

 **ADDOPTML2024**

 **OPTARC-2024**

**OPT-ii2024**

Jordan, October 1<sup>st</sup> - 4<sup>th</sup> 2024

*1<sup>st</sup> ADDitively Manufactured OPTimized Structures by means of Machine Learning*

*2<sup>nd</sup> International Conference on Optimization Driven Architectural Design*

*2<sup>nd</sup> Engineering and Applied Sciences Optimization*



# Bridging Traditional Sculpture Methods with 3D Scanning/Printing

G.-Fivos Sargentis, Matina Kougkia and Nikos D. Lagaros



National Technical University of Athens

School of Civil Engineering

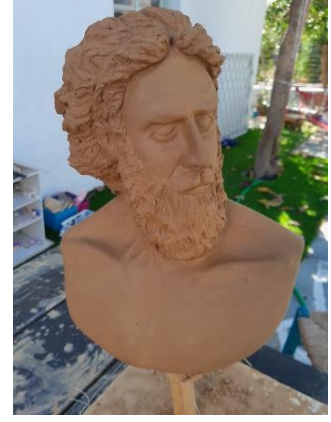
# Contents

- Introduction
- The creation of two clay models
- Traditional approach
- Modern approach with 3D scanning and 3D printing
- Conclusions

# Introduction

- In the ever-evolving landscape of art, the convergence of traditional craftsmanship and state of the art technology has become a dynamic arena for creative exploration [1, 2, 3].
- The project at hand delves into this intersection, unraveling the symbiotic relationship between traditional sculpture techniques and state-of-the-art 3D scanning and printing technologies [4].
- Initiated in the summer of 2023, G.-Fivos Sargentis crafted two intricate clay sculptures as the cornerstone of this innovative exploration.
- The project transcends the boundaries of conventional artistry, as it seamlessly integrates classical sculpting methodologies with the transformative potential of modern innovation.
- Following the initial sculpting phase, where I formed the clay model, each model underwent a revolutionary metamorphosis, exemplifying the synthesis of time-honored artistry and contemporary advancements.

# Model 1: The bust of Prometheus



[5]

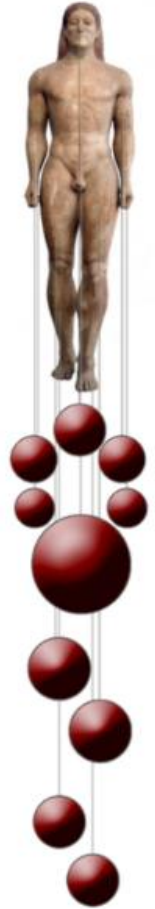
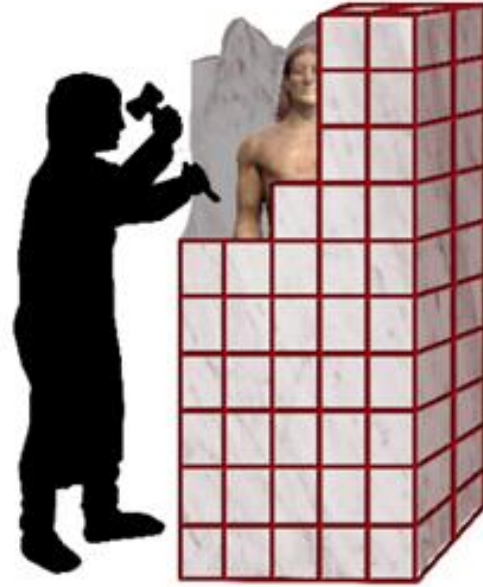
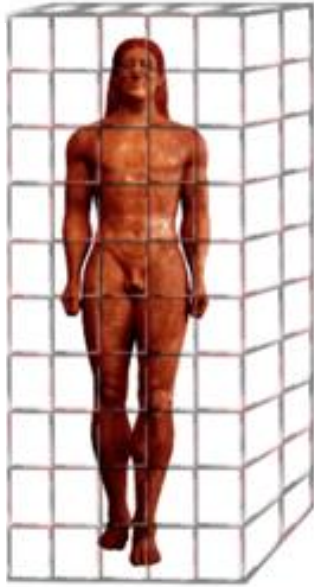
## Model 2: Gia



[5]

