

ELT-32050 EMBEDDED SYSTEMS PRODUCTION

Making a literature survey

Reference: Ranta M. Asplund H. J., 2017, ELT-23050 Embedded systems production – lecture 2 at Tampere University of Technology, lecture slides, Idegos Oy, Espoo, Finland

Making a literature survey

- Objectives
- Reliability, sources and referencing
- Answers to some questions on surveys
- Processing literature survey
- Template for the survey
- Example of the content of a literature survey
- Applying the table of contents and some tips
- Guiding sessions

Objectives of literature survey 1/2

- Gaining an understanding on the fundamentals and state-of-the art of the area
- Learning the definitions of the concepts
 - Same words have different meanings in different contexts (architecture of a building vs. software architecture)
- Access to latest approaches, methods and theories
- Discovering research topics based on the existing research

Objectives of literature survey 2/2

- Concentrate on your own field of expertise
 - Becoming an expert on a new field takes years (and is beyond the scope of this course)
- It improves the quality of the literature survey to exclude sidetracks
 - Remember to explicate what is excluded
- “Jack of all trades is master of none.” ("Hyvä kaikessa, ei mestari missään")

Reliability and validity in research

- The challenge of research is to ensure that the sources of information, experimentation settings and methodologies are reliable.
 - Knowing what are the assumptions, restrictions and open questions makes possible to evaluate the reliability and applicability of the knowledge.
 - Prerequisite for reliability and sharing information is that the researcher uses only the concepts, theories and methods of own discipline.
 - Concepts of two different theories are not interchangeable

Valid sources

- Refereed article in a journal or a conference
- Book published in a scientific series
- Articles referred to in other articles are excellent sources
- At some stage you will learn to evaluate the coherence and concept definitions
- University libraries have courses and material on searching for scientific information

Wikipedia is not a source for scientific writing

- Wikipedia has no formal and strict refereeing
 - Reviewers in wikipedia can be from a completely different field
- The disciplines get mixed up in wikipedia
 - Wikipedia articles try to cover every discipline, which causes loss of the focus
- Wikipedia is modified constantly which hinders checking the reference
 - Reader of the literature survey must be able to access the exactly same text as the author
- Even Encyclopaedia Britannica is not a source for scientific information
 - Encyclopaedias list facts, but not the reasoning or research methods behind them
- Wikipedia cannot be revised as fast as new material is created

Answers to some questions on surveys

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Concepts containing several words

- Do not separate words constituting a concept
 - For example “embedded system” is not “embedded” + “system”
 - Merriam-Webster
 - Embed
 - to enclose closely in or as if in a matrix <fossils embedded in stone> , to make something an integral part of <the prejudices embedded in our language>, to prepare (a microscopy specimen) for sectioning by infiltrating with and enclosing in a supporting substance, to surround closely <a sweet pulp embeds the plum seed>
 - System
 - a group of related parts that move or work together, a body of a person or animal thought of as an entire group of parts that work together, a group of organs that work together to perform an important function of the body
 - These are not related to embedded systems
- Always find the definitions for concepts from scientific publications

Example concept and definition - the reference is relevant

- Citation
 - "The Internet of Things (IoT) is about millions of connected, communicating and exchanging objects, scattered all over the world and generating tremendous amounts of data using their sensors every single second." (Karcouch, 2016)

List of references

Aimad Karkouch, Hajar Mousannif, Hassan Al Moatassime, and Thomas Noel. 2016. Data quality in internet of things. J. Netw. Comput. Appl. 73, C (September 2016), 57-81.
DOI: <http://dx.doi.org/10.1016/j.jnca.2016.08.002>

Generally known concepts?

