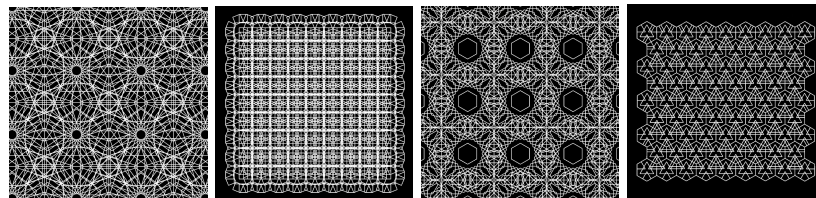
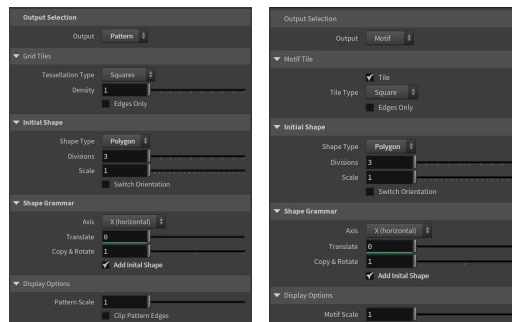
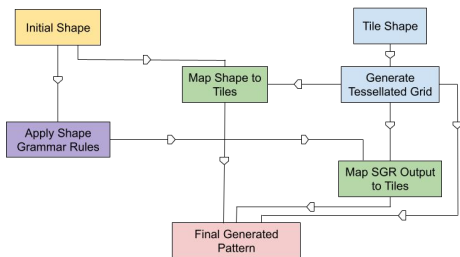


## Node Network Pipeline



## Results & Critical Analysis

The images above show a small selection of the patterns generated with the tool. There was a fair amount of troubleshooting involved in regards to maintaining symmetry and the aesthetic of the patterns.

It is possible for the user to produce void or unexpected results by pushing certain parameters. However, in order to prevent this the amount of variation that could be achieved would be limited. I felt it was more important to allow for iteration than try to prevent the user from breaking the patterns. However, with additional time it could be possible to optimise certain aspects of the tool and user interface.

## Conclusions

I have presented my approach to develop an artist friendly tool to aid in the creation of islamic geometrical patterns taking advantage of the procedural, industry standard software Houdini.

Considering this was my first time using Houdini I believe I was able to pick up the basics of the software and VEX for efficient application in this project. I was able to implement everything outlined in my aims and objectives. Whilst there are aspects that could be further developed and improved upon in future, the tool serves as a successful proof of concept.

## Overview

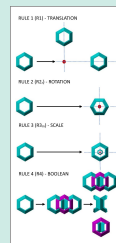
This research presents an accessible proof of concept tool, in the form of a digital asset, for Houdini that allows the user to intuitively generate Islamic geometrical patterns. I adapted the method of shape grammar rules to create designs procedurally. The tool has multiple parameters which can be controlled by the user, yielding many iterations.

## User Interface

The UI was designed to follow the steps of pattern creation, to help the user understand how each parameter effects the design. Care was taken to make sure it was initiative and artist friendly.

## Shape Grammar

I adapted Sayed's parameterized shape grammar rules: translation, rotation, scale, duplicate, add. These are based on traditional methods of pattern construction and formed the basic functions of the procedural network. Further parametrization allowed for the user to have more control.



## References

- Sayed, Z. (2017) 3D mapping of Islamic geometric motifs. thesis, University of Bradford.  
 G. Shteyn and J. Gips, "Shape Grammars and the Generative Specification of Painting and Sculpture," Int. Fed. Inf. Process. Congr., vol. 2, no. 3, pp. 125–135, 1971.  
 Bonner, J. and Kaplan, C.S. (2017) *Islamic geometric patterns: Their historical development and traditional methods of construction*. New York, New York: Springer.

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