

# TFG-Localization Based Systems and Intelligent Space

## 2025-01 Semester Activities Planning

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## Instructions for the assignment CA1

**To-do date:** 19 Feb.

**Deadline:** 04 March.

### Description

The first Continuous Assessment Test (CAT) of the final project is the project plan. This document describes the scope and goals of the project, as well as a schedule detailing which tasks will be carried out during the semester (and when).

Your submission for this first CAT should include the following information:

- **Scope:** High-level description of the requirements of the application being built. It is important to provide descriptions and provide details for the tasks. Please kind in mind that the scope should be complex (a realistic project testing the skills acquired during the degree) but realistic (it can be completed in one semester).
- **Technology:** Description of the technologies and frameworks that will be used in the project.
- **Schedule:** Detailed description of the tasks, duration, dates and milestones. You should consider defining intermediate milestones before the CATs so that you can ask for feedback before the final submission of each CAT. You can use tools such as Microsoft Project or Excel in order to prepare a Gantt diagram.

### Learning resources CA1

Instructions for making the work plan

Below are some guidelines that will try to guide you when writing your proposal.

- **Title:** The title should reflect the content of the paper. It must be complete, clear, precise and refer to the main topic.
- **Keywords:** Keywords are usually words or combinations of words with a semantic unit that serve to summarize a scientific work. For example: natural language processing, sentiment analysis, e-learning. The previous 3 keywords would serve to summarize a work that uses natural language processing techniques to analyse emotions/opinions/feelings within an online learning environment.
- **Summary of the proposal:** First of all, you must explain the topic on which the FP will be carried out and then describe what you want to achieve, in general terms, at the end of the work.
- **Justification:** The subject on which the FP will be carried out must be explained, justifying its relevance for society or the scientific field to which it corresponds.
- **Motivation:** It is important that the student explains why they want to do this FP, e.g. professional experience in the field, personal interest (hobby), contribution to current work, etc.
- **Objectives:** Given a theme and a problem to be solved (or line of research to investigate), the objectives determine what is intended to be achieved with the work or research. A good way to define goals is to answer questions like: What do I want to do? What do I want

to check/contribute/modify? What is the scope of my work or research (what goes in and what doesn't)? In this activity the objectives will be indicative and in future activities they will be refined.

- **Hypothesis** (or main objective): Closely related to the problem is the hypothesis or main objective of the research. It must be defined clearly and concisely (a maximum of three lines).
- **Sub-goals (or research questions)**: In order to confirm your hypothesis (or achieve your main goal), you will probably need to take some preliminary steps. These steps are the partial objectives or research questions.
- **Methodology**: Depending on the type of work we are doing, we can establish two groups:
  - Regarding the description of the work or applied research methodology and key concepts: Indicate what are the possible strategies for carrying out the work and indicate which one was chosen (e.g. develop a new product, adapt a product existing, etc.). Evaluate why this is the most appropriate strategy to achieve the proposed objectives.
  - Regarding the general description of the work / development process carried out: Describe possible research methodologies (eg surveys, interviews), development methodologies (eg waterfall, prototyping, agile programming), resources, etc. used to approach the project.
- **Project or research planning**: Planning is essential to determine what needs to be done, in what time and with what dedication to achieve the established goals. Also to change it and plan, if possible, during execution. To do this section of the PAC, you need to identify the activities / tasks you have to do from now on, determine their duration, the start and end dates, as well as the possible dependencies between them.
- **Bibliography**: To get to know the problems existing in the world and the phase they are in, it is very important to look for documentation. In an information and knowledge society such as the one we live in, it is fundamental to be critical of what is found, above all, on the Internet. We can find everything on the web, but not everything is good in the scientific field. For example, an entry (post) in a blog can give us very useful information, but its use (citation) is not permissible in a scientific document. However, we can use the information it gives us as a clue to further search for information.

# Instructions for the assignment CA2

**To-do date:** 5 Mar

**Deadline:** 01 April

## Description

The second Continuous Assessment Test is devoted to the **design phase** of your project. In this phase, you will:

- Describe the **requirements, use cases, and architecture** of your application.
- Increase your knowledge of the **technologies** used to develop the application (*finding and reading documentation, installing the necessary components, etc.*).

*Your submission for this CAT2 should include at least the following:*

- **Use cases/User stories:**
  - Definition of the features provided by the application from the point of view of the user.
  - The detailed definition of a use case is only required for complex use cases.
- **User interface design:**
  - Hand-drawn sketches of the different **GUI elements** and the **navigation between them**.
- **Database design:**
  - Description of the **entities and associations** in the database.
  - Corresponding **tables/columns**.
- **Class and architecture diagrams:**
  - Graphical description of the main **components** in the application **front-end** and **back-end**.
  - Relevant **architectural decisions**.
- **Update to the project's schedule:**
  - Critical discussion of the **status of the project** with respect to the planned schedule.
  - If there are **significant deviations**, propose actions to get the project back on track.
- **Any other deliverable or product** that has been established in the project plan.
- **Prototype implementation:**
  - A working **prototype of the login screen/main UI** is desirable.
  - Ensures you are ready to start the full implementation.

