

Extracting Center Pixel Coordinates from Human Body Laser Stripe Image with Bezier Curve Fitting Method^{*}

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Abstract

The main goal of this study is to improve the performance of laser rotating of non-contact human body scanning system, and to get the true and accurate 3D information of measured human body. In the aspect of obtaining the human body pixel coordinates, the extraction accuracy of laser stripe center is one of the important factors to affect the measurement accuracy. Therefore, this paper mainly discussed the algorithm of obtaining and the curve fitting human body scanning laser stripe center pixel coordinates. In the analysis of the characteristics of the human body laser stripe images, put the improved column processing algorithm to compute stripe center position. Using the Bezier curve fitting of the human body scanning light trap center line, effectively improved the smoothness of the human body scanning light trap center line.

Keywords: Bezier Curve Fitting; Human Body Measurement; Point Cloud Processing; The Laser Stripe Center; Pixel Coordinates

1 Introduction

CCD camera collecting the human body laser stripe images is based of rotary 3D body scanning system that is based on structure of optical visual measurement [1]. The quality of human body laser stripe images and the processing algorithm is correct or not directly affect the system scanning precision [2, 3]. In order to meet the accuracy requirement of the system of scanning, the human body laser stripe images have to be complete the following steps: (1) pre-processing; (2) the extraction of laser light center pixel coordinates; (3) the curve fitting of the center line of human body scanning laser light, etc. Through the reasonable algorithm, the laser light band width of more than one pixel has developed into complete, single pixel of human body center laser

^{*}Integrated Management and Control of RFID Application in Complex Equipment Manufacturing Enterprise (No. 2014BAF07B01).

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line, which met the requirements of the subsequent of three dimensional human body coordinates reconstruction. Because the characteristics of laser stripe images to the pre-treatment, extraction and curve fitting of laser light center position and so on, all have higher requirements [4-6].

This paper's main goal is to improve the measurement performance basing on structure light vision of rotary 3D body scanning system, measures the body, get true and accurate three-dimensional coordinate information, so this paper from the subject of the second step, the laser stripe image data processing technology, the system to the human body laser stripe image pixel coordinates calculate methods for special treatment and research.

In pixel coordinates calculating, the extraction accuracy of human body laser light center pixel coordinates is one of the important factors that affect measuring precision [7], and the camera discrete pixels can cause human body surface originally a smooth band becomes not smooth [8, 9]. Therefore, this paper focuses on the two parts of algorithm, first is after analysis the characteristic of human body laser stripe images, a column processing algorithm is proposed to calculate human body center of the laser light; second, in the case of the images on the border between the cameras as sensitive unit, with the Bezier curve fitting body scanning laser light center line, effectively improved the body scan, the smoothness of the center line of the laser light.

2 Characteristic of Human Body Laser Stripe Images

By using a three-dimensional structured light vision measurement principle as well known [9], the depth parameter of this study is determined by the measured human body laser stripe pixel coordinates in the camera position. Laser stripe shapes that camera received were varied with the transformation of human body's surface situation.

According to the characteristics of laser stripe images, the human body laser stripe images whose acquisition was based on the laser stripe rotating 3D human body scanning system usually has the following characteristics:

1) Most of the human body laser stripe images are simple stripe images. These images usually have one or more smooth stripes. That is to say, there are one or more continuous laser stripes in one human body image. These simple laser stripes appear in the relatively flat surface region of the human body, such as the position of neck region, the position of back or shoulder and so on.

2) Because of the human body are measured by natural standing posture, when the laser stripe is located at the position of the torso, both side of the arms images will be obtained. Usually, these images have one or more segment of laser stripes, and these stripes cannot overlap. For example, the laser stripe image of human body's back is shown in Fig. 1, it can be seen from Fig. 1 that the optical laser stripe consists with three parts, namely, the left arm laser stripe, torso laser stripe and the right arm laser stripe.

3 The Extraction of Human Body Laser Stripe Center Pixel Coordinates

The accuracy of the extraction of human body laser stripe center pixel coordinates is one of the most important factor, that affects the accuracy of this scanning measurement. This paper