Writing your report

These pages aim to take you through the process of preparing and writing your report for the ET project this semester. Much of the information here is based on work in previous years and/or taken from 'A Guide to Technical Report Writing' from the Institution of Engineering and Technology, cf. www.theiet.org , as are most of these introductory remarks.

A good report is clear in its aim; to give concise and accurate information. Reading a well written report is pleasurable, with a fluent style, headings showing the structure and diagrams and graphs which present detailed information clearly.

There are no absolute rules about how to write and produce your report, but an overriding principle is to focus on who will read the report. Here it is good to think further than just the lecturers responsible for this project course and to imagine publicising your ‚product' to a potential company.

With this in mind, here are 10 guidelines from 'A Guide to Technical Report Writing', as mentioned above:

1. The reader is the most important person.
2. Keep the report as short as possible.
3. Organise for the convenience of the report user.
4. All references should be correct in all details.
5. The writing should be accurate, concise and unobtrusive.
6. The right diagram with the right labels should be in the right place for the reader.
7. Summaries give the whole picture, in miniature.
8. Reports should be checked for technical errors, typing errors and inconsistency.
9. The report should look as good as it is.
10. The reader is the most important person.

The first rule is repeated because it is the one which should never be broken. If readers find reading the report a burden, this will be counterproductive, at least in the world of business.

This information is ordered in 3 sections:

- Preparation for the report
- Format of the report
- English: style and mistakes to avoid

Preparation

Taking notes from each lab session an gathering information about the whole project and the tasks you have to fulfil will be an important step in knowing what you want to put into your report

Log Book

A log book can help you to keep track of the step-by-step proceedings, progress and possible problems in your project work. You may wish to use the following format and it can be a good move to dedicate 15 minutes every lab session to making notes:

Reporting	**Problems / Comment**
Task (one entry in the beginning)	
Method (one entry in the beginning)	
Step-by-step proceedings (notes of every lab session)	

This can help you focus on the important parts which you must include in your final report:

AIM	(What do we want to achieve or solve?)
METHODS	(How did we go about solving the problem?)
RESULTS/Conclusion	(What goals were reached, answers obtained? Were major problems encountered?

Working as a team

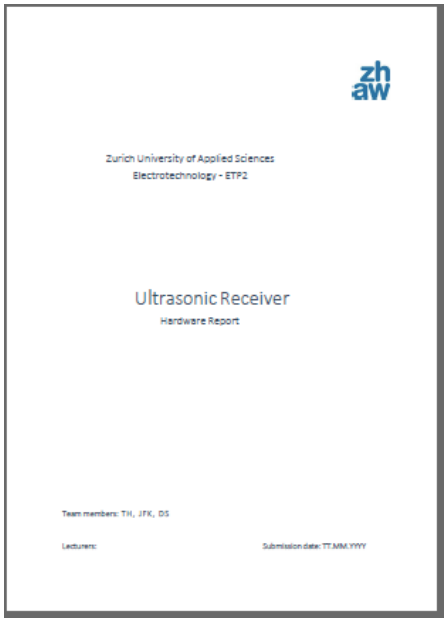
This possibly goes without saying, but it is advisable to set out from the beginning who is responsible for which part of the work, supplying plans or graphics, writing a part/whole of the report etc. This is especially true when it comes to having all the necessary information at hand when you want to start writing your report.

Format of the report

As mentioned, here are no absolute rules about the exact format of a report, but it should be easy to read, and therefore, concise, though it needs to contain all (but only) the necessary information for the reader. You have received an outline of the necessary content of your report in the document ***ConceptReport.docx*** and therefore some things listed in the following pages may not always be relevant in this particular case, but they will show you how these elements of your report fit into a general and academic framework of reports.

Title page

➔ Title / authors / date written / department / course of studies(module)



A simple and clear title page is best. It is not necessary (and often unwanted) to 'enhance' the title page with photographs.

Abstract

This should be a very concise overview of the whole project in approximately 250 – 300 words. Abstracts usually follow this strict pattern:

➔ Background/aim – methods – results – conclusions/outlook

Here, according to the ***ConceptReport.docx***, you will mention very briefly the 3 – 4 main concepts and features and possibly how you achieved this or why you chose a particular approach. The abstract structure mirrors approximately the structure of the report.

Your abstract should also include **keywords** contained in the body of the text. These facilitate electronic search machines. The list of keywords follows the abstract text.

Example keywords: LED drivers / hardware design / HSL hue saturation lightness / etc.

Table of Contents

The table of contents lists all the section headings and sub-headings, showing the structure often in the form below. Again your sections will be mainly descriptions of how you designed the various elements and features.

As with any technical report, your readers may also be non-technical people who do not understand the intricacies and terminology of electrotechnology. While you do not have to oversimplify or dumb-down your technical descriptions, the avoidance of 'jargon-only' text and the provision of a **list of abbreviations** will help such readers follow your reasoning and probably also make you report more easily readable.

