

Interaction-Free Hand Segmentation Using Kinect Camera

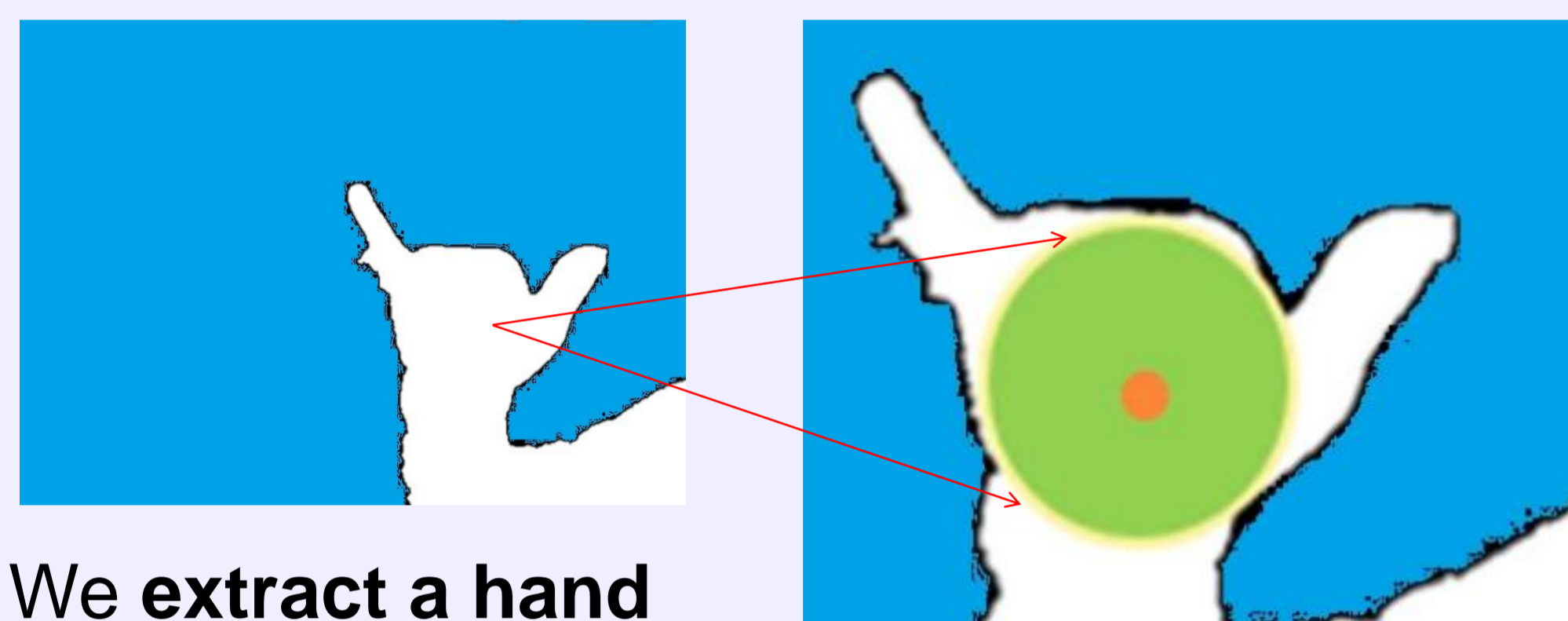


Yiwei Wang and Cheolkon Jung
School of Electronic Engineering, Xidian University, China



Key Idea

If the depth information are effectively utilized by **Kinect Camera**, the **automatic hand segmentation** system will be realized which obtains the seed on the depth map using a **variable-scale circle** automatically and refines the hand segmentation result around **the seed point** on the color image.



We **extract a hand segment** on the depth map by Otsu's binarization. To **detect the seed** for automatic hand segmentation, we find the largest connected region and using a variable-scale circle on the binarized depth map.

Background

Hand segmentation is a fundamental technology in computer vision, which is used as a pre-processing step for various applications such as **human-computer interaction (HCI)**,

