University of Tissemsilt
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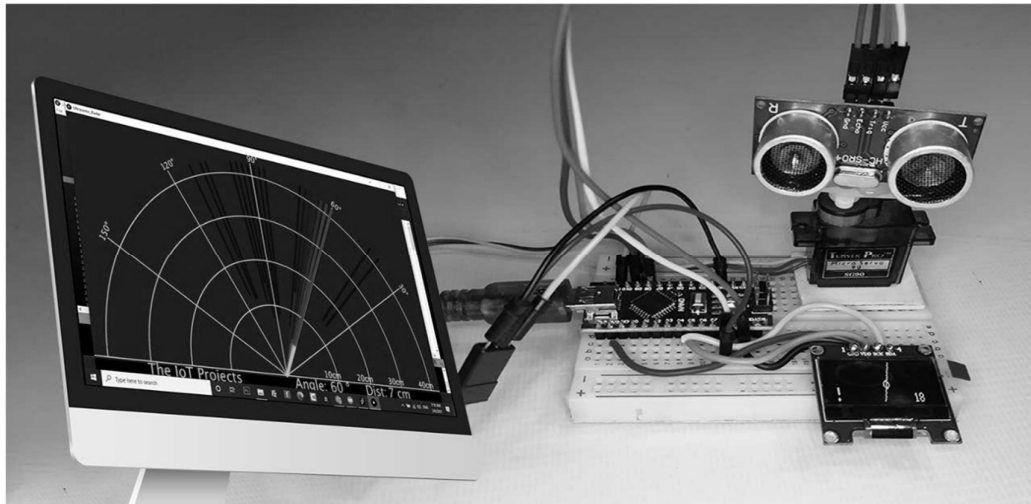
Matière Avant-projet

Niveau : Master 1
Filière : Electronique
Option : Instrumentation

Dr. NAIL Bachir

Projects with step-by-step guide

circuit schematics and source codes using

Proteus and Arduino

Année Universitaire 2022/2023

Lecture contents

➢ Overview on Arduino Uno (Blinking A LED)

➢ Motion control using Servo motor

➢ Motion control using Stepper motor

➢ Segment Counter

➢ Character Display in I2C LCD

➢ Traffic Light

➢ Traffic Light with a Timer

➢ Distance Measurement

➢ Light Detection and Light Intensity Measurement

➢ Obstacle Detection Using IR Sensor

➢ PWM Control

➢ Brightness Led Control using PID controller

مقدمة

مجموعة من الدروس على شكل مشاريع تطبيقية لمقياس avant-projet موجهة لطلبة السنة الأولى ماستر شعبة إلكترونيك تخصص أداتية، يكتسب من خلالها الطالب مهارتي التخطيط وإدارة المشاريع خاصة المتعلقة بمساره الأكاديمي الدراسي، منهجية مشاريع هذا الحامل البيداغوجي تبدأ بطرح الإشكال، ثم الفرضيات وتقديم الخطط، ثم الإنطلاق في تصميم الحلول وتطبيقها، البداية تكون بالمحاكاة عن طريق برنامج Proteus والهدف من استعماله هو التأكد من سلامة ونجاح تنفيذ الدارات المقترحة، في المرحلة الثانية يأتي تجسيد التصميم ميدانيا بواسطة الأدوات المتاحة، في مشاريعنا استخدمنا ميكروكنترولر Arduino atmega328p بسبب فعاليته وجدارته التي أثبتها في المشاريع المضمنة في الزمن الحقيقي (Real-time and Embedded systems)، بالإضافة الى سهولة ومرونة التعامل مع أوامره ولغة برمجته.

الهدف من هذا المقياس ومن هذه المشاريع هو تهيئة الطالب وتمرينه وتحضيره على انجاز وإداره المشاريع، ونخص بالذكر هنا تجهيزه لمشروع نهاية التخرج PFE.

