Uday Kusupati

Ph.D. Candidate
Swiss Federal Institute of Technology Lausanne (EPFL), Switzerland
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Google Scholar/ GitHub

Research Interests

Shape Optimization, Generative Design, Inverse Problems, 3D Vision, Computer Graphics

Publications

1. **Normal Assisted Stereo Depth Estimation**
   Uday Kusupati, Shuo Cheng, Rui Chen, and Hao Su
   Computer Vision and Pattern Recognition (CVPR), 2020
2. **Learning 3D Human Pose from Structure and Motion**
   Rishabh Dabral, Anurag Mundadha, **Uday Kusupati**, Safeer Afaque, Abhishek Sharma, and Arjun Jain
   European Conference on Computer Vision (ECCV), 2018.

Education

Swiss Federal Institute of Technology Lausanne (EPFL) *Oct 2020 - Present*
Ph.D. in Computer Science, Advisor: Prof. Mark Pauly

The University of Texas at Austin *Aug 2018 - May 2020*
Master's in Computer Science, GPA: **4.0/4.0**

Indian Institute of Technology Bombay *Jul 2014 - May 2018*
B.Tech (Honours) in Computer Science and Engineering with Minor in Mathematics, GPA: **9.0/10.0**

Research Experience

Geometric Computing Laboratory, EPFL *May 2020 - Aug 2020*
Ph.D. Candidate - Advisor: Prof. Mark Pauly — Lausanne, CH

- Working on the inverse design and analysis of out-of-plane material transfer for free-form shape transformation through volumetric mechanisms (submission to SIGGRAPH 2022)
- Worked on a geometric abstraction for design of Kirigami inspired cut-pattern mechanisms on elastic sheets. Working on generative modeling of these structures and extension to arbitrary cut-patterns.

Media Analytics, NEC Laboratories America *May 2020 - Aug 2020*
Research Intern - Advisors: Dr. Buyu Liu, Prof. Manmohan Chandraker — San Jose, CA

- Worked on a parametric representation for holistic indoor scene understanding and reconstruction (patent filed at the USPTO)

SU Lab, University of California San Diego *May 2019 - Aug 2019*
Visiting Graduate Researcher - Advisor: Prof. Hao Su — San Diego, CA

- Developed a deep-learning framework that captures an implicit understanding of surface normal information as well as enforces depth-normal consistency for better stereo depth estimation

The University of Texas at Austin *Jan 2019 - May 2019*
Graduate Researcher - Advisor: Prof. Qixing Huang — Austin, TX

- Worked on leveraging language based supervision for 3D Human Pose estimation in noisy and ill-posed scenarios.
- Worked on an approach to topology aware single-view mesh reconstruction which can also be used for polygon-based image segmentation.

Indian Institute of Technology Bombay *Jan 2017 - May 2018*
Undergraduate Researcher - Advisor: Prof. Siddhartha Chaudhuri — Mumbai, IN

- Worked on scene parsing and reconstruction with stochastic grammars and recursive neural networks.
- Worked on the inverse design of furniture optimized to specific affordance measures

Samsung Research Korea *May 2017 - Jul 2017*
Research Intern - Advisor: Dr. Inkwon Choi — Seoul, KR

- Worked on resource-efficient object recognition algorithms for an automated robot cleaner

Indian Institute of Technology Bombay *Jul 2017 - May 2018*
Undergraduate Researcher - Advisor: Prof. Arjun Jain — Mumbai, IN

- Proposed a semi-supervised learning method using a structure-aware loss function along with a temporal network for 3D Human Pose Estimation in real-time

DATASHAPE team, Inria Sophia Antipolis *May 2017 - Jul 2017*
Research Intern - Advisor: Dr. Jean-Daniel Boissonnat — Sophia Antipolis, FR

- Worked on improving a probabilistic approach to reduce algebraic complexity of Delaunay Triangulations

Selected Awards and Honors

- EPFL EDIC Fellowship *2020 - 2021*
- **All India Rank 11** in **JEE Advanced (IIT-JEE) 2014** among 150,000 students *2014*
- **AP Grade** for exceptional performance in Engineering Graphics & Drawing, IIT Bombay *2014*
- KVPY Fellowship, Government of India *2013*

Teaching Experience

- **EPFL**
  - Geometric Computing (Fall 2021), Theory of Computation (Spring 2021)
- **UT Austin**
  - Computer Graphics (Spring 2020), Natural Language Processing (Fall 2019), Computer Graphics Honors (Spring 2019)
- **IIT Bombay**
  - Computer Programming and Utilisation (Spring 2018, Fall 2017)
  - Data Structures and Algorithms (Spring 2017)

Mentorship

- Cosme Jordan (Masters student, EPFL), Topic: Generative Inverse Design of Kirigami Sheets *Fall 2021*
- Hang Yin (Undergraduate student, CMU), Topic: Interactive Surface Parametrization *Summer 2021*
- SIGGRAPH RCDC Gradschool Application Mentor *Fall 2021*
- Department Academic Mentor, CSE, IIT Bombay *2017-18*

Selected Academic Projects

Robust Cloth Simulation Spring 2019
Physical Simulation, *Advisor: Prof. Etienne Vouga, UT Austin* [Report]

- Combined Bridson et al.'s method with a position based dynamics model of cloth for handling collisions between the cloth and rigid bodies as well as itself along with friction on the contact surfaces

Role of structured information for answering questions on data visualizations *Fall 2018*
Deep Learning Seminar, *Advisor: Prof. Philipp Kraehenbuhl, UT Austin* [Report]

- We exploit the structural information within bar graphs and use a multi head attention on top of features extracted specific to each type of information like bars, text, etc.
- We show that our approach outperforms the best performing baseline SANDY by a significant margin

Natural Language to Code using Transformers *Fall 2018*
Natural Language Processing, *Advisor: Prof. Greg Durrett, UT Austin* [Report]

- We analyze the effectiveness of Transformers for the natural language to code translation task and also experiment with techniques like back translation and cycle consistency
- We achieve a BLEU score of 16.99 beating the previously reported baseline of the CoNaLa challenge

Relevant Coursework

- **UT Austin:**
  - Physical Simulation, Numerical Optimization for Graphics & AI, Deep Learning Seminar, Natural Language Processing, Reinforcement Learning, Unconventional Computation
- **IIT Bombay:**
  - Computer Vision, Computer Graphics, Digital Geometry Processing, Digital Image Processing of Remotely Sensed Data, Advanced Machine Learning, Artificial Intelligence, Information Retrieval and Web Mining
  - Real Analysis, Complex Analysis, Basic Algebra, General Topology