

# Research on the design of Chaoshan intelligent tableware based on digital image processing technology

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## Abstract

Smart tableware is a tool produced along with smart catering. It is a smart food container designed based on the Internet of Things, cloud computing and artificial intelligence technology through new technologies and information technology. Based on digital image processing technology, this paper develops and designs smart tableware, introduces the digital image calibration principle and sampling quantification method adopted by Chaoshan smart tableware, and then uses image segmentation and binarization analysis, color digital image processing and analysis technology to explore the abstract beauty of Chaoshan smart tableware. The development of this creative product not only brings convenience to our use, but also a symbol of our cultural innovation.

## 1 Introduction

Graphics processing technology refers to a series of technical designs in which humans use computer software to draw "concept" graphics to obtain certain visual effects and achieve the ultimate purpose of actual operation [1]. At present, most of the design analysis of Chaoshan smart tableware still stays on the traditional analysis method. Through the level of artificial eye detection, its detection efficiency is low and labor intensity is high, which will inevitably lead to false detection, missed detection and unqualified detection due to fatigue, personal emotions and other reasons [2]. The art of smart tableware is both a designer's wisdom and the crystallization of hard work, but also the product of society. Restricted and influenced by different social aesthetic ideals, it will inevitably be branded with different social aesthetic ideals [3]. The so-called "decorative pattern" refers to the artistic addition after the simplification of things. Behind every pattern is a piece of ancient Chinese human history.

Digital image processing technology has three important characteristics: non-contact, full-field measurement and high precision [4]. Especially in the past ten years, with the rapid development of the national economy and the substantial improvement of the national comprehensive economic strength, all major industrial departments in my country have increased their investment in non-destructive testing technology, which has greatly improved the level of digital image processing technology in my country [5]. After more than ten years of development, digital processing technology has been applied in many fields and has received extensive attention. In recent years, more accurate tableware design analysis technologies such as optical holography, infrared thermal imaging, microwave detection, industrial CT technology, acoustic vibration detection, acoustic emission detection and computer vision have been developed [6].

This paper studies the design of Chaoshan smart tableware based on digital image processing technology, introduces the digital image calibration principle and sampling quantification method used in the design, the mathematical representation and characteristics of digital images, studies the

current status of Chaoshan smart tableware design research, and proposes the use of image recognition. Technological design of smart tableware, through the use of Matlab-based digital image processing algorithms to transform the design of Chaoshan smart tableware, and adding Chaoshan cultural elements to smart tableware, it is more flavorful.

## 2 Digital image calibration principle and sampling and quantization method

### 2.1 Mathematical representation and characteristics of digital image

The main measurement features of general images are light intensity and color. For intensity images (also known as gray images or black-and-white images), they can be represented by illumination and reflection models. The simple traditional pattern is combined with the smart tableware shape that modern people love, and it is presented in a concise and lively shape. Today, the most important thing in the era of big industry is complex and sophisticated technology, and people are working hard to settle down in an impetuous society. These seemingly simple but formal patterns give people the greatest comfort and the best inheritance of traditional culture left by their ancestors. After defining the mathematical representation of digital images, in order to achieve the purpose of photogrammetry, it is necessary to establish a coordinate transformation relationship between two different coordinate systems. The ultimate goal is to get the relationship between the object coordinate system and the image coordinate system.

### 2.2 Image sampling and quantization method

The outputs of most sensors are continuous voltage waveforms. The amplitude and spatial characteristics of these waveforms are related to perceived physical phenomena. Image processing is to transform a given image to improve the image quality or transform it into a form suitable for