## Learning Resources CA2

### *What is meant by 'State of the Art'?*

The **State of the Art** is an **introductory part** of any final work or doctoral thesis, typically placed in the **second chapter** (after the introduction). If the project covers **multiple topics**, this section may be divided into several chapters.

### *Purpose of the State of the Art*

- Reviews **how researchers have addressed** the problem the thesis aims to solve.
- Provides a **photograph of the current state** of knowledge in the field.
- Requires an **exhaustive search of existing literature**.

### *Why is this section essential?*

- **Defines the research scope, objectives, and limitations.**
- **Serves as a bibliographic foundation** for the entire report (methodology, implementation, conclusions, etc.).
- **Justifies decisions** made throughout the project.
- **Identifies contributions** made within the field.

### *Guidelines for a Good State of the Art*

- Requires **many hours of searching, reading, and understanding**.
- Making a **conceptual map** of the literature helps structure the report.
- Search sources:
  - **Libraries (physical/virtual)** (e.g., UOC library).
  - **The Internet** (Google, Bing, Yippy, blogs, websites, etc.).
  - **Books and scientific journals**.
- Carefully **select keywords** for online searches.
- Iterative search process improves **quality of findings**.
- **Useful search engines:**
  - **Google Scholar** (<https://scholar.google.es/>)
  - **Web of Science** (<https://apps.webofknowledge.com/>)

### *Recommended Search Topics*

- **Subareas** within the project's scope.
- **Achievements** in the field.
- **Current research problems** and their progress.
- **Potential applications** in fields such as **medicine, education, etc.**

- **Similar software** (private programs, open source, APIs, etc.).
- **Relevant hardware** components.

#### *Types of Resources*

- **Final Degree/Master's Projects** or **Doctoral Theses** from UOC or other universities.
- **Articles from scientific journals and conferences.**
- **Books** and online literature.
- **Websites** and software documentation.

#### *How to Perform Effective Google Searches?*

- **Find a specific file type:** filetype:pdf
  - Example: natural language processing filetype:pdf
- **Find an exact phrase in a website:** Use " "
  - Example: "Identification of emotions from text using semantic disambiguation"
- **Combine text with and without quotes:**
  - Example: "student-centered learning" UOC Minguillón
- **Use Google Advanced Search** for better filtering.
- **Google Scholar** (<http://scholar.google.com/>) is useful for academic searches.

## Instructions for the assignment CA3

**To-do date:** 2 Apr

**Deadline:** 06 May

### Description:

The third Continuous Assessment Test is devoted to the implementation of the application. In this CAT, you will develop an application that fulfils the user requirements considering the design decisions taken in the previous CAT.

The deliverable for this CAT should include at least the following:

- **Product:** Submission of the code used for your application, together with the resources (installation manual, usernames and passwords, virtual machine, ...) that can be used to test your application.
- **Project report:** Description of the implementation of your application as it will be featured in your project report. This description should provide a concise overview of the relevant aspects of your application (implementation decisions, high-level code organization, challenges addressed during the development, testing strategies, ...).
- **Update to the project's schedule:** A critical discussion of the status of the project with respect to the planned schedule. If there are significant deviations from the original schedule, you should propose actions to get the project back on track.

At the end of this CAT, you should aim for a working implementation of the core features of your application, with only minor extensions/optional features pending to be completed in the final submission.

### Learning resources CA3:

#### *Contents and resources*

Below are some guidelines for both parts of the CA. Obviously, its use will depend on the nature of the work, i.e. whether or not it includes these two parts in their entirety.

This phase is very important because it lays the foundations for what the entire work will be. A very current habit in Engineering is *"thinking with ten fingers."* This is a serious problem in engineering due to the ease with which it is possible to run code and see if it really works. Although it may seem incredible, *"wasting"* an hour doing a good design (thinking, making diagrams, pseudocode, etc.) allows, in the long term, to reduce the number of unexpected problems (and, therefore, the development time is shorter and, the quality, higher).

A design must start from the objectives of the Final Work and define specifications (**i.e., what must be met?**). These specifications will be used to start developing the project.

To carry out the design of any product (Final Work included) there are several techniques:

- If the end users of the product are known, it is advisable to conduct an interview or survey to find out their needs.
- Above all, have a good knowledge of the area. If you do not have it, you must acquire it.
- Make a block diagram of the Final Project (this also helps to structure the explanation of the work in the report).

## Product Implementation

The implementation must ensure compliance with the specifications described in the design phase. Aspects such as modeling, encapsulation, and documentation of the code (or hardware development) are key to guaranteeing high quality.