نايل البشير

Introduction

Since the beginning of organized human activity, people have been busying themselves with various kinds of tasks. Projects were our ancient ancestors' hunting groups in which they sought to bring down large game. Projects can also be little and simple endeavors, like writing a letter, or they can be large and complicated, like the pyramids or the Great Wall of China. Even something as straightforward as preparing a meal can be considered a project in its own right. The word "project" comes up very regularly in the conversations that take place here on a daily basis. This book provides an introduction to project management and its fundamental concepts. This comprises the processes of initiating, planning, executing, controlling, and closing out the project, which are common to all projects.

Definition of a Project

A project is a transitory undertaking that is undertaken to generate a one-of-a-kind product, service, or outcome, according to the Project Management Institute (PMI), which provides a formal definition of the term "project" for those who are interested. Due to the transient nature of projects, there is always a starting point and an ending point. When all of the goals of the project have been accomplished, when the project is canceled because its goals will not or cannot be attained, or when the need for the project is no longer there, one has arrived at the conclusion of the endeavor.

Project Initiation

The process of beginning a new project is what kicks off the first stage of the project management life cycle. This phase is also known as the project initiation phase. During the phase known as "initiation," a business problem or opportunity is recognized, a solution is outlined, a project is established, and a project team is selected to construct and deliver the solution to the end user. A business case is developed in order to outline the issue or opportunity in greater detail as well as to

choose which potential solution should be implemented. The following are included in the business case:

A comprehensive analysis of the issue or opportunity, broken out into sections with titles like "Introduction," "Business Objectives," "Problem/Opportunity Statement," "Assumptions," and "Constraints," among others.

- A list of the alternative solutions available
- An analysis of the business benefits, costs, risks, and issues
- A description of the preferred solution
- Main project requirements
- A summarized plan for implementation that includes a schedule and financial analysis.

After that, the business case is given the go-ahead by the project sponsor, and the necessary funds are allotted so that the feasibility study may move forward. The person who is sponsoring the project is the one who is responsible for deciding whether or not the project should be carried out and whether or not it will result in a profit for the organization. The commencement of the planning phase is signaled when the feasibility study is finished and given the green light to proceed. The feasibility study can also reveal that the project is not profitable enough to continue, in which case the project would be scrapped and the next phase would never get started.

There is a purpose behind the birth of any project. Someone recognizes a need or an opportunity and then formulates a plan to fulfill that need in order to take advantage of the opportunity. The accomplishment or failure of the project will be determined by how effectively it ultimately satisfies that requirement.

The clarity and precision of your business case, in addition to the degree to which individuals believe they can successfully complete the project, will determine whether or not it is successful. When you think about things that have happened in the past, your business case becomes more realistic. When you involve other people

in the process of developing the business case, you encourage their commitment to attaining the goal.

People are often encouraged to immediately begin the process of exploring alternative solutions when they are under pressure to generate results because they do not completely grasp the demand or what the project is attempting to achieve. If the wrong need is met using this strategy, it has the potential to generate a substantial amount of immediate activity; but it also generates a significant number of opportunities for waste and errors. One of the most effective ways to get approval for a project is to define the problem or opportunity that the project will solve in detail, along with the project's goals. This is one of the greatest ways to get approval for a project. Being misunderstood is something that happens to the vast majority of us on a daily basis, making it a rather typical event. When the waiter serves us our supper at the restaurant, we see that the baked potato is stuffed with sour cream, despite the fact that we specifically ordered that "no sour cream" be included in our order. Misunderstandings between consumers and project workers are commonplace throughout the duration of a project. What the buyer ordered, or more exactly what they think they ordered, is not always what they got. This happens rather frequently. It's been said so many times that it's become a cliché: "I know that's what I said, but it's not what I meant." The significance of writing down one's goals is seen in Figure 6.1. [1]

