The research is based on the Maltese archipelago, a collection of islands with no other building material available apart from Globigerina limestone. Importing materials before the industrial revolution was an impractical endeavor which led to the inhabitants of the island to learn and master ways how stone can be used in a variety of ways. This restriction resulted in a cultural landscape made out of one material. Hence the material was not only transformed from a building resource to a building system but also became a predominant factor in the cultural identity of the island. Furthermore, stone’s natural and mass properties, gave the sense of firmness and timelessness, qualities which are rarely found in contemporary architecture. Also, this building tradition is being replaced by modern industrialized materials and building techniques which depend on standardization and require much less craftsmanship. The knowledge of the art and technique of cutting volumetric stones and assembling it into a building (stereotomy) is becoming less and less of a viable option, hence in risk of becoming stagnant and redundant.

This study explores regionalism from a techno-cultural point of view. It investigates the combination of traditional building techniques with current emerging technologies in digital fabrication with the goal to understand, reinterpret and also extend the performance of stereotomy as building technique through the use of computer aided craftsmanship. For this reason the starting points of the research were the material characteristics and craftsmanship considerations; more specifically, compression-only structural system and a 6-axis industrial robotic arm with an abrasive diamond wire cutter. This ultimately strives for the preservation and contemporary reinterpretation of cultural identity in the use of stone. In order to achieve this, the overall design intent is to give an architectural statement that would show an alternative to what post colonial Maltese society could identify themselves with. Both stone stereotomy and Maltese literature share the idea of transcendence from the mundane into the extraordinary; a narrative which was also the main driving force for the architectural gesture shown in the building’s morphology.

**Robotically Aided Regionalism**

**Reawakening stone stereotomy through robotic fabrication**

How can computational design and digital fabrication help in the reinterpretation and to extend the performance of vernacular stone architecture?

- **Architectural Intent:**
  - Concept
  - Program
  - Relation to surroundings
  - Views/privacy from interior
  - Indoor Lighting Levels
  - Aesthetics

- **Environmental Considerations:**
  - Solar radiation Levels.
  - Thermal Mass.
  - Wind Speed and Directions.
  - Stack Effect.
  - Glare.

- **Architectural Intent:**
  - Concept
  - Program
  - Relation to surroundings
  - Views/privacy from interior
  - Indoor Lighting Levels
  - Aesthetics

- **Fabrication Consideration:**
  - Cutting Reach of Robot
  - Geometry - Ruled Surfaces
  - Time of cutting
  - Margin of Error
  - Assembly Logistics
  - Cost

- **Material Properties:**
  - Largest raw dimension
  - Compression Strength
  - Porosity
  - Thermal coefficient
  - Workability of cutting
  - Waste
  - Cost

- **Structural Requirements:**
  - Establish
  - Unstructured
  - Redundancy
  - Robotic
  - Ductile

- **Integrated Design Process:**
  - Structural Requirements:
  - Equilibrium
  - Live/Dead loads
  - Wind loads
  - Force flows
  - Stacking Principles

- **Environmental Considerations:**
  - Solar radiation Levels.
  - Thermal Mass.
  - Wind Speed and Directions.
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- **Overall design methodology:**

- **Program on site.**

- **Detailed prototype shell fragment.**

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