

Dear Students,

Besides the opportunity to participate in the courses offered in the regular study program, we extend our offer with the projects.

Each project is supervised by tutor responsible for its realization.

The project which will be successfully completed will give the student 15 ECTS.

The projects create the possibility to gain fuller knowledge about the subjects then during normal studying process.

In a special case it is possible to agree on a different topic according to the capabilities.

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Academic year 2019-2020

1. Project title:

Arrival and departure curves and their measurement-based estimation

Description of project:

The notions of arrival and departure curves play a crucial role in Network Calculus, which is used for description of teletraffic systems (networks). They correspond to the input and output signals in convolution integral description of time-continuous electronic circuits and systems. However, their understanding and measurement is not so simple. This is so, mostly, because of the usage of another algebras in Network Calculus (min-plus or max-plus ones) and because they cannot be identified with the input and output traffic, respectively. They are envelopes for these data streams (more precisely, in sense of cumulative ones) and should be tight. This project aims in investigating, in very detail, how to get the tight arrival and departure curves for the traffic in simple and more complicated networks and for different excitations. It is planned that the investigations will be performed both analytically and experimentally. Furthermore, it is planned in this project, for the purpose of experiments, to build up a network consisting of two or more hosts, at least two switches, and a router. On the router, different service curves will have to be implemented. Moreover, a method of measuring the arrival and departure data streams and their estimation by tight envelopes, taking into account the literature recommendations, will need to be devised.

As prerequisites, the student should be interested in traffic analysis, Network Calculus, implementation of simple networks, and programs devoted to traffic analysis like, for example, Wireshark.

Remarks:

There is possibility of continuation of this semester project as a BSc or MSc project for getting one of these degrees. 2

2. Project title:

Service curves and their measurement-based estimation

Description of project:

The notion of service curve plays a crucial role in Network Calculus, which is used for description of teletraffic systems (networks). It corresponds to the impulse response in convolution integral description of time-continuous electronic circuits and systems. However, its understanding and measurement is not so simple. This is so, mostly, because of the usage of another algebras in Network Calculus (min-plus or max-plus ones). This project aims in investigating, in very detail, basic service curves known in the literature like the so-called peak-rate or rate-latency ones for getting better understanding of their operation for different traffic forms. It is planned that the investigations will be performed both analytically and experimentally. Furthermore, it is planned in this project, for the purpose of experiments, to build up a network consisting of two or more hosts, at least two switches, and a router. On the router, different service curves will have to be implemented. Moreover, a method of measuring the service curve and/or its estimation, taking into account the literature advices, will need to be devised.

As prerequisites, the student should be interested in traffic analysis, Network Calculus, implementation of simple networks, and programs devoted to traffic analysis like, for example, Wireshark.

Continuation: There is possibility of continuation of this semester project as a BSc or MSc project for getting one of these degrees.

3. Project title:

Introduction to Deterministic and Stochastic Calculi

Description of project:

Deterministic and Stochastic Calculi, are new analytical tools for determining performance of communication networks and systems. Recently, at some universities, there appeared offers of courses on these topics. However, most of them are rather theoretically oriented. Herewith, we would like to announce that our Department of Marine Telecommunications can prepare and offer, depending upon requests received, its own course - on the fundamentals of Deterministic and Stochastic Calculi. This course would be practically oriented. 3

4. Project titles:

4.1. Development of Human-Machine Interface for the specified measurement and control tasks on the base of cRIO (NI) platform and LabVIEW environment.

4.2. Development of Human-Machine Interface for the specified measurement and control tasks on the base of cDAQ (NI) platform and LabVIEW environment.

4.3. Development of Human-Machine Interface for the specified measurement and control tasks on the base of PXI (NI) platform and LabVIEW environment.

4.4. Development of Human-Machine Interface for the specified measurement and control tasks on the base of selected Programmable Logic Controller (Horner) and LabVIEW environment.

4.5. Development of Human-Machine Interface for interactive control of the Robot (Epson) operations in LabVIEW environment.

