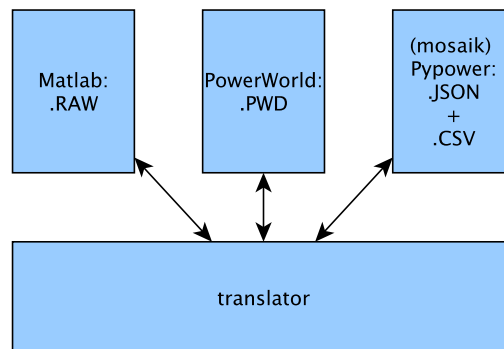# Translation Framework for Various Power Distribution File Formats for Power Flow Equation Calculation

Power Flow Equation calculation is essential for estimating the state of the power distribution grid, detecting false data, and predicting the outcome of changes in the physical power distribution system. In order to perform a power flow analysis, it is necessary to model the power distribution system. Over the years, many software solutions were proposed, using own way to describe the physical system. For example, Matlab (MATPOWER[1]) uses M files which return mpc struct or a MAT-file defining the mpc struct. PowerWolrd[2] uses a .RAW or .PWD format file. It is possible to convert between said formats with specially written functions, such as **psse2mpc** in Matlab. However, the benchmark IEEE power flow cases, such as 24-bus system case[3], which are described in those formats, are calculated for pre-defined set of input values, therefore, not allowing for changes in the system over time. For example, they are calculated for constant values of loads.

Pypower is a python plugin for MATPOWER, which can be used in Mosaik[4] co-simulation framework to analyse a dynamic power distribution system, where the values of the power loads can vary over time. However, in order to use Pypower, a different file format is needed[5]. Moreover, the information about the loads should be stored separately as a CSV file, or created as a simulation with initial parameters taken from the .PWD or .RAW file.

In this assignment, we ask you to:
- Compare models used by Matlab, PowerWorld, and (mosaik) Pypower (preferably also (mosaik) Pandapower).
- Develop a translation framework (e.g., using Eclipse tools) between various formats, and instantiate this framework with specific, earlier mentioned formats.

[1] http://www.pserc.cornell.edu/matpower/MATPOWER-manual.pdf

[2] https://www.powerworld.com

[3] http://icseg.iti.illinois.edu/ieee-24-bus-system/

[4] https://mosaik.offis.de

[5] https://bitbucket.org/mosaik/mosaik-pypower

- Initially, you can generate a Pypower file for constant values of power (static case). As a next step, we would like you to create a dynamic case where the value of used energy of the loads varies over time (corresponding to house load profiles).

The dynamic model of the power distribution will be used in a co-simulation testbed to validate whether the commands sent using the control network are safe to the power distribution grid.

This bachelor assignment will be performed at the **DACS** (Design and Analysis of Communication Systems) group. It is applicable for the following Master Programs:
- Technical Computer Science
- Internet Science & Technology
- Electrical Engineering
- Embedded Systems

For information about this assignment contact Justyna Chromik (j.j.chromik@utwente.nl)