- If you have to consider whether a concept is generally known or not, put the definition in your survey
 - Examples of what you do not have to define
 - Computer, mouse, program
 - Examples of what you have to define
 - Machine learning, ubiquitous computing, context awareness, embedded system
- However, you may assume level of knowledge of a third year student of technology
 - In a very focused conference or journal for professionals of a certain field, one can assume that the readers have a strong background
- Always define the central concepts
 - If an everyday word is used in a specific precise way, give a definition

Original source

- Always search the original article that presented the result
 - Chaining the references changes the information due to the different interpretations of the authors
- The original the source is, the more stable and reliable it is (e.g. Eppinger, Boothroyd, Weiser)
 - Even if technology developed rapidly the basic ideas, methods and theories usually maintain their value
 - Very fresh articles may be confusing, since they occasionally reflect the current buzzwords and hype

Keeping own ideas separate

- The literature survey must replicate the essential content of the source and avoid too much interpretation
- The author of the literature survey can select the viewpoint and choose what is essential according to that
- Own conclusions, opinions and interpretations must be separated clearly from the content in sources

Referencing

- Skillful referencing makes your literature survey much more valuable
- The more citations your survey has, the more reliable it becomes
 - Note: quantity does not compensate the lack of quality in citations
- Article references are always more valuable than own ideas
 - Almost certainly someone has already published on an idea you thought is original
- The seminar recommends using Harvard style (Author, year)
 - <http://libweb.anglia.ac.uk/referencing/harvard.htm>
- Select one style and use it consistently
- Learn the idea of the referencing style for your future theses
 - We are not going to check where you put the commas, semicolons and other minor details

Processing literature survey

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Processing literature survey 1/5

- Select sources
 - Reading the articles you were given allows you to define your precisely focused topic
 - Choose some of the given articles and search additional ones from article databases
 - Even if you stick to the given articles, visit the article databases to get a grasp of literature search
 - Focus your topic carefully
 - Also limit the number of articles to be feasible as a seminar assignment

Processing literature survey 2/5

- Read papers
 - While searching for articles, boldly drop those that do not exactly match your topic
 - Check first keywords, abstract and conclusions
 - Read the chosen relevant articles so carefully that you understand the content really well
 - Scientific papers are much more difficult and require more time than a typical textbook.
 - Reading the references of the paper usually helps with understanding the text
 - Particularly the concept definitions are important

Processing literature survey 3/5

- Write survey
 - Explain in your text the content to a reader who has never read the paper
 - It is necessary to define concepts, give reasons and explain things with many sentences.
 - Explain the relevant points in a coherent manner
 - To make a better survey, you should focus your survey to only some topics mentioned in the papers.
 - Use proper citations so that readers always knows the source of the information
 - Separate clearly your own comments and conclusions

Processing literature survey 4/5

- Start the work immediately
 - Making a literature survey is laborious and demanding task
 - Running out of time is inevitable, if you do not follow the timetable
- Proceed gradually
 - Process the sources in gradual manner to ensure getting a finished version within the time limits
 - E.g. first read 2 most relevant articles and write a survey on them
 - Then enhance by processing one article at a time

Format of the literature survey

- We will only read PDF files.
 - We may use commenting functions of PDFs
 - You may use any word processor or desktop publishing software
- We will not help with technical issues with the writing
- Select the easiest tool, or one with which you plan to use on your theses
 - Think which is the easiest tool for creating references

Example of the content of a literature survey 1/3

- Title and author
 - Name, student id and other information as usual
- Abstract
 - Short text of the essential content of your survey
 - Has to be comprehensible as an individual text
- Keywords
 - Give a list of names of essential concepts, approaches and methods that you have covered in your work
 - Do not just collect some words that just sound nice

