INFORMATION SHEET FOR PARTICIPANTS IN RESEARCH STUDIES

You will be given a copy of this information sheet.

Project Title: **Four-Handed Human Robot Manipulation**
This study received the approbation of the EPFL ethical committee.
Principal investigator: **Aude BILLARD**

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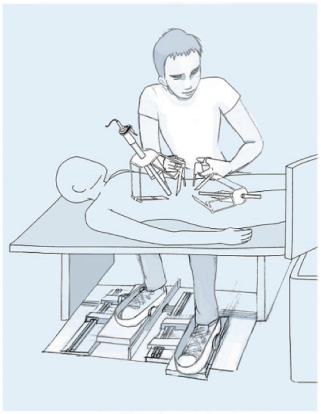
Details of the study

1. AIMS OF THE RESEARCH

- You are invited to participate to a study which aims to investigate decoupled control of the lower limbs and feet in view of enabling a human to control jointly two robotic arms via foot interfaces.
- To determine whether such four-hand manipulation via feet-interface is feasible, we will study:
  1) the level and precision of position and force control at each foot.
  2) how this control deteriorates as the subject is requested to control simultaneously but in a decoupled manner the two feet.
  3) Finally, we investigate the abilities to control the hands in coordination with the feet with a simulation/a mock-up laparoscopic surgery (cutting tissue and suturing a wound while moving the endoscope and retractor with their two feet).



Envisioned 4-Hands System

2. POSSIBLE BENEFITS OF THE RESEARCH

- This study, by working on the control of robotic arms, presents obvious scientific impact in the field of robotics. Hopefully, the use and control of the mentioned arms will help the conduct of laparoscopic surgery.
- While there is a vast literature studying coupled control of the lower limbs for locomotion, there are far less studies on decoupled control of the feet. This study will contribute not only to robotics but also to human motion science, by advancing our understanding of decoupled control of the lower limbs (legs and feet).
- The participant will not benefit directly from their participation to the study.

3. DETAILS OF THE EXPERIMENT

- For this study, you will be asked to sit on a stool and place your feet on the feet interfaces in front of a computer screen. The height of the stool and distance to the computer screen will be adjusted to your comfort.
- You will be tasked to control cursors displayed on a computer screen with foot motion on the foot platform.
- The experiment requires about one-hour time:

  - 15 minutes for informing you, filling in a questionnaire and setting up the devices for the recordings.
  - Approximately, 45 minutes of performing the feet control tasks.
  - According to the task, the test might be divided in several shorter sessions

4. RESEARCH PROCEDURE

- During the tests, we will ask you to interact with the following settings:
  - The foot interfaces on which you will perform different leg/foot movements.
  - The computer screen to observe the cursor/virtual instrument you are controlling.
  - Your lower limb movements will be recorded (cameras) throughout the experiment (Your face will not be identifiable, the data will be saved in a way to protect your anonymity).
  - Possibly, some EMG electrodes to record your lower limb muscles activity.

5. SOURCE OF FUNDING OF THE RESEARCH

- This project is funded by the Hasler foundation on "Four-Armed Manipulation with Robot Assisted Laparoscopic Surgery".

6. CONDITION OF PARTICIPATION

- Your participation is on voluntary basis.
- You cannot participate to the study if you suffer from motor disabilities affecting your lower limbs.
- You should have vision correction in case of visual impairments (in order to see the screen cursor you will control and your manipulations).

7. DATE AND PLACE OF THE STUDY

- The study will take place, at your convenience, at the robot room of the Learning Algorithms and Systems Laboratory (LASA), STI, EPFL located at the ME A3 455 EPFL, Station 9, CH-1015, Lausanne or at the SFITS at the HUG.
- The tests will be scheduled during the week's working hours according to your availabilities. If it suits you better, some experiments may be organised during the weekend.

8. POSSIBLE DISADVANTAGES AND RISKS FOR PARTICIPANTS

- Some foot position on the platform might be uncomfortable and can limit your ability to perform the tasks. In this situation, please inform the researcher immediately.

9. RIGHT OF WITHDRAWAL

- Your participation is on voluntary basis. It is up to you to decide whether you will take part or not; choosing not to take part will not disadvantage you in any way.
- As a participant you have the right to withdraw from the study at any time without giving a reason or facing negative consequences.
- You will be thanked at the end of the experiment for your participation.

10. QUESTIONNAIRES

- You will be asked to fill out a form before the foot control tests. The aims of this questionnaire are to know your practical experience in surgery, to evaluate your ability to use various foot interfaces, and your use of legs/feet in daily life.
- Your foot and hand dominance will be determined thanks to the "Edinburgh handedness inventory" standardised questionnaire » (Caplan & Mendoza, Encyclopedia of clinical neuropsychology, 2011).
- Finally, you will be asked to fill out a form after the foot control tests in order to assess your performance (subjective evaluation).

11. CONFIDENTIALITY

- Your identity will be confidential. The data collected and information submitted can be published as a scientific report. However, confidentiality and anonymity will be maintained and it will not be possible to identify you from any publications. Recorded data corresponding to sequences of digits will be saved on a computer from the EPFL LASA laboratory under a coded title in order to ensure your anonymity.
- All data will be collected and stored safely and reported in an anonymous form, in accordance with the CH Federal law on data protection ("Loi fédérale sur la protection des données" – RS 235.1). Only the principal investigator and/or the members of the Research Ethics Committee have access to the original data under strict confidentiality.
- Personal data will be preserved for no longer than the duration of the project and an eventual follow-up study.

12. INSURANCE COVERAGE

- If you are injured as a direct result of taking part in this research study, emergency medical care will be provided by EPFL medical staff or by transporting you to your personal doctor or medical centre. You might indicate any preferred health care institution for being transferred in the Informed Consent Form. Any possible damage to your health, which is directly related to this study and is demonstrably the fault of EPFL, will be covered by the general liability insurance of EPFL. However, beyond the before mentioned, the health insurance and the accident insurance will be in your responsibility.

13. CONTACT INFORMATION

- You can contact the principal investigator of the study, Prof. Aude Billard, anytime before and after the experiment.

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Please ask us if there is anything that is not clear or if you would like to receive more information.