

# QEF Project (No. 2011/0162)

## A computerized interactive training system for helping students with disabilities to acquire the skills in activities of daily living

### User Manual

#### 1. System Overview

The computerized interactive training system (as shown in the following figure) is designed for helping students with disabilities to acquire the skills in activities of daily living. The system is safe, economical, effective and versatile for disabled students to acquire the skills in three activities, namely, unlocking a door, pouring water and cutting meat.

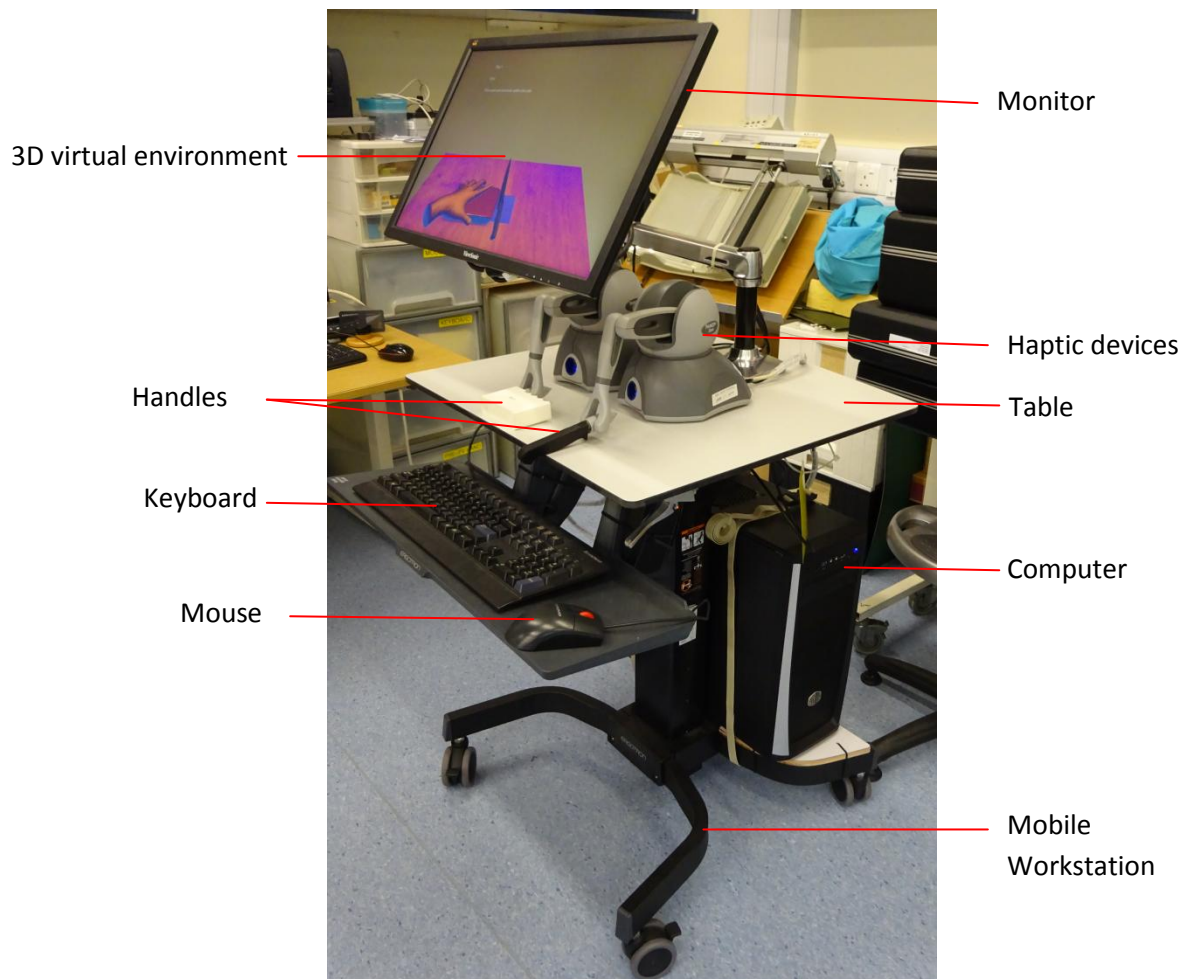


Figure 1. The computerized interactive training system.