It is impossible to place enough emphasis on the need of defining the project's goals clearly. When an aim or goal is presented to five different people, and each of those people interprets it differently, the objective or goal lacks clarity. In a perfect world, you would be able to show an objective to five different people and have each of them arrive to the same conclusion regarding its significance after reading it. One of the most effective methods for elucidating a goal is to articulate it in a manner that allows for its verification. This can be accomplished by incorporating tools to measure achievement. It is vital to establish measurable meanings to qualitative concepts.
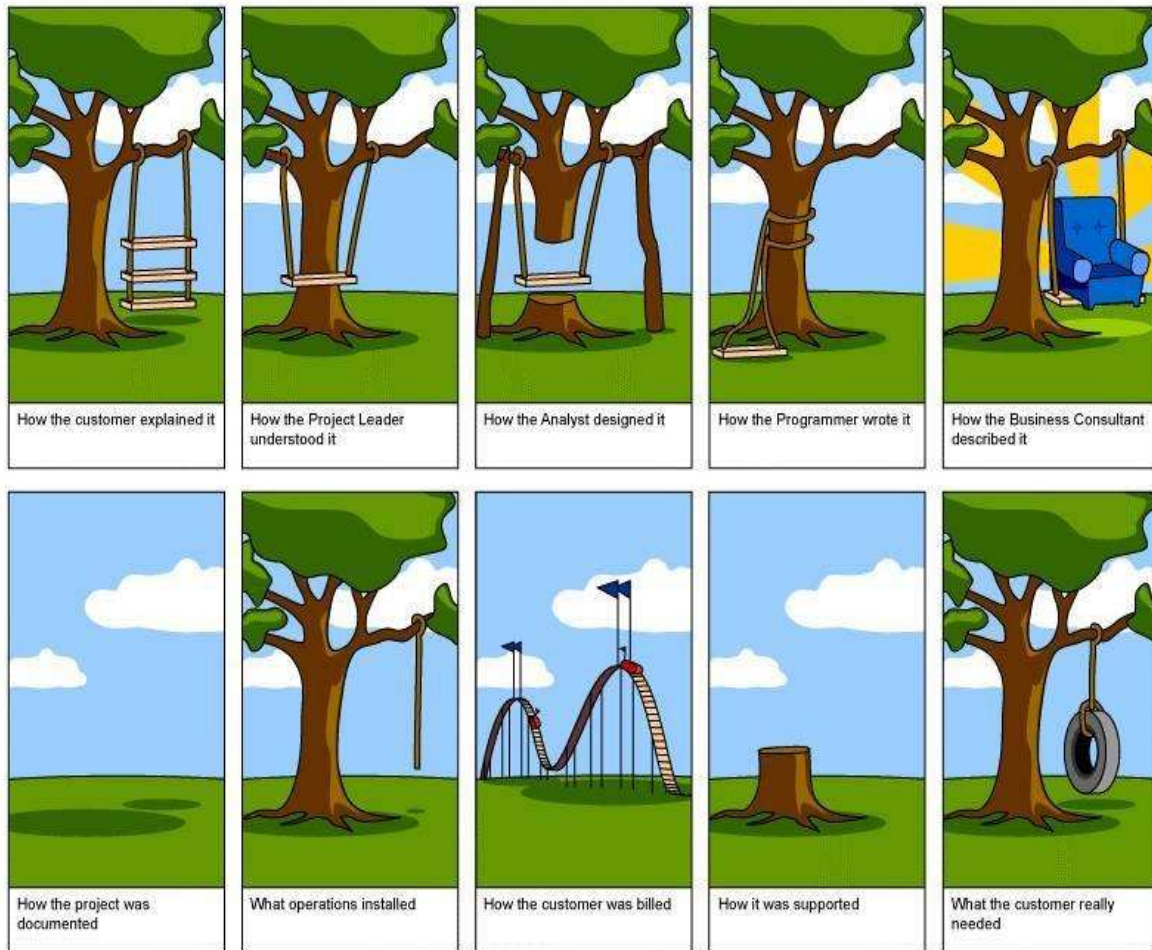
Figure 1. Project Management.

