

Optimisation offers a more robust solution to systems identification than traditional least squares regression techniques.

How optimisation algorithms can fail or succeed in parametric systems identification.

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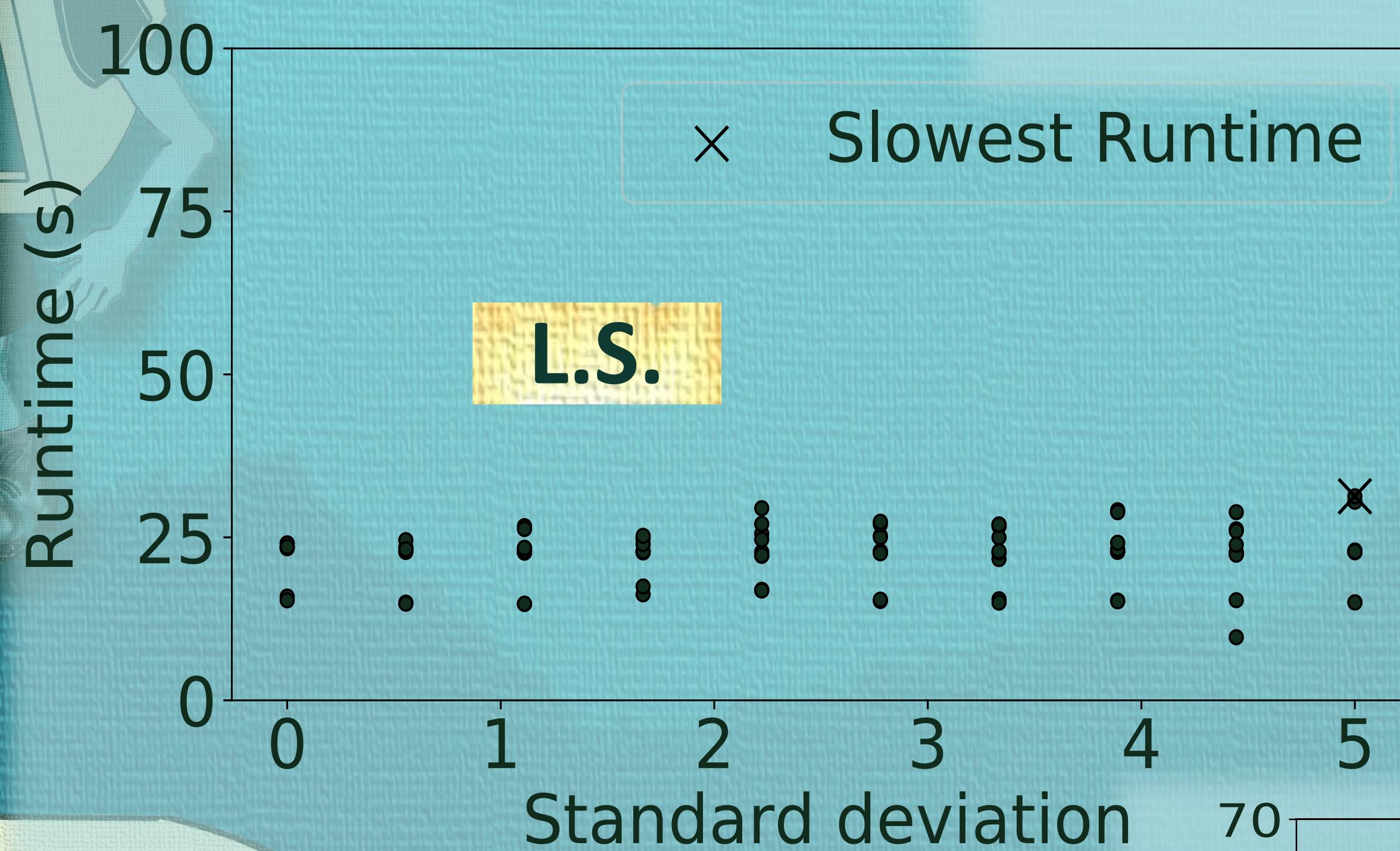
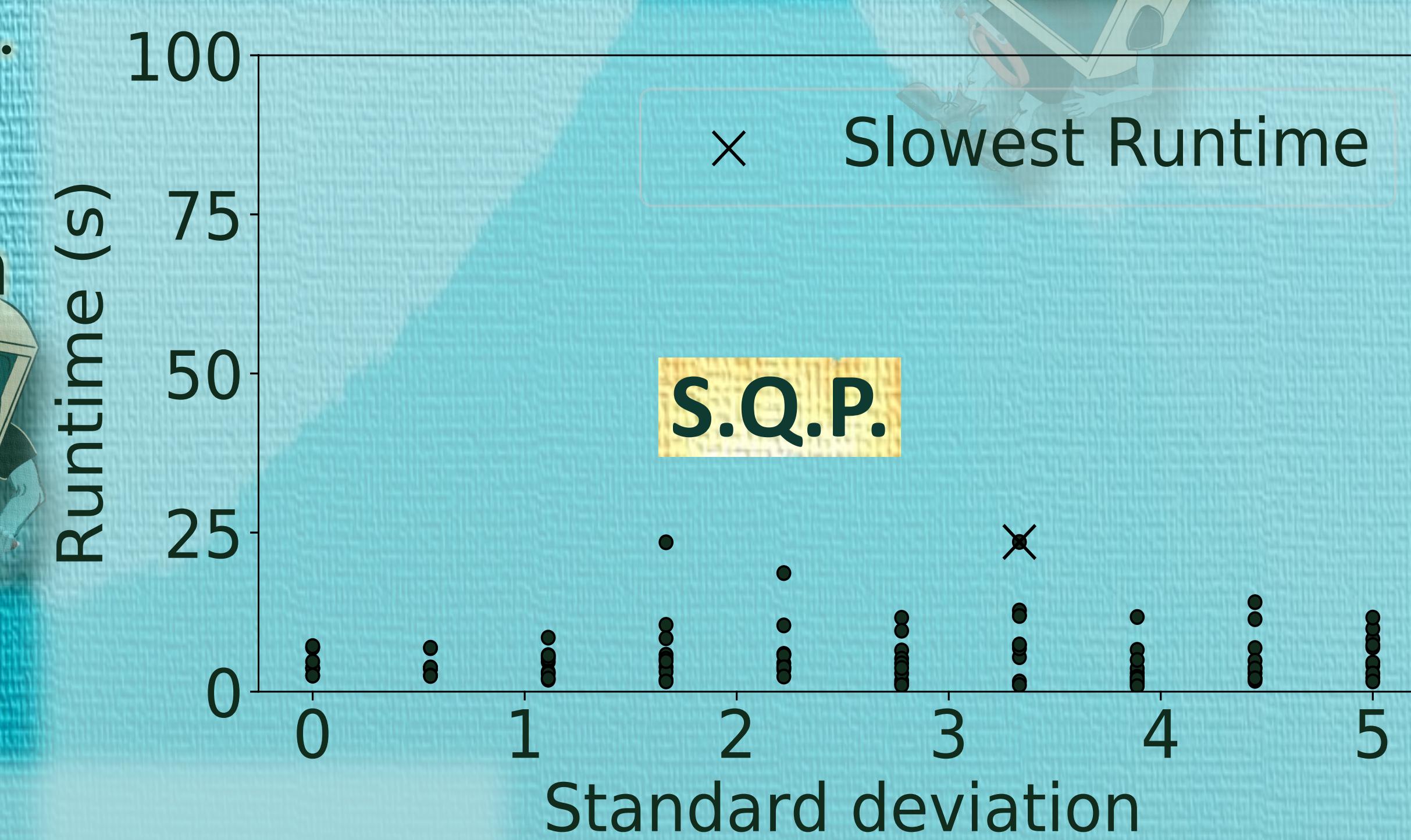
Motivation

