Written Communication and Documentation of Projects

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Written Communication of Projects

- You as a project manager spend a large portion of your time communicating to ensure the success of your project. You require the cooperation of others to make the decisions and complete the tasks. You must communicate so others clearly understand their role in the project and complete their areas of responsibility in a timely fashion. Your objective is to get action from others.

- The PMBOK® Guide discusses many areas, which require communication. This paper deals with the day-to-day, often informal, communications so crucial in project management. We communicate to inform or solicit input as part of the decision-making process. We communicate to build a consensus among the project team or to resolve conflict. In the end, we communicate to assign tasks and responsibilities.

- No matter what the reasons are for communication, it should be for a purpose. We expect our communication to result in effecting the way our project progresses. Most of the time, this requires action on the recipient's part. Bottom line, we are tying to sell the recipients to perform a desired action.

Written Communication of Projects

- Reporting is an essential part of a design project.
- We have not completed our project if we have not communicated our work and findings to our client and to others take holders the client may designate.
- We communicate final design results in several ways:
  - Oral presentation
  - Progress report
  - Final report
  - Prototype
  - Model

- The primary purpose of such communication is to inform our client about the design, including explanations of how and why this design was chosen over competing design alternatives.
- It is most important that we convey the results of the design process.
- The client is probably not interested in the history of the project or in the design team's internal workings, and so we should ensure that final reports and presentations are not narratives or chronologies of our work.
- Rather, our presentations and reports should be lucid descriptions of design outcomes, as well as the processes with which those outcomes were achieved.

Main principles of technical writing

- Know your purpose
- Know your audience
- Choose and organize the content according to your purpose and your audience
- Write precisely and clearly
- Design your pages well
- Think visually
- Write ethically!

Know your purpose

- Just as we want to understand what the designed object must be, we need to understand **the goals of a report or presentation**.
- The design documentation informs the client about the features of the designed product.
- The design team may be trying to persuade a client that a design is the best alternative.
- In still other cases a designer may wish to report how a design operates to users, whether beginners or highly experienced ones.

Know your audience

- When documenting a design, it is essential that a design team structure its materials to its targeted audience.
- The team should ask questions like, "*What is the technical level of the target audience*?" and "*What is their interest in the design being presented*?"
- Sometimes you may need to prepare multiple documents and briefings on the same project for different audiences.
- For example, *a technical briefing* and *a management briefing* can be prepared sepaately.

Choose and organize the content according to your purpose and your audience

- Selecting and organizing the content are so important to ensure that the content will reach its intended target and audience.
- There are many different ways to organize information, including going from general concepts to specific details, or going from specific details to general concepts.
- Once an organizational pattern is chosen, the design team should translate it into a written outline.
- This allows the team to develop a unified, coherent document or presentation while avoiding needless repetition.

Write precisely and clearly

- Be sure effective use of short paragraphs that have a single common thesis or topic.
- Be sure using short and direct sentences that contain a subject and a verb.
- Bu sure using active voice and action verbs that allow the reader to understand directly what is being said or done.
- Opinions or view points should be clearly identified.

Design your pages well

- Use numbered headings and subheadings, often identified by different font type and font size.
- A long section can be divided into several subsections that helps readers to follow the pages more easly.
- Tables should be treated as a single table and should not be split over a page break.

Think visually

- Designs often start as sketches, analyses often begin with free-body or circuit diagrams, and plans for realizing a design involve graphics such as objectives trees and work break down structures.
- Just as designers often find that visual approaches are helpful to them, audiences are helped by judicious use of visual representation of information.
- These can range from the design tools discussed throughout this book, to detailed drawings or assembly drawings, to flow charts and cartoons. Even tables present an opportunity for a team to concentrate attention on critical facts or data. Given the enormous capabilities ofword processing and presentation graphics software, there is no excuse for a team not to use visual aids in its reports and presentations. On the other hand, a team should not allow their graphics' capabilities to seduce them into clouding their slides with artistic backgrounds that make the words illegible. The key to success here, as it is with words, is to know your purpose and your audience, and to use your medium appropriately

Write ethically!

- Designers often invest themselves in the design choices they make, in time, effort, and even values. It is, therefore, not surprising that there are temptations to present designs or other technical results in ways that not only show what is favorable, but that also suppress unfavorable data or issues. Ethical designers resist this temptation and present facts fully and accurately. This means that all results or test outcomes, even those that are not favorable, are presented and discussed. Ethical presentations also describe honestly and directly any limitations of a design. Further, it is also important to give full credit to others, such as authors or previous researchers, where it is due. (Remember that this discussion of the seven principles began with an acknowledgment to their originator, Thomas Pearsall, and that each chapter of the book ends with references and citations.)

