

Semi-automatic Scoring Method for Torticollis by Using Kinect

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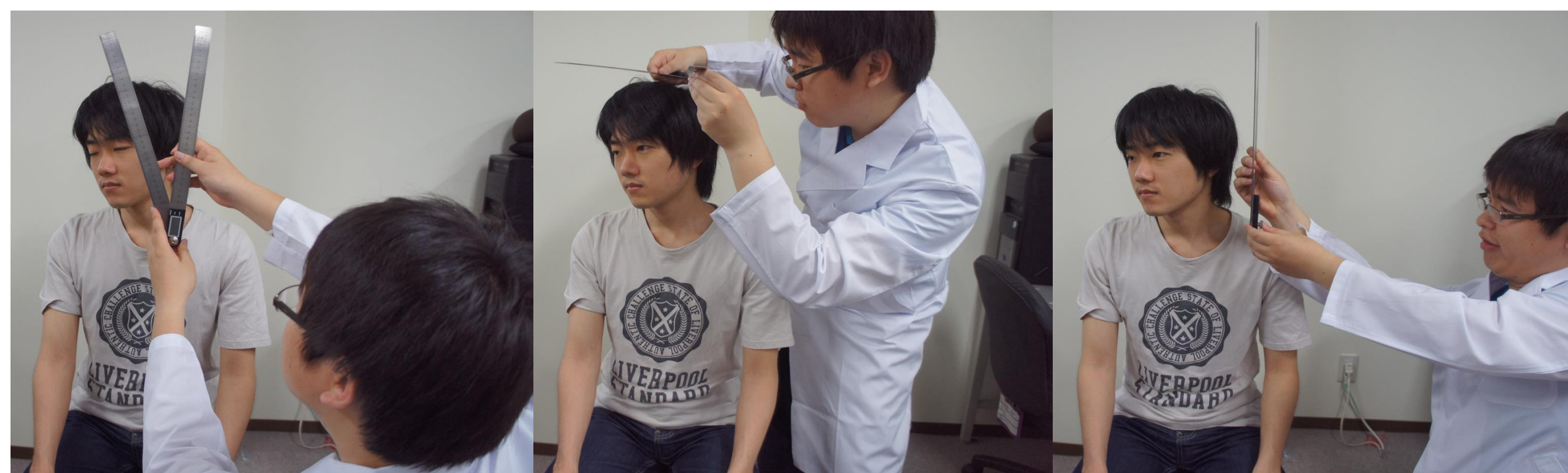
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Introduction

Purpose

To increase the **ACCURACY** and **REPRODUCIBILITY** of the scoring results for torticollis

Conventional Method

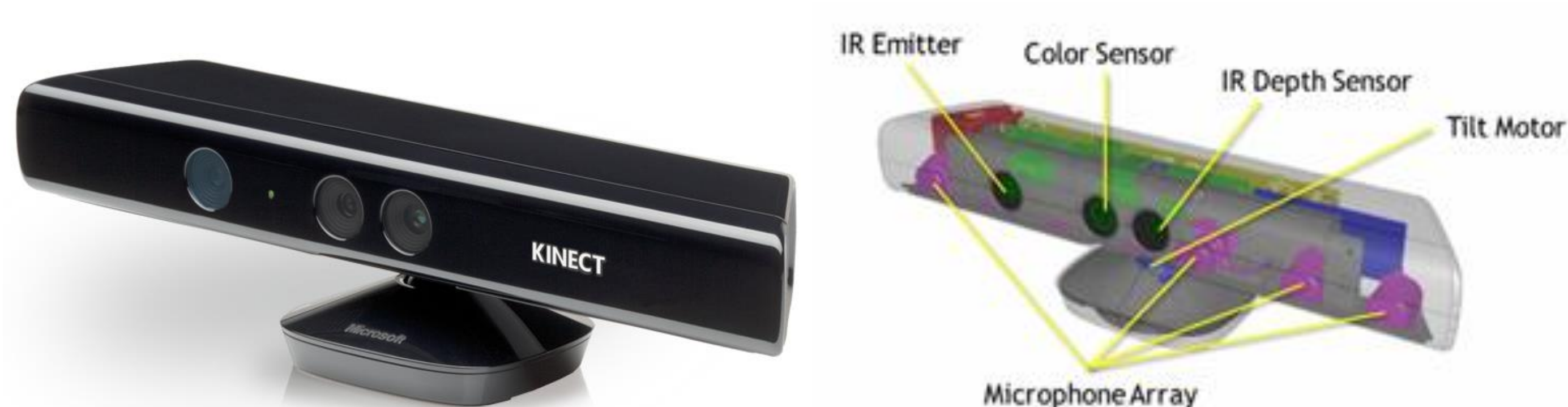


Conventionally, torticollis is scored manually (TWSTER[1], Tsui[2]). However, this manual operation results in inaccurate and non-reproducible scoring [3]. It also takes time, vague in scale, and quite complicated