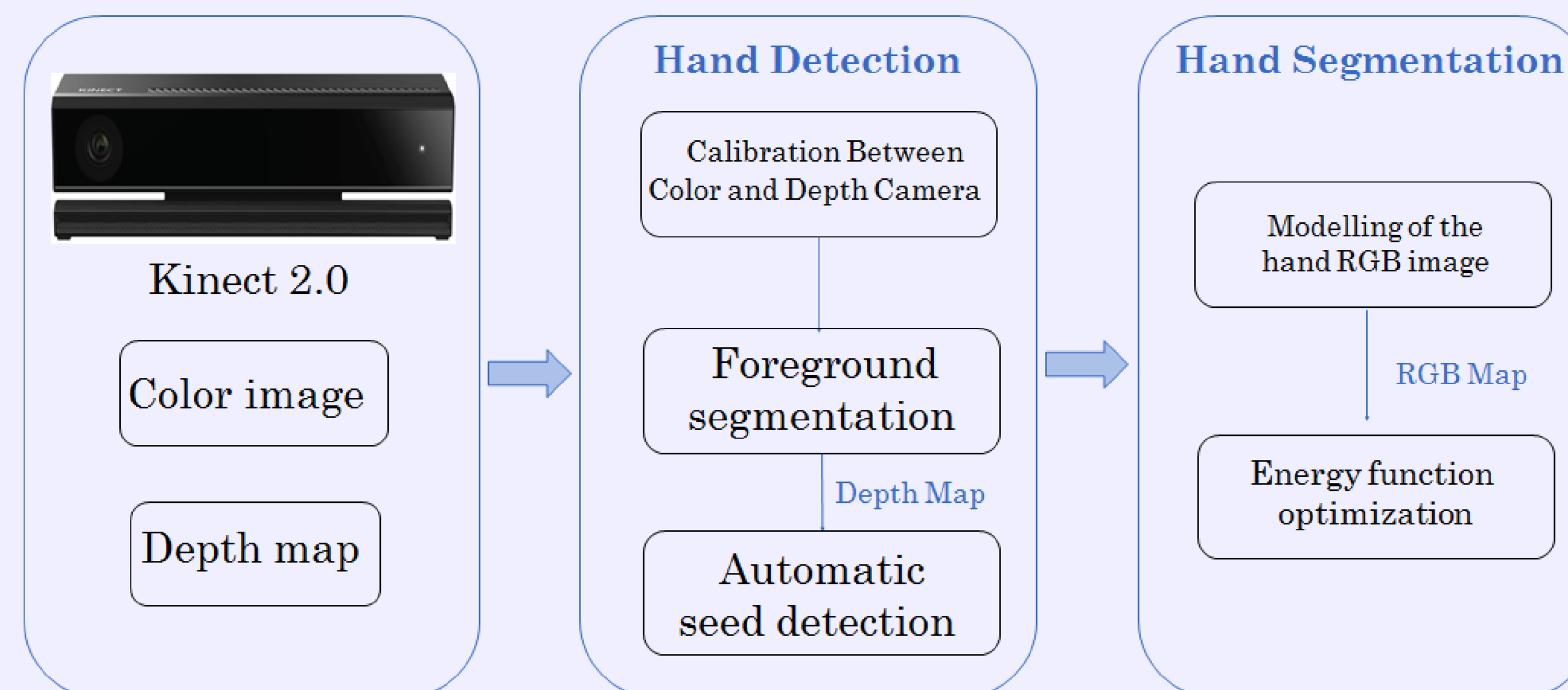
Novelty

- We perform automatic seed selection on the depth image by foreground segmentation and variable-scale circle detection.
- We perform seed-based hand segmentation on the color image using Gibbs random field.

Significance

- It is a challenging task since hands have a high degree of freedom in poses and vary with viewpoints.
- Interactive hand segmentation methods highly depend on the user's input.