The project proposal/report

- The project proposal is written to give the details and steps of a project. This proposal is usually evaluated by an evaluator, such as supervisor, manager, client, and etc...
- The progress report is written to inform the evaluator about the progress of the project, to check it also whether it is going according to the plan.
- The final report is written when the project ends and the product or design is ready to present. The final report includes all necessary details about the project including detailed information on finished product, design, or process, also it include test results showing the objectives are fully met, and etc...

The parts of a project proposal

- Abstract
- Novelty (Original Value)
- Aim and Objectives
- Method and Research Techniques
- Project Management
- Risk Management
- Research Opportunities
- Project Budget
- References

Abstract

- An abstract is expected to cover information about the (a) original value, (b) method, (c) management, and (d) widespread impact of the research proposal.
- Each abstract should be limited to 200-450 words or one page.
- It is recommended that this section be written last.
- It is recommended to use *present tense* or *future tense*.
- **Abstract Example:**
- In this project, the design and implementation of a three-phase ±100 kVAR energy quality regulator (EQR) which is capable of providing reactive power/neutral current compensation, load balancing as well as low order current harmonic mitigation will be designed. The proposed EQR is based on three-leg four-wire voltage source converter topology with split capacitors in the DC link. At first, the power stage and the control system of the EQR will be modelled and verified in PSCAD/EMTDC by extracting the compensation reference currents in synchronous reference frame. After that, the hardware of the EQR based on naturel air forced IGBT modules switching at 5 kHz will be developed and practically implemented. The EQR control card will be based on two Arm Cortex-M4 microprocessors© which handles all control and protection functions. Closed loop operation of the EQR will be ensured with P, PI and PR type controllers due to their simplicity and reliability in practical applications. The field tests in a 50 Hz live distribution circuit will be carried out by connecting the EQR to the low voltage side of a three-phase 34.5/0.4kV 400kVA distribution transformer. It will be verified by real-time measurements that the EQR is able to perform the aforementioned compensation functions simultaneously.

Source: Ahmet Eren, Ahmet Mete Vural, «Arm cortex M4 microprocessors based ± 100 kVAR energy quality regulator for reactive power/neutral current compensation, load balancing and harmonic mitigation,» Engineering Science and Technology, an International Journal, Volume 27, 2022, 101018, ISSN 2215-0986, https://doi.org/10.1016/j.jestch.2021.05.022.

Keywords

- Keywords are ideas and topics that define what your content is about. In another words, keywords are the words and phrases also called "*search queries*« that searchers enter into search engines or a local database.
- **Why are keywords important?** Becasue they provide valuable insight into the queries that your target audience is actually searching on search engines or a database. The insight that you can get into these actual search terms can help inform content strategy.
- Maximum number of keywords: Usually **5** or **6**
- The keywords should be separated by a comma «**,**» or semicolon «**;**»
- The format of each keyword should be unique. (For example only first letters are capitalized)
- **Keywords Example:**

Energy quality regulator, Reactive power compensation, Neutral current compensation, Load balancing, Current harmonic mitigation.

Novelty (Original Value)

- The novelty section is sometimes optional.
- The following points should be clarified in novelty section:
  - The importance of the subject
  - The original value of the project
  - The scope and limits of the subject
  - The critical evaluation of the literature with reference to the literature
  - «What kind of unique contributions will this project make to the relevant science or technology field(s) conceptually, theoretically and/or methodologically.» This question should be addressed.

Aim and Objectives

- The aim and objectives of the design project are written in a way that is clear, measurable, realistic and attainable throughout the research period.

- **Example:** The **aim of this project** is to develop a new fault-tolerant and adaptive control-based state-of-charge balancing method for grid-connected three-phase nine-module cascaded H-bridge based battery storage system.

Aim and Objectives

- **Example:** The **objectives** determined in line with the aim of the project are listed below:
- 1. Modeling the fixed coefficient SOC balancing method given in reference [5] in the simulation environment and operating it together with the independent active-reactive power control method.
- 2. To verify the ability of the proposed adaptive SOC balancing method to avoid over-modulation by running the proposed adaptive SOC balancing method together with the independent active-reactive power control method in a simulation environment and to show that it performs SOC balancing **at least 2 times faster** than its counterparts in the literature.
- 3. To show that the total harmonic distortion is reduced below the standards by programming the harmonic reduction method together with other control methods in the microcontroller environment and combining it with semiconductor trigger signals generated in the FPGA environment. .