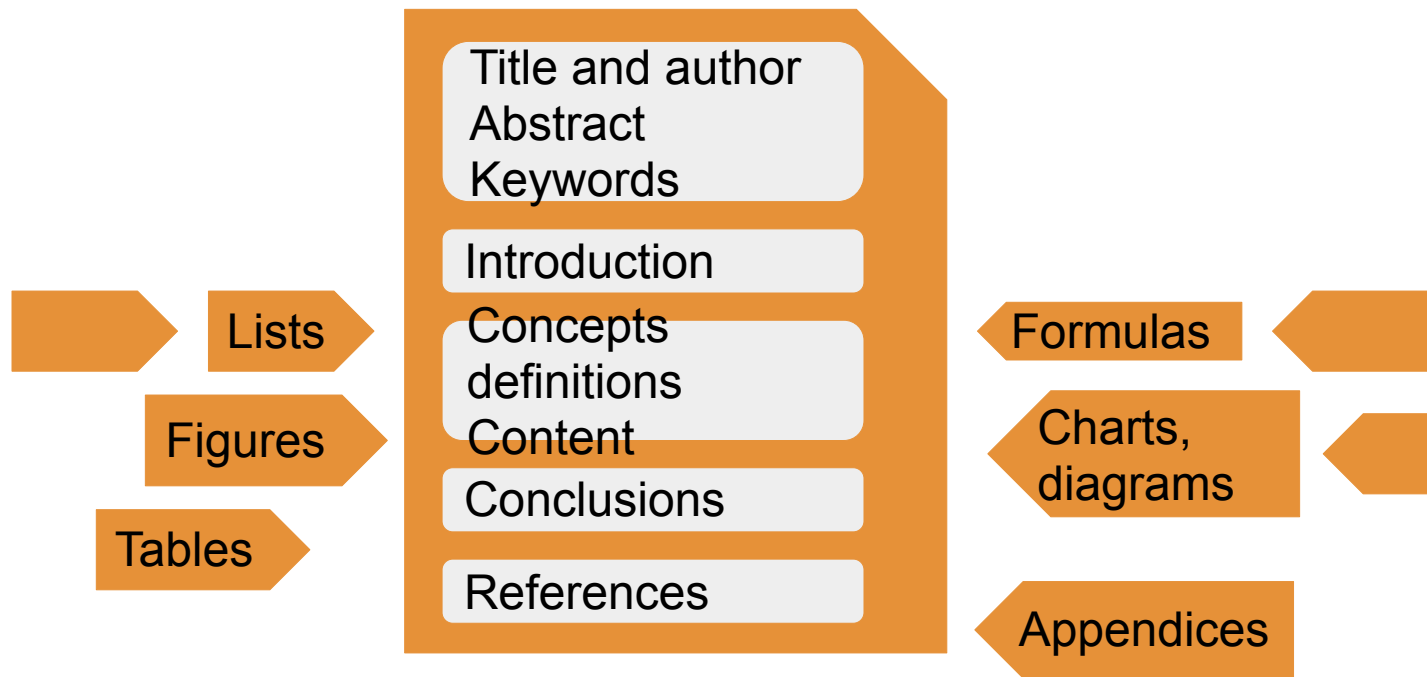
Example of the content of a literature survey 2/3

- Introduction
 - What is the topic and why it is important
 - To what larger wholeness the survey topic belongs
 - What you plan to accomplish in your literature survey
 - Remember to briefly explain the content
- Definitions of concepts (remember the references)
 - Description of the meaning of the concept
 - Possible competing definitions
 - Concepts that might cause misunderstandings and confusion
 - Possible methods and approaches
- The actual content with appropriate titles
 - E.g. description and comparison of approaches, methods and models and examples.

Example of the content of a literature survey 3/3

- Conclusions
 - Most important discoveries and conclusions
 - Proposals for further research
 - Separate your own argumentation clearly from the work of others
- References
 - A good list of references is important
 - Has to follow some known referencing practice (E.g. Harvard referencing)

Example of the content of a literature survey



Applying the table of contents

- It is not necessary to directly follow the previous example of table of contents.
- Please do apply it according to your topic!
- If you decide to deviate from these guidelines, consider what you are doing thoroughly - these guidelines are found to be a best practice.

Some tips: abstract

- The idea is to write an informative abstract.
- The abstract must show the reader very quickly whether the full report is valuable for further study.
- It must function as an individual text, and not be worthless even if it is not accompanied by the report itself.
- The abstract must be short, concise (give a lot of information in few words, brief but comprehensive), but completely self-explanatory. (Abstracted from Davis, M: Scientific papers and presentations, 1997, p. 101).
- The abstract should be from a half of a page to one page long.

Some tips: conclusions

- It is crucial that you spend much effort on the conclusions, as that contributes to the work of the next stage.
- Conclusions is the best place to present your own ideas in a literature survey.
 - Otherwise, a literature survey is meant to cover the work done by others in the research field.
- As always, avoid mixing your opinions with the opinions of the authors of the sources.

Some tips: figures

- Always remember to include also corresponding explanatory text in your literature survey when including a figure, image, picture etc.
- The caption is simply not enough, it does not tell the reader unambiguously why the element is there, what you are planning to say with it and what does it tell.
- If you include a figure (or table, diagram etc.) from a source, remember to put the reference also to the caption

Contact information

- Please do not hesitate to contact us, if you have any questions or you just want to check something
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