Body/main part of report

(Note: While this section describes conventional report structure as met in academic papers, research etc., the relevant sections listed in ***ConceptReport.docx*** have been added ***(italicised in brackets)*** to illustrate how they relate and fit in with this standard format.)

Introduction ***(Requirements and Overall Concept)***

This should attract and introduce the reader to your work. It should certainly be short and comprehensible to the non-expert and will usually contain general background/context of the task and briefly describe the task itself. In other words, where does this project/work come in the field of (ultrasonic devices for measurement), and what is the aim or purpose of the project.

Example outline:

Whereas biofuel as such represents a valuable alternative to fossile fuel the production of it involves a lot of energy. It is therefore necessary to develop a new method of…This study is part of a larger project to investigate the possibilities of… it focuses on… and reveals some interesting features of… It had to be completed within the Spring term and therefore not all the… could be taken into consideration.

The introduction either concludes with or is immediately followed by:

Aim: a precise description of the assignment

Here you state the task you were given (and given parameters/specifications) and name the aim(s) of the project; perhaps you will want to include a schedule and milestones and illustrate parts with a functionality and block diagram. The diagram, as with all graphs, must have an explanation/comment.

Methods **(*Hardware Concept, Microcontroller SW Concept, Android SW Concept, Additional Feature(s)*)**

This section sets out what design alternatives there are, and these are explained and compared them. You will probably illustrate these with graphs and/or formulas.

Each section should have as much explanation as needed to make the method/approach clear. Any diagrams or charts used may need some comment to clarify. You may also need to justify any changes made from the original design.

In some ways the methods section is the easiest to write, as it simply records what you did. Therefore, you may wish to start writing with this part.

Results

This section sets out and explains the results you obtained in your project; they are put in relation to aims and discussed. Do they solve or at least contribute to the solution of the problem? Where you need to illustrate results, use **only** key figures, formulas or graphs etc. (the complete set of graphs, diagrams, formulas etc. belongs in the appendices).

(These sections, i.e results and conclusion will probably not be necessary in your concept report, although you may wish to add as a conclusion any comments describing major problems or limitations in realising the project. This may include an insight into possible solutions which would lead to an improvement in your concept/product in future.)

Conclusion

Here you try to take a broader view and state what the results of your work mean. Why are they significant? In other words, you reflect on the outcome of your work, and here you may also suggest alternatives or improvements. These comments form your outlook for future work in this field.

Example conclusion:

While we achieved satisfactory results with only slight deviation to the forecasted(simulated) values, the use of. . . would have simplifed the procedure/led to greater accuracy and therefore we would recommend future projects to employ. … in their work. . ..

Appendix/appendices

This section contains data, lists, results in full. The idea here is that the reader may easily find and consult this information only as necessary or of interest. In the main body of your work you have included only the diagrams and figures necessary to illustrate the point at hand and you will probably have made reference to information in the appendices with a note such as: *cf. appendix 2* The appendices will document some/all of the following data:

5.1 Bill of material (List of components and material used)

5.2 PCB layout

5.3 Design tools

5.4 Details of calculations made

5.5 Simulations

5.6 Measurements

5.7 Data sheets

5.8 References/Bibliography

5.9 Lists of tables/figures/disgrams etc.

5.9 Minutes/error log

5.10 You may also consider it necessary to provide a **glossary** of technical terms and abbreviations which a lay person (someone with no/little technical background) would need to interpret the report properly.

Referencing /bibliography

There are several standard conventions of referring to works and articles which it is necessary to quote in the body of your report, the 2 major standards being Harvard and IEEE. Where you use any information from another source to support your report in any way whatsoever, you must make reference to this in the bibliography. Not to do this would theoretically amount to you claiming this to be your own ideas/results etc. and would constitute plagiarism, and thus disqualify your work from contributing to knowledge in the scientific community. As IEEE is a widely used convention by engineers, and is somewhat easier to use, this is to be recommended. See: http://libguides.murdoch.edu.au/IEEE *(retrieved 18.3.2016)*

Abbreviations:

cf.	vgl.
e.g.	z.B.
i.e.	d.h.
n.b.	notabene
fig. (figure)	Abbildung, Bild (Darstellung, Illustration)
diag. (diagram [US] diagramme [UK])	Diagram
table (unabbreviated)	Tabelle
footnote	Fussnote
app. (appendix)	Anhang

English style in report writing

You are certainly aware of the fact that the style of your report is not similar to an e-mail that you might write to a friend. Below is a summary of some of the characteristics of formal English.