Method and Research Techniques

- The methods and research techniques (including data collection tools and analysis methods) to be applied in the project are explained with reference to the relevant literature. It is demonstrated that the methods and techniques are suitable for achieving the goals and objectives envisaged in the project.
- The methods section should cover the design of the study, dependent and independent variables, and statistical methods. If any preliminary work or feasibility has been made in the project proposal, they are expected to be submitted. Methods must be associated with work packages.
- A good example is that, in method section, you can give the equations that you will use in your design. You can also use block diagrams and flow charts.

Project Management

- Project management section consists of a **Work-time schedule.**
  - In **work-time schedule,** the work packages are defined together with the duration of each work package and the list of project team that will work in each work package.

WP No	Name of WP	Project Team	1	2	3	4	5	6
1	Literatür Review	Student-1 Student-2	X					
2	Modeling and Simulation Studies	Student-2 Student-3		x				
3	Obtaining Components	Student-3 Student-4			x			
4	Hardware and Experimental Setup	Student-1 Student-2			x	x		
5	Tests on the designed system and possible corrections	Student-3 Student-4				x	x	
6	Writing the final report	Student-1 Student-2 Student-3 Student-4						x

Project Management

- For each work package,
  - 1. The ***objectives of each work package*** should be clearly identified.
  - **Example: The proposed control algorithm will be modelled in simulation platform and it will be shown that it has a better transient response when compared to classical PI controller.**
  - 2. The ***success criterion of each work package*** should be clearly identified.
  - **Example1: The electric crane should be remotely controlled in an open area having a radius of minimum 50 meters.**
  - **Example2: The electric crane should lift a mass of minimum 1 kg.**

Project Management

- For each work package,
  - 3. ***Work/Duties to be performed within the scope of WP*** should be clearly identified.
  - **Example:**
  - 1. Modeling of the proposed method in simulation environment.
  - 2. Testing the accuracy of the proposed method under different operating conditions.
  - 3. Comparison of the proposed method with its counterparts in the literature.

Project Management

- For each work package,
  - 4. ***Intermediate output(s)*** should be clearly identified.
  - **Examples are;**

Simulation model

Mathematical model

Measurement results

Test results

Journal/conference paper

and etc...

Risk Management

- In risk management section,
  - The risks that may adversely affect the success of the project should be foreseen and clearly addressed.
  - The measures that must be taken to ensure the successful execution of the project when these risks are encountered should be clearly addressed as **Plan B**.
  - Example;

WP No	The Risk(s)	Plan-B (Measures to be taken)
2	The unstable operation of the designed control system	The PI control parameters will be modified to ensure stable operation
4	During the experimental applications, the microcontroller may not complete the required operations within the specified sampling time.	Reducing the serial communication frequency between the microcontroller and the FPGA development board.

Research opportunities

- Research opportunities should be given in a table
- For example;

Research Opportunities Table

The component that is available in the laboratory	The purpose in the project
Digital multimeter	The voltage and current will be measured
Dijital oscilloscope	The observation of the voltage and current waveforms
Single-phase adjustable variac (0-270 V)	Single-phase adjustible voltage will be obtained for experimental studies

Project Budget

- The project budget will be given before the references
- An example is as follows:

03.2 TÜKETİME YÖNELİK MAL VE MALZEME ALIMI		
1 koli Fotokopi Kağıdı	125,00TL	
2 adet Kartuş	274,56 TL	
5 adet Siyah Kalem	41,30 TL	
5 adet Renkli Kalem	41,30 TL	
2 ader Asetat Kalemi	17,84 TL	
20 metre 2x2,5 Kordon Kablo	300,00 TL	
50 adet Kablo Yüksüğü	13,00 TL	
4 adet Delikli Plaket	36,00 TL	
50 adet Yeşil Klemens	25,00 TL	
20 adet Bobin	35,27TL	
30 adet Kapasitör	1362.37 TL	
30 adet Kapasitör	1376,00 TL	
30 adet Kapasitör	4808,70 TL	
30 adet Alüminyum Soğutucu	205,50 TL	
50 adet Direnç	4,11 TL	
30 adet IGBT	1750,86 TL	
50 adet Direnç	4,11 TL	
50 adet Diyot	1150,80 TL	
TOPLAM	11571,72 TL	

References

- The references must be added at the end of the project proposal with a unique writing format.
- The examples are as follows:

[1] C. S. Lai, Y. Jia, L. L. Lai, Z. Xu, M. D. McCulloch, and K. P. Wong, "A comprehensive review on large-scale photovoltaic system with applications of electrical energy storage," *Renew. Sustain. Energy Rev.*, vol. 78, pp. 439–451, 2017.

