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EVALUATION OF REAL-TIME HAND MOTION TRACKING USING A RANGE CAMERA AND THE MEAN-SHIFT ALGORITHM

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Keywords: Hand motion tracking, Range camera, Mean-shift algorithm, Accuracy assessment

Abstract. Several sensors have been tested for improving the interaction between humans and machines including traditional web cameras, special gloves, haptic devices, cameras providing stereo pairs of images and range cameras. Meanwhile, several methods are described in the literature for tracking hand motion: the Kalman filter, the mean-shift algorithm and the condensation algorithm. In this research, the combination of a range camera and the simple version of the mean-shift algorithm has been evaluated for its capability for hand motion tracking. The evaluation was assessed in terms of position accuracy of the tracking trajectory in x, y and z directions in the camera space and the time difference between image acquisition and image display. Three parameters have been analyzed regarding their influence on the tracking process: the speed of the hand movement, the distance between the camera and the hand and finally the integration time of the camera. Prior to the evaluation, the required warm-up time of the camera has been measured. This study has demonstrated the suitability of the range camera used in combination with the mean-shift algorithm for real-time hand motion tracking but for very high speed hand movement in the traverse plane with respect to the camera, the tracking accuracy is low and requires improvement.

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