

## Master's Thesis:

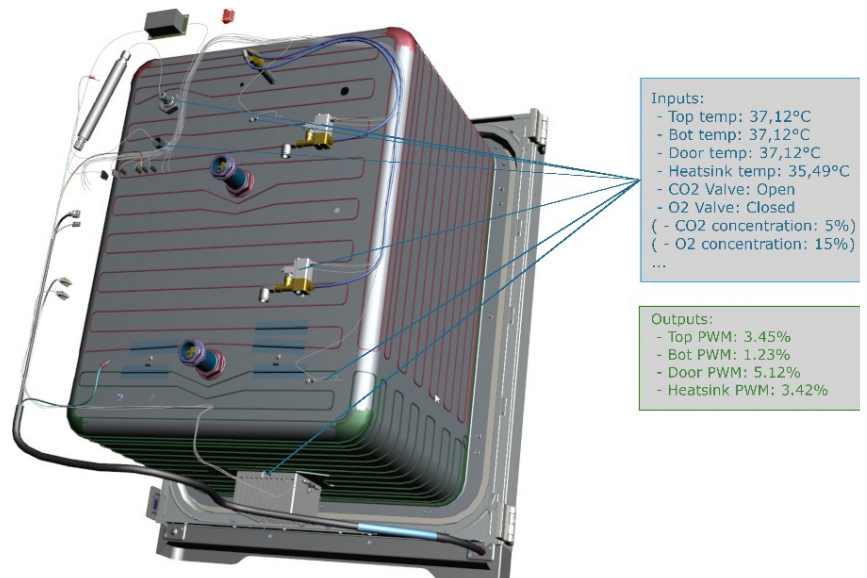
### Design and Evaluation of Smart Temperature Control System based on Neural Networks for a CO2 Incubator

#### We are

a market leading life-science device manufacturer located in Hamburg – the Eppendorf Instrumente GmbH. We produce devices and solutions for cell, liquid and sample handling. With the CellXpert we introduced our new incubator product series. Besides the four different heating circuits which are to be regulated independently, the gas control system also impacts the device's temperature. One challenge in controlling the temperature is the lack of information due to the missing air temperature sensor.

#### We offer

thesis based challenges where you will develop a smart temperature controller for our CellXpert C170, based on Neural Networks. With the combined sensor inputs you will develop a solution to enable fast temperature recoveries without any overshoot. Furthermore, you will benchmark your approach against our current implementation. Because these models should run on an embedded platform, a trade-off between low operation counts and small error rates should be found.



#### We require

you to have programming skills with Python 3 and at least some experience with machine learning frameworks like Keras or SciKit-Learn. Interest in machine learning, control and statistics.

#### We provide

- > A full functioning CellXpert C170 Incubator for your tests.
- > Remote control interface to the C170 (Python, C++, C#).
- > A high accuracy air temperature sensor kit for data generation.
- > An extendable machine learning pipeline.
- > A Log database from our own adjustment process.
- > A special machine learning server with 52 real cores, 1TB RAM and 5x Tesla V100 GPUs.
- > Experience in supervising Bachelor's and Master's Thesis.

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