Teodoro Fields Collin
Address Omitted

Email: teoc@mit.edu
Mobile: Omitted

Education

- **University of Chicago** — Chicago, IL
  BS in Applied Mathematics with Honors — *September 2014 - June 2018*

Experience

- **University of Chicago, Department of Computer Science** — Chicago, IL
  Research Assistant with Prof. John Reppy and Prof. Gordon Kindlmann — *June, 2017 - Present*
  - Design, implement, optimize, and test an extension of the Diderot Programming Language that allows for the manipulation and visualization of finite element data.
  - Develop new algorithms to accurately visualize finite element data.
  - Analyze the academic literature to further the design and development of the extension.
  - Generate and understand data to formulate and test hypothesis about the visualization of finite element data.
  - Design and implement Julia libraries with functionality similar to that of the Diderot programming language.
  - Publish based on this work.
- **University of Chicago, Department of Mathematics, REU** — Chicago, IL
  REU Participant — *Summer of 2017*
  - Worked with mathematics graduate students to understand the applications of the finite element methods to problems on curved boundaries.
  - My exposition of the results is available at math.uchicago.edu/~may/REU2017/REUPapers/Collin.pdf.
- **University of Chicago, Department of Mathematics, REU** — Chicago, IL
  REU Participant — *Summer of 2016*
  - Worked under mathematics graduate students to understand basic results in random matrix theory.
  - My exposition of the results is available at math.uchicago.edu/~may/REU2016/REUPapers/Collin.pdf.

Publications and Presentations

3.1 Publications

- **Point Movement in a DSL for Higher-Order FEM Visualization**
  IEEE VIS Scientific Visualization Conference — *Oct 25th, 2019*
  Teodoro Collin, Charisee Chiw, L. Ridgway Scott, John Reppy, and Gordon Kindlmann
  - This paper presents a family of novel visualization algorithms for finite element data by augment previous Diderot program with a technique for efficiently traversing curved meshes.
  - The paper proposes language abstractions to support easily composing the efficient traversal of curved meshes with preexisting Diderot programs.
  - Paper available: https://arxiv.org/abs/1911.05668
  - Presented the paper at the conference in Vancouver, Canada; slides available at http://people.cs.uchicago.edu/~glk/pubs/pdf/Collin-PointMovementFEM-VIS-2019-talk.pdf

3.2 Submitted Publications

- **An Adaptive Savitsky–Golay Filter for Smoothing Finite Element Computation**
  SIAM Journal on Scientific Computing — *Submitted on October 28th*
  Teodoro Collin, Gordon Kindlmann, and L. Ridgway Scott
  - This paper demonstrates a new post-processing technique for finite element data.
  - Pre-print available on arxiv: http://arxiv.org/abs/1911.00790

3.3 Presentations Given

- **Diderot: A Domain-Specific Language for Visualizing FEniCS Functions** University of Oxford, UK
  Speaker at the FEniCS Conference *March, 2018*
  Teodoro Collin, Hannah Morgan, L. Ridgway Scott, John Reppy, Gordon Kindlmann, and Charisee Chiw
  - Presented an extension of the Diderot language that handles finite element data.
  - Used the extension of Diderot to develop and present a novel visualization technique for accurate ray tracing of finite element data.
  - Received honorable mention for best student presentation.
  - Two page abstract available at http://people.cs.uchicago.edu/~glk/pubs/pdf/Collin-DiderotForFEniCS-FEniCS-2018.pdf

3.4 In-Preparation

- **On The Expression of Visualization Algorithims on Finite Element Solutions**
  IEEE Transactions on Visualization and Computer Graphics *Planned for IEEE Vis 2020*
  - This paper represent the culmination of my work on allowing Diderot to express visualization algorithims on finite element solutions. The paper analyzes the literature to find patterns in FEM visualization, details the various abstractions that have been implemented in the compiler to support the identified patterns, and then applies Diderot by re-implementing algorithims that have appeared in previous finite element visualization research. In particular, the paper will re-investigate performance and accuracy claims made by previous papers.

Teaching

- **University of Chicago, Department of Computer Science** TA
  Paris, France and Chicago, IL *Weeks of December 10th (2018) and June 10th (2019)*
  - Served as a TA for L. Ridgway Scott's short course on automated modeling in FEniCS at the University of Chicago Paris Center and at the University of Chicago Department of Computer Science
- **University of Chicago, Department of Computer Science** Mentor
  Chicago, IL *Winter of 2016*
  - Mentored first year undergraduates in the Honors Intro to Computer Science II class.
  - The class focused on students picking their own technologies to solve problems posed by other students and then documenting their solutions on a class wiki.

Languages and Technologies

- **Languages (Proficient)**: C, Python, Standard ML, Elm, Bash, Scheme, Julia
- **Languages (Prior Experience)**: Haskell, SQL, R, C++, Antlr, Lex, LLVM
- **Technologies**: Emacs, git, svn, LaTeX, gdb, valgrind

Misc

- **Ham Radio**: Acquired a Technician's license in the amature radio service (call sign: KD9LZW).
- **Triplebyte Certification**: Passed the generalist software engineering interview. The certification can be found at triplebyte.com/certificate/VsHf6S6
- **Category Theory Reading Group**: Organized and led graduate and masters students in the study of two category theory texts.
- **Visualization Reading Group**: Helped to organize a visualization reading group and presented several papers on scientific visualization to undergraduate and graduate students.