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Status of online model developments for BESSY II

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Digital twins have emerged as a powerful tool for monitoring and optimizing complex systems, including Synchrotron Light Sources. This paper describes the development of a digital twin for BessyII and MLS, two Synchrotron Light Sources, which allows for real-time monitoring of the machine status and easy integration of online analysis while measurements are taken. The digital twin is designed to provide accelerators with commissioning predictions and feedback capabilities, and offers greater flexibility in configuring the modelling part combined with ease of adding new features. To enable the various components developed in EPICS, Python, C, and C++ to work together seamlessly, a microservice design is adopted, with REST API services providing the interfaces between the components. End user scripts are implemented as REST API services, allowing for better data analysis and visualization. The paper also describes the integration of dash and plotly for enhanced data comparison and visualization. Overall, this workflow provides a powerful and flexible solution for managing and optimizing BESSY II digital twins, with the potential for further customization and extension to upcoming machines. The digital twin is also considered important for the design of complex systems and can serve as a natural interface for machine learning and AI approaches.

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Footnotes

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Yes

Primary author: SULAIMAN KHAIL, Waheedullah (Helmholtz-Zentrum Berlin für Materialien und Energie GmbH)

Co-authors: BENGTTSSON, Johan (Helmholtz-Zentrum Berlin); RIES, Markus (Helmholtz-Zentrum Berlin für Materialien und Energie GmbH); SCHNIZER, Pierre (Helmholtz-Zentrum Berlin für Materialien und Energie GmbH)

Presenter: SCHNIZER, Pierre (Helmholtz-Zentrum Berlin für Materialien und Energie GmbH)

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