The system is composed of two haptic devices, one desktop with mouse, keyboard and monitor and other toolkits for three tasks. For the first two tasks, only one haptic device is needed. For the third one, two devices are needed. The toolkits can be attached to the handle of the haptic devices. The position of the monitor can be adjusted via an arm according to the tasks and the user's height.

## 2. Device Calibration

Before the training, all the wires are needed to be connected correctly and the haptic devices need to be well calibrated. To calibrate the devices, the following steps need to be followed:

- 1) Run "Phantom\_Test" on the desktop. **To make sure there is no error message.** If there are errors, just unplug in and plug in the power and cable wires and try it again. If this solution does not work, turn the PC and the power off. And then reboot the whole system again.
- 2) Select device P1 for calibration. First put the stylus into the inkwell position, then the system will auto detect it. If the calibration is fine, the button becomes green.

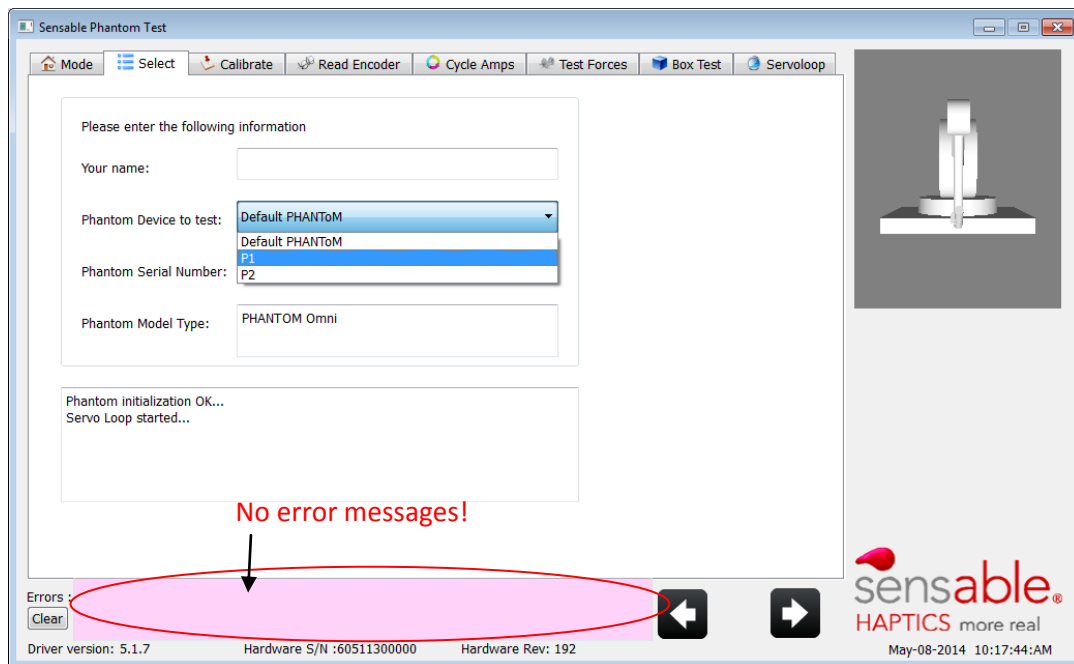


Figure 2. The user interface of haptic device selection.

