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Humanity Centered Robotics Initiative Talk

Brooks Hagan, RISD

Wednesday, October 16 at 2pm in CIT 477

"Weaving Objects: Spatial Design and Functionality of 3D Woven Textiles"

Abstract: 3D weaves are typically used for ultra-strong and lightweight composites such as engine fan blades and ballistic armor. These fabrics are difficult to engineer and can involve up to 40+ layers of material. The extreme depth of the fabrics means that yarns often travel on a "Z" axis as they move from one layer to another. Predicting yarn-based changes involving compression, friction, and take-up is key to the composition of a sample, yet current CAD systems do not robustly address these concerns. With RI manufacturer, TEAM, Inc, we have developed samples exploring parameters and properties of 3D woven textiles. Then, researchers at Cornell work on a UI that divides complex 3D fabrics into small and easy to understand component parts to demonstrate allowable interactions and connections between multiple layers of a textile. Offline simulation demonstrates the behavior of yarns and structures in the selected configuration, creating an end model that accurately shows behavioral dynamics and provides feedback about physical fabric behavior and allowable design decisions.

Brooks Hagan is a textile designer, artist and researcher. He works with Cornell and Stanford to investigate visualization for constructed textile design and is funded by a $1.2M grant from the NSF. In 2015, Hagan cofounded Computational Textiles Inc. with NSF SBIR support, and launched software product Weft in 2017. Hagan's research investigates historical industrial textile processes and 3D weaving for rapid prototyping. He received his BA from UNC Chapel Hill and his MFA from RISD, and has taught at RISD since 2006.

Host: James Tompkin/HCRI

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