



Master Degree Project in Wireless Sensor Networks Performance in High/Medium Voltage Environments

ABB is a global leader in power and automation technologies that enable utility and industry customers to improve their performance while lowering environmental impact. ABB is present in more than 100 countries and employs about 135,000 people. ABB Corporate Research, in close collaboration with varied ABB business areas, is developing the foundations for the next generation of ABB products. In Sweden, ABB Corporate Research, located in Västerås, employs 280 scientists from over 40 countries with expertise in automation and power technologies for manufacturing, consumer and process industries as well as power utilities.

Background:

The thesis should investigate and verify functionality of wireless radio communication in a high-voltage environment typically found in transformation stations and other parts of the power distribution grid. The radio communication in a wireless sensor network is the main source of energy drain and in order to prolong the lifetime of the sensors and the network, packet loss needs to be minimized. The experimenting should lead to a deeper understanding of the origin of disturbances in radio link quality.

Problem Statement:

The scope of the master thesis will include planning of testing procedures, simulations, monitoring of the (short and long-term) test, identification of disturbance sources, verification and analyzing of results and calculations of overall system reliability. The primary objective is to use state-of-the-art commercially available sensors with limited possibilities of configuration for the verification. However, the scope could be extended to also include different types of sensors with which configuration possibilities are greater.

Requirements:

Students in MSc programs in Electrical Engineering and Engineering Physics, or similar is suited for this job. Candidates are expected to have a strong background in communication theory and signal processing. Good mathematical, programming and practical skills are desired. It is also important that the applicant have good writing and communication skills. Please indicate a list of courses with marks and a CV in your application.

Contact:

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Master Degree Project – Performance Evaluation of 900MHz Radio Technologies

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Background:

Unlicensed spectrum at 2.4 GHz and 5 GHz provides rather high data rates, but at fairly long ranges. 900 MHz radios (for US, Brazil, Australia etc) typically reaches longer distances and master NLOS environment better than the 2.4/5 GHz radios. Typically applications that need long range is metering or low-bandwidth DA (monitoring of transformers, capacitor banks, etc.).

Task:

The purpose is to investigate 900 MHz radio technology for outdoor environments. The student will do theoretical analysis and perform simulations to investigate different performance indicators such as range, data rate, latency, receiver sensitivity, etc. If time allows, performance evaluation with commercially-available 900 MHz radio technologies.

Requirements:

Students in MSc programs in Electrical Engineering, Engineering Physics, and Computer Engineering or similar is suited for this job. Candidates are expected to have a strong background in communication theory, signal processing and computer science. Good mathematical and programming skills are desired. It is also important that the applicant have good writing and communication skills. Please indicate a list of courses with marks and a CV in your application.

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Master Degree Project – Performance Evaluation of IEEE 802.11n with Beamforming

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Task:

The purpose is to investigate transmitter beamforming approaches in meshed wireless LAN for outdoor environments. The student will do theoretical analysis and perform simulations to investigate different performance indicators such as range and data rate. If time allows, implementation of beamforming algorithms will be implemented in 2.4/5 GHz radios and tested in outdoor environments.

Requirements:

Students in MSc programs in Electrical Engineering, Engineering Physics, and Computer Engineering or similar is suited for this job. Candidates are expected to have a strong background in communication theory, signal processing and computer science. Good mathematical and programming skills are desired. It is also important that the applicant have good writing and communication skills. Please indicate a list of courses with marks and a CV in your application.

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Master Degree Project –Evaluation of UWB Technologies for Industrial Wireless Applications

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Background:

Ultra wideband (UWB) is expected to be a promising alternative as physical layer of many industrial wireless applications in terms of improved throughput and reliability comparing to narrow band ones. New standards like 802.15.4a (as amendment to the commonly used 802.15.4) and 802.15.6 have been launched. Specific chips are at the early stage now.

Task:

The purpose is to investigate the state-of-the-art and best practices of low data rate UWB technologies for industrial wireless applications. The student will do literature review and in-lab performance evaluation with commercially-available chips to identify the promising applications, challenges and solutions. If time is enough, in-field evaluation will also be carried out in real industrial environments.

Requirements:

Students in MSc programs in Electrical/Electronic Engineering, Engineering Physics, and Computer Engineering or similar are suited for this job. Candidates are expected to have a strong background in hardware, RF testing and embedded C/C++ programming. Good knowledge on mathematics, wireless sensor network, and communication theory is desired. It is also important that the applicant have good writing and communication skills. Please indicate a list of courses with marks and a CV in your application.

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