Description of projects:

Human-machine interface (HMI) is a component of certain devices that are capable of handling human-machine interactions. The interface consists of hardware and software that allow user inputs to be translated as signals for machines that, in turn, provide the required result to the user. Touch screens and membrane switches can be considered as examples of HMIs. HMI technology is also widely used in virtual and flat displays, pattern recognition, Internet and personal computer access, data input for electronic devices, and information fusion. Since HMI technology is ubiquitous, the interfaces involved can include motion sensors, keyboards and similar peripheral devices, speech-recognition interfaces and any other interaction in which information is exchanged using sight, sound, heat and other cognitive and physical modes are considered to be part of HMIs.

HMI is also known as man-machine interface (MMI), computer-human interface or human-computer interface. HMI technology has been used in different industries like electronics, entertainment, military, medical, etc. HMIs help in integrating humans into complex technological systems.

The subject of each of the projects based on specified devices and development environments is to develop a device setup configuration and the software application designed to perform of desired functions.

The necessary equipment and manuals will be available for the student.

The person responsible for the classes will show in detail the assumptions of the project.

Requirements for student:

- knowledge of basics of measurement and automatics,
- programming skills,
- welcomed knowledge of LabView environment. 4

5. Project title:

Designing a testing methodology single-stage amplifier RC

Description of project:

The aim is to develop a methodology for the detection and location of damage to the amplifier.

1. The aim of this project is designed in the program of electronic components and systems Spice single amplifier RC which is build based on bipolar transistor which is supply using power potentiometric.
2. Show nodes and size measurement. Measurements reduce to the DC signal.
3. Define possible damage of considered network.
4. Determined measured values.
5. Optimize methods of diagnosing creating Dictionary signature-integer code.
6. Build a real amplifier circuit and causing damage of the considered circuit verified the developed method of fault location.

6. Project title:

Antennas and wave propagation - project

Description of project:

The aim of the project is to acquaint with the construction and principle of operation of selected antennas, as well as the analysis of the propagation phenomena in these antennas. The project implements the following tasks:

1. recognizing the basic features of a computer program AWAS intended for the design and analysis of the characteristics and parameters of antennas,
2. placing a construction of antenna to the simulator using Cartesian coordinate system,
3. determination of the frequency range for analysis of the considered antenna,
4. defining far field groups - the relevant sections in the spherical coordinate system,
5. examination of the real and imaginary parts of input impedance of the antenna in a wide range of frequency,
6. examination of impedance matching of the antenna to the impedance of the generator,
7. examination of polarization antenna radiation,
8. examination of the distribution of currents in the individual segments of the antennae and their graphical illustration.

Requirements for student:

Theory of electromagnetic field, physics (basics), mathematics (basics), complex numbers. 5

7. Project title:

Maintenance of electrical explosion proof equipment in ship's hazardous areas

Description of project:

Hazardous area exist on each ships. On the specialized ships and oil rigs can be common. Safe operation of an electrical equipment requires special skills which can be reached on different courses. ETO on the ship's is a special person which is responsible person not for operation but for maintenance. So the electrician has to have special competences to correctly take care about explosion proof equipment especially that many time functional property are separate to safety property. In the world are some different approaches to certification of electrical equipment which can be on board of ships. ETO should be familiar with almost all.

During the works on the project the students can achieve deeper knowledge in this area.

Requirements for student:

Student should take part in the following subjects:

Explosion Protection Engineering

Ship's Monitoring Systems and Instrumentation

8. Project title:

Intrinsically safe apparatus in ship's hazardous areas

Description of project:

Intrinsically safe apparatus are most popular explosion proof solution for automation and instrumentation. The project give possibility to meet with different solution used on board of ships. Additionally student receive unique knowledge connected with influence of intrinsically safe solution on functional property of intrinsically safe system.

Requirements for student:

Student should take part in the following subjects:

Explosion Protection Engineering

Ship's Monitoring Systems and Instrumentation