- System identification involved the determination of parameters in a mathematical model that aimed to describe a dynamic system.
- Identification was mostly done with prediction error methods and subspace identification.
- Optimisation was then explored.
- The need arose to reflect on the capability of optimisation...
- In terms of robustness and speed.

Findings

- Results of second order ARX model are shown.
- For this model instance, minimization produced faster run-times than least squares.

Finding the maximum

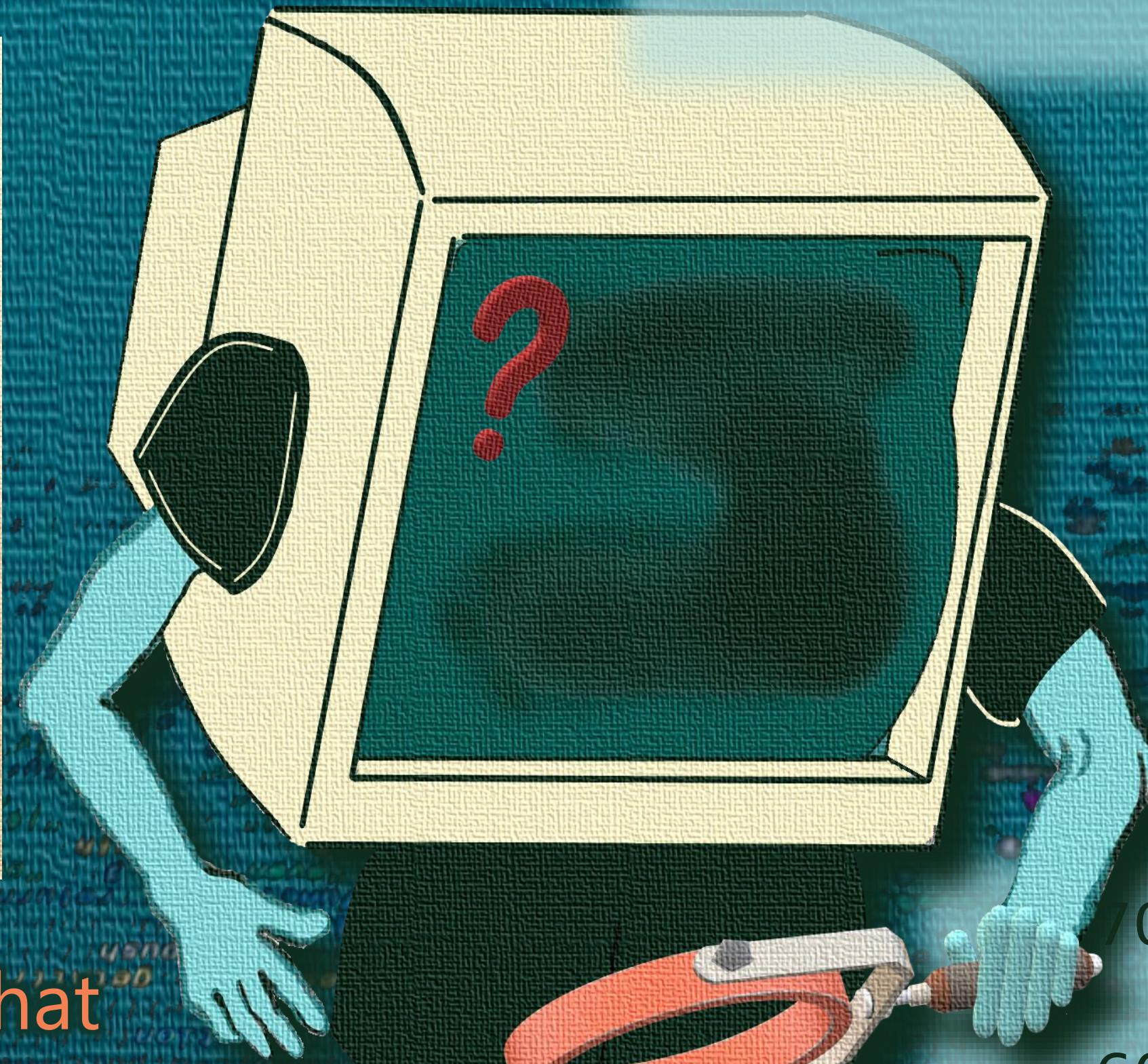
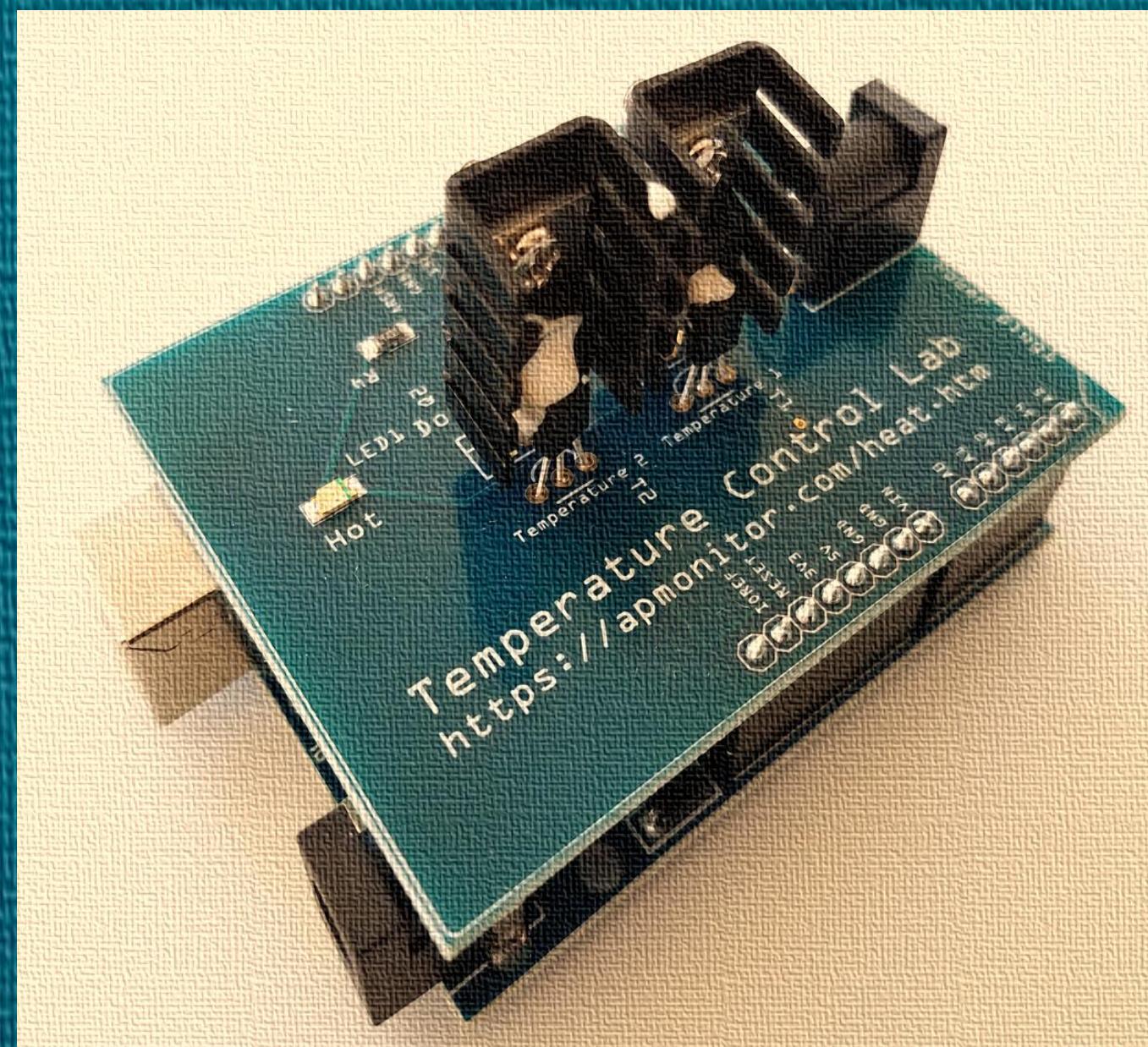


