BOOK of ABSTRACT

ICFP-2025

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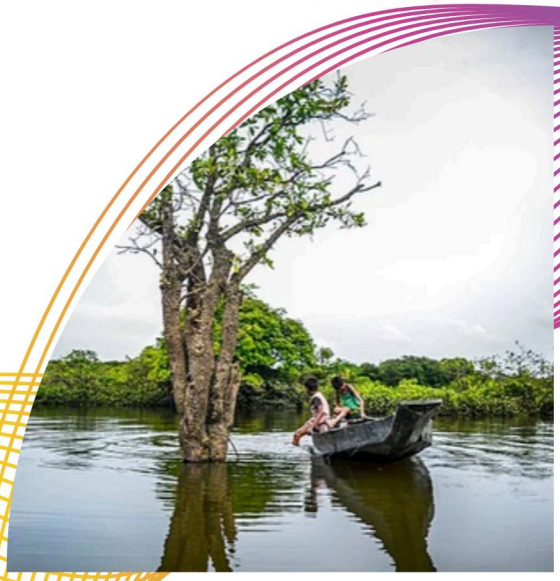

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26-27 AUGUST, 2025

ID-25-22: An Interactive, Real-Time Fabric Simulator Using a Mass-Spring Model

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Abstract: Dynamic simulation of textile behavior is particularly a challenge in computer graphics, with uses in such areas as digital fashion design, video game development, and visual effects. The paper describes a new interactive fabric simulator that operates in real-time, using a conventional mass-spring system, but it adds a solid collision detection and response system. To maintain numerical stability, the simulation uses a Verlet integration scheme and applies an iterative constraint-based method to model the various forces: structural, shear, and bending, and enables a large variety of material behaviors, such as delicate silk or hard denim. One of the important aspects of this work is that it involves collision with wind and solid objects to observe runtime interaction. The simulator provides a Graphical User Interface (GUI) that is easy to use to manipulate physical conditions in the environment, such as gravity, dynamic wind forces, and material stiffness. The users can also directly interact with the fabric in two ways: pin and drag individual points and various draping objects. It uses dynamic texture mapping, which also enables real-time display of custom-designed patterns on fabric patterns. This tool provides a lightweight, accessible platform for rapid prototyping, educational purposes, and exploring the intricate dynamics of cloth simulation.