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## High precision fast line detection of alignment and coupling for optoelectronic devices

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Optoelectronic devices are the foundation of optical fiber communication system and optical fiber sensor system. With the development of optical fiber communication, alignment and between planar optical waveguide chip (POW chip) and optical fiber array (OFA) have become the focus of many industries. In general, the alignment is performed passively and actively. During passive alignment, the two optical components may be placed according the expected desired orientation. Machine vision can be used in passive alignment to locate the position of the two optical components, then used to guide the movement of the motor stage for the alignment. Optical component edge detection is one of the key steps of machine vision in alignment. This paper has proposed a line detection algorithm based on the progressive probabilistic Hough transform (PPHT) and iteratively reweighted least squares (IRLS) algorithm for alignment between planar optical waveguide chip and optical fiber array. The experiment results show that the detection angle error is less than  $0.005^\circ$  and the time consumption is less than 0.5 s through the proposed algorithm. Besides, it also can accurately fit optical component edge with some non-random factors. Therefore, the proposed new algorithm has the advantages of high precision, fast computing speed and good robustness and it can successfully realize the high-precision fast line detection of optical component edge.

### Biography

Yu Zheng has completed his PhD in the year 2012 from Central South University. He is the Associate Professor of Central South University. He has published more than 50 papers in reputed journals and has more than 30 patents in China. His current research interest is precision engineering, precision motion control and optoelectronic device packaging.

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