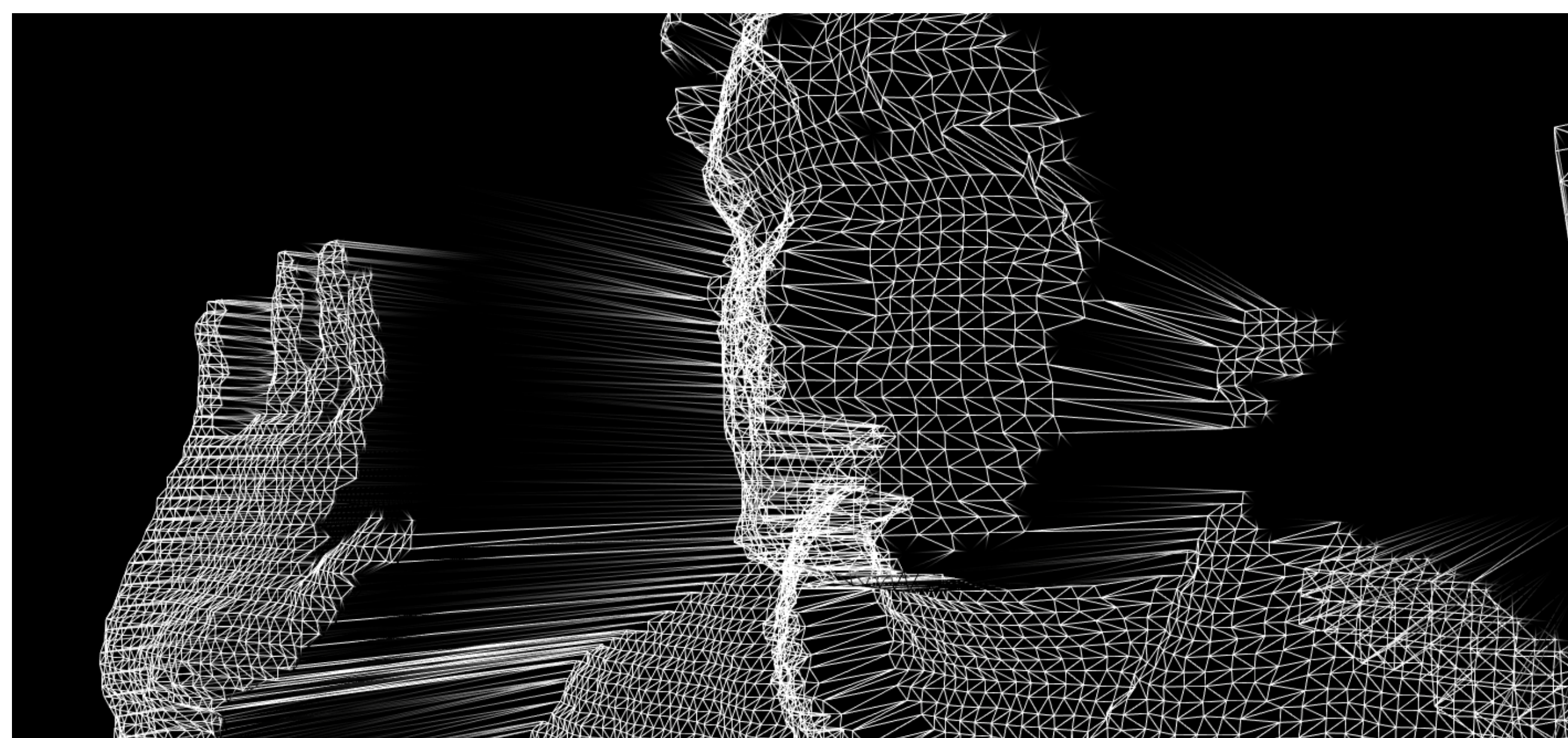
Method

In order to capture patients' facial orientation in **REAL TIME**, we used **Kinect** to track patients' faces.