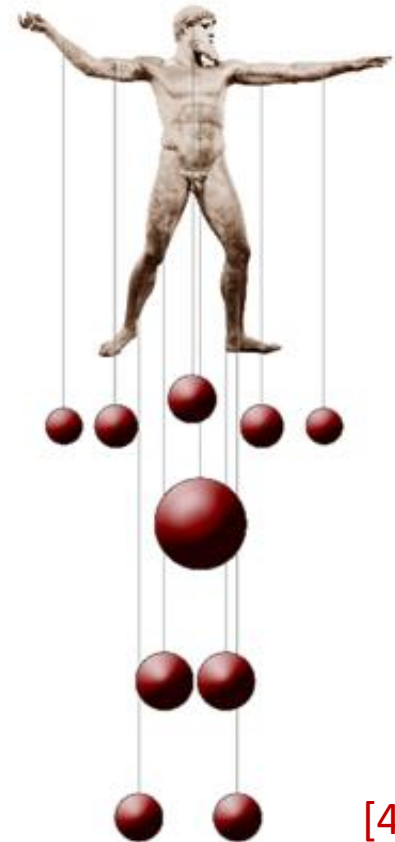
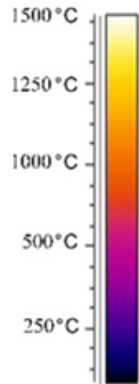
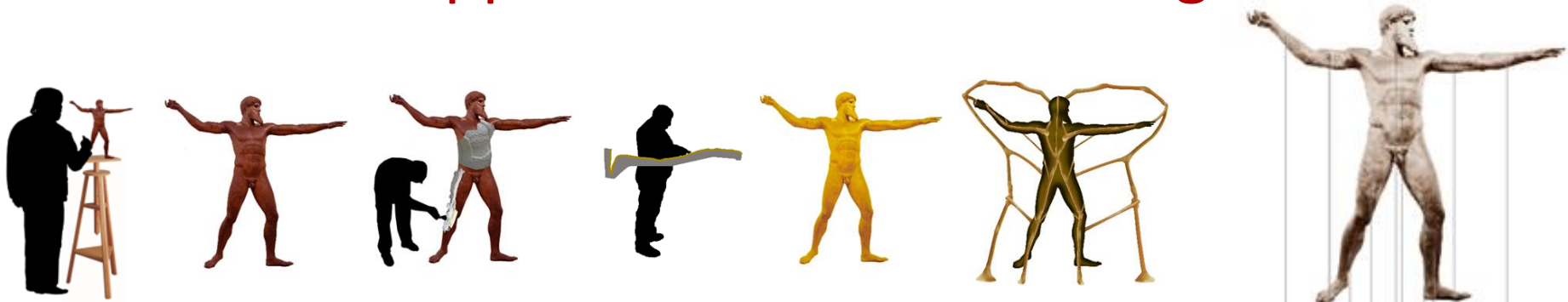


# Traditional approach. Curving



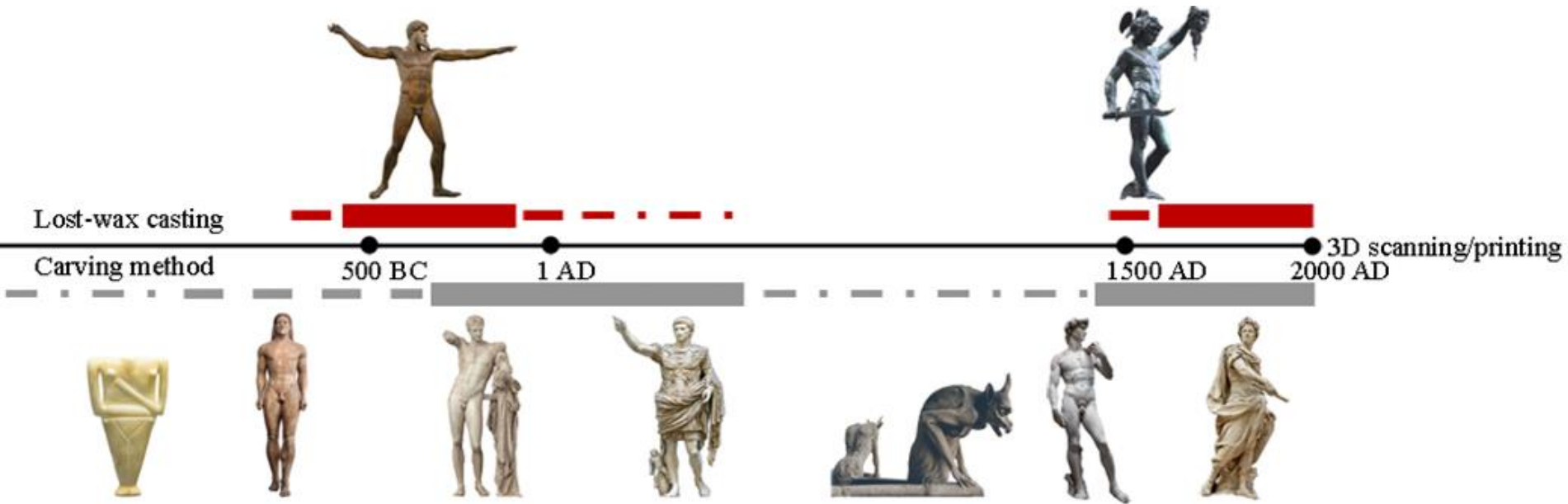
[4]