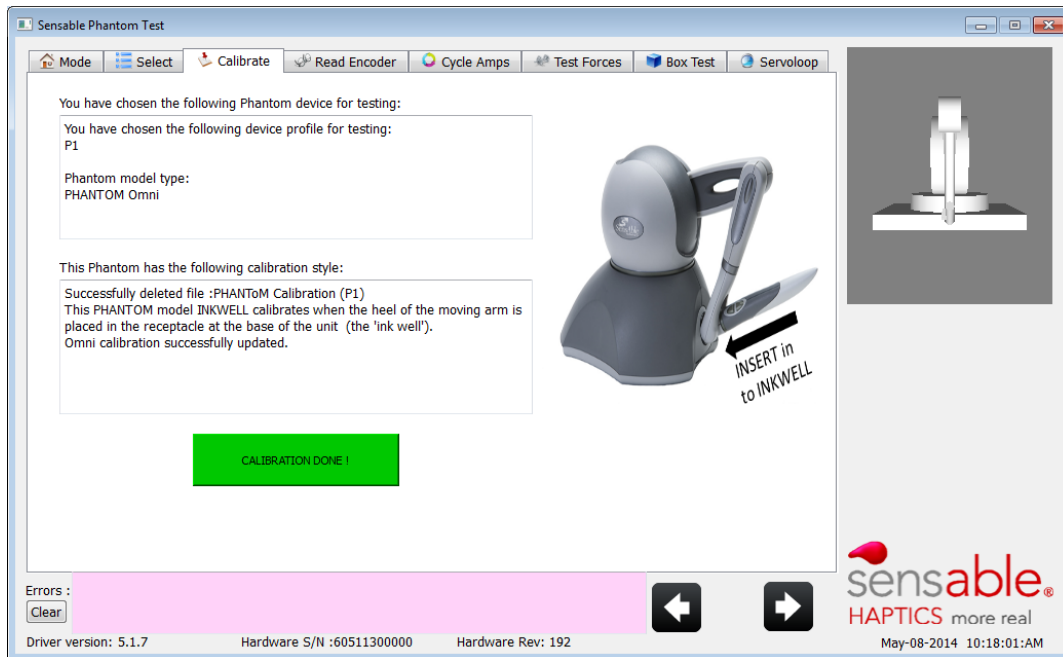


Figure 3. The user interface of haptic device calibration.

- 3) Test the forces in the "Box" test. To make sure you can feel the forces along the three directions. Then calibrate device P2 just as the steps 2) and 3). Then, close the program.  
**Note: due to the software flaw, sometimes, you cannot feel forces. In this case, you need to try the calibration again until there are forces during the "Box" test.**