INFORMAL	FORMAL
- conversational, talking or writing to family or friends - simple sentences, sometimes incomplete or grammatically incorrect or vague - not clearly organised - use of idioms and slang	- serious thought, writing (or talking) to academics - complex sentences showing considerable variety in construction, likely to be error-free - clear, well planned organisation - accurate use of academic/technical language
Words of Anglo-Saxon (Germanic) origin *get, keep, look into*	**Words of Latin / French origin** *obtain, maintain, investigate*
Phrasal Verbs *be made up of*	**Single word verbs** *comprise*
Use of contractions (short forms) *We didn't get any results.*	**No contractions (full forms)** *We did not obtain any results.*
Simple, neutral linking words *but, so, and*	**Formal connecting words** *yet, however, thus, furthermore*
Active constructions, personal address *They say that ...* *They took out the dissapator.* *We found out that ...*	**Impersonal, passive constructions** *It is said that ...* *The dissapator was removed.* *It was discovered that ...*
Frequent adverbs and adjectives for emphasis *really, very, such a, lots of, a lot*	**Fewer, more formal adverbs and adjectives for emphasis** *notably, remarkably, a considerable number*
Modal verbs, simple verbs+adjectives *This configuration shouldn't be changed.* *If you can't find the error, redo the test*	**Abstract nouns** *A change in the configuration is not recommended.* *The test can be repeated where no error is found/recorded.*

These are the most common types of errors when writing a report:

L language ➔ mainly grammatical and lexical errors

These are not always as bad as they might seem. Often the reader can understand the intended meaning as long as there are not too many.

C clarity: reference and cohesion ➔ clearly written, easy to understand intended meaning

This type of mistake is often more serious, as it is often the connection or cohesion between sentences or paragraphs which is unclear or lacking.

S style ➔ conforms to format and style of report

Although this type of mistake does not usually stop understanding, it makes the report read oddly or seem out of place.

The following pages contain some practice.

Look at these typical report style sentences. First, choose a more formal verb from the list below for the verbs *in italics*

Second, where possible change the sentence to a more formal academic type style, i.e. use a passive construction if possible.

Finally decide if any other changes, e.g. word choice, word order in sentence might produce a more formal version.

We *did* the test over a period of 3 weeks

Then one student *put together* the results in a spreadsheet

We *used* the anisys programme so that we could *figure out* the exact forces that the electric motor was *making*.

The results *show* us that we have 3 alternatives

We were not happy with the results cos of a material problem

We *tried out* flexures with all kinds of cross-sections

There are bigger forces *working on* this bit of the flexure

calculate subject to test compile

conduct exert employ indicate

Invariably, our first language ‚interferes' when we try to put our ideas into another language (here English). Often it can be a problem of word order in the sentence. **While** German is somewhat more fixed in ordering the elements of a sentence, English can be more flexible, **yet** it still has certain ‚rules' which are rarely broken. One of **these** is the **[** subject ➔ verb ➔ (object / adverb) **]** block. **Considering this**, how would you put these sentences below into English?

1. Mit Hilfe eines morphologischen Kastens und einer Bewertungsmatrix wurden die verschiedenen Lösungsvarianten untereinander verglichen und bewertet.

2. Mit dieser Methode kann objektiv die beste Lösung ermittelt werden.

3. Durch diese Simulationen wurden unsere Berechnungen bestätigt.

4. Es soll der EVAK-R entwickelt werden welcher einen verdächten Personenwagen entfernen kann.

5. Zudem wird anhand der CAD-Daten ein Druckmodell im verkleinerten Massstab erstellt.

6. Zu jeder Baugruppe haben wir den Gesamtpreis der dazugehörigen käuflichen Teile. So ist in der Hauptbaugruppe der Gesamt-preis der käuflichen Teile eines kompletten EVAK-R ersichtlich.

7. Es sind lediglich zum Entfernen der Abdeckung des Mittelteils Werkzeuge notwendig.

(p.s. What do the words **in bold** do in the introductory text?)

Here are some actual sentences used in a report similar to the one you will produce. How would you improve/correct them?

1. The built device makes extended use of surface-mount components.

2. The device is extraordinarily flexible in respect to software control. It opens the software wide possibilities to achieve the defined range and accuracy specifications and beyond.

3. Ultrasound can be emitted by piezoelectric crystals, which start oscillating on their characteristic frequency when they are stimulated with alternating voltage.

4. We discussed about many other interesting possibilities to enhance our device but unfortunately we are limited in time.

5. Moreover we're going to implement the hardware using only surface mount devices.

6. It was a pleasure to implement our own ideas and to find a proper solution to a lot of questions during the whole development. We think we managed it quite well. In the end of this hardware development we are also proud to have made something by our own which looks quite nice and complies all its functions.

Clarity/Cohesion problems

7. The task in this module was to produce a receiver board (RX-board) in a team of two persons. It should be capable of measuring the distance and. . .

8. The ultrasonic signal from the transducer has a frequency of 40 kHz. In the project, a filter which cuts off unwanted frequencies is used. . . . . a combination of low pass and high pass filter is used to limit the bandwidth to a lower and upper threshold. Reasons are to reduce high frequency electromagnetic interference……..

9. For the schmitt-trigger a stable reference voltage is used. For that a virtual ground with half of the supply voltage is produced.