# Traditional approach. Lost-wax casting



[4]

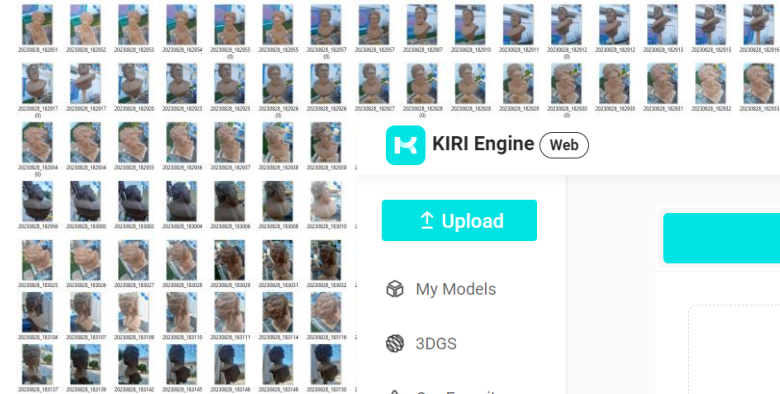
# The evolution of sculpture techniques



[4]



# Creation of 3D models



 KIRI Engine Web

[Join Community](#)

[Tutorial](#)

**KIRI Engine Pro**



 Upload

 My Models

 3DGS

 Our Favorites

 Feedback

[Download App](#)

[Contact Us](#)

Photo Mode

Featureless Object Mode

3DGS

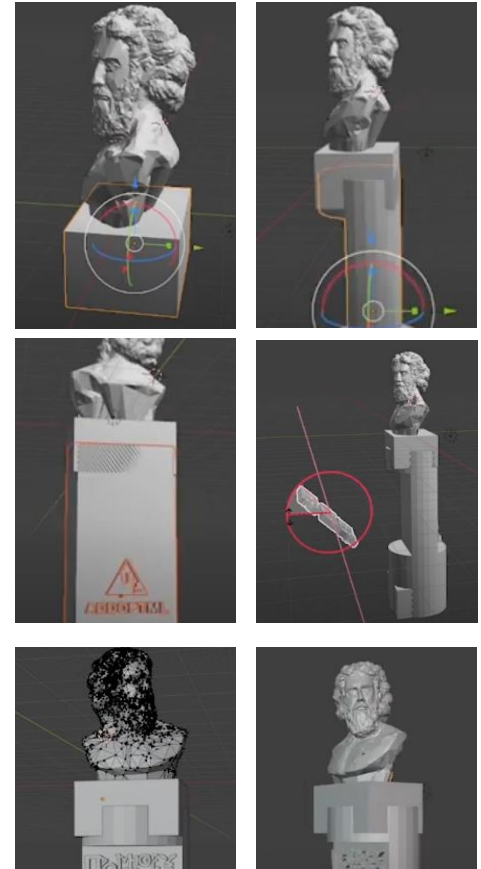
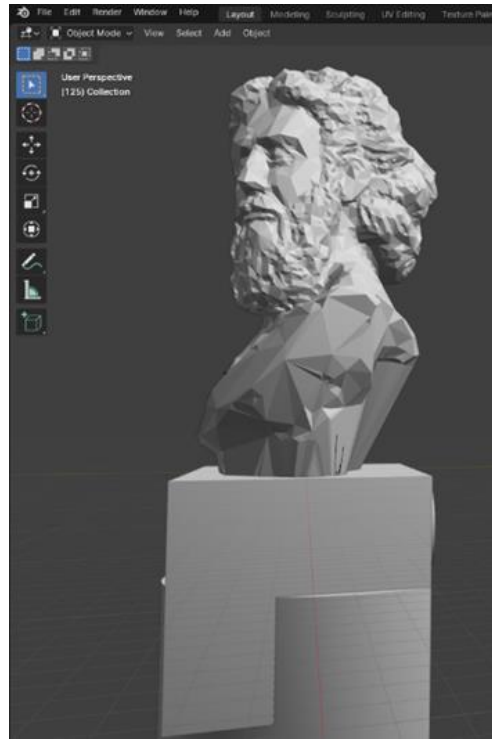
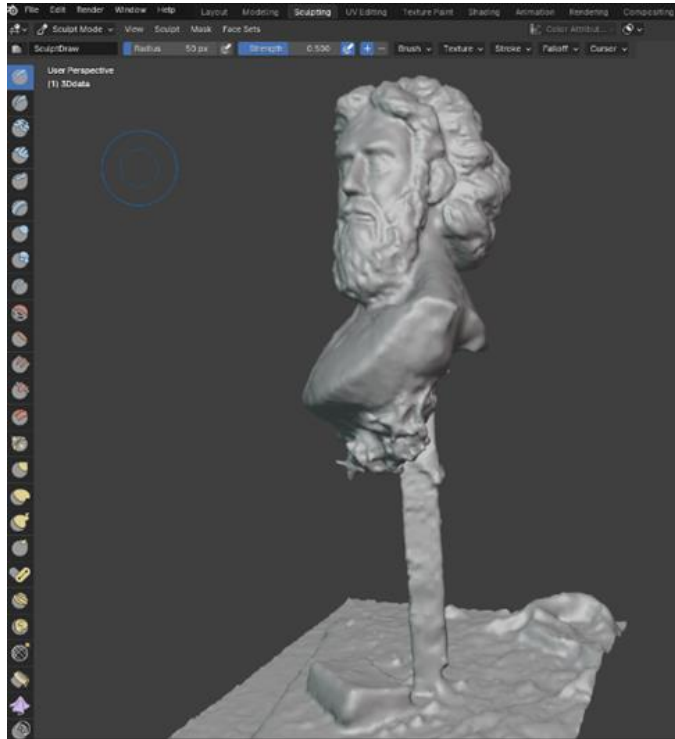