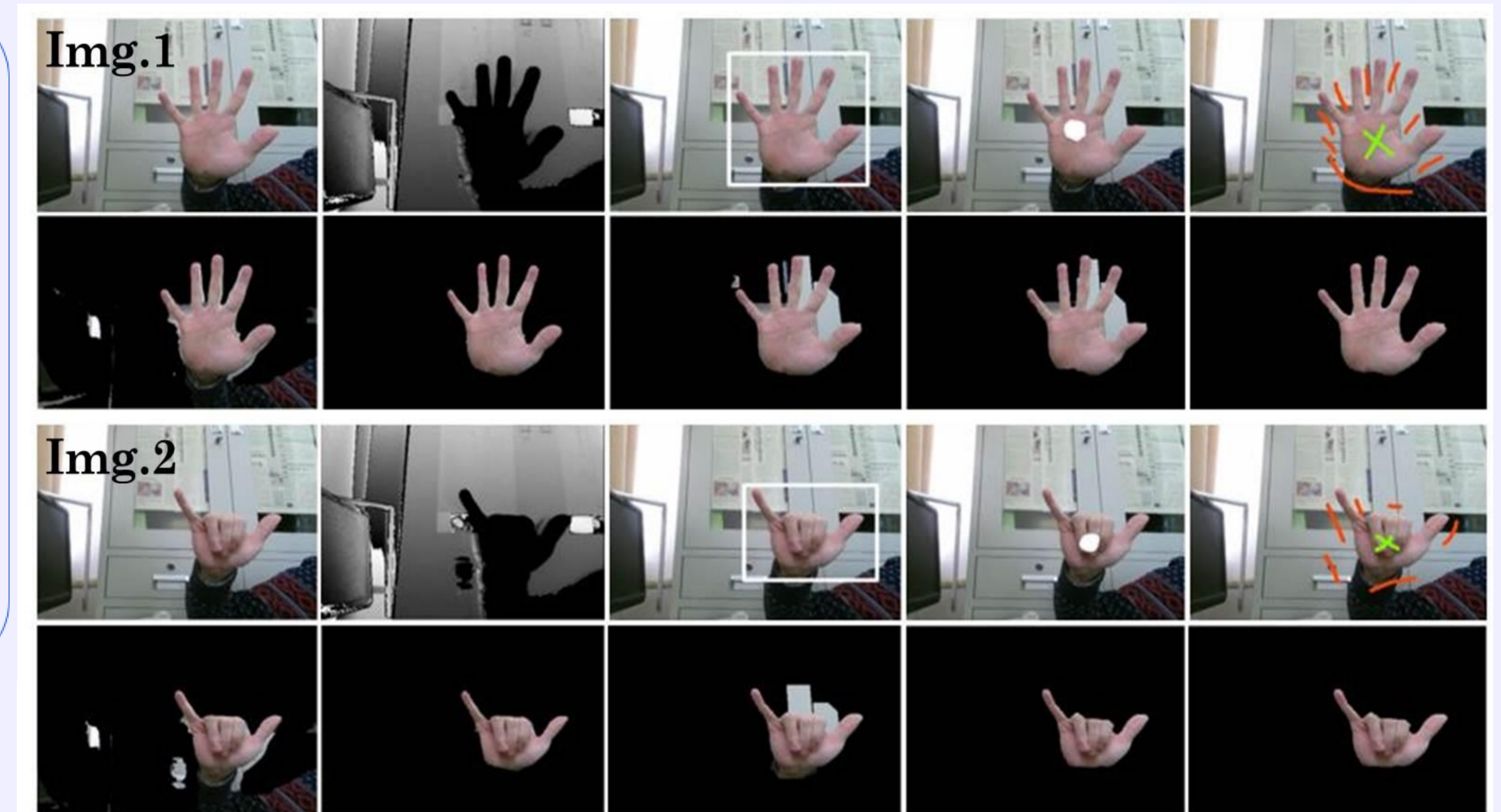
Proposed Method



Entire diagram of the proposed interaction-free hand segmentation

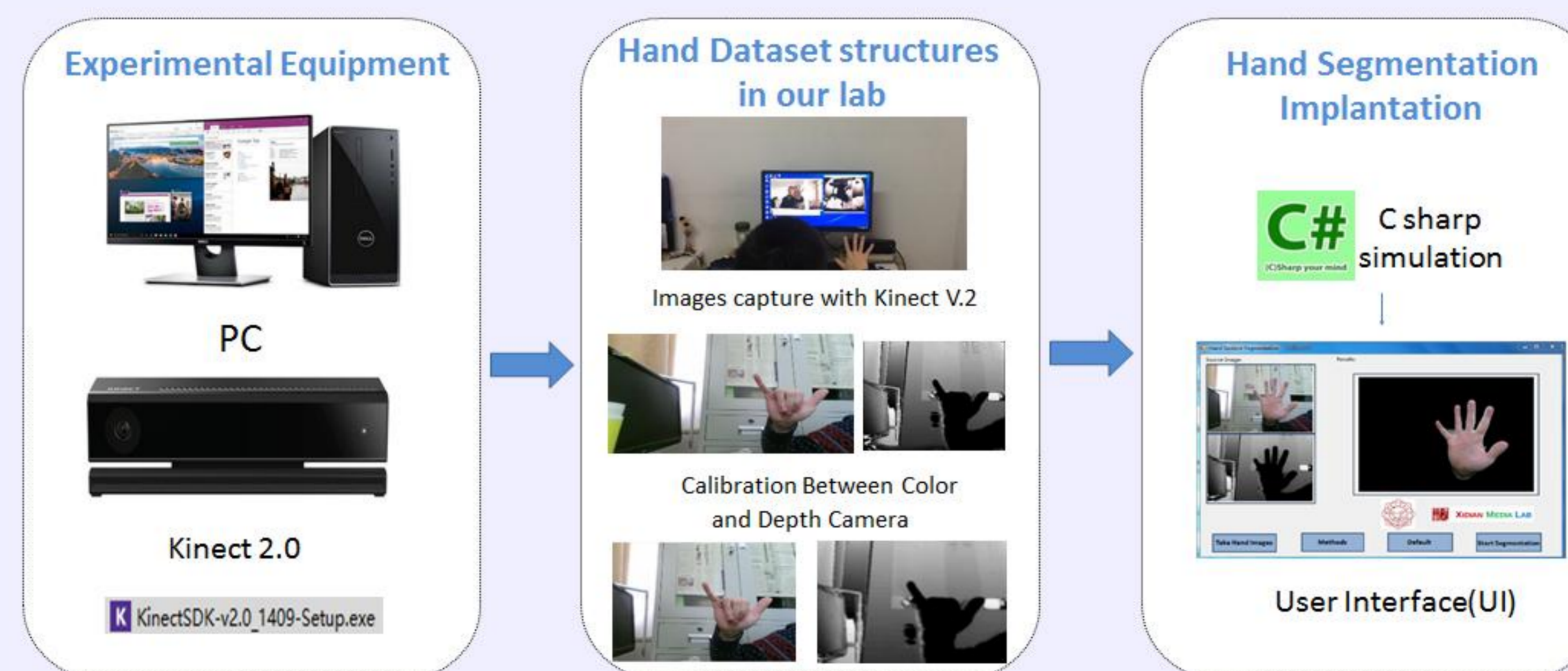


An example of seed selection on the depth map. Left to right: Depth map. Initial segmentation result by Otsu's method. Largest connected region. Variable-scale circle (blue). Seed selection result (seed: black point).

