

# ABHINIT SATI

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## EDUCATION

- PhD, Computer Science, Boston University, 2021-present
- MS, Computer Science, Clemson University, 2019-2021, GPA - 3.65/4.0
- BS, Computer Science, University of Mumbai, 2016-2019, CGPA - 8.2/10.0

## RESEARCH EXPERIENCE

### Graduate Research Assistant

*Advised by - Dr. Emily Whiting*

**Boston University**

*September 2021 to present*

- Working on applying fabric formworks to large architectural structures

### Graduate Research Assistant

*Advised by - Dr. Victor Zordan and Dr. Ioannis Karamouzas*

**Clemson University**

*May 2020 to May 2021*

- Developed algorithms to simulate/predict cloth behaviour that adheres to a user specified performance criteria
- Employed inverse design based optimization techniques to efficiently find designs that produce desired performance
- The work eventually led to my Master's thesis publication - [https://tigerprints.clemson.edu/all\\_theses/3621/](https://tigerprints.clemson.edu/all_theses/3621/)

### Research Assistant

*Advised by - Dr. Victor Zordan and Dr. Ioannis Karamouzas*

**Clemson University**

*Jan 2020 to May 2020*

- Developed stitch planning techniques to alter tensile properties of fabric
- Built path planning procedures for directional control of stitches that enable anisotropic material behaviour, taking into account the many limitations of the embroidery machine
- The project led to a *Symposium on Computational Fabrication*, 2021 paper - <https://dl.acm.org/doi/abs/10.1145/3485114.3485121>
- The project also led to the submission of a patent which is pending approval

## PERSONAL PROJECTS

### Ray-traced Rendering (<https://github.com/Abhi2114/adv-raytracer>)

- Applied Cook's distributed ray tracing techniques to achieve high quality soft shadows
- Modelled material properties of surfaces using MC path tracing and Importance Sampling
- Implemented 'Defocus Blurring/Depth of Field' by modifying the standard camera model
- Employed a BVH for speeding up intersection tests using a KD-tree, rendering the Stanford Armadillo sitting inside a Cornell Box in a matter of minutes

### Simulating Cloth (<https://github.com/Abhi2114/cloth-simulation>)

- Wrote a cloth simulator in OpenGL by modelling cloth as a spring mass system of a 2D lattice structure that deforms under the force of gravity
- Coded equations for forces that preserve distance, area and angle between particles and faces of the lattice to let the cloth respond back to deformations

### Simulating Rigid Bodies (<https://github.com/Abhi2114/Rigid-Body-Simulator>)

- Wrote a Rigid Body Simulator in OpenGL, with the RB enclosed in a cubic box where it reacts to the downward force of gravity and has the ability to spin about any axis of rotation
- Implemented collision testing (using the iterative root solve midpoint technique) and handling for when the RB crashes into the box by updating the angular and linear velocities such that the total energy of the RB remains unchanged

## AWARDS

- Graduate Scholarship at Clemson University for the final academic year (in the form a fully funded Research Assistantship)
- Runner up, Best Virtual Reality project (Course Instructor - Dr. Sabarish Babu)
  - Developed an application that makes it easier for students to visualize complex chemistry topics such as orientation of molecules and bond formations in an immersive 3D environment.

## INVITED TALKS

- Gave an invited talk at the School of Computing seminar at Clemson University - [https://calendar.clemson.edu/event/school\\_of\\_computing\\_seminar\\_with\\_abhinit\\_sati#.YXHJIRrMKU1](https://calendar.clemson.edu/event/school_of_computing_seminar_with_abhinit_sati#.YXHJIRrMKU1)

## PUBLICATIONS

- Sati, Abhinit, Ioannis Karamouzas, and Victor Zordan. "DIGISEW: Anisotropic Stitching for Variable Stretch in Textiles." Symposium on Computational Fabrication. 2021.
- Sati, Abhinit. A System for Programming Anisotropic Physical Behaviour in Cloth Fabric. Diss. Clemson University, 2021.

## TECHNICAL SKILLS

- **Programming Languages:** C/C++, Java, Python, JavaScript
- **Software Packages:** Numpy, Pandas, OpenCV, CUDA, OpenGL