

## **Advanced HCI - Project 2025-2026**

### **Topic of the project: Physical, mental, societal well-being**

The recent advance of novel technologies such as artificial intelligence, robotics, virtual reality, cloud computing, and so on has accelerated the digital transformation of the world. Such a transformation has impacted several spheres of society by opening new opportunities in people's lives as well as shaping new challenges to be faced. A worldwide challenge concerns the development of technological solutions putting the human well-being as the main focus of attention.

In such a framework, you are asked to imagine a technological solution that could be the game changer for the next generation of digital tools impacting physical, mental and / or societal well-being.

Your solution should intervene in one of the following areas:

- a - Promoting mental well-being through digital health applications: possible topics within this area cover stress reduction, anxiety management, resilience building, and the role of meditation and mood-tracking tools;
- b - Using technologies to shape social connections, enhancing the sense of community;
- c - Mitigating technostress for better well-being: possible topics within this area include mental fatigue, physical strain, and strategies to maintain balance in digital environments;
- d - Supporting healthy bodies through digital solutions: possible topics include obesity prevention, physical activity, and nutrition guidance;
- e - Promoting equitable digital health solutions: possible topics within this area include gender and diversity considerations, barriers to use, and varied health outcomes;
- f - Other: everything is not covered by the other areas but you think that is relevant!

### **Your work**

**Each student has to work on their individual project. Before starting your work, please read carefully the instructions provided in the Instructions Section at the end of this document.**

### **Part I: Problem and Solution**

Choose **one** of the previously mentioned 6 fields. Identify a specific problem that can occur in this field and that you wish to address. Propose 1 technological solution to solve the problem specifying at least 3 pros and 3 cons.

Make a draft list (high level, no technical details are required at this stage!) of the functionalities offered by the solution explaining how it concurs to solve the problem.

Each solution **must** exploit at least 2 modalities: modalities can either be used, for example, one after the other or in parallel; at least one functionality of your technological solution must be supported by two modalities to take into account user preferences; a modality can be used for example to control error ...what you want! About the functionality that is supported by two modalities, explain how one or more of the strategies of the ARCADE model could be used to help user choices.

Please, notice that when you conceive your ideas, you do not need to exactly know all the technical details of the implementation.

Complete a small-scale literature review on how researchers already dealt with the problem you chose. The review should be a descriptive and critical summary of previous research in the field and it should include **at least 3 scientific references** that have to be properly cited in your presentation. This review is aimed at informing about the knowledge that has been established and technological solutions that have been adopted on that problem. Highlight the novelty of your solution with respect to this previous work.

## **Part II: Go deeper in your idea!**

Following the discussion you had after the presentation of Part I refine your work including the feedback you received, and possible further material you found.

Identify needs and goals of people expected to use the technological solution you are proposing. To do that, ground your analysis on existing documents, that is sources already available such as statistics, surveys, papers or market analysis reports. You do not have to collect any data! Then, derive a prototypical user profile (i.e. a *persona*), and a scenario of how your solution works. List the possible stakeholders for your solution.

Identify hardware and software tools that you hypothesize to use to develop your solution, not necessarily limited to what we studied during the lectures. More specifically, make a list of the hardware components needed to develop your solution by also identifying the technical specifications more suitable in your scenario (e.g. spatial and temporal resolution and so on). Design a *UML component diagram* of your solution illustrating how components are wired together to build your technological solution.

Refine the draft list of functionalities adding more details about how they concretely work and how they could be implemented (no implementation is required).

### Part III:

Design a *UML state chart diagram* (i.e. a diagram of the finite-state-machine governing the game) of your solution to model its behavior and its states. Do not forget to find ways to manage errors.

Now, choose at least one functionality of your solution and implement it using Python or another programming language, as you wish. The functionality can be implemented offline or on-the-fly. Write the algorithms to compute the features used by the chosen functionality on time windows. These windows should have an adequate size and can be consecutive or overlapped according to the goals you want to achieve. To select size and overlapping, take care of the output sampling frequency you need. Concretely, time windows can be implemented as arrays or matrices. You can use already existing pre-trained models publicly available, if you need them (e.g. OpenPose and so on. Read the licenses of use).

In case data is needed, every student has to work using his/her own data only, that is you must not record/collect data of other people. Describe the results of your approach (e.g. plots, tables, stats, and so on).

### Instructions

#### Deadlines

**14 November 2025 - Presentation of your work on Part I** to the other students and to the teacher. The presentation has to be structured as follows: a PowerPoint (or similar) presentation in which **1** slide will briefly describe the field you decided to address, **1** slide will present the problem you want to solve, **3** slides will report the literature review (1 for each reference), **3** slides describing your solution, its functionalities and the ARCADE strategies you think to adopt, **1** slide with issues to be faced for developing the idea, **1** slide with references. The goal of Part I is to present your thoughts and solutions and to discuss them for possible improvements. Your presentation should last **8 minutes maximum**.

**12 December 2025 - Presentation of your work on Part II** to the other students and to the teacher. The presentation has to be structured as follows: a PowerPoint (or similar) presentation in which **1** slide will present your final idea, **1** slide will show the improvements with respect to your previous presentation, **1** slide reporting the persona, **1-2** slides describing the scenario as a short text or as a storyboard, **2-4** slides with the refined list of functionalities, **2-3** slides about the hardware and software tools, **1** slide will depict the UML component diagram, **1** slide with references. Your presentation should last **12 minutes maximum**.

**At the exam call (January, February in the first semester; June, July, September in the second semester) - Final Presentation of your whole work.** The presentation has to be structured as follows: a PowerPoint (or similar) presentation in which **1** slide will present the field you address and the problem you want solve, **2** slides about literature review, **1** slide will describe your solution, **3-4** slides about the functionalities of your solution, **1** slide will report the persona, **1-2** slides will describe the scenario, **1** slide will provide the list of the hardware components (and their technical specifications) you need to develop your solution, from **1** to **3** slides on technical tools, **1** slide will depict the UML component diagram, **1** slide will depict the UML state chart diagram, **3-4** slides about the functionality implementation and results, **1** slide will be about conclusions and lessons learnt, **1** slide with references. After the presentation, you will have to show a demo of the functionality you implemented. Your presentation should last **25 minutes maximum**. The duration of the demo should be around **5 minutes**.

Three days before the exam call, upload to the Project section of Moodle a .zip file with your final work. The name of the file must be: **Lastname\_student(s).zip**.

The folder has to contain:

- 1) your final presentation (pdf format);
- 2) a folder with your code (no data!)

Your final grade will be assigned based on your project, your skills at mastering the presented topic, and your answers to questions on the course topics.