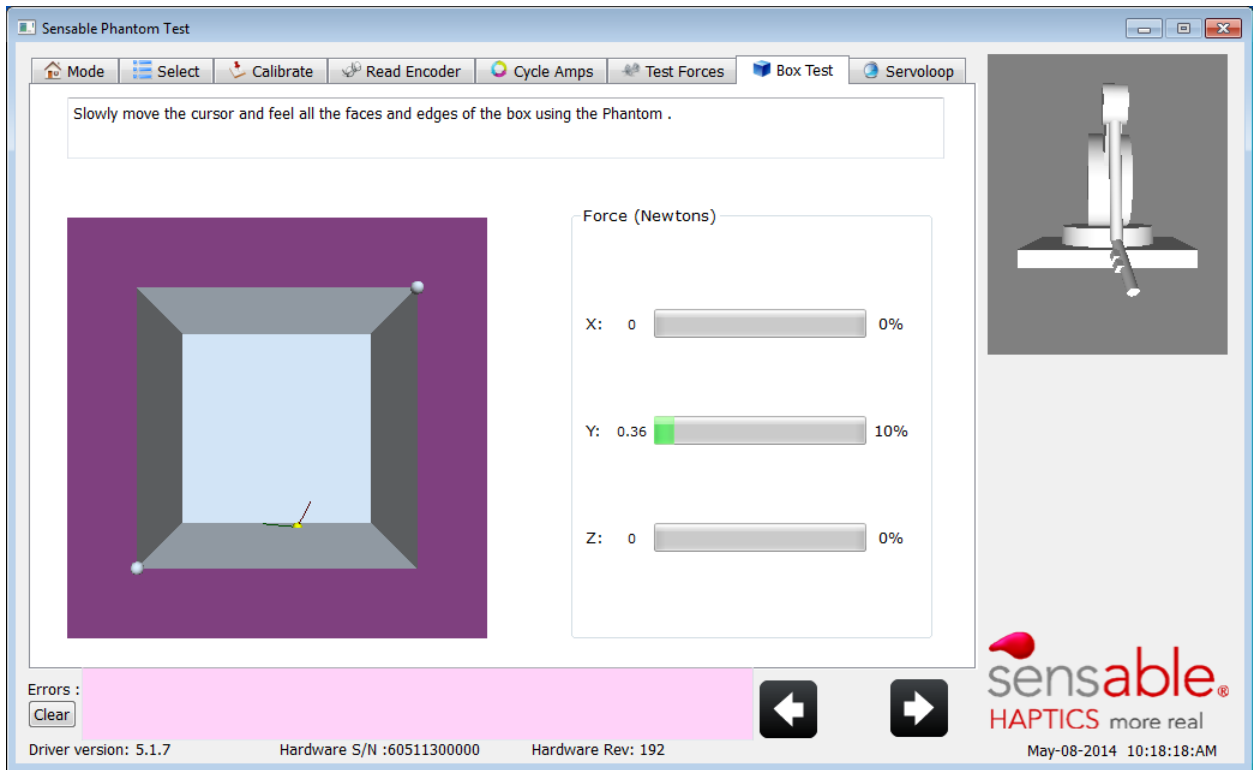


Figure 4. The user interface of the force test.

### 3. Tasks

Double click the shortcut "HapticUI-shortcut" on the desktop to launch the ADL program. Input the student's information into the boxes. Then click "Confirm" button to show the main UI of the training system.

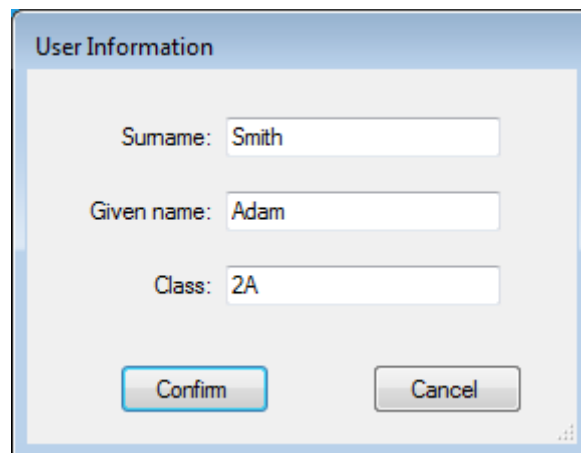


Figure 5. The user interface of user information inputs.

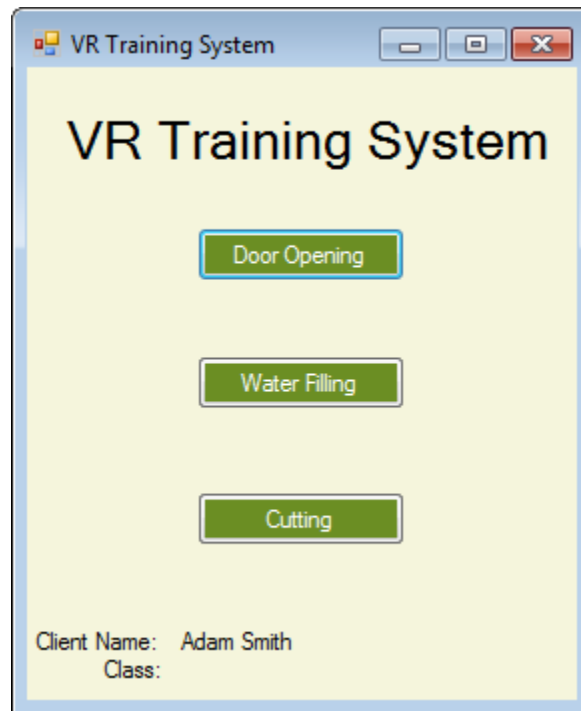


Figure 6. The user interface of task selection.

