

Master 2019

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A Study of Electromagnetic Interference in Industrial Environments.

ABSTRACT - Masterthesis

Wireless communications is expected to play a significant role in automation, control and monitoring of processes in factories of the future (Industry 4.0). A high reliable communication system (e.g. 4G or 5G based) is crucial for such applications. An accurate understanding of the electromagnetic interferences occurring in industrial environments is necessary to design and validate the reliability of wireless communication devices for industries.

The aim of this thesis is to understand the various types of radiated interference that occur in industrial environments. In this regard, a comprehensive survey of prior studies and relevant standards (e.g. FCC, ETSI, etc.) will be conducted. More specifically, the characteristics of various interference sources such as welding machines, switched power systems, electric motors, etc. will be explored.

Generation of various interference waveforms is a crucial component of any test and evaluation suite aimed at industrial wireless systems. Here, an adequate representation of the time-frequency characteristics of the interference is essential. To this end, various models for interference sources such as Middleton Class A (MCA), Symmetric Alpha Stable (SS), etc. will be studied and their use for generating interference realizations in the complex baseband domain will be explored.

Another objective is to conduct measurements of interferences in specific bands from various industrial equipment and processes. Using the measurement, the parameters of different interference models will be extracted and the effectiveness of various models will be compared. If required, potential modifications will be explored.