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3B BİYOMODEL ÜRETİMİ İÇİN MEDİKAL GÖRÜNTÜLEME TEKNİKLERİNİN KARŞILAŞTIRILMASI

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ÖZET

Hızlı prototipleme veya diğer bir ifadeyle katmanlı üretim teknolojisi, uzay ve havacılık sektörü için üretilmesi hedeflenen parçaların seri imalat öncesinde test edilmesi amacıyla yirminci yüzyılın sonlarına doğru kullanılmaya başlanmıştır. Katmanlı üretim teknolojisi, günümüzde başta medikal uygulamalar olmak üzere mimari, ayakkabıcılık, kuyumculuk, eğitim ve otomotiv gibi her alanında varlığını genişleterek sürdürmektedir. Medikal alanda, katmanlı üretim yöntemiyle cerrahi müdahale öncesi planlama yapabilmek için oluşturulan üç boyutlu biyomodel sayesinde başarılı ameliyatlara gerçekleştirildiği gibi, hastanın anatomik yapısına uygun implant veya operasyonel cihaz tasarımında ve cerrahi eğitimlerde de sıklıkla kullanılmaktadır. Medikal görüntüleme, katmanlı üretim teknolojisi yardımıyla anatomik model yapımının ilk basamağını oluşturmaktadır. Görsel verinin başarıyla işlenebilmesi ve biyomodel elde edilebilmesi için uygun görüntüleme tekniğinin seçilmesi önemli bir unsurdur. Bununla beraber, anormal veya patolojik yapısal görüntü kümesinin üç boyutlu model oluşumuna en uygun biçimde imkân sağlaması gerekmektedir. Bu çalışmada, medikal görüntülemeye üç boyutlu biyomodel üretimine kadar geçen sürecin aşamaları irdelenmiştir. Ayrıca, çene ve yüz kemikleri ve kalp-damar cerrahisi uygulamalarında üç boyutlu biyomodel oluşturabilmek için kullanılan medikal görüntüleme teknikleri araştırılmıştır ve uygulamaya özgü faktörler dikkate alınarak karşılaştırma yapılmıştır.

Anahtar Kelimeler: Eklmeli üretim, 3B baskı, hızlı prototipleme, medikal görüntüleme, 3B biyomodel.

A COMPARISON OF MEDICAL IMAGING TECHNIQUES FOR 3D PRINTED BIOMODEL

ABSTRACT

At the end of the twentieth century, rapid prototyping or, in other words, additive manufacturing technology was used to test parts intended for production in aerospace industry before mass production. Additive manufacturing technology continues to expand its presence in all areas of architecture, shoemaking, jewelry, education and automotive, especially medical applications. Thanks to the three-dimensional biomodel designed to make planning before the surgical intervention with the medical field, additive manufacturing method has been used frequently in the design of implant or patient-specific device design that is suitable for anatomical structure and surgical training as well as successful operations. Medical imaging is the first step to building anatomic models with the aid of additive manufacturing technology. It is important to select the suitable imaging technique so that visualization can be successfully processed and the biomodel can be obtained. However, an abnormal or pathological structural data set must be provided in a way that is most appropriate for

the three-dimensional model modality. In this study, stages of process were examined from medical imaging to three-dimensional biomodel production. In addition, medical imaging techniques used to create three-dimensional biomodels were investigated in maxillofacial and cardiovascular applications, and comparison was made taking into account the application-specific factors.

Key words: Additive manufacturing, 3D printing, rapid prototyping, medical imaging, 3D biomodel.

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