- **Task #1: Unlocking a door with a key**

Before starting the "Door Opening" task, you need to replace the default tool with the "key". And put the "key" at the right position (about 10 cm before the device and 10 cm above the table). Then, press the first button to launch the UI as shown in the following figure. After finished, you can press "Q" button to exit it.

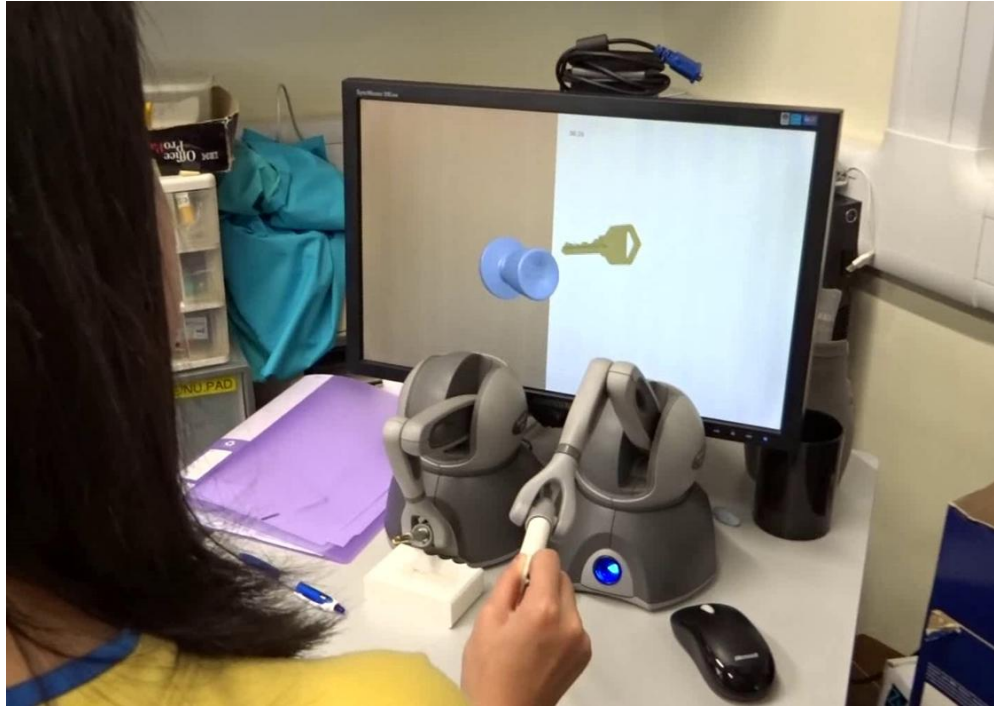


Figure 7. Task #1: unlocking the door. The user holds the device handle (a “key” in white connected to the device arm) to control the virtual key. When the “key” touches the lock, the user can feel force feedback. When the door is unlocked, a sound will be played and the position of the virtual key will be fixed.

- **Task #2: Pouring water in a glass cup**

Before starting the second task, you need to replace the "key" with "jar" and put the cup at the right position. Press "Yes" button to launch the UI for the second task. If you want to repeat the first task, you can press "No" button.

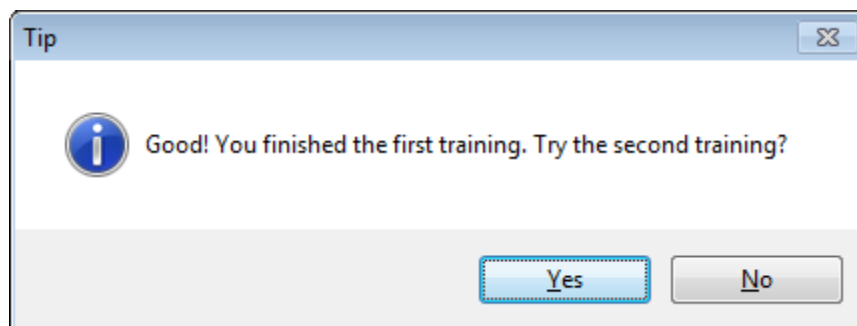


Figure 8. The dialog pops out after Task #1 is finished.

