

# Improved QR code embedding for meshes with 3D printing

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## Abstract

One of the advantages of 3D printing is the ability to quickly turn a customized 3D model into a real-world object. It is often required to provide additional information about what are the meshes and objects and how they can be used. However, it is not an easy task to provide this information in a quickly accessible format encoded into the surface of the object itself. One of the solutions is to embed QR codes into a B-spline surface [1] or into a mesh. However, if the shape of the mesh does not contain an optimal (i.e. flat, smooth) surface patch for placing the QR code, then the task is even more challenging.

In this paper, we present an improved method for embedding QR code into any area of the surface of a mesh (see Figure 1.). Therefore, the process of embedding a QR code does not require a smooth surface patch. Also, we present a method that can determine the largest size for a QR code that can be placed at a selected point while maintaining the readability of the QR code. Besides, we discuss a new way to determine the ambient occlusion for the carved QR code, which can speed up the process of defining the carving depth for the QR code.

*Keywords:* 3D printing, QR code, QR code embedding, mesh, ambient occlusion, rendering

*MSC:* 68U07

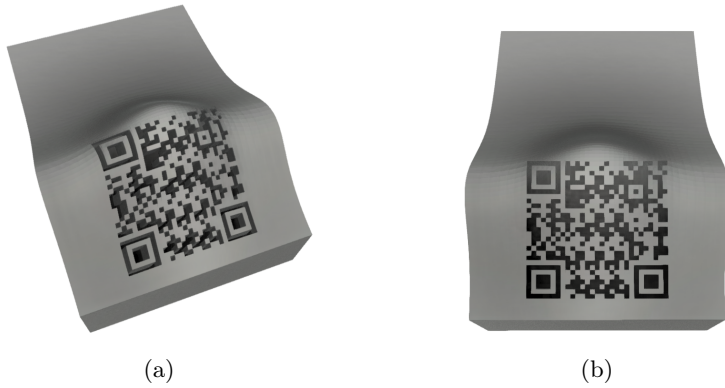


Figure 1: The images show an example to embed a QR code into a surface.

## References

- [1] KIKUCHI, R., YOSHIKAWA, S., JAYARAMAN, P. K., ZHENG, J., MAEKAWA, T. Embedding QR codes onto B-spline surfaces for 3D printing, *Computer-Aided Design* Vol. 102 (2018), 215–223.