A design phase that is halfway between the previous phase and the implementation phase is the **selection of the tools** (software libraries or algorithms), the **programming language** (or languages), and the **hardware to be used**. It is important to prepare a good analysis of the available technologies (as has been done in the *State of the Art*), since it is not necessary to reinvent the wheel. That is, if there is already open source and/or APIs that do precisely what is needed at work and can also be used, it will be enough to learn how to use them. *Time is gold!*

The following are fairly standardized programming habits:

- **Notation:** There are several systems for declaring names of variables, constants, and classes. Among the best known is the *Hungarian notation*. However, the notations are not always followed 100%, but there are quite popular habits, such as:
  - Writing the classes with the first letter of each word in capital letters and without separators (e.g., Figure, SintacticLabeler).
  - Writing variable names similar to classes but starting with a lowercase letter (e.g., playerAgeB, patientName).
  - Writing constants in capital letters with an underscore as a separator between words (e.g., MAX\_PLAYERS).
- **Documentation tools:** There are various techniques to clearly and exhaustively document the code, such as **Doxygen** (<http://www.doxygen.org>) or **JavaDoc** (included in JDK). This is especially useful because:
  - In the future, someone else may want to use the code.
  - The author may want to reuse the code a few years later.
  - If the code is not well documented, it is very difficult to understand and maintain.
- **Performance Optimization:** In the event that the FP requires the development of code and this consumes a large amount of memory and/or CPU resources, the use of *profilers* is recommended to guarantee the correct functioning and efficiency of the implemented code.



## Instructions for the assignment CA4

**To-do date:** 7 May

**Deadline:** 03 June

### Description:

The final submission of your project consists of three elements: **a report, a presentation, and the product.**

- **Report:** The report should be a self-contained description of the project's goals, development, and results. The report should follow the template provided in CAT1 and cannot exceed **90 pages** (\*). The assessment of the report will consider both its technical quality (*correctness, completeness, conciseness, bibliography, discussion of decisions and alternatives, ...*) as well as its formal aspects (*presentation, organization, writing, ...*).
- **Product:** The final version of the product, including its **source code, installation and user manuals**, should also be included in the final submission.
- (\*) The **limits on extension/duration are hard limits**. Exceeding these limits may have a negative impact on your grade.

## Learning resources CA4

### *Contents and resources*

In this CA, you must **finish writing the report of your final work**, completing the remaining parts and reviewing the content of the entire report (*including the sections reported in previous activities, i.e., 1, 2, and 3*).

To produce a **quality report**, it is necessary to follow the most common formalisms, both aesthetic and content. It is necessary to have minimal knowledge of the word processor that will be used. In this sense, to help you make a report that meets minimum **aesthetic and content requirements**, we have provided you with a template in **Word and LaTeX** at the beginning of the project, which has informed each of the project activities.

### *Formal Aspects of the Report*

The document must comply with the following formal aspects:

- It must be written in a **single language (English)**.
- The pages must be **white**, and their measurements must follow the **DIN A-4 format**.
- The font must be **Arial, Times New Roman, or similar**:
  - **Size 11** if the font is Arial.
  - **Size 12** if the font is Times New Roman.
- The **line spacing** should be between **1.15 and 1.5**.
- It is necessary to **justify the alignment** of the text.

- The **writing style should be formal**. The use of the first-person singular and plural should be avoided, changing it to an **impersonal form**.
- **All figures and tables** must be properly **numbered**.
- The **bibliography** must be clear and concise. It must be **ordered**, either by **order of appearance and citation throughout the text**, or **alphabetically**:
  - If more than one resource by the same author is listed, its items will be **ordered chronologically, from oldest to newest**.
- Throughout the text, **all references to bibliographic resources** must follow the same format, e.g.:
  - Numbers **[1]** or other variants, such as **(Mazza, 2004)** or **(Yee et al., 2000)**.
- The use of **footers should be avoided** as much as possible.
- The **report will be delivered in PDF**.

# Instructions for the assignment CA5

**To-do date:** 4 Jun

**Deadline:** 10 Jun

## Description

The final presentation of your project consists of a **video presentation** summarizing the key aspects of your final project. This video will typically be a **screen cast using a slide deck** and should not exceed **20 minutes** (\*). Like the report, the presentation will be assessed both on its **technical merits** and its **clarity and delivery**.

(\*) **The limits on duration are strict. Exceeding these limits may negatively impact your grade.**

### *Recommended Structure for the Presentation:*

- **Introduction**
  - Briefly introduce yourself and the project.
  - State the goals and purpose of the project.
- **Project Overview**
  - Summarize the main aspects of your final project.
  - Highlight the key features and technologies used.
- **Demonstration**
  - A **short demo** of the tool focusing on its most relevant aspects.
  - Showcase the core functionality and any unique features.
- **Challenges & Solutions**
  - Discuss any obstacles faced during the project.
  - Explain how these challenges were addressed.
- **Conclusion**
  - Summarize the achievements of the project.
  - Provide potential future improvements.

### *Format of the Delivery*

- The presentation **must be submitted** using the "**Delivery of Presentations**" discussion forum in the classroom.
- You **can** use the **UOC template**, but it is **not mandatory**.
- Ensure the **video is clear**, with good audio quality and well-structured content.