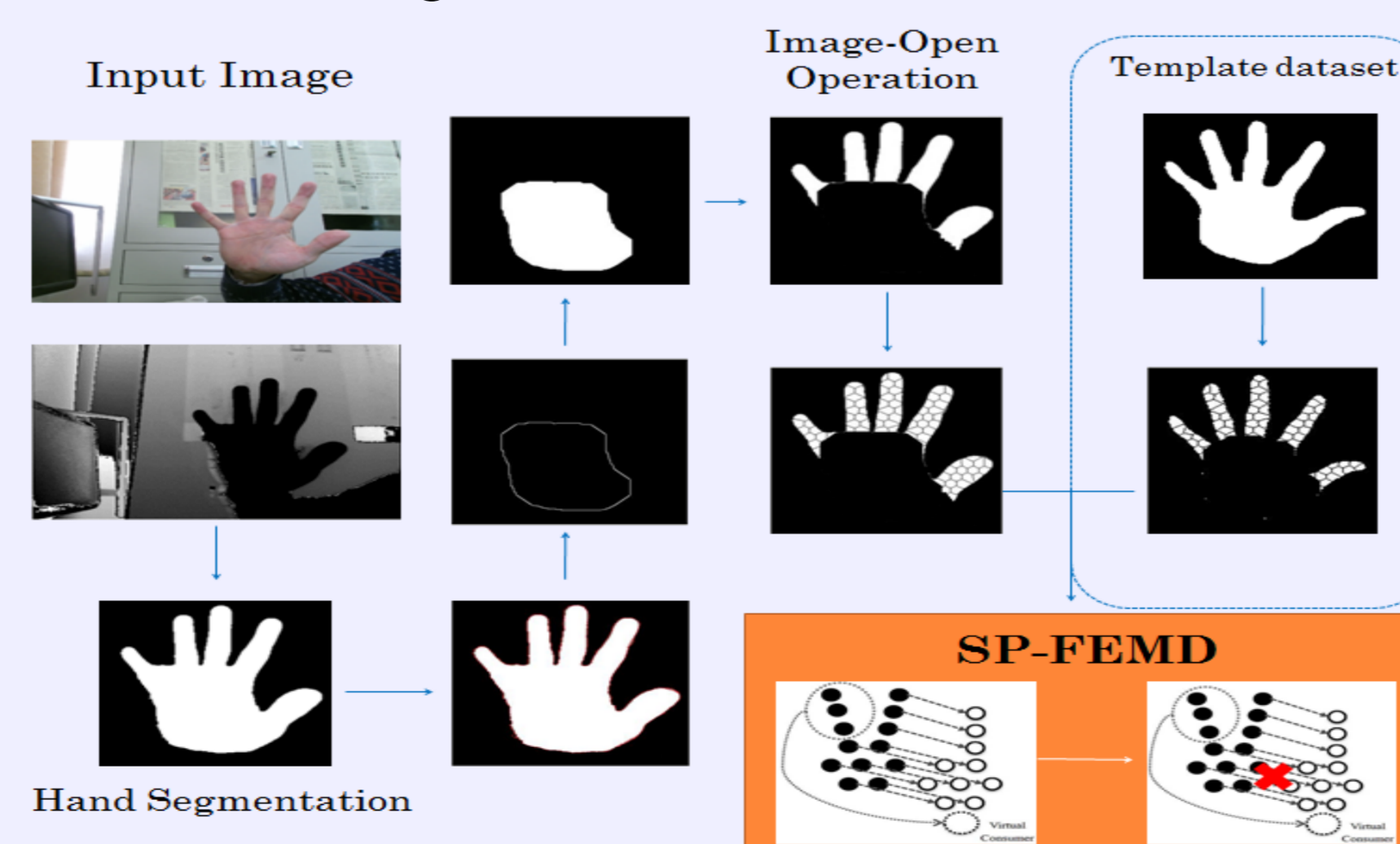


Performance comparison between different methods on our lab data sets. Left to right: Threshold-based segmentation, proposed method, Grab-Cut, Magic-Wand, and Graph-Cut. Top: Input images and user interactions. Bottom: Segmentation results.

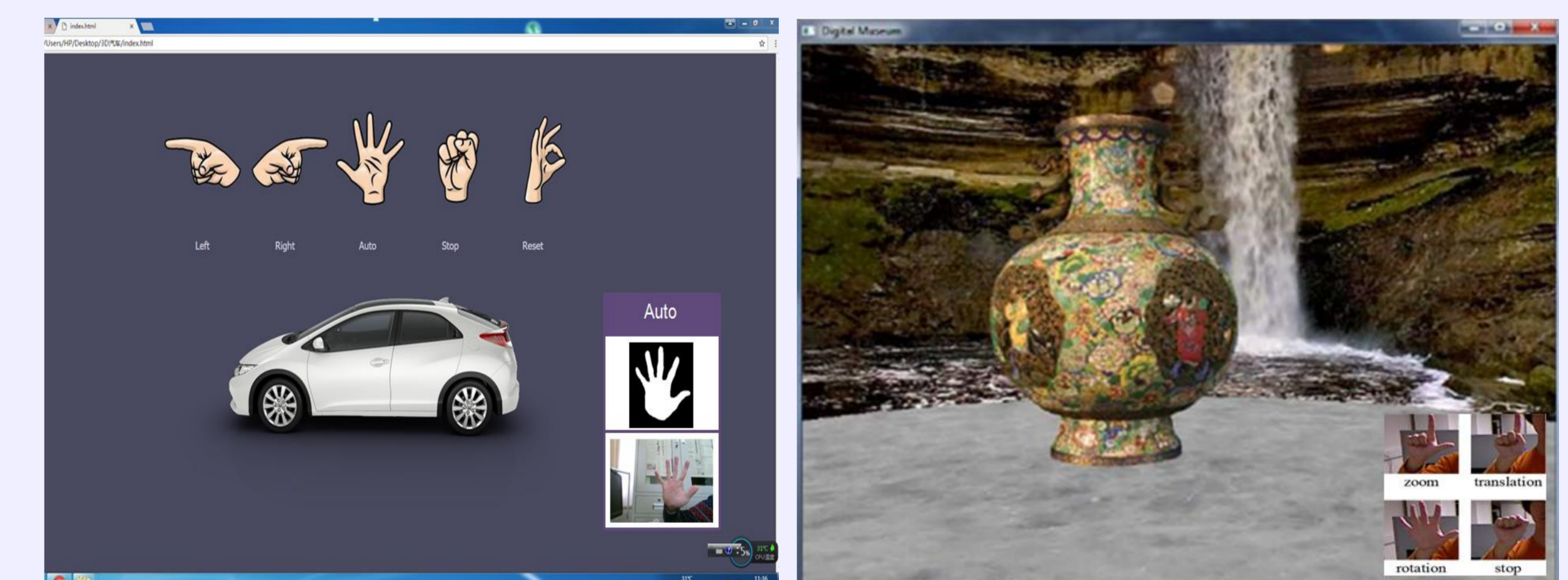
Applications



Block diagram of interaction-free hand segmentation using Kinect camera.



3D Content Browser



VR Interactive Media



Hand Gesture Recognition