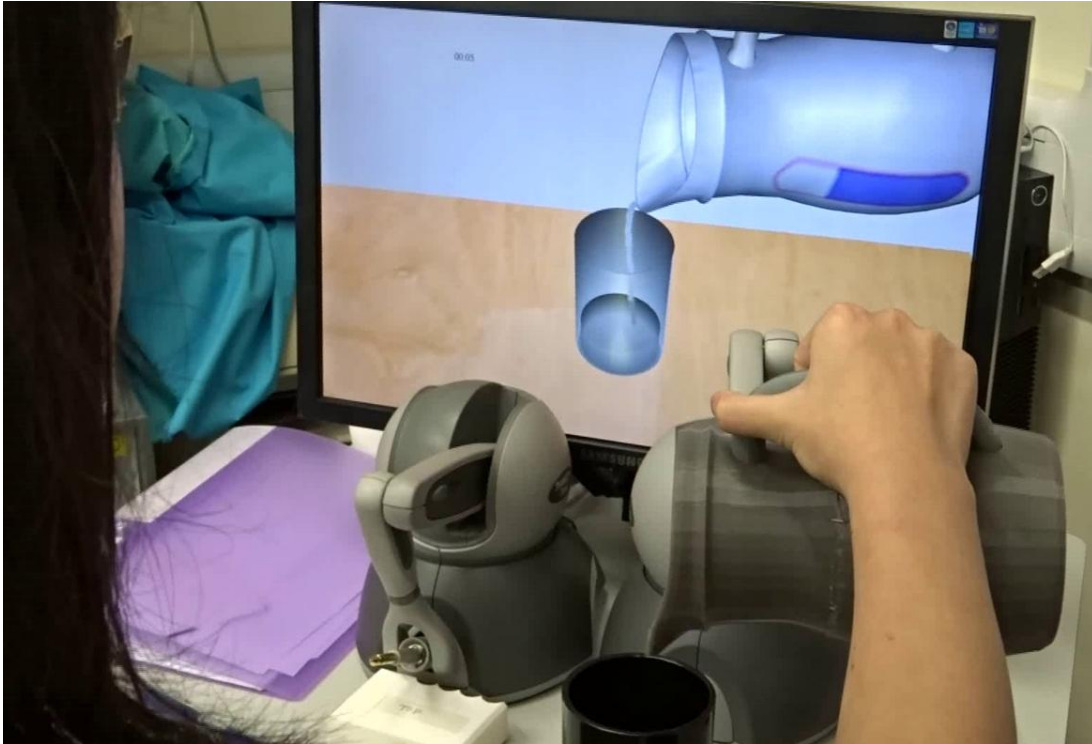


Figure 9. Task #2: pouring water. The user holds the plastic jar handle to control the virtual one in the computer. The user can feel the gravity force of the jar. As more water is poured out, the force decreases. The user can hear different sounds when the water is poured in the cup or onto the table. The blue mark on the jar is to indicate the water quantity in the jar. When all the water is poured in the cup, the position of the jar will be fixed and the user cannot move it anymore.

- **Task #3: Cutting a piece of meat**

After finish task #2, press "Q" to exit it. For task 3, first replace the tools with "meat" and "knife". Then, press "Yes" button to launch the UI. For task #3, the user needs to first put the "meat" at the green region. If it is at the right position, the color changes to indicate it is ready. Then, put the "knife" along the line on the "meat". If it becomes green, then, it is ready to cut. Note the messages on the screen during the operation.