Click to upload or drag files into this area

Photogrammetry for professional 3D model quality,  
works for featureful objects or scenes

[6]

# Digital processing of the 3D models



[7]

# 3D printed wax models and lost-wax bronze casting



[8]

# Shaping the metal and patina



# The bust of Prometheus.

- 3D printing in wax
- lost-wax bronze casting



# The bust of Prometheus. 3D printing in plastic



# The bust of Gia.

- 3D printing in wax
- lost-wax bronze casting



# Conclusions

- The works which were presented in this case study, Prometheus and Gia, would have been lost if there was a commitment to traditional mold-making practices, as the region where they were created lacked the necessary tools and materials at that time.
- Using the 3D scanning method, the artworks were preserved in digital models and could be printed and reproduced through 3D printing. This process is estimated not only to have preserved artistic creation but, on the contrary, to have added value, provided freedom of expression, adaptation to various sizes, and ultimately capitalized on artistic creation.
- In essence, 3D printing in artwork not only introduces novel possibilities for artistic expression but also addresses practical considerations of accessibility, efficiency, and technological innovation. The ability to replicate artworks in various scales marks a transformative shift in the art landscape, enhancing both the creative process and the audience's engagement with art.



# References

1. Sargentis, G.-F.; Dimitriadis, P.; Koutsoyiannis, D. Aesthetical Issues of Leonardo Da Vinci's and Pablo Picasso's Paintings with Stochastic Evaluation. *Heritage* 2020, 3, 283-305. <https://doi.org/10.3390/heritage3020017>
2. Sargentis, G.-F.; Dimitriadis, P.; Iliopoulou, T.; Koutsoyiannis, D. A Stochastic View of Varying Styles in Art Paintings. *Heritage* 2021, 4, 333-348. <https://doi.org/10.3390/heritage4010021>
3. Sargentis, G.-F.; Ioannidis R.; Chiotinis M.; Dimitriadis P.; Koutsoyiannis D. Aesthetical Issues with Stochastic Evaluation. In: Belhi A., Bouras A., Al-Ali A.K., Sadka A.H. (eds) *Data Analytics for Cultural Heritage*. Springer, Cham 2021. [https://doi.org/10.1007/978-3-030-66777-1\\_8](https://doi.org/10.1007/978-3-030-66777-1_8)
4. Sargentis, G.-F.; Frangedaki, E.; Chiotinis, M.; Koutsoyiannis, D.; Camarinopoulos, S.; Camarinopoulos, A.; Lagaros, N.D. 3D Scanning/Printing: A Technological Stride in Sculpture. *Technologies* 2022, 10, 9. <https://doi.org/10.3390/technologies10010009>
5. Sargentis, G.-F. Use and Technical Aspects of Materials in Sculpture. Ph.D. Thesis, School of Architecture, National Technical University of Athens, Athens, Greece, 2005.
6. Kiriengine. Available online: <https://www.kiriengine.app/>
7. Blender. Available online: <https://www.blender.org/>
8. Koroneos, A.; Sargentis, G.-F. Casting of the Bust of Professor A. Prokopiou, Research Report, Laboratory of Building Materials; National Technical University of Athens: Athens, Greece, 2005.

# Acknowledgments

This research was supported by the ADDOPTML project “ADDitively Manufactured OPTimized Structures by means of Machine Learning” (No: 101007595) belonging to the Marie Skłodowska-Curie Actions (MSCA) Research and Innovation Staff Exchange (RISE) H2020-MSCA-RISE-2020.

