

CPS: Frontier: Collaborative Research: Data-Driven Cyberphysical Systems

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Project Details

Lead PI:	Ufuk Topcu
Co-PI(s):	Isil Dillig Scott Fish Constantine Caramanis
Performance Period:	10/01/17 - 09/30/20
Institution(s):	University of Texas at Austin
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Abstract: Data-driven cyber-physical systems are ubiquitous in many sectors including manufacturing, automotive, transportation, utilities and health care. This project develops the theory, methods and tools necessary to answer the central question "how can we, in a data-rich world, design and operate cyber-physical systems differently?" The resulting data-driven techniques will transform the design and operation process into one in which data and models - and human designers and operators - continuously and fluently interact. This integrated view promises capabilities beyond its parts. Explicitly integrating data will lead to more efficient decision-making and help reduce the gap from model-based design to system deployment. Furthermore, it will blend design- and run-time tasks, and help develop cyber-physical systems not only for their initial deployment but also for their lifetime. While proposed theory, methods and tools will cut across the spectrum of cyber-physical systems, the project focuses on their implications in the emerging application of additive manufacturing. Even though a substantial amount of engineering time is spent, additive manufacturing processes often fail to produce acceptable geometric, material or electro-mechanical properties. Currently, there is no mechanism for predicting and correcting these systematic, repetitive errors nor to adapt the design process to encompass the peculiarities of this manufacturing style. A data-driven cyber-physical systems perspective has the potential to overcome these challenges in additive manufacturing. The project's education plan focuses on the already much needed transformation of the undergraduate and graduate curricula to train engineers and computer scientists who will create the next-generation of cyber-physical with a data-driven mindset. The team will reach out to K-12 students and educators through a range of activities, and to undergraduate students from underrepresented groups through year-long

research projects. All educational material generated by the project will be shared publicly.

Related Artifacts

Presentations

- [Data-Driven Cyberphysical Systems](#) | [Download](#)
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Posters

- [Data-Driven CPS: Provably correct control in data rich:labels scarce scenarios](#) | [Download](#)
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