The prediction accuracy improved when a second order ARX model was used.

Methods and Python

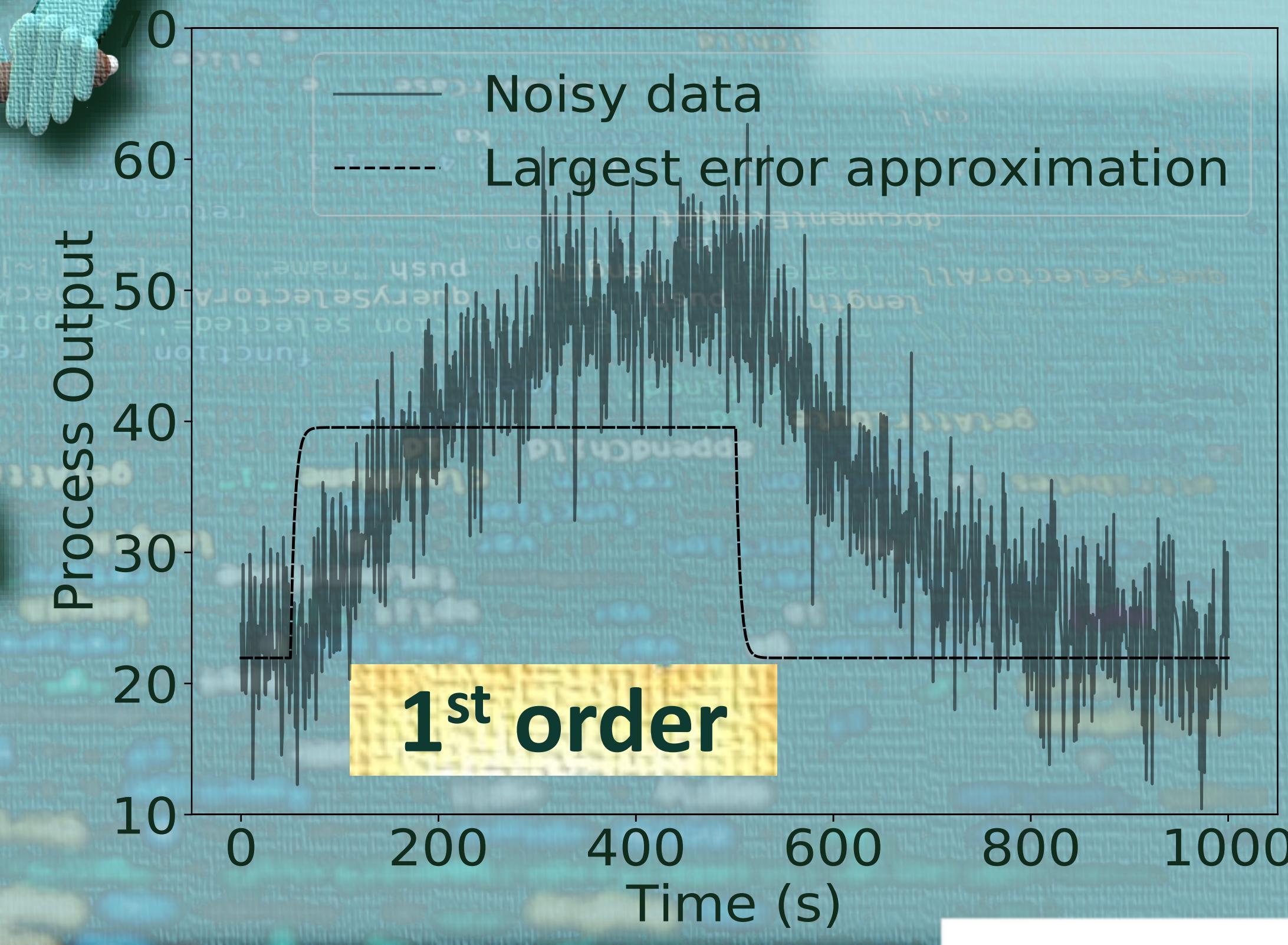
1. Dynamic system:

Temperature Control Lab

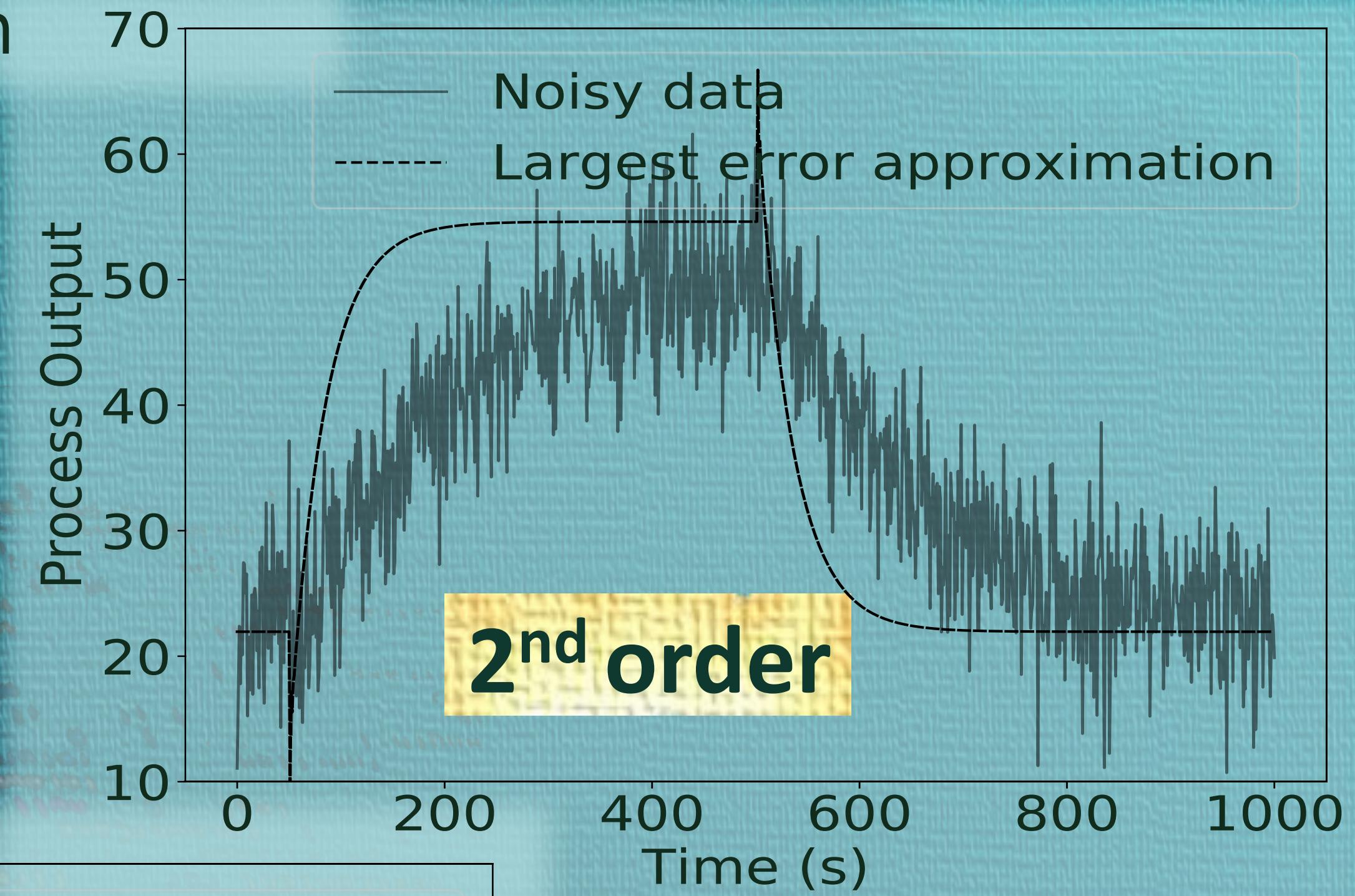


2. A program was coded that performs optimization to find the coefficients of an autoregressive with exogenous input model (**ARX**).

Differential Evolution was sensitive to the model instance.



The prediction shows slight improvement.



Department of Chemical Engineering
2019 Project Evening

Acknowledgements

Darren Roos for assisting with coding the ARX objective function.

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Inspired by life