The management of the project and the people who actually carry out the job must come to an agreement on the project's goals in order to guarantee that they are attainable and reasonable. Introducing realism is made possible by the fact that the individuals who will be performing the work have a solid understanding of the requirements necessary to complete a specific endeavor. This procedure also ensures that there is a certain amount of commitment on both the part of management and workers. Management demonstrates its readiness to support the work effort, and workers exhibit their willingness to participate in the task.

Imagine for a moment that an office manager has hired a painter to decorate his workplace. It is one of his goals or objectives to have the office painted a calming shade of blue. Take into consideration the dialogue that took place after the task outlined in Figure 6.2 was completed.
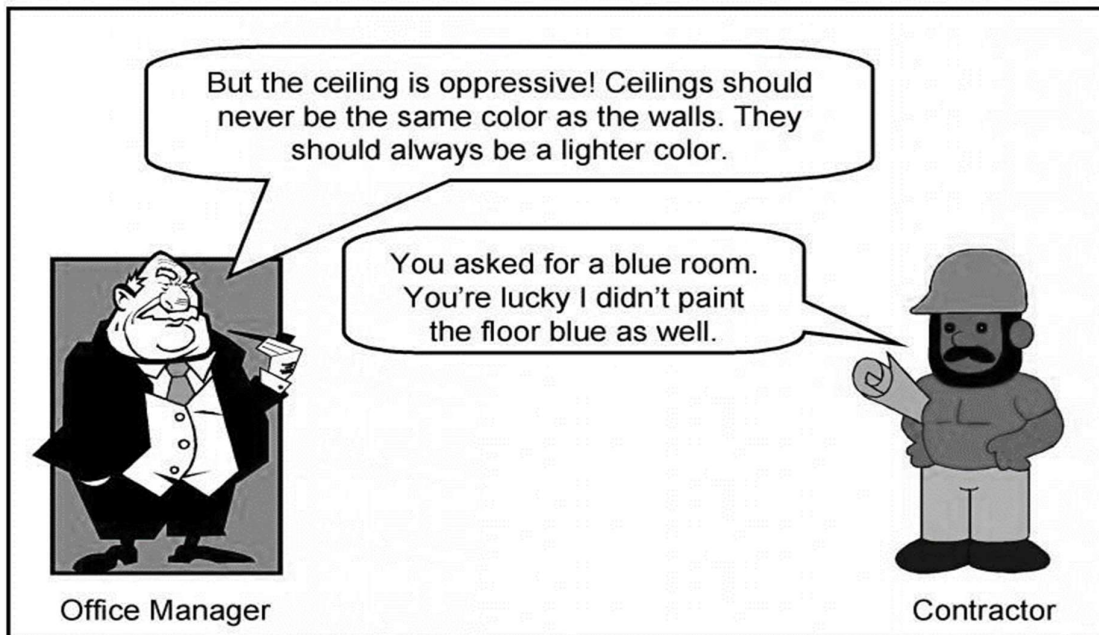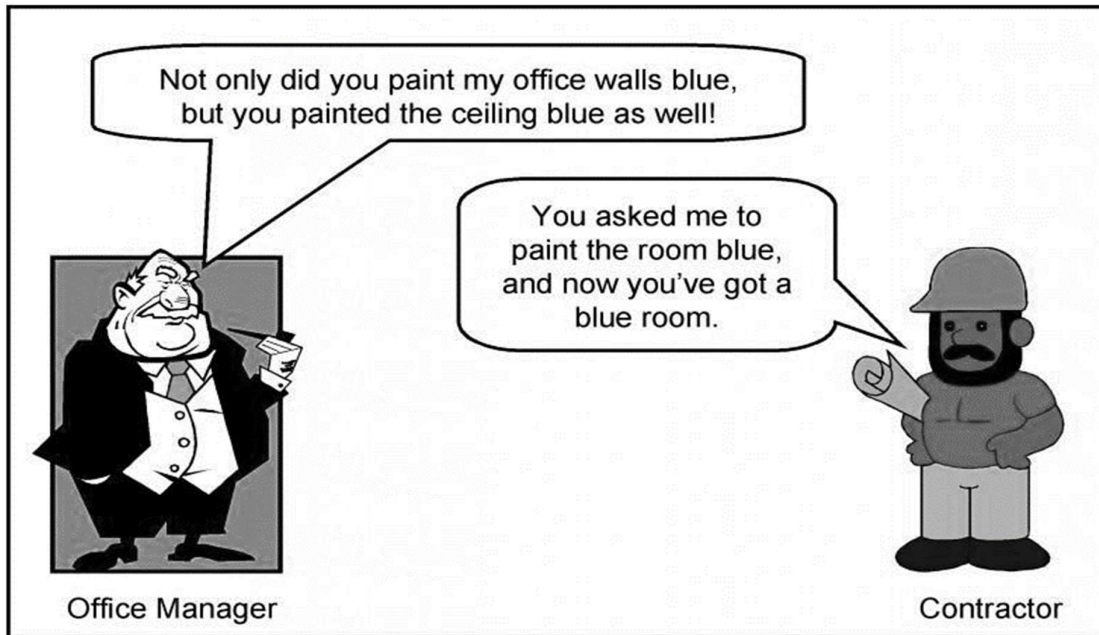
Figure 2. The consequence of not making your objective clear.