Kinect (Microsoft Xbox full-body game controller) is a device that can simultaneously capture 2D color images and depth images



Depth images which Kinect captures consist of **distance data** of each pixel to the object. Therefore, Kinect is able to construct 3D image from the distance data.



Application

The system captures patients' facial orientation and score automatically. Patients' facial orientation for each axis is also shown as the graph.



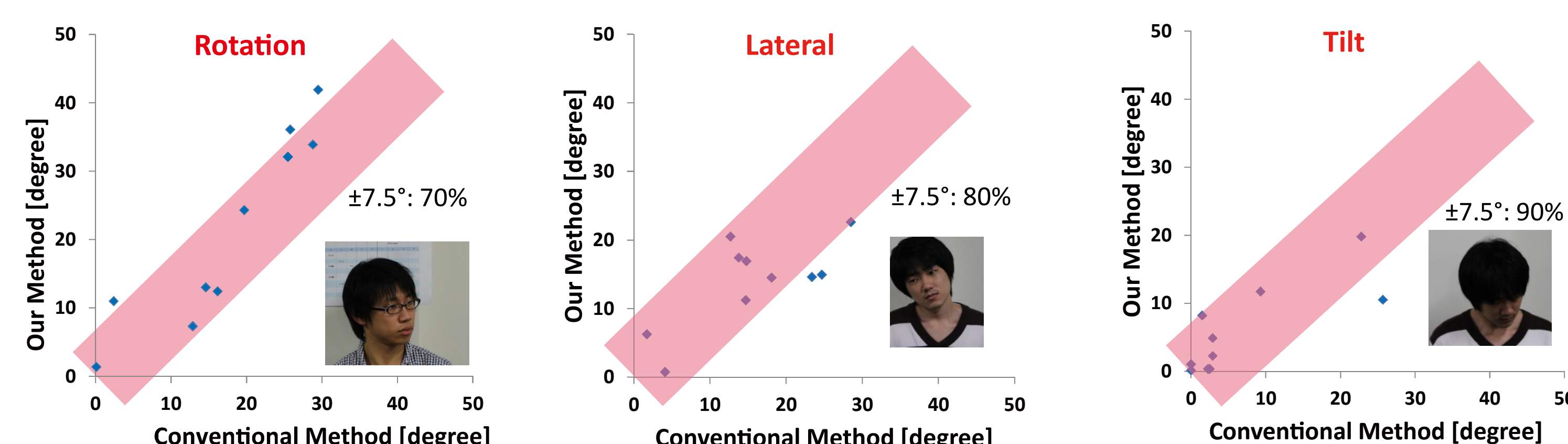
The system realizes **real-time monitoring**. It scores 10 times in 1 second, and draws the graph of facial orientation. The graph visualizes tremor and duration of symptoms. In addition, the system also realizes **automatic scoring** which makes results accurate and reproducible. Automatic scoring realizes easy setup which is just putting Kinect and installing the software.

Result/Conclusion

Result

We applied the system to 10 participants(7 males, and 3 females), and compared the results with those of conventional method. Manual scoring was conducted by a trained person.

Comparing automatic scoring with manual scoring for three facial orientations, 80% of the automatically acquired angles were within $\pm 7.5^\circ$ range of the manually measured data. It indicates sufficient accuracy for Tsui scale that rates the orientation for each 15° .



Conclusion

We developed an automatic scoring system using Kinect. The results showed that the system can obtain posture data with sufficient accuracy to calculate Tsui score.

Get Started Now!

Access our web page and start semi-automatic scoring.



We deliver this system on our web page. Anybody can download and use it.

<http://kaji-lab.jp/en/index.php?research/hanger>

1. Consky, E. S., et al "Assessment of cervical dystonia: the Toronto Western Spasmodic Torticollis Rating Scale (TWSTRS)." *Therapy with botulinum toxin, neurological disease and therapy series* 25 (1994).
2. Tsui, JosephK C., et al. "Double-blind study of botulinum toxin in spasmodic torticollis." *The Lancet* 328.8501 (1986): 245-247.
3. Wolfgang et al.: Rating scales for cervical dystonia: a critical evaluation of tools for outcome assessment of botulinum toxin therapy, *J Neural Transm* 120, 2013,