

METICS: A Holistic Cyber Physical System Model

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Abstract: The electric power research and education communities and industry have been successfully sharing and using common IEEE Bus power system models for many years. This has enabled researchers, engineers, and educators to better communicate their findings and comparatively validate power analysis solutions using a common model set. However, today's power systems are Cyber Physical Systems (CPS), that embed digital Operational Technology subsystems and networks (OT) and are also connected to Information Technology (IT) systems and networks. A set of freely accessible models, similar to the IEEE Bus model set, which includes the OT and IT subsystems, does not currently exist. We present METICS: Models for ExTensible Cyber-physical system Security. Project METICS is our endeavor to create a set of free and holistic Cyber Physical System (CPS) models. We introduce a model for an electric power CPS, based on the IEEE 14-bus system, that also includes the cyber, control, and corporate IT subsystems. Common holistic system models such as the one presented here can enable: CPS modeling and analysis tool testing and validation, comparative, cross-disciplinary and cross-project solution evaluations, and CPS instruction. We are using this model for evaluating cyber-security solutions for Smart Grid CPS using adversarial and machine learning approaches. People who would like to use or improve upon these models are encouraged to visit the project page at github.com/METICS-CPS.



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Ananth Jillepalli is a doctoral student at the University of Idaho. He received his MScS (Cybersecurity) degree from University of Idaho in 2017 and his BTech in Computer Science and Engineering degree from Jawaharlal Nehru Technological University in 2015. He is grateful to have found brilliant mentors at the department of Computer Science, especially Dr. Daniel Conte de Leon – his advisor. His current research interests include design and analysis of critical infrastructure risk assessment methodologies using adversarial modelling. He also believes in community service and is an actively serving member of the Graduate and Professional Students Association and the International Programs Office at University of Idaho.

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