This discussion encapsulates in its whole the core of one of the most significant factors contributing to misunderstandings regarding projects, namely the significance of defining one's goals in advance. The office manager's explanation to the painter of how he wanted the room painted meant one thing to the manager, but something quite another to the painter. Because of this, the office manager was unhappy with the way the room was painted when it was finished. If he had been able to articulate his goal

more precisely, he almost certainly would have achieved the result he desired. Remember to keep in mind the following:

- Less is more
- Avoid technical jargon or acronyms
- Create SMART objects (See below)
- Make the objectives controllable
- Be sure all relevant parties agree on the project's objective

Project Charter

A project statement, also known as a project charter, a project definition, or a project statement, is a declaration that outlines the participants, goals, and scope of a project. It identifies the primary stakeholders, specifies the project objectives, offers a basic demarcation of roles and responsibilities, and defines the authority of the project manager. It not only gives the project official backing but also acts as a reference of authority for the project's trajectory in the future.

Purpose of the Project Charter

The purpose of a project charter is to:

- Provide a high-level information and addresses the WHY, WHOM, WHAT, HOW, WHEN of the project?
- Provide an understanding of the project, the reason it is being conducted, and its justification (recognizes the existence of a project).
- Provide directions on the projects, resources, leadership and management
- Establish early on in the project the general scope
- Establish the project manager and his or her authority level.
- Provide a focal point to bring to bear all the skills and experience in planning and launching a project.
- A note of who will review and approve the project charter must be included.

A Project Charter as an important Tool for Project Managers

The project charter is a critical tool for all project managers because

- It launches the project and team!

- It facilitates the knowledge distillation process – what is most important about the project?
- It is used as a communication tool by project managers to communicate with the team, sponsors and stakeholders.

The project initiation phase addresses the following questions:

- Why are we doing this project? (Purpose).
- What organization level goals and objectives does this project support? (Alignment).
- How does the project fit with other projects that are going on?
- What is the expected benefit from the project (Value)?
- What are we going to do? (Scope)?
- How are we going to do it? (Strategy)?
- Who is affected by this and who must be involved? (Stakeholders)?
- How do we obtain approval? (Project Charter)?
- How will we know when we are done and successful? (Success Criteria)?

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