[2] B. Wu and M. Narimani, *High-power converters and AC drives*. 2016.

[3] G. Gutiérrez-Alcaraz, E. Galván, N. González-Cabrera, and M. S. Javadi, "Renewable energy resources short-term scheduling and dynamic network reconfiguration for sustainable energy consumption," *Renew. Sustain. Energy Rev.*, vol. 52, pp. 256–264, 2015.

[4] M. Coppola, F. Di Napoli, P. Guerriero, D. Iannuzzi, S. Daliento, and A. Del Pizzo, "An FPGA-Based Advanced Control Strategy of a Grid Tied PV CHB Inverter," *Power Electron. IEEE Trans.*, vol. 31, no. 1, pp. 806–816, 2016.

[5] O. Nematollahi, H. Hoghooghi, M. Rasti, and A. Sedaghat, "Energy demands and renewable energy resources in the Middle East," *Renew. Sustain. Energy Rev.*, vol. 54, pp. 1172–1181, 2016.

A fast check-list for technical report writing

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Version 1.0

- The abstract (around 230 words) should summarize your work with all the contributions you progressed included.
- Maximum 5 keywords, the first letter of each one capitalized, they are separated by semicolon (;)
- Table of contents should be automatically prepared by word program
- The format of each title level must be same with each other.
- All the words in the titles must begin with a capital letter except prepositions. (For example: Mathematical Model of the Motor based on dq Theory).
- Chapter names must be all capital letters (For example: LITERATURE SURVEY).
- A maximum of 3 numbering level is advised (For example: 3.2.1 Mathematical Model of the Motor).
- List of tables and list of figures should be automatically prepared by word program
- List of symbols and list of abbreviations should be complete and in alphabetical order
- At the end of thesis writing, all page numbers should be checked in Table of contents, List of tables and list of figures.

- All the paragraphs should be justified (press: CNTRL + J)
- Line spacing in the paragraphs must be 1.5
- Top, down, left and right spaces must be controlled from the thesis writing guideline of the university
- Font type must be Times New Roman (Also check from the thesis writing guideline of the university)
- Font size must be 12 for all paragraphs (Also check from the thesis writing guideline of the university)
- Font size for the titles must be 12 for all paragraphs (Also check from the thesis writing guideline of the university)
- The space between the title and the continuing paragraph must be unique (same) in overall thesis
- The space between the title and the paragraph above it must be unique (same) in overall thesis
- Use simple sentences in the paragraphs. They must be easily understood without any confusion.

- Each Chapter must include an introduction section (10-15 lines) at the beginning and a summary or conclusion section (10-15 lines) at the end of the chapter
- All the figures must be seen clearly with all the details including text on them. If page space is not enough you can rotate the figure by 90 degrees and locate in on a separate page.
- Avoid putting too small or too big figures.
- Figure caption must have a unique writing format, for example: (Figure 2.1 Main circuit topology of the MMC)
- Each figure must be cited in the related paragraph. The location of this citing must be close enough to the figure.
- Each table must be cited in the related paragraph. The location of this citing must be close enough to the table.
- Table caption must have a unique writing format, for example: (Table 2.1 Comparison of different SMs)
- Avoid adding too much space between paragraphs
- Avoid adding too much space between the words in a sentence. For example; There are many topologies in this type of the converter)

- There must be one-row space before and after the figure
- There must be one-row space before and after the table
- There must be one-row space before and after the equation
- All the figures must be centered in the page.
- All the tables must be centered in the page.
- All equations must be written with equation editor.
- The format of the equation must be unique (same) in overall of the thesis.
- The left side of the equation must be oriented with the paragraph above it.
- The equation number must be added at the rightest position of the page. (Please do not do this manually, instead use word tab properties)
- All the parameters, variables and symbols in the paragraphs must be written with equation editor
- The first references must begin with number [1] and then continue. The following example is WRONG:
- “Recently, MMCs have been widely preferred in different fields such as HVDC networks [77]–[79], static synchronous compensator (STATCOM) [80], motor drives [81], battery energy storage systems (BESSs) [85], [83]…”. The problem here is that before giving references 82,83,84, the reference [85] is given
- The equation number must be added at the rightest position of the page. (Please do not do this manually, instead use word tab properties)
- The format of the references must be unique (same). (Please check the format from the thesis writing guideline of the university)

Thank you for listening, any questions ?