The purpose of this document is to support graduate students in Mechatronics Engineering bachelor's program to develop a thesis.

The purpose of a thesis is to describe that a graduate student is able to apply the basic engineering solutions acquired during the training. Therefore, it is a general rule that those engineering techniques should be applied in a thesis that were studied in specific courses related to the topic specified.

General content structure of the thesis

A thesis must be elaborated according to the following paragraphs.

Chapter 1: To select the right solution from that of acquired in the courses in the frame of the bachelor's program to the task defined in the Thesis Topic Announcement form. The solution should be presented by means of operation and block sketch. Engineering parameters required by the task should be chosen. Moreover, the appropriateness of the choice should be justified.
- What kind of real physical parameters must be measured and what physical quantities must be intervene in?
- What auxiliary power is required to operate the system? (e.g.: 12V, 2A) Is network or battery supplier is required?
- What size of memory is required? (it can be calculated from the sizes of variables)
- What computing capacity is required? It can be calculated from the calculations required. (controlling, filtering etc.)
- How many digital and analogue outputs and inputs are required? What will be the resolution of the analogue channel in relation to a real physical quantity? (e.g.: 1 °C degree/mV, 1 mm/mV, etc...)
- Has similar resolution been implemented? If there has been one what are the advantages and disadvantages of this implementation? (literature search) maximum 3-4 pages with a comparative table.
- Listing the standards and specifications if they are relevant to the specified topic, describing the test methods set out in the test standard.
- What is the expected operation of the equipment?

Draw attention to the standard literature reference. Avoid internet references.

Recommended page number: 10-15 pages

Chapter 2: The implementation of an engineering solution described in chapter 1
- Principle of a circuit implementation, circuit diagrams: analogue, digital circuits, power supply circuits.
- A circuit implementation in practice: printed circuit planning regarding the size of the box, the construction of the appropriate connectors and possible manufacture of boxes (e.g.: 3D printing) suggested by the supervisor.
- The block sketch, the process diagram, the finite-state machine diagram of the program the task was implemented.
The program code must be displayed in the supplement. Notes are required to apply so that it support easier understanding. The name of functions and variables must correlate with the operating manuals.

- Introduce a block diagram or a process about testing the program and the hardware.

Recommended page number: 10 – 15 pages.

Chapter 3: Presenting the results of measurement and controlling Describing the engineering solution implemented in chapter 2 in the way required in chapter 1 with controlling defined in topic announcement and/or the measurement of physical quantities.
- Demonstrating an implemented specific measurement sketch: a photo, a reference to the block sketch, possible differences from the required engineering resolution described in paragraph 1.
- Possible technical differences from the required engineering resolution described in chapter 1.
- Demonstrating measurement results in tables and/or graphs. Comparison of the results obtained and the results expected. Explanation of the differences.
- Examination of the operational goodness of the technical solution implemented:
e.g. – in case of controlling examining the stability of performance indicators,
- in case of measurement and data collection checking resolution, sampling time, linearity and analysing measurement failures.

Recommended page number: 20 – 25 pages.

Chapter 4: Thesis summary
The purpose of the summary is to summarize the thesis topic and the results obtained. You are suggested eliminating and referring to one or some characteristic figures.
The recommended personal pronoun of the sentences is first person singular in order to emphasize the own independent implemented work.
The summarized results are suggested to group according to the three chapters above.

Recommended page number: 5 pages.

Recommendations to the 5-page summary of the thesis (abstract):
The aim of the abstract is to demonstrate the thesis topic and the engineering resolutions briefly and right to the point.
Recommended chapters:
(1) Introduction and literature review
In the Introduction present the purpose of the thesis. In the literature review literature describe what similar resolutions were implemented compared to a technical solution. Eliminate differences and similarities between the existing solution and the one implemented by you.
(2) Describing the engineering solution
Introduce your physical, hardware and software solutions. Describe the engineering parameters.
(3) Measurement and operating results
Describe the measurements results and the evaluation method. Demonstrate how the measurement results represent and confirm the correct operation of your engineering solution.

Please avoid eliminating contents directly from literature. For example: instead of writing ’I implemented this and that in my thesis’ please write ’my task was this and that’.

Note to a thesis prepared not in the Department but on the basis of an external task:

Our Department support any thesis topic from industry. In this case an external supervisor is also required who can deal with the student on a daily basis. Moreover, an internal supervisor is required who can control the thesis requirements.
It is important that an engineering resolution may differ from that one defined in the industrial task. The aim of the difference is to fulfil the requirements regarding the thesis more precisely. As in industry a technical solution may occur that due to economic reasons or deadlines in which the student does not participate or the resolution does not reach a mechatronics engineering student's thesis level required.
It is the student's responsibility to realise a derogation request and discuss it with the internal and external supervisors in time before the submission deadline.

Use of Open-source Hardware and Software Components:

The general attitude of the department is to Arduino, Raspberry Pi and other similar technologies are very suitable in education, however, they are not industrial technologies. Applying them in a thesis requires strong professional support. Unfortunately, we have not had such theses in the past five years therefore, we do not support Arduino and Raspberry Pi platforms.

The other approach is that several enterprises support our Department with lots and lots of ten million forints (in particular, our BSc and MSc training implemented by the department. Thus, they have the right to expect that their technologies and equipment shall be applied in education especially in a thesis.

Issue of Software and Hardware Licences:

A student may use exclusively those hardware and software elements to prepare a thesis to which the Department, the Faculty or the University holds a valid license. The issue of invalid licenses is also the supervisors' responsibility hence they are the co-authors of a thesis.

A thesis of an external site requires a statement by the responsible manager of the host firm bound in the thesis. It must declare that the student applied valid licenses.

It is important:

The Deapartment may invalidate a thesis at any time if any of the requirements above are not fulfilled.