



## Modelling of Networks in Industrial Environments



### Motivation

The security of networks and embedded computers systems found in industrial environments is an essential objective. Attacks on productive networks can lead to failures and errors with negative economic effects or harm people and devastate the environment.

Networks in industrial environments have specific properties: First, the networks are "closed". This means these networks consist of computers that control the production, which communicate with embedded computers on the production machines. Second, network traffic is expected to be correlated with the current production situation. This is an important difference to e.g. office networks, where no clear communication patterns are to be expected.

The properties of industrial networks allow for the creation of a production site model from which the behaviour of the network can be derived. This is beneficial for various purposes: 1) to understand which traffic patterns are to be expected at a certain point in time, 2) to rate the importance (criticality) of a controlling service or of an embedded computer at a certain point in time.

The production site model is an important basis for further mechanisms as network intrusion detection or attack/problem mitigation.



### Task Description

Your first task is to perform a literature research on characteristics of production site networks and on network modeling. Your next step is a requirements analysis of the envisaged production site model, from which expected network communication patterns and the criticality of services/machines can be derived. Based on the requirements analysis you will design and implement a prototype of the modelling tool. Finally, the prototype will be evaluated.

### Requirements

You should have interest and basic knowledge in network security and communication protocols. The implementation will be performed in C/C++ or Java.

### Miscellaneous

Thesis can be performed in German or English. Continuation of your work as HiWi is possible.