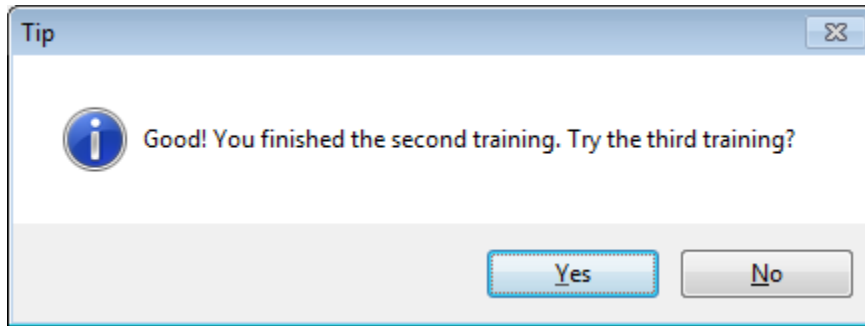


Figure 10. The dialog pops out after Task #2 is finished.

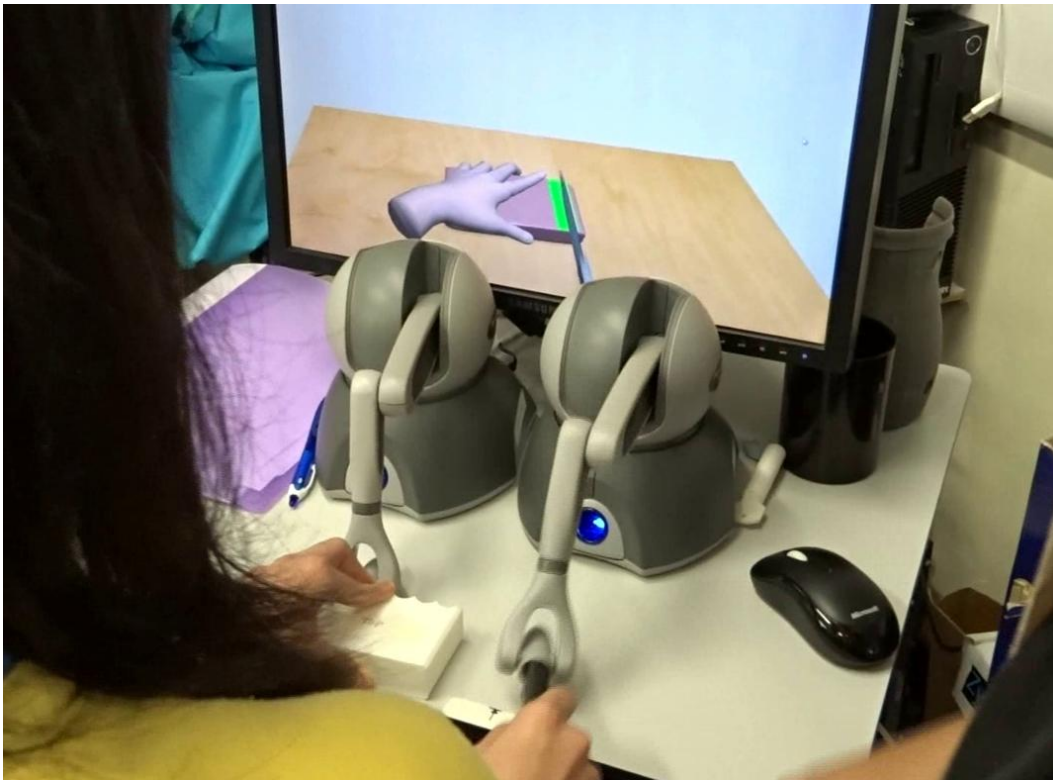


Figure 11. Task #3: cutting meat. The user uses the left hand to control the “meat” and right hand to control the knife. First, the user needs to move the “meat” to a rectangle in green. As the meat is in the good position, the “meat” will change color to indicate that it is ready to cut. Then, the user moves the “knife” to the cutting area marked with green rectangle. Next, the user sees the “meat” to cut it. Watch the screen notice to see if the current cutting is OK or not. If the operation is finished, there is a message on the screen.



Note: after each all the tasks are finished, please check if the data are saved correctly. The data are saved in Excel format. They are under: \ADL(project fold name)\task1 (or task2, task 3 respectively). The file name is identified with date. For example, Task 1\_\_\_\_04-07-2014\_12-19